

3 October 2017

LETS GET WELLINGTON MOVING SCENARIOS MCA ASSESSMENT

This memo provides a summary of the recently completed MCA assessment of five Scenarios for the above project. The memo sets out the methodology used for this assessment and the subsequent results.

1 CONTEXT

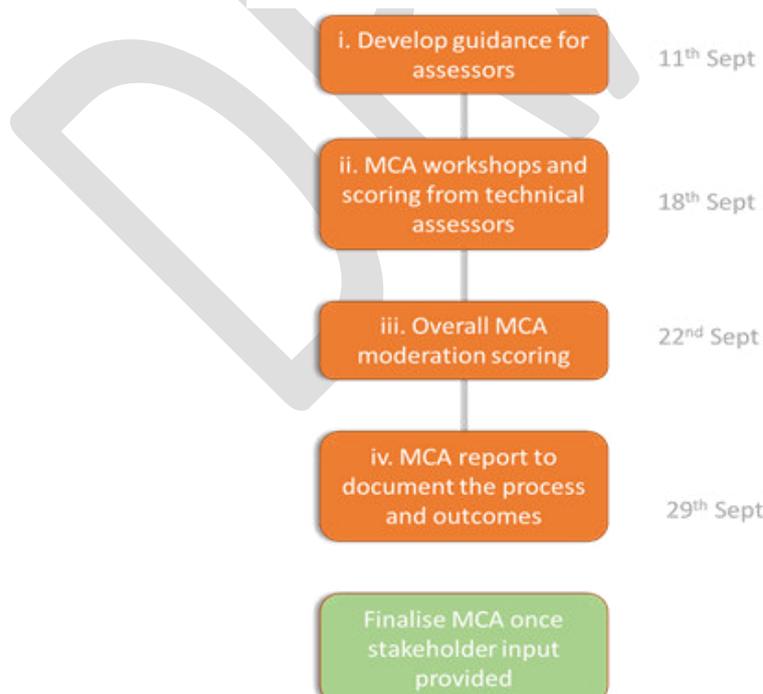
The Let's Get Wellington Moving (LGWM) programme has developed five draft scenarios. These scenarios have been assessed by technical specialist to understand the potential impacts against the project assessment criteria. The next stage in the public consultation on the project is to present scenarios for feedback. To inform this consultation the five draft scenarios have been put through the project Multi-Criteria Analysis (MCA) assessment.

This note sets out the process and outcome of this MCA assessment.

2 METHODOLOGY

A two-step assessment process has been used: firstly an evaluation against the assessment criteria was undertaken by the relevant technical assessors, and secondly an overall review to ensure consistency across the different criteria to be undertaken by the LGWM Management Team and key technical leads. The dates of this process are outlined in the figure below.

Figure 1 : MCA assessment approach



2.1 TECHNICAL WORKSHOPS

MCA scoring workshops (2-3hrs each) with technical assessors were held by grouped assessment criteria. This step ensured that technical assessors scored all scenarios and agreed as a group on the technical scoring of each scenario for their specific criteria. Each technical group agreed on the relativity of the assessment results provided ie what constitutes a minor vs moderate impact. Tony Innes facilitated these workshops.

Three workshops were held, grouped by common technical Tier 1 assessment criteria as follows:

- i. **Criteria 6 : Implementability**, attended by Robert Schofield, **Graeme Doherty**, Kerryn Merriman and Soon Teck [9-11am 18 September]
- ii. Criteria 2, 3,4 & 5 : Transport System that provides more efficient access to support growth (and less private cars) and Safety and Resilience, attended by Phil Peet and Brabha [11am-2pm 18 September]
- iii. Criteria 1 : Transport System that enhances liveability, attended by Claire Pascoe, Lucie Desrosiers, Moira Smith and Tom Pettit [2-5pm 18 September]

Workshop pre reading notes and the scenario information provided is included in Appendix A

2.2 MODERATION WORKSHOP

This session brought together all scores from the technical workshops for a consistency review across all criteria. This group comprised Barry Mein, Harriet Shelton, Adam Nicholls, Kesh Keshaboina, Phillip Eyles from the LGWM Project Management Team, Gunther Wild and the group leads from each of the preceding technical workshops (group leads identified in bold above). Tony Innes facilitated this session.

The session was completed on the 22nd September 2017 from 10am to 1pm.

Following this session there were a couple of areas identified where it appeared that there was some inconsistency in the scoring across different criteria (ie what constituted a significant impact for one criteria, appeared to have been assessed as moderate or minor based on data) and technical assessors were asked to review this with their teams.

3 MCA CRITERIA

3.1 ASSESSMENT CRITERIA

The criteria upon which the technical assessment was undertaken is outlined in Figure 2 below. The desired direction change indicates what is deemed a positive or adverse impact (ie increasing the spatial coverage of speed limits in the CBD is to be scored positive, whilst a reduction in coverage would be scored as an adverse impact).

Some minor changes have been made to the assessment criteria whilst completing this assessment. This has included adding in a cycling LOS measure under the journey time reliability tier 2 criteria.

