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Committee Wellington PT Spine Hearing Subcommittee
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Wellington public transport spine options - public feedback and consideration of key issues

1. Purpose

The purpose of this report is to inform the Hearing Subcommittee of the feedback received from the consultation process and to provide officer guidance in response to the key issues raised through the consultation.

2. Background

The Wellington Public Transport Spine Study (PTSS) was completed in June 2013. The study was a key action from the Ngauranga to Airport Corridor Plan and was undertaken to help determine a future high quality public transport solution for the primary public transport spine through Wellington City. The PTSS was commissioned jointly by Greater Wellington Regional Council, Wellington City Council and the NZ Transport Agency.

The overall purpose of the study and the objectives for a high quality public transport spine were:

- Enabling economic growth and productivity by improving access into, out of, and within the Wellington CBD
- Meeting future growth in public transport demand as part of the wider transport network
- Improving public transport reliability and efficiency
- Improving the safety and resilience of the transport system for all types of user including public transport users, car users, pedestrians and cyclists
- Providing public transport that is affordable for passengers and ratepayers and that is increasingly less reliant on subsidy

The PTSS investigated the feasibility of a large number of different public transport options and progressively narrowed these down to three shortlisted modal based options – Bus Priority, Bus Rapid Transit, and Light Rail Transit. After considering the study outcomes at its meeting on 19 June 2013, the Regional Transport Committee identified Bus Rapid Transit as its preferred option and agreed to consult with the community on the three shortlisted options.

2.1 Consultation Process

Consultation on the Wellington City Public Transport Spine options commenced on the 24 July and closed on 1 October 2013. Information on the key findings of the PTSS was provided to the public via the following means:

- Public release of the study findings and study reports on GWRC and partner websites
- Distribution of the summary report and consultation brochure at study partner offices and libraries
- Mailout to key stakeholders and groups
- Advertisements in the Dominion Post, Wairarapa Times Age and local Wellington City community newspaper
- Media stories
- Stakeholder engagement meetings

Feedback was obtained through submissions and a market research survey using online citizens panels managed on behalf of Wellington City Council and Greater Wellington Regional Council.

A total of 278 submissions were received, 26 of these were from organisations or groups and the remainder were from individuals. One of the submitters, Generation Zero, created a petition in support of the themes within their submission that was filled out by 514 people.

Market research was undertaken at the same time as the submissions process, to obtain a representative view on the options. This was conducted through three online panels.

- Our Capital View (715 members) and Our Capital Voice (424 members), both managed by Wellington City Council. There were 479 respondents to the survey, with a margin of error of $\pm 4.5\%$ with a 95% confidence level.
- Greater Say (1377 Members), managed by Horizons Research on behalf of Greater Wellington Regional Council. There were 669 respondents to the survey with a margin of error of $\pm 3.9\%$ with a 95% confidence level.

Members were recruited via a combination of random recruitment through a third party company and self-selected participation. The sample is weighted by age, gender and ward so it is representative of the population.

2.2 Consultation Results: Submissions

The results below summarise the feedback from the questionnaire included as part of the submission form. This was completed by a significant majority (almost 80%) of the submitters. In addition where other written responses were clear on their views on the same topic these have been included in the numbers presented below. These results provide an overview of the views of these submitters.

Question 1:

Taking into account the costs and benefits of each option, which of the proposed options to improve public transport in Wellington City do you most prefer?

Option	%
Bus Priority	9
Bus Rapid Transit	32
Light Rail Transit	49
Other	8
Don't know	2

Question 2:

Please state how much you agree with the following statement – The loss of some on-street parking in return for faster more reliable public transport is an acceptable trade-off

Strongly agree and agree = 88%

Question 3:

Please state how much you agree with the following statement – Restricting access for general vehicles to parts of Lambton Quay and Willis Street during business hours in return for faster more reliable public transport is an acceptable trade-off.

Strongly agree and agree = 84%

Question 4:

Please state how much you agree with the following statement – Using an alternative route for some peak bus services through the CBD in return for faster more reliable public transport is an acceptable trade-off

Strongly agree and agree = 75%

Question 5:

Thinking of the overall priorities for the future of Wellington's transport network what priority would you give implementing the final public transport spine option chosen for Wellington?