Figure 2 : LGWM Assessment criteria and proposed performance measures

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change
A transport system that enhances the liveability of the central city	Walkability in the CBD and access to the waterfront	Pedestrian levels of service - delay at specified locations, capacity/density	Improve
		Spatial coverage of speed limits in the CBD under 50kph	Increase
	Quality of the urban environment	Space reallocated from motorised vehicles to people (including to greenspace)	Increase
	Impact of motorised transport in CBD	Number of vehicles entering the CBD	Reduce
	Impacts on natural environment	CO2 emissions, local ambient air quality, noise and vibration, impact on green space	Improve
	Impacts on built environment	Number/floorspace of buildings impacted in terms of resident and working population	Minimise
	<i>No increase to number of vehicles in the CBD</i>	<i>Covered in above measure (motorised vehicle impact)</i>	
A transport system that provides more efficient and reliable access to support growth	Journey time reliability and access to and from CBD	Travel time and delay (PT)	Reduce
		Travel time and delay (Private vehicles)	Reduce
		Active mode usage (Cycling LOS)	Increase
		Accessibility: Households within 30 minutes of CBD	Increase
	Connecting places of identified growth	Qualitative assessment	Yes / No
	Throughput of people and goods on strategic corridors	People throughput on major corridors	Increase
		Change in goods service access to CBD (time and space)	Increase
		Operating Gaps all mode values (NOF)	reduce
Reliability and access to and from the airport, hospital and port	Accessibility: Households within 30 minutes of key destinations	Increase	
Transport demand spread across the day	Proportion of trips made during peak periods	Reduce	
<i>PT travel time variability</i>	<i>Covered in above measure (journey time reliability and access).</i>		
A transport system that reduces reliance on private vehicle travel	mode share (by mode and by time of day)	Mode share (non car driver)	Increase
		pedestrian mode share	increase
		public transport mode share	increase
		cycling mode share	increase
		number of people within 30mins of CBD by PT	increase
Motor Vehicle occupancy	Average motor Vehicle occupancy by time of day on major corridors	increase	
A transport system that improves safety for all users	Road Safety	Safety for pedestrians and cyclists (crashes by severity)	reduce
		Total casualties by severity and by mode	Reduce
A transport system that is adaptable to disruptions and future uncertainty	Adaptability to be able to respond and recover from unplanned events	Availability of alternative routes in case of disruption	improve
		Availability of the transport system (the ability to react to short term unplanned events)	improve
		Mitigation of identified resilience issues on major corridors	improve
	Adaptability and flexibility to cope with future uncertainty and technologies	Qualitative assessment of risk of stranded investment in case of: -Sea level rise -New vehicle technologies -Alternative growth futures (such as?)	
Implementability	Scale of RMA Requirement	Qualitative assessment: Scale and challenge of consents required	
	Feasibility	Qualitative assessment: risk of known or unknown impediments to implementation	
Affordability	Capital cost	Estimated capital cost (\$2017)	
	Operational cost	Estimated ongoing operating cost (NPV)	

3.2 SCORING CRITERIA

A 7-point scoring scale is being utilised on this project as outlined in Table 1.

Table 1 : MCA scoring criteria

Rating	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

4 TECHNICAL ASSESSMENT

There are a number of criteria that contribute to this objective as outlined in Figure 2. The technical teams scored each of these assessment criteria separately (ie did not simple score the Tier 1 objective) and in some instances considered a number of sub criteria for each assessment criteria.

Appendix B contains the technical notes from the technical leads which provides further detail on their assessments.

Each of the Tier 1 objective assessments is outlined in the discussion below.

4.1 A TRANSPORT SYSTEM THAT ENHANCES THE LIVEABILITY OF THE CENTRAL CITY

This resulted of the scoring summarised in Figure 3.

Figure 3 : Liveability technical assessment scoring

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change	P	PK	PV	PKV	PKVT
A transport system that enhances the liveability of the central city	Walkability in the CBD and access to the waterfront	Pedestrian levels of service - delay at specified locations, capacity/density	Improve	+	++	+	++	+++
		Spatial coverage of speed limits in the CBD under 50kph	Increase	+	+	+	+	+
	Quality of the urban environment	Space reallocated from motorised vehicles to people (including to greenspace)	Increase	0	--	-	--	---
	Impact of motorised transport in CBD	Number of vehicles entering the CBD	Reduce	+	+	+	-	+
	Impacts on natural environment	CO2 emissions, local ambient air quality, noise and vibration, impact on green space	Improve	0	+	-	--	--
	Impacts on built environment	Number/floorspace of buildings impacted in terms of resident and working population	Minimise	0	---	--	---	---
	<i>No increase to number of vehicles in the CBD</i>	<i>Covered in above measure (motorised vehicle impact)</i>						

The individual criteria and rationale behind the scoring are presented below.

4.1.1 WALKABILITY IN THE CBD AND ACCESS TO THE WATERFRONT

This was assessed in terms of the pedestrian levels of services. All scenarios are considered to improve the walking conditions compared with a 'Do minimum' scenario:

- Scenario P is beneficial in that it removes general traffic from parts of Lambton Quay and Willis Street, two of the busiest pedestrian routes in the city.
- Scenario PK builds on scenario P, adding the benefit of reduced conflicts between State highway vehicles and pedestrians across Vivian Street and Karo Drive.
- Scenario PV offers similar benefits to scenario P; the improved pedestrian facility in Mt Victoria tunnel is balanced out by the increase in vehicular traffic the tunnel duplication brings to the CBD.
- Scenario PKV has similar benefits to scenario PK.
- Scenario PKVT builds on PKVT, adding the benefits of greater pedestrian amenity along and across the quays thus improving access to the waterfront.

The experts discussed whether induced traffic should reduce the scoring of PKV and PKVT but agreed that this was better addressed under a different criterion.

The experts also discussed the spatial coverage of future speed limits but agreed that all scenarios were equally compatible with lower speed limits. Given the low actual traffic speeds during peak periods, it was concluded that such a measure would have minor benefits on walkability.

4.1.2 QUALITY OF THE URBAN ENVIRONMENT

This was assessed using four sub-criteria:

- Space reallocated from motorised vehicles to public space and greening
- Visual and physical clutter
- Important views
- Community severance

All scenarios are considered to create more space for public space and greening:

- Scenario P is beneficial in that it creates opportunities for widening footpaths along parts of Lambton Quay and Willis Street, and expanding the public space on Lower Cuba Street.
- Scenario PK builds on scenario P, creating additional opportunities for greening along Vivian Street and expanding the public realm along Cambridge and Kent terraces. The undergrounding of parts of SH1 along Karo Drive provides opportunities for new or improved public spaces along Cuba Street, Victoria Street, Willis Street and Abel Smith. This scenario is therefore more beneficial than scenario P.
- Scenario PV offers similar benefits to scenario P.
- Scenario PKV offers similar benefits to scenario PK. [The impact of the Ruahine Street widening on existing green spaces is addressed separately in section 2.3]