High and medium = 90%

Question 6:

The average household currently pays around \$300 a year in regional rates. Some of the costs of the public transport spine options are likely to be passed on to ratepayers through increased rates. For each of the options how much extra would you be prepared to pay each year in addition to your regional rates to make it happen?

Amount	Bus Priority	Bus Rapid Transit	Light Rail Transit
	%	%	%
Not willing to pay more	29.1	15.8	14.6
\$1 - \$10	18.1	11.0	4.0
\$11 - \$20	14.1	16.7	5.8
\$21 - \$40	12.8	12.3	6.6
\$41 - \$60	2.2	11.8	11.9
\$61 - \$100	4.8	10.1	15.5
More than \$100	4.8	7.5	28.3
Don't know	14.1	14.9	13.3

In addition to submitters preference for particular options and the trade-offs outlined above, the written submissions raised a number of additional issues including:

- Overall support for public transport in the city/region and a strong desire to see it improved
- Concern about current travel times and reliability of public transport services
- Concern over the terms of reference for the study and the need for the spine to be integrated with the wider transport network
- Suggestions for alternative routes (either through the CBD or extensions to the north or south)
- Desire for a better, safer cycling network
- General opposition to roading projects and RoNS
- Preference for new public transport vehicles to be electrically powered
- Further consideration of climate change, environmental issues, urban design, public health and accessibility
- Perception that the PTSS had an anti-LRT bias, particularly in relation to costs, patronage figures, and economics.

A full summary of the key themes raised by submitters is contained in **Attachment 1**.

2.3 Consultation Results: Market Research

Both online surveys found that more respondents supported Bus Rapid Transit as the preferred option, with 46% of the Wellington City panels and 30% of the Greater Wellington Regional Council panel preferring this option. However there was also strong support for the other options. LRT was generally seen as the highest quality option, but respondents perceived both the bus-based options as better value for money.

A significant proportion of respondents (85% and 88%) considered that the preferred option should be given a high or medium priority for implementation.

Panel respondents were also willing to pay more in rates to support the preferred option, with 50% (GWRC panel) and 63% (WCC panels) of respondents willing to pay something, and some respondents prepared to pay more than \$100 in additional rates each year.

In response to the trade-offs, the panel results were as follows:

Trade-Offs	Strongly Agree and Agree
The loss of some on-street parking in return for faster more reliable public transport is an acceptable trade-off	73% GWRC 72% WCC
Restricting access for general vehicles to parts of Lambton Quay and Willis Street during business hours in return for faster more reliable public transport is an acceptable trade-off.	75% GWRC 77% WCC
Using an alternative route for some peak bus services through the CBD in return for faster more reliable public transport is an acceptable trade-off	67% GWRC 79% WCC

A full summary of the market research results is contained in **Attachment 2**.

3. Comment

Extensive community feedback has been received on the shortlisted options and the overall PT Spine Study through a range of methods, including formal submissions, market research, stakeholder briefings and media comment. Together these have raised a wide variety of issues and views. The key themes have been collated and officer responses on these are provided in **Attachment 3**.

A number of overarching considerations can be identified from the feedback which provide important context for evaluating the shortlisted options. These have been captured below along with officer commentary.

3.1 What is the context within which the study sits and what scope is appropriate?

This study originates from a specific action identified in the Ngauranga to Airport Corridor Plan 2008 (N2A Plan). The N2A Plan is based on an analysis of the transport needs of the whole corridor, as part of the overall Regional

Land Transport Strategy. It identified an integrated package of projects, including improvements to the strategic road network and a high quality, reliable, safe public transport service between the Wellington railway station and the regional hospital. The N2A Plan identified a ‘staged approach’ to passenger transport improvements, including early bus priority measures, in advance of any high quality, high frequency system that might be implemented.

Over the last few years, Greater Wellington Regional Council and the Government have committed substantial funding to the upgrade of the heavy rail network, including 83 new Matangi train units. These units have a design life of 30+ years (i.e. beyond the horizon of this study). As such it is not appropriate to consider any options that would undermine or replace this investment. Significant investment in the upgrade of the Johnsonville line has also taken place since 2008 to accommodate the new Matangi trains, including upgrades to tunnels, platforms and passing lanes.

The Regional Public Transport Plan (RPTP) will address the medium-term (10 years) direction for the regional public transport network. The current plan includes undertaking the PT Spine Study. The RPTP is currently being reviewed in accordance with the requirements of the Land Transport Management Act.

The terms of reference for the PT Spine Study were set in this context.