- Scenario PKVT builds on PK, creating additional space for street trees and other public space improvements along the quays. This scenario is considered more beneficial than scenario PK.
- All scenarios, except for scenario P, are considered to have negative impacts in terms of visual and physical clutter, important views, and community severance:
- Scenario P is considered to be similar to a 'do minimum' scenario for these sub-criteria and therefore was assigned a neutral score.
- Scenario PK would likely add tunnel portals, signage gantries and noise walls along Karo Drive, thus increasing the existing level of visual and physical clutter associated with the State highway corridor. The grade separation (two-ways) at the Basin Reserve would result in elevated structures that contribute to visual clutter and obscure views between the Basin Reserve and nearby landmarks (eg Memorial Park and crèche, Canal Reserve, Carilion, entrance to Government House). The ramps / open trenches along Karo Drive have the potential to exacerbate community severance in a part of the city that is starting to recover from the effects of the construction of the Inner City Bypass.
- Scenario PV adds a tunnel portal and associated gantries at Mt Victoria tunnel and a one-way grade separation at the Basin Reserve. These structures add to visual and physical clutter. With regards to impacts on important views and community severance, these are considered to be less significant than the cut and cover along Karo Drive as they do not separate nearby communities to the same extent. The scoring reflects the relatively lower scale of impacts compared with scenario PK.
- Scenario PKV is similar to PK in terms of impacts on important views and community severance. In terms of physical and visual clutter, the addition of the Mt Victoria tunnel duplication means more additional structures (tunnel portals, gantries, noise walls, etc) so the option scores lower than PK for this criteria. Overall, however, the effects on views, severance and clutter are similar in scale to those of PK.
- Scenario PKVT is considered to have similar effects on important views and community severance as PKV because these effects are caused primarily by the cut and cover along Karo Drive and the grade separation at the Basin Reserve. PKVT is considered to have greater impacts on visual and physical clutter due to the addition of tunnel portals and associated signage, retaining walls and other highway-related structures at the Terrace Tunnel.

4.1.3 IMPACT ON THE NATURAL ENVIRONMENT

This was assessed using two sub-criteria:

- CO2 emissions
- Impact on existing green spaces

Due to the limited information available at this stage (number of vehicles entering the central city) it was not possible to assess the impact of the scenarios on air quality or noise and vibration. This assessment could be undertaken at the next stage of the process when vehicle kilometres travelled, fleet composition and other metrics are available.

The projected change in the number of motorised vehicles entering the central city was used as a proxy for CO2 emissions in the absence of other data. The impact of the shift to electric vehicles over the long term was not considered to affect the scoring due to the slow rate of renewal of the car fleet in

New Zealand generally. CO2 emissions were assessed in the context of the City's adopted objective of reducing CO2 emissions by 80% by 2050, and the project's principle to be 'clean and green'. This means that any increase in the number of vehicles entering the central city was given a negative scoring (except where it sat at 1%, which was considered insignificant). The weight of this negative scoring was debated and this remains an area where views diverge on what level of traffic increase should be considered to have a low, moderate or severe impact. The rationale put forward was:

- Scenario P is considered to be similar to a 'do minimum' scenario for CO2 emissions and therefore was assigned a neutral score.
- Scenario PK results in a slight reduction in vehicles entering the central city and therefore was considered to deliver minor benefits.
- Scenario PV results in an increase in vehicles entering the central city and therefore was considered to have a negative impact on CO2 emission.
- Scenario PKV and PKVT both result in higher increases in vehicles entering the central city than PV and therefore were considered to have greater impacts on CO2 emissions.

In terms of the impacts of the scenarios on existing green spaces, the assessment was limited to the impact of the widening of Ruahine Street on the Town Belt which is present in scenarios PV, PKV and PKVT only (scenarios P and PK get a neutral scoring). It was assumed that the widening would result in a strip of land directly adjacent to the current road corridor being removed from the Town Belt. Given the scale of the Town Belt, this was considered to give rise to localised and limited negative effects.

4.1.4 IMPACT OF MOTORISED TRANSPORT IN THE CBD

At the time of the assessment, the data provided to support the scoring of this criterion was the number of vehicles crossing 'screenlines' at the edges of the central city. Consequently, the scores are identical to those assigned to the scenarios under the CO2 emissions criterion.

At the moderation workshop, it was agreed that this criterion was intended to address the impact of motorised traffic on the 'core' CBD, ie the area of highest pedestrian activity around the high rise office buildings and shopping precinct in the northern part of the central city. It was therefore suggested that new screenlines that better reflect the 'core' CBD (eg east of the urban motorway and north of Vivian Street) be used.

The assessment against the new screenlines data showed that scenarios P, PK, PV and PKVT reduce traffic into the city by 760, 1090, 510 and 1270 vehicles in the AM peak, resulting in a minor benefit as this is a reduction of between 1-3%. Scenario PKV increase traffic by approximately 750 vehicles, or 2% resulting in an assessment of a minor adverse impact.

4.1.5 IMPACT ON THE BUILT ENVIRONMENT

This was assessed using two sub-criteria:

- Impact on heritage (including heritage areas; heritage buildings, objects and trees; sites of significance to tangata whenua and other Maori; inner city pre-1930s areas; Pukeahu National War Memorial Park and Home of Compassion crèche; Basin Reserve; entrance to Government House; Canal Reserve; and archaeology)
- Number of buildings impacted and/or people displaced

- The potential for redevelopment and private investment facilitated by the scenarios is assessed separately in section 2.6.
- All scenarios, except for scenario P, are considered to have negative impacts on the built environment using the above criteria:
- Scenario P is considered to have no impact on heritage items and does not require the demolition of any buildings so was assigned a neutral score. This is based on the assumption that double-decker or other larger buses will be implemented under a 'do minimum' scenario and that any impacts on verandahs (for example) are already part of the base situation against which the potential future scenarios (P, PK, PV, PKV, PKVT) are assessed.
- Scenario PK results in the demolition or relocation of individually listed heritage buildings and buildings covered by NZTA / Heritage New Zealand covenants to accommodate a cut and cover along Karo Drive. It would also likely affect buildings in the Cuba Street Heritage Area, protected trees (listed in the District Plan) and areas of interest to tangata whenua (Hauwai cultivation area). These impacts would affect numerous heritage items and are considered to be significant. The cut and cover would also require the demolition of non-heritage buildings and the displacement of numerous residents and building users. Grade separation at the Basin is likely to have adverse impacts on archaeology, the Canal Reserve, Basin Reserve, Pukeahu National War Memorial Park, the House of Compassion Creche and the entrance to Government House – all of which underpin the negative scoring of this scenario.
- Scenario PV results in the demolition or relocation of houses on Paterson Street and the effects associated with grade separation at the Basin Reserve. These impacts are considered to be less significant than those of the Karo Drive cut and cover as they affect fewer heritage items and non-heritage properties.
- Scenarios PKV and PKVT are similar to PK in terms of impacts on heritage items and displacement. The addition of the Mt Victoria or Terrace tunnel duplications do not affect the scoring as the effects of the Karo Drive cut and cover and Basin Reserve grade separation already warrant a significantly negative scoring.

4.2 A TRANSPORT SYSTEM THAT PROVIDES MORE EFFICIENT AND RELIABLE ACCESS TO SUPPORT GROWTH

The technical assessment has resulted of the scoring summarised in Figure 8.

Figure 4 : More Efficient and reliable transport system technical assessment

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change	P	PK	PV	PKV	PKVT
A transport system that provides more efficient and reliable access to support growth	Journey time reliability and access to and from CBD	Travel time and delay (PT)	Reduce	+	++	++	++	++
		Travel time and delay (Private vehicles)	Reduce		++	+	+++	+++
		Active mode usage (Cycling LOS)	Increase	+	+	++	+++	-
		Accessibility: Households within 30 minutes of CBD	Increase					
	Connecting places of identified growth	Qualitative assessment	Yes / No	+	++	++	+++	+++
	Throughput of people and goods on strategic corridors	People throughput on major corridors	Increase			+	++	++
		Change in goods service access to CBD (time and space)	Increase	-	-	-	-	-
		Operating Gaps all mode values (NOF)	Reduce					
	Reliability and access to and from the airport, hospital and port	Accessibility: Households within 30 minutes of key destinations	Increase		++	+	++	++
	Transport demand spread across the day	Proportion of trips made during peak periods	Reduce				-	-
PT travel time variability	Covered in above measure (journey time reliability and access).							

4.2.1 JOURNEY TIME RELIABILITY AND ACCESS TO AND FROM CBD

From the transport model and technical assessment both PT and private vehicles travel times on key routes has resulted in the following assessment:

- Scenario P has in the order of a 5% improvement on general PT trips and a less the 3% improvement to and from the CBD. This is considered to have a minor positive impact. In terms of private vehicle impacts a small difference on all key routes was predicted resulting in a less than minor impact. No significant change in travel time reliability was predicted
- Scenario PK has in the order of a 25-35% improvement on key PT routes and a less the 6% improvement to and from the CBD. This is considered to have a moderate positive impact. In terms of private vehicle impacts benefits to the eastbound state highway traffic and trips from the CBD to the south and east were identified on key routes resulting in a moderate benefit assessment. These travel time changes also translated to a moderate benefit in travel time variability.
- Scenario PV has in the order of a 25-40% improvement on key PT routes and a less the 6% improvement to and from the CBD. This is considered to have a moderate positive impact. In terms of private vehicle impacts benefits to Airport to Johnsonville route resulting in a minor benefit assessment. These travel time changes also translated to a minor benefit in travel time variability.
- Scenario PKV has in the order of a 30-40% improvement on key PT routes and a less the 8% improvement to and from the CBD. This is considered to have a moderate positive impact. In terms of private vehicle impacts benefits most movements experienced a benefit, including to the CBD from the east and south resulting in a significant benefit assessment. These travel time changes also translated to a moderate benefit in travel time variability.
- Scenario PKVT resulted in the same results as the PKV scenario, giving a similar level of assessment.

4.2.2 CONSISTENCY WITH THE URBAN GROWTH PLAN AND WELLINGTON REGIONAL STRATEGY

In addition to the criteria pertaining to the liveability objective, the liveability technical experts also discussed the extent to which the scenarios open up opportunities for investment in new or existing

buildings (ie urban regeneration). Such investment is especially desirable in areas identified for intensification in the Wellington Urban Growth Plan – these include the central city (particularly Te Aro), the Adelaide Road corridor and the rest of the growth spine that stretches between Johnsonville and the airport.

Using the criteria “the extent to which the scenario improves access to identified growth areas”, all scenarios are beneficial to a greater or lesser extent:

- Scenario P is considered to deliver some benefits in that it improves public transport access to the hospital and therefore improves the attractiveness of the Adelaide Road corridor for development.
- Scenario PK builds on scenario P and creates opportunities for redevelopment along/above the Karo Drive cut and cover in addition to unlocking the potential of Adelaide Road. It would also likely encourage further private investment along Vivian Street and Cambridge and Kent terraces as a result of the removal of State highway traffic. For these reasons, this scenario gets a higher score than scenario P.
- Scenario PV improves public transport access both to the hospital and the airport, thus making Adelaide Road and the eastern suburbs more attractive to developers. It is considered to have benefits similar in scale to those of scenario PK.
- Scenarios PKV and PKVT deliver more development benefits than PK and PV in that they combine redevelopment opportunities in Te Aro (Vivian Street, Cambridge and Kent terraces, Karo Drive cut and cover), along Adelaide Road (mass rapid transit to the hospital) and in the eastern suburbs (mass rapid transit to the airport). The duplication of the Terrace Tunnel provides limited additional benefits to growth areas as Johnsonville is already well connected to the CBD by rail. Both scenarios get a higher score than PK and PV.