3.2 What is the problem that the options need to address?

A high-quality, high frequency public transport network was proposed in the N2A Plan to support Wellington City Council’s Growth Spine.

The N2A Plan recognised the critical importance of this part of the public transport network, because most journeys end or commence within the short section through the Wellington CBD. The efficiency of this part of the network therefore has significant impacts on the vast majority of public transport journeys across Wellington.

The specific problem definition for the study was established at the beginning of the study through an Investment Logic Mapping exercise, in accordance with Treasury and NZTA guidelines. The problem definition was confirmed through the investigations subsequently carried out.

The problem definition is future-focussed (10-30 years’ time), and its key elements are:

- slower public transport journey times;
- unreliable public transport journey times;
- increased traffic congestion in the strategic and local road network and related environmental impacts;
- constrained economic growth and productivity in Wellington as a result of access constraints;

- diminished returns from current and planned transport investment resulting from the uncertain nature and shape of the public transport system in the longer term.

The components of this problem definition are important factors that need to be considered in determining which option is preferred.

In addition to evaluating the options to understand how they addressed the specific problem identified through the Investment Logic Mapping exercise, the evaluation of the options took account of a range of expected economic, financial, social and environmental impacts. This included consideration of future urban development and land values along the corridor, and the interdependencies between land use densities and public transport infrastructure improvements.

3.3 What capacity is needed to meet future needs?

Analysis of future transport demand shows that across the region there is expected to be a 17% growth in trips (private vehicles and PT combined), between 2011 and 2031 with slightly higher growth for private vehicles (18%) compared to PT (15%). Across the region, the highest percentage growth rates for PT trips between 2011 and 2031 (around 30%) are seen in the CBD, northern and southern suburbs of Wellington City.

The predicted trip growth takes account of forecast population and economic growth in the region, the additional attractiveness of the PT Spine options, and expected major transport projects.

All the shortlisted options provide sufficient capacity to cope with these levels of growth in the AM peak (the busiest period). Analysis of loadings in the AM peak hour show that BRT and LRT services along the Newtown branch will operate at 45% and 35% of their respective capacities, whereas along the Kilbirnie branch BRT and LRT operate at 100% and 70% of their respective capacities.

If additional capacity is required beyond this level, then higher service frequencies can be scheduled. The theoretical capacity of the proposed BRT network is estimated to be over 6,000 passengers per hour. As modelled in the PTSS it is only running at a capacity of 3200 passengers per hour between the Basin and Railway Station and 1600 passengers per hour between the Basin to Kilbirnie and between the Basin to Newtown.

The current service frequency for BRT on the Kilbirnie branch is 16 vehicles per hour. It would be practical to increase this to between 20 and 30 vehicles per hour without compromising travel times. Further refinement of the network design may also mean that it makes sense to retain additional local bus services using alternative routes, which will reduce projected capacity on the core BRT routes.

In short, if patronage were over time to exceed current forecasts then both the BRT and LRT options have plenty of potential to add additional vehicles to boost capacity.

There would however be limited scope within the Bus Priority option to add capacity to cope with greater than forecast growth, with the major constraint on growth being the number of additional buses that can be accommodated through Kilbirnie, Newtown and the bus tunnel given that the current number of buses already causes congestion in these locations.

Along the Golden Mile congestion is part of the problem that has already been identified. The BRT and LRT options propose to deal with this by providing more effective utilisation of services, increasing the capacity of vehicles, restricting other vehicles from using parts of the Golden Mile during business hours, and through utilising a secondary route through the CBD for some buses. This results in an overall increase in capacity through the CBD. However if patronage were over time to exceed forecasts, additional BRT / LRT vehicles could also be accommodated along through the CBD, including through increased use of a secondary route.

3.4 How can reliability be improved?

Journey time reliability is one of the key elements of the problem to be addressed – it continually ranks high when passengers are asked about what dissuades them from using public transport. It is influenced by a number of factors including:

- Other vehicles using the same corridor
- Traffic signals and intersections
- Multiple PT vehicles at stops and a lack of passing space
- Number of access points for other vehicles onto the corridor
- Loading and unloading times
- The number of stops/stations
- Accidents and breakdowns

International studies point to the primary importance of a dedicated corridor to improve reliability (and travel times). To maximise efficiency, public transport vehicle pre-emption at signalised intersections is also important, along with a rationalised number of stops, and off-vehicle ticketing. Along some high frequency routes passing lanes may also be warranted. The importance of many of these factors was previously outlined in the Wellington Central City Bus Operational Review (Opus 2009).