4.2.3 THROUGHPUT OF PEOPLE AND GOODS ON STRATEGIC CORRIDORS

From the transport model and technical assessment on key routes has resulted in the following assessment:

- Scenario P and PK have in the order of a 1% increase in throughput across the screenlines resulting in a less than minor impact.
- Scenario PV has in the order of a 1% increase in throughput across the northern screenline and a 6% increase through the southbound screenline resulting in a minor positive impact.
- Scenario PKV and PKVT has in the order of a 2% increase in throughput across the northern screenline and a 8-9% increase through the southbound screenline resulting in a moderate positive impact
- improvement on general PT trips and a less the 3% improvement to and from the CBD. This is considered to have a minor positive impact. In terms of private vehicle impacts a small difference on all key routes was predicted resulting in a less than minor impact. No significant change in travel time reliability was predicted
- It is forecast that there is in the order of 23 loading spaces lost in all scenarios resulting in a minor adverse impact for all scenarios

4.2.4 RELIABILITY AND ACCESS TO AND FROM THE AIRPORT, HOSPITAL AND PORT

This information is currently being developed from the regional transport model. In the meantime, an appropriate proxy for this is the change in travel time for PT and private vehicles as discussed in section 4.2.1.

4.2.5 TRANSPORT DEMAND SPREAD ACROSS THE DAY

From the transport model and technical assessment both PT and private vehicles trips by time period has resulted in the following assessment:

- Scenario P, PK and PV are considered to have material change. The Mass Transit elements of PK and PV may result in additional trips in the peak hour but this is not considered to be material.
- Both Scenarios PKV and PKVT have been assessed as having a minor adverse impact as they are forecast to increase peak period travel due to the increase in private vehicle transport infrastructure in particular.

4.3 A TRANSPORT SYSTEM THAT REDUCES RELIANCE ON PRIVATE VEHICLE TRAVEL

The technical assessment has resulted of the scoring summarised in Figure 8.

Figure 5 : Transport system that reduces reliance on private vehicle travel

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change	P	PK	PV	PKV	PKVT
A transport system that reduces reliance on private vehicle travel	mode share (by mode and by time of day)	Mode share (non car driver)	Increase		++	++	+	+
		pedestrian mode share	increase		++	++	+	+
		public transport mode share	increase		++	++	+	+
		cycling mode share	increase		++	++	+	+
		number of people within 30mins of CBD by PT	increase		++	++	+	+
	Motor Vehicle occupancy	Average motor Vehicle occupancy by time of day on major corridors	increase					

4.3.1 MODE SHARE

An assessment based on technical knowledge of the potential mode shift of the different scenarios was undertaken as the transport modelling results were considered to be under representing potential mode shift and this is a known challenge with the models used. This assessment concluded:

- Scenario P had modest investment in PT, with walking and cycling a priority. This was considered to have a less than minor impact on mode share changing.
- Scenario PK and PV were considered to have a moderate impact on mode change due to the investment in mass transit and the improvements for non-car modes around Karo Drive and the Basin reserve areas of the network.
- Scenarios PKV and PKVT were considered to have a minor impact on mode change as whilst they provided high quality mass transit they also provided additional private vehicle infrastructure which was assessed as reducing the likely driver for mode shift change to a minor level.

4.3.2 VEHICLE OCCUPANCY

No data is yet available on this criteria.

4.4 A TRANSPORT SYSTEM THAT IMPROVES SAFETY FOR ALL USERS

The technical assessment has resulted of the scoring summarised in Figure 6.

Figure 6 : Transport system that reduces reliance on private vehicle travel

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change	P	PK	PV	PKV	PKVT
A transport system that improves safety for all users	Road Safety	Safety for pedestrians and cyclists (crashes by severity)	reduce	+	++	+	++	++
		Total casualties by severity and by mode	Reduce	+	++	+	++	++

An assessment based on technical knowledge of the potential safety outcome of the different scenarios was undertaken. This concluded:

- Scenario P and PV provide minor safety improvements due to speed reductions, improved walking priority and infrastructure and enhanced cycling facilities.
- Scenarios PK, PKV and PKVT were considered to have a moderate positive impact as they had the above benefits plus the additional benefits associated with the Karo Drive works. PKVT also included improvements to the Quays, however this was not considered sufficient to justify a significant safety impact.

4.5 A TRANSPORT SYSTEM THAT IS ADAPTABLE TO DISRUPTIONS AND FUTURE UNCERTAINTY

The technical assessment has resulted of the scoring summarised in Figure 7.

Figure 7 : Adaptive and Resilient transport system technical assessment

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change	P	PK	PV	PKV	PKVT
A transport system that is adaptable to disruptions and future uncertainty	Adaptability to be able to respond and recover from unplanned events	Availability of alternative routes in case of disruption	improve	0	+	0	+	++
		Availability of the transport system (the ability to react to short term unplanned events)	improve	0	+	0	+	++
	Adaptability and flexibility to cope with future uncertainty and technologies	Mitigation of identified resilience issues on major corridors	improve	0	+	0	+	++
		Qualitative assessment of risk of stranded investment in case of: -Sea level rise -New vehicle technologies -Alternative growth futures (such as?)		0	+	0	+	++

A single assessment that considered each of the measures have been undertaken. This assessment looked at the different elements of the programmes on the concluded:

- Mass Transit, Full grade separation of the Basin Reserve and Mt Victoria tunnel duplication and Ruahine Street provided partial benefits to the resilience and adaptability of the transport system.
- Karo Drive and the Terrace tunnel duplication provide greater resilience and adaptability than the above schemes.
- Reducing traffic lanes on the Quays has a negative impact on resilience
- An additional lane on Aotea to Ngauranga conversely has a slight positive impact.

Combining all of these conclusions results in the following assessment for each scenario.

- Scenario P and PV provide no substantive improvement in resilience or adaptability of the transport system.

- Scenarios PK and PKV provide a minor improvement in resilience due to the provision of mass transit and Karo Drive predominantly.
- PKVT was assessed has having a moderate resilience benefit, the highest of all scenarios due to the addition of the terrace tunnel duplication.

4.6 IMPLEMENTABILITY

There was general discussion around public transport (PT) priority lanes in general and what “Mass Transit” was and whether that was separated from priority PT lanes and whether there were extra traffic lanes for general traffic. Clarification from the LGWM team on the following formed the basis for the scoring of scenarios:

- Priority PT lanes are incorporated into the existing transport corridors without the need to take land;
- Mass transit was assumed to be Bus Rapid Transit that operated within the PT priority lanes from the Golden Mile to the hospital. The BRT that would operate from the Basin to the airport would be in a dedicated lane with one general lane of traffic in each direction. This would require a 4 lane transport corridor, which meant that a second tunnel was required at Mt Victoria with 4 laning of Ruahine Street and Wellington Road to Cobham Drive needed.
- With regard to (1) above, the Technical Specialists acknowledged that parking would require removal to create dedicated PT lanes. In scoring consentability, the Technical Specialists took the view that removal of parking was a political decision rather than an effect under the RMA and hence the scoring did not consider the difficulty of removing parking.