Both the BRT and LRT options share a similar dedicated corridor. It has also been assumed that improvements will be made to signalised intersections along these corridors to provide full priority at the busiest intersections and that the number of public transport stops between Newtown / Kilbirnie and Courtenay Place and along the Golden Mile will be rationalised to improve travel times and travel time reliability.

An additional factor that was analysed concerns the longer-term reliability of the network following a disaster or other significant event. As was shown in the recent earthquakes in Wellington; rail based system including LRT, need to shutdown following an event for the track to be checked. In a significant event the rails and other infrastructure may be damaged and the network will be inoperative for a period. Bus based systems on the other hand are more flexible and are likely to be available for use almost immediately following an event as they can be re-routed onto alternative streets.

3.5 Is the choice of vehicle type critical?

The choice between bus and light rail vehicles has attracted many comments from submitters.

Both BRT and LRT can deliver a high quality, high frequency and reliable public transport system, and as such can effectively address the core problem, as identified in this study. What then are the differences between these options?

Proponents of LRT argue that it allows integration with the wider heavy rail system in Wellington, as it can run on the same tracks and can provide a seamless service between the destinations to the north and the CBD/south-east of Wellington. Whilst possible in theory, in practice there would be significant issues to resolve. Investigation of the potential to convert the Johnsonville line to LRT showed that there were high costs and limited benefits. The examination of a wider LRT system is also not within the scope of this study.

The LRT option evaluated in this Study is a relatively short distance of 4.5 to 6 kilometres from the railway station along the central city spine to either Newtown or Kilbirnie. Passengers travelling to and from further destinations would be required to interchange. BRT on the other hand does have the identified potential to run beyond the dedicated routes and provide a seamless service to a range of other destinations within Wellington City. The BRT vehicles would simply exit the busway lanes and continue their journey along the wider road network.

Both BRT and LRT have the potential to result in value uplift to properties along the corridor. Overseas studies have demonstrated that an uplift of up to 20-25% can be achieved in certain circumstances. A higher value uplift is more likely with systems that have more fixed infrastructure, and seems to be generally higher for LRT. However the Alternative Funding Study identified that there was no legislative mandate for a general value capture charge, and that development contributions would only be able to recover a small amount of funding. As such the value capture potential of the respective options appears to be of limited importance.

The Study results show that the estimated BRT and LRT travel times between Kilbirnie / Newtown and Wellington Station are practically identical. This is not a difference between the options.

There are however significant differences related to the rate of project funding, and impact on the amenity and activity of the city during construction. The

LRT network would most likely need to be built as a single project from end to end before it is possible to begin any form of operation that generates real benefits. There would create significant disruption to traffic and affect amenity during the construction process. On the other hand, building the BRT network is a much less intrusive process that can be staged with vehicles taking advantage of parts of the network as they are completed, thus returning progressive and cumulative benefits from the early stages.

The Study notes that modern electric BRT vehicles are readily available as are a range of other environmentally friendly technologies. As such the quality and comfort of the vehicles is also not a significant distinguishing factor between the options.

A further issue raised by submitters is that a LRT system would attract additional patronage and result in mode shift, due to its greater attractiveness. There are overseas studies that indicate substantial additional public transport patronage as a result of the construction of an LRT system. However there is also evidence of a number of schemes where patronage has turned out to be substantially lower than predicted. Three LRT schemes in the UK examined by the National Audit Office showed shortfalls in expected patronage of between 12-40% after 5+ years of operation. There is also strong evidence that a high quality BRT system can also achieve significant mode shift and high patronage numbers, as demonstrated in Brisbane, Australia. One key difference identified in the PTSS is that the BRT option is shown to achieve greater patronage than the LRT option. This is primarily due to the impact of forced transfers being a disincentive for potential LRT users, and the higher service frequencies made possible by smaller vehicles.

3.6 Where do people want to travel?

The Wellington CBD is a key destination for travel within the region, particularly in the AM peak, with over 64,000 trips (car and PT combined) terminating in the CBD in the AM peak in 2011. This represents 28% of all trips made in the region, and 46% of all trips originating in Wellington City, during the AM peak period. When analysed in isolation, around 75% of PT trips in the AM peak terminate in the Wellington CBD.

Trips that pass through the CBD, heading to other destinations, form only a very small proportion of total trips: for cars and public transport combined - less than 3% in the AM peak and 4% in the inter-peak – reinforcing the view that the transport network is very Wellington CBD centric.

The majority of these through trips are currently made by car. Improving cross-city public transport links should encourage more of these trips to be on the public transport network. However, any change will be relatively small compared to the vast majority of trips travelling to and from the CBD.

The PT Spine options are designed to respond to the forecast trip patterns and growth levels. They focus on:

- providing enhanced access into, out of and within the CBD

- enhanced PT services to the south and east of Wellington which currently do not have access to a rapid transit system and which currently have the highest gap between PT travel times and car travel times and therefore considerable potential for mode shift.

3.7 What route alignments are appropriate?

All the PTSS options involve use of the Golden Mile route through the CBD. A range of alternatives were assessed at the medium list evaluation through a multi-criteria analysis, including use of the Quays route, Featherston Street, Wakefield and Victoria Streets. The Golden Mile emerged as the preferred route because it:

- provides convenient access to major destinations
- maximises the potential catchment within easy walking distance, including major office buildings along Lambton Quay and The Terrace
- provides direct access to major retail and entertainment facilities
- provides a legible, well-defined route
- has existing public transport stop facilities and weather protection along footpaths
- provides an important component of activating key streets and providing informal surveillance, particularly after business hours.

All the PTSS options travel along the route from Cambridge/Kent Terrace, through the Basin Reserve, Adelaide Road to Newtown. This is the existing main public transport route. The only alternative routes via Cuba Street and Wallace Street were discounted at the long-list evaluation stage.

The Study also determined that extending the high quality/high frequency public transport route to the eastern suburbs was desirable. The route options examined for this extension included:

- the existing bus tunnel through Hataitai
- SH1 through the planned new duplicated tunnel
- through Newtown town centre, Constable Street and Crawford Road to Kilbirnie
- through Newtown town centre, Riddiford Street, Mansfield Street and a new tunnel to Kilbirnie.

In determining the best sub-options for connecting to the east the following factors are relevant:

- potential future patronage numbers, including total numbers and the ability to support a high frequency service
- total PT travel times from key centres – Newtown, Kilbirnie, Island Bay, Miramar – to the CBD and their comparison against car travel times (which is a competing mode)
- ease of construction

- cost
- impacts on existing communities
- ability to provide dedicated public transport lanes
- safety and resilience.

It is the combination of these various factors that determine the preferred option. The conclusion of the feasibility study is that the SH1 corridor provides the best overall route option. The next stage of investigation and detailed design will be able to test this conclusion in further depth with a detailed corridor design.

All the other options evaluated involve significant compromises. The Generation Zero submission provided an analysis indicating that two lanes of LRT could fit along Constable Street without affecting private property. This is not correct. An analysis shows clearly that such a proposal through Constable Street would impact on at least 13 buildings, and would mean the loss of all on-street parking. There would also be significant effects on existing properties along Riddiford Street through the Newtown town centre, and parts of Crawford Road would require widening beyond the current physical extent of the road corridor. Further explanation of why other routes were discounted is provided in **Attachment 3**.

The resulting ‘split’ route has attracted considerable comment. However analysis has shown that each of the routes to Newtown and Kilbirnie are able to support a high frequency service of one BRT vehicle every 4 minutes and one LRT vehicle every 5 minutes (although higher frequencies could be accommodated if required in the future). These routes combine at the Basin Reserve, providing a higher frequency (2 minutes for BRT and 2.5 minutes for LRT) service through the central city. This provides a good match between capacity and demand along these different sections of the corridor. In the BRT option, the ‘split’ route also enables BRT services to travel beyond the dedicated corridors to serve separate communities in Island Bay and Miramar that cannot sustain a ‘core’ BRT service, providing them with direct benefits from this option that would not be available with a single route.

3.8 Is the spine ‘broken’ at the central railway station?

The central railway station is located at one end of the CBD due to a number of historical and geographic reasons. Development trends over the last 10+ years, such as the development of a number of new government offices around the parliamentary precinct and Molesworth Street, as well as development in Harbour Quays, have resulted in the centre of gravity of the CBD shifting further north, and in close proximity to the railway station.