This has resulted in the scoring outlined in Figure 8.

Figure 8 : Implementability technical assessment scoring

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change	P	PK	PV	PKV	PKVT
Implementability	Scale of RMA Requirement	Qualitative assessment: Scale and challenge of consents required		0	--	--	--	--
	Feasibility	Qualitative assessment: risk of known or unknown impediments to implementation		-	--	--	--	--
Affordability	Capital cost	Estimated capital cost (\$2017)						
	Operational cost	Estimated ongoing operating cost (NPV)						

The individual criteria and rationale behind the scoring are presented below.

4.6.1 CONSENTABILITY

All scenarios are considered to have some consenting risk. To a degree, the level of risk depends on what mitigation can be achieved (for example, relocating heritage buildings as opposed to full demolition). It is assumed that some of the buildings with highest heritage value could avoid being adversely affected through detailed design (for example, to avoid the need to demolish buildings to reduce tight corners).

Scenario P was considered to have a minor risk given the low level of additional infrastructure needed, the ability to contain work within existing road reserves and therefore the small degree of consenting that may be required to authorise the necessary changes. At the other end of the scale, scenario PKVT was considered to carry the greatest consenting risk. This was due to the extent of work

required outside road reserves, the number and value of buildings required to be demolished or affected (many of which have heritage values), and the impact on the town belt. Scenarios PK, PV and PKV were considered to have moderate consenting risks. Having both directions of travel for the state highway within Karo Drive was considered to carry a significant level of risk, as did the changes required to provide for Mass Transit from the Basin Reserve to the airport.

4.6.2 FEASIBILITY

Overall all scenarios were considered to have implementation risk. This assessment was predominantly based on how difficult, and how long, it would be to construct an intervention and the potential property impacts. Scenario P was considered to have the smallest risk given the limited additional infrastructure. All interventions with Mass Transit from the Basin Reserve to the airport were considered to carry significant implementation risk due to road widening, impacts on property and likely duration of impacts, as was having both directions of travel for the state highway within Karo Drive as well as grade separation at the Basin Reserve.

4.7 AFFORDABILITY

The capital and operating costs for each of scenarios was still in development at the time of the MCA workshops.

5 REVIEW INPUT

The review of the individual scoring identified a few areas where the technical specialists were asked to consider the relatively of their score. The identified areas of review, which are included in the above assessments were:

- In the Liveability criteria related to impact on vehicles on the CBD, given the proposed changes forecast in the model, scores of "--" and "---" for scenarios PV, PKV and PKVT was reconsidered and the scores revised to "-." and "-.-".
- In the Liveability criteria related to impact on the natural environment, given the proposed changes forecast in the model, scores of "--" and "---" for scenarios PV, PKV and PKVT was reconsidered and the scores revised to "-." and "-.-".
- In the Liveability criteria related to impact on the built environment, given the proposed changes forecast in the model, scores of "---" for scenarios PKV and PKVT was reconsidered and the scores were not changed.
- The consentability scores were queried as being appropriate given the above impact on the built environment. This was considered and no changes made.

6 FINAL ASSESSMENT

Once all of the technical assessments had been undertaken and the review complete, the complete assessment of the scenarios against all of the criteria is summarised in Figure 9.

Without applying any weighting and simply averaging the Tier 2 criteria we have also calculated an overall score for the Tier 1 objectives.

Figure 9 : Assessment Summary

Tier 1 (Objectives)	Scenario					Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change	Scenario					
	P	PK	PV	PKV	PKVT				P	PK	PV	PKV	PKVT	
A transport system that enhances the liveability of the central city	+	0	-	-	-	Walkability in the CBD and access to the waterfront	Pedestrian levels of service - delay at specified locations, capacity/density	Improve	+	++	+	++	+++	
						Spatial coverage of speed limits in the CBD under 50kph	Increase	+	+	+	+	+		
						Quality of the urban environment	Space reallocated from motorised vehicles to people (including to greenspace)	Increase	0	-	-	-	-	-
						Impact of motorised transport in CBD	Number of vehicles entering the CBD	Reduce	+	+	+	-	+	
						Impacts on natural environment	CO2 emissions, local ambient air quality, noise and vibration, impact on green space	Improve	0	+	-	-	-	
						Impacts on built environment	Number/floorspace of buildings impacted in terms of resident and working population	Minimise	0	-	-	-	-	
A transport system that provides more efficient and reliable access to support growth	0	+	+	++	++	Travel time and delay (PT)	Travel time and delay (PT)	Reduce	+	++	++	++	++	
						Journey time reliability and access to and from CBD	Travel time and delay (Private vehicles)	Reduce		++	+	+++	+++	
						Active mode usage (Cycling LOS)	Increase	+	+	++	+++	-		
						Accessibility: Households within 30 minutes of CBD	Increase							
						Connecting places of identified growth	Qualitative assessment	Yes / No	+	++	++	+++	+++	
						Throughput of people and goods on strategic corridors	People throughput on major corridors	Increase			+	++	++	
						Change in goods service access to CBD (time and space)	Increase	-	-	-	-	-		
						Operating Gaps all mode values (NOF)	reduce							
						Reliability and access to and from the airport, hospital and port	Accessibility: Households within 30 minutes of key destinations	Increase		++	+	++	++	
						Transport demand spread across the day	Proportion of trips made during peak periods	Reduce				-	-	
A transport system that reduces reliance on private vehicle travel	0	++	++	+	+	Mode share (non car driver)	Mode share (non car driver)	Increase		++	++	+	+	
						pedestrian mode share	Increase		++	++	+	+		
						public transport mode share	Increase		++	++	+	+		
						cycling mode share	Increase		++	++	+	+		
						number of people within 30mins of CBD by PT	Increase		++	++	+	+		
						Motor Vehicle occupancy	Average motor Vehicle occupancy by time of day on major corridors	Increase						
A transport system that improves safety for all users	+	++	+	++	++	Road Safety	Safety for pedestrians and cyclists (crashes by severity)	reduce	+	++	+	++	++	
						Total casualties by severity and by mode	Reduce	+	++	+	++	++		
A transport system that is adaptable to disruptions and future uncertainty	0	+	0	+	++	Adaptability to be able to respond and recover from unplanned events	Availability of alternative routes in case of disruption	improve	0	+	0	+	++	
						Availability of the transport system (the ability to react to short term unplanned events)	improve	0	+	0	+	++		
						Mitigation of identified resilience issues on major corridors	improve	0	+	0	+	++		
Adaptability and flexibility to cope with future uncertainty and technologies	0	+	0	+	++	Qualitative assessment of risk of stranded investment in case of: -Sea level rise -New vehicle technologies -Alternative growth futures (such as?)		0	+	0	+	++		
						Scale of RMA Requirement	Qualitative assessment: Scale and challenge of consents required		0	-	-	-	-	
Implementability	-	-	-	-	-	Feasibility	Qualitative assessment: risk of known or unknown impediments to implementation		-	-	-	-		
						Capital cost	Estimated capital cost (\$2017)							
Affordability						Operational cost	Estimated ongoing operating cost (NPV)							