Heavy rail services from Kapiti, Porirua, Hutt Valley, Wairarapa and Johnsonville all terminate at the railway station, with around 12,500 people alighting at Wellington station between 7am and 9am, and around 7500 in the peak hour.

For the vast majority (around 90% in 2011) of persons coming into Wellington by rail their final ‘inbound’ destination is in Wellington CBD. Reaching their final destination involves a transfer to another mode, and for 90% of rail

passengers this final leg of their journey is currently made by foot, with people on average walking less than 1 kilometre. Survey data also shows that only 1% or 2% of persons arriving into Wellington railway station continue onwards past Courtenay Place on public transport in order to reach their final destination.

Trips that pass through the CBD, heading to other destinations, currently form only a very small proportion of total trips (by car or PT) - only 3% in the AM peak, and 4% in the inter-peak. These figures are not forecast to change significantly during the study period. Given that there is relatively low demand either now or in the future for a service that passes through the CBD to other destinations, a 'seamless' public transport option is only likely to replace a relatively short walking trip from the railway station to other parts of the CBD itself.

A light rail option that utilised the heavy rail tracks from Johnsonville and continued through the railway station and the CBD, was considered as part of the option development process. However the conversion of the Johnsonville line was found to have high costs and low transport benefits and was discounted. This sub-option also has significant capacity constraints, because light rail vehicles (180 passengers for a 2 car unit suitable for city streets) have around half the capacity of the Matangi trains (490 passengers for a 4 car unit). With over 7,500 passengers and 20 trains arriving at the central railway station in the AM peak hour, LRT would only have the capacity to provide services for a very small proportion of the total incoming passengers.

3.9 How important are transfers?

In both the BRT and LRT options, some transfers are required. These occur between bus and BRT/LRT and between rail and BRT/LRT. Transfers between services result in a physical time delay to a journey and a perceived inconvenience to users. Whilst transfers can be made more convenient through quality interchange facilities and frequent timed services, they are an important factor that needs to be included in the modelling results.

Transfers for the PT Spine have been modelled to include a number of components, namely:

- waiting and boarding time
- walk time between stops
- Inconvenience of transferring.

For transfers to BRT and LRT low transfer penalties have been applied to reflect the high quality of the services proposed and the high quality of the interchange. In total a transfer penalty of 5.5 minutes has been applied. There is no fare penalty applied as integrated ticketing has been assumed. This compares favourably with international practice – the Australian Transport Council recommends a 7 minute penalty for same mode transfers (with 10 minutes for different mode transfers), whilst other studies suggest up to 9 minutes. A recent stated preference survey in Australia (*NJ Douglas and M*

Jones 2013) found that the pure transfer penalty (ie not including waiting time) was between 7 minutes for rail to rail, and up to 18 minutes for rail to bus.

In the PM peak, where most trips are outbound from the CBD, transfers would be from BRT/LRT to bus, and it is envisaged that connecting bus services would need to be timetabled to minimise transfer times. Note that the PM peak has not been modelled as part of this study.

Transfers do have a material effect on the reported results of the options. They affect overall travel times and impact on people's choice of mode. For the relatively short length of network considered in the PTSS options (the longest current bus journey from Wellington Station to Miramar is timetabled as taking approximately 35 minutes) the transfer penalty takes on even greater significance.

It is notable that the LRT option involves significantly more transfers than BRT. In the LRT option most passengers (around 90%) from Miramar and Island Bay are required to transfer at Kilbirnie and Newtown when heading towards the CBD. This reduces to less than 30% for BRT.

Public perception of transfers does support their importance to people's travel choices and that they can be perceived negatively. As part of the Wellington Bus Review, where in the initial network proposals a number of suburban interchanges were proposed, a very significant number of submissions were received (over 6000) with one of the dominant themes being concern over the need to transfer between services and the quality of the interchange facilities.

3.10 Is our population large enough to support a high frequency/high quality spine?

The population of Wellington City in 2013 is 191,000, within the wider regional population being 470,000. It is possible for a city of this size to sustain either BRT or LRT. The patronage on the existing heavy rail network in the region clearly supports this view, as do numerous overseas examples.

It is not the total city population that is relevant to the viability of BRT or LRT, rather a combination of factors such as:

- density of population along the chosen transport corridors and the level of accessibility to the route
- availability and attractiveness of other transport choices and therefore the PT mode share that can be achieved
- the range of destinations that are served by the network and whether these correspond to people's desired destinations
- the length of the network and the need to transfer.

Modelling of the BRT and LRT options has demonstrated that both options can generate levels of patronage to justify a high frequency service, although with the LRT option there are relatively low levels of utilisation of the available capacity. Designing a network for both BRT and LRT requires a balance to be struck between demand, frequency, capacity and cost. Whilst the PT Spine

routes run through the CBD for some 40% of the total route, the remainder runs through suburban areas of Wellington City, where the current and projected population density is low to medium. There is therefore a limit to the likely patronage on these parts of the route and this makes it difficult to identify a strong demand node to which the end of the routes can be anchored. Given larger vehicles to fill, LRT can support a peak frequency of one vehicle every 6 minutes between Kilbirnie/Newtown and the CBD, but BRT can support a service frequency of 4 minutes for these same routes.

Predicted patronage on the BRT option means that only about 50% of the theoretical total capacity of the system is utilised to the end of the study period (2041). For the LRT option however this reduces to around 25%, because of the greater capacity of the vehicles. As such it would be difficult to justify LRT in the Wellington context, given the relatively low levels of utilisation.

The study also found that there was a marked difference between the BRT and LRT options in terms of the cost of providing those services and the overall benefit-cost ratio. LRT is considerably more expensive to build and generates less patronage.

3.11 What costs are realistic?

The costings included in the PT Spine Study are estimates prepared at a suitable level for a feasibility study by a specialist international consultancy. They are based on the indicative network design and a range of assumptions relating to the design requirements of each option. The costs for each option are built 'from the ground up' using individual components and include a full range of likely costs for:

- site preparation
- traffic management
- diversion of underground services
- road alterations and pavement strengthening
- power supply
- traffic signals
- tracks
- stations
- landscaping
- depots
- vehicles
- design fees

Where practical the estimated costings have been benchmarked against New Zealand and international cost comparisons. A reasonable contingency allowance of 20% has been allowed, which recognises the uncertainty of some design elements and ground conditions.

Whilst submitters have pointed to some other LRT projects in overseas countries with different costs per kilometre of track, this does not recognise the

particular challenges of Wellington or necessarily include the full suite of associated costs for necessary elements like traffic management and design fees. In Wellington the introduction of a new BRT or LRT mode happens in a narrow corridor through the central city that is utilised for a range of different purposes and a range of users. Experience of other recent projects, such as Manners Mall and Memorial Park, which have involved significant changes to inner city streets, have clearly shown the very significant costs (millions of dollars) associated with diversion of underground services.

Costs will be quite different in many overseas schemes where LRT or BRT has been constructed on ballast along existing rail or motorway corridors. The estimates provided include significant costs for traffic management (\$25m in the LRT option), and the installation of concrete pads (\$37m in the LRT option) which may not be comparable to many other overseas projects.

A balanced analysis of overseas projects, even those within the same country, shows that they have very varied costs. There is also considerable variation between initial estimated costs and the actual costs, which indicate the appropriateness of including a reasonable contingency allowance. A review of light rail schemes in the UK by the UK Department for Transport (September 2011) states that:

“Comparisons between the capital costs of light rail projects are difficult to make because no two schemes currently in operation in England are directly comparable. They all have different characteristics.”

This report uses data prepared by the UK National Audit Office and compares the capital cost of 11 different LRT schemes undertaken between 1987 and 2004. The construction costs of these schemes (in current prices and converted to NZ \$) was found to have varied from \$12.6 million/km to \$94.0 million/km, a considerable range. It is also important to note that all of these LRT projects included at least part of their route on non-road corridors (ie an existing or disused rail corridor), which would make a significant difference to overall costs. The PTSS International Review found a similar range at \$12 - \$141/km.

The PTSS option for LRT equates to \$59m/km (excluding vehicles and the dedicated tunnel) or \$68/km (excluding just the tunnel), which sits well within this range. Constructing an LRT scheme in Wellington is likely to have higher costs than many other countries. This results from our lack of experience in this mode and the need to buy in expertise, the higher cost of construction here due to the smaller market, and the fact that the entire route is on an existing road corridor with the associated additional costs of service relocation and concrete pads.

The UK Department of Transport report also examines the issue of cost overruns and found that some light rail schemes saw their costs increase substantially after government funding approval had been given, resulting in some schemes being abandoned. The report puts this down to poor initial estimating and the over optimism of scheme promoters.