7 NEXT STEPS

There are some minor areas where additional data is being gathered to complete and supplement the above analysis. This is not anticipated to change the fundamental conclusions.

The assessment team are considering key outcomes for inclusion in the scenario presentation to stakeholders. Current thinking includes:

- Forecast increase number of people into the CBD
- Travel time on key routes:
 - PT from Mirimar to Wellington Street
 - PT from Island Bay to Wellington
 - Car travel time Airport to Johnsonville
- Number of homes within 30 mins of CBD on PT and by car

DRAFT

APPENDIX A – TECHNICAL WORKSHOP MATERIAL

DRAFT

11 September 2017

LGWM MCA ASSESSMENT TECHNICAL WORKSHOP

This memo provides pre reading material of the proposed above workshops and expectations of technical assessors prior to the workshop .

1 CONTEXT

As you are aware the Let's Get Wellington Moving programme has developed five draft scenarios and are currently undertaking some analysis of these. The next step is to put the scenarios through a high-level evaluation process based on a Multi-Criteria Analysis (MCA) methodology. A two-step assessment process has been identified: firstly an evaluation against the assessment criteria by the relevant technical assessors, and secondly an overall moderation to be undertaken by the LGWM Alliance Management Team and key technical leads. The dates of this process (referred to as the MCA for convenience) are outlined in the figure below. Importantly you have been identified as one of the technical assessors.

Figure 1 : MCA assessment approach



Technical Workshops 18th September: MCA scoring workshops (2-3hrs each) with technical assessors will be held by grouped assessment criteria. The purpose of this step is to get technical assessors to score scenarios and agree as a group on the technical scoring of options. Each group will agree on the relativity of the results provided and how this relates to the MCA, ie what is minor vs moderate. Tony Innes will facilitate these workshops. Three workshops are proposed, grouped by Tier 1 Assessment Criteria as follows:

- i. **Criteria 6 : Implementability**, attended by Robert Schofield, **Graeme Doherty**, Kerryn Merriman and Soon Teck [9-11am 18 September]
- ii. **Criteria 2, 3,4 & 5 : Transport System that provides more efficient access to support growth (and less private cars) and Safety and Resilience**, attended by **Phil Peet** and Brabha [11am-2pm 18 September]
- iii. **Criteria 1 : Transport System that enhances liveability**, attended by Claire Pascoe, **Lucie Desrosiers**, Moira Smith and Tom Pettit [2-5pm 18 September]

Moderation Workshop 22nd September: This session will bring together all scores from the technical workshops and carry out moderation and alignment. This group will comprise the LGWM Alliance Management Team, Gunther Wild and the group lead from each of the preceding technical workshops (group leads identified in bold above). Tony Innes will facilitate this session and will document the outcomes. This session is expected to take 4-6 hours. The session will conclude this phase of the MCA workshops.

2 YOUR ROLE

2.1 TECHNICAL ASSESSOR

As a technical assessor, it is your role in the workshop to:

1. Have undertaken your own individual assessment of the scenarios against the criteria in your technical area that includes a score and justification
2. Discuss, debate and ultimately reach alignment as a technical group on the scoring for each option as a group for your area of technical expertise.

The criteria and scoring are outlined in Section 3 of this note.

2.2 TECHNICAL LEADS (GRAEME, PHIL, LUCIE)

As well as the above requirements as a technical assessor, you also have the responsibility of attending the moderation exercise and outlining why the scoring from the technical workshops was arrived at and also to assist the moderation team as required on technical understanding.

You could also have a role of assisting the moderation team in moderating the scores if this need arises in your technical area.

You will also be required to assist in the documentation of the report summarising the discussion at each of your workshops.

3 ASSESSMENT CRITERIA

The criteria upon which you are assessing is outlined in table below. The desired direction change indicates what is deemed a positive or adverse impact (ie Increasing the spatial coverage of speed limits in the CBD is to be scored positive, whilst a reduction in coverage would be scored as an adverse impact).