A particular focus has been put by submitters on the need for an additional tunnel for LRT, and whether this is required. The clear recommendation of the PTSS is that an additional tunnel is required (see **Attachment 3** for further detail), however further analysis has shown that even if it were not, the cost for LRT would only reduce to around \$550 million, still considerably above the estimated cost for BRT at \$207 million. As such whether or not a tunnel is required, does not make a material difference to the relative results for the shortlisted options.

4. Independent Peer Review

The PT Spine Study report has been subject to an independent peer review and this confirms the appropriateness of the methodology and evaluation used in the study.

The peer reviewer concludes that the economic evaluation results are sufficiently robust to draw the conclusion that, in transport economic terms, the value for money associated with the LRT option would be considerably poorer than that of either of the bus-based options. The peer reviewer also states that the evaluation as a whole has not identified any other factors that would be of such importance as to offset the economic disadvantage of the LRT option and his conclusion is that no further work is warranted on the LRT option, and that further investigations should focus on bus-based options.

In regard to the bus-based options, the peer reviewer indicates that the Bus Priority and BRT options should be regarded as only representative ends of a spectrum of possible solutions to improve the quality of bus-based public transport through the Wellington CBD. He suggests that the next stages of investigation and design work should concentrate on the key elements underlying these options:

- Addressing service reliability problems through: dedicated lanes, signal priority measures, off-bus ticketing and improved stops.
- Designing an efficient network serving the CBD, and identifying the key ‘spine’ routes on which high quality, high capacity vehicles and limited stop services should run, in addition to other bus services.
- Development of a staged implementation plan.

5. Communication

The summary of submissions and market research results has been placed on the GWRC website. All submitters will receive a written response outlining the deliberations and recommendations of the Subcommittee following the conclusion of the hearing process.

It is however clear that there are a number of people with a high level of interest in the study and the preferred option for Wellington. As such it is recommended that a more detailed write-up of the proceedings of the Subcommittee be prepared and published. This would outline the key themes from the submissions and oral hearings, the consideration of the Subcommittee on these matters, and the evidence used in the deliberation process.

6. The decision-making process and significance

The subject matter of this report is part of a decision-making process that will lead to the Committee making a decision of medium significance within the meaning of the Local Government Act 2002. The decision-making process is prescribed by the consultation process outlined in the Local Government Act 2002.

7. Next steps

Implementation of the preferred option is likely to require action and funding from each of the three partner organisations (Wellington City Council, Greater Wellington Regional Council and NZ Transport Agency). As such the recommendation of the Subcommittee on the preferred option will be referred to the three partner organisations for their additional consideration before final adoption by the Regional Transport Committee.

The next stages of the project will require detailed design and planning of the chosen option. This may involve such tasks as: network design; corridor design; vehicle specification; and investigation and specification of supporting infrastructure. Preparation of an indicative and detailed business case will also be necessary. These tasks are likely to require a further two years to complete and additional funding will need to be identified to complete these.

Construction timing will depend on the option chosen, and will have to follow obtainment of any necessary approvals and funding.

8. Recommendations

That the Subcommittee:

1. *Receives the report.*
2. *Notes the content of the report.*
3. *Considers the information in this report and attachments, along with the written and oral submissions in determining its findings and recommendations to Regional Transport Committee.*
4. *Recommends to the Regional Transport Committee:*
 - a. *A preferred option*
 - b. *A preferred route*
 - c. *That it requests Wellington City Council to advance more detailed designs for a dedicated corridor along the preferred route*
 - d. *That it requests Wellington City Council and Greater Wellington Regional Council to advance investigations into intelligent traffic signals and enhanced ticketing systems to support the preferred option*

- e. *That is requests Wellington City Council, Greater Wellington Regional Council and NZ Transport Agency prepare an implementation plan*
- f. *That a high priority be considered for this project in the forthcoming Regional Land Transport Plan 2015.*

5. ***Refers the recommendations to the Wellington City Council, Greater Wellington Regional Council and NZ Transport Agency for their additional consideration prior to the Regional Transport Committee making its final decisions on the preferred outcome.***

Report prepared by:	Report approved by:	Report approved by:	Report approved by:
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Attachments:

Attachment 1: Summary of submissions

Attachment 2: Feedback from market research

Attachment 3: Officer responses to key submission themes