Let's Get Wellington Moving: Assessment Criteria and Proposed Performance Measures

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (core in bold)	"Desired" direction of change
A transport system that enhances the liveability of the central city	Walkability in the CBD and access to the waterfront	Pedestrian levels of service - delay at specified locations, capacity/density	Improve
		Spatial coverage of speed limits in the CBD under 50kph	Increase
	Quality of the urban environment	Space reallocated from motorised vehicles to people (including to greenspace)	Increase
	Impact of motorised transport in CBD	Number of vehicles entering the CBD	Reduce
	Impacts on natural environment	CO2 emissions, local ambient air quality, noise and vibration, impact on green space	Improve
	Impacts on built environment	Number/floorspace of buildings impacted in terms of resident and working population	Minimise
	<i>No increase to number of vehicles in the CBD</i>	<i>Covered in above measure (motorised vehicle impact)</i>	
A transport system that provides more efficient and reliable access to support growth	Journey time reliability and access to and from CBD	Travel time and delay (all modes)	Reduce
		Travel time variability (all modes)	Reduce
		Accessibility: Households within 30 minutes of CBD	Increase
	Consistency with the Urban Growth Plan and Wellington Regional Strategy	Qualitative assessment	Yes / No
	Throughput of people and goods on strategic corridors	People throughput on major corridors	Increase
		Change in goods service access to CBD (time and space)	Increase
		Operating Gaps all mode values (NOF)	reduce
Reliability and access to and from the airport, hospital and port	Accessibility: Households within 30 minutes of key destinations	Increase	
Transport demand spread across the day	Proportion of trips made during peak periods	Reduce	
<i>PT travel time variability</i>	<i>Covered in above measure (journey time reliability and access).</i>		
A transport system that reduces reliance on private vehicle travel	mode share (by mode and by time of day)	Mode share (non car driver)	Increase
		pedestrian mode share	increase
		public transport mode share	increase
		cycling mode share	increase
		number of people within 30mins of CBD by PT	increase
Motor Vehicle occupancy	Average motor Vehicle occupancy by time of day on major corridors	increase	
A transport system that improves safety for all users	Road Safety	Safety for pedestrians and cyclists (crashes by severity)	reduce
		Total casualties by severity and by mode	Reduce
A transport system that is adaptable to disruptions and future uncertainty	Adaptability to be able to respond and recover from unplanned events	Availability of alternative routes in case of disruption	improve
		Availability of the transport system (the ability to react to short term unplanned events)	improve
		Mitigation of identified resilience issues on major corridors	improve
	Adaptability and flexibility to cope with future uncertainty and technologies	Qualitative assessment of risk of stranded investment in case of: -Sea level rise -New vehicle technologies -Alternative growth futures (such as?)	
Implementability	Consentability	Qualitative assessment: risk that consents will be difficult to obtain	
	Feasibility	Qualitative assessment: risk of known or unknown impediments to implementation	
Affordability	Capital cost	Estimated capital cost (\$2017)	
	Operational cost	Estimated ongoing operating cost (NPV)	

A 7-point scoring scale is being utilised on this project as outlined in the table below.

It is important that you consider the absolute impact of a scenario as well as the relativity to the other scenarios. You should ask yourself is the difference in impact sufficient or not warrant a different score.

Rating	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

4 WORKSHOP OUTCOME

The outcome of these technical workshops will be agreed scoring for each scenario and a report summarising the rationale based on the conversation. Tony Innes will draft this report for review by the technical leads.

This report will also summarise the moderation exercise as well.

We look forward to this important day in the project, your technical expertise and strength working in a team environment will be greatly appreciated.

APPENDIX B – TECHNICAL ASSESSMENT NOTES

DRAFT

Let's Get Wellington Moving

Scenarios multi-criteria analysis: Liveability objective

26 September 2017

1. Participants

An assessment of five scenarios was undertaken on 18 September 2017. The following technical experts attended the assessment and provided advice which informed the scoring:

- Claire Pascoe - Lead Advisor – Multi Modal, System Design and Delivery (Operational Policy, Planning & Performance), NZ Transport Agency. Claire led the assessment of the scenarios' walkability.
- Moira Smith - Senior Heritage Advisor, Wellington City Council. Moira led the assessment of the impact of the scenarios on the built environment.
- Tom Pettit - Sustainability Manager (acting), Wellington City Council. Tom led the assessment of the impact of the scenarios on the natural environment and on motorised transport in the CBD.
- Lucie Desrosiers – Senior Spatial Planning Advisor, Wellington City Council. Lucie led the assessment of the impact of the scenarios on the quality of the urban environment and on regeneration opportunities.

The experts had undertaken a preliminary assessment of their assigned criteria prior to the day. Their proposed scoring was discussed by the group before a joint scoring was agreed upon.

2. Assessment criteria

The team was assigned the assessment criteria which fall under the following project objective: "A transport system that enhances the liveability of the central city".

The individual criteria and rationale behind the scoring are presented below.

2.1 Walkability in the CBD and access to the waterfront

This was assessed in terms of the pedestrian levels of services. All scenarios are considered to improve the walking conditions compared with a 'Do minimum' scenario:

- Scenario P is beneficial in that it removes general traffic from parts of Lambton Quay and Willis Street, two of the busiest pedestrian routes in the city.
- Scenario PK builds on scenario P, adding the benefit of reduced conflicts between State highway vehicles and pedestrians across Vivian Street and Karo Drive.
- Scenario PV offers similar benefits to scenario P; the improved pedestrian facility in Mt Victoria tunnel is balanced out by the increase in vehicular traffic the tunnel duplication brings to the CBD.
- Scenario PKV has similar benefits to scenario PK.

- Scenario PKVT builds on PKVT, adding the benefits of greater pedestrian amenity along and across the quays thus improving access to the waterfront.

The experts discussed whether induced traffic should reduce the scoring of PKV and PKVT but agreed that this was better addressed under a different criterion.

The experts also discussed the spatial coverage of future speed limits but agreed that all scenarios were equally compatible with lower speed limits. Given the low actual traffic speeds during peak periods, it was concluded that such a measure would have minor benefits on walkability.

2.2 Quality of the urban environment

This was assessed using four sub-criteria:

- Space reallocated from motorised vehicles to public space and greening
- Visual and physical clutter
- Important views
- Community severance

All scenarios are considered to create more space for public space and greening:

- Scenario P is beneficial in that it creates opportunities for widening footpaths along parts of Lambton Quay and Willis Street, and expanding the public space on Lower Cuba Street.
- Scenario PK builds on scenario P, creating additional opportunities for greening along Vivian Street and expanding the public realm along Cambridge and Kent terraces. The undergrounding of parts of SH1 along Karo Drive provides opportunities for new or improved public spaces along Cuba Street, Victoria Street, Willis Street and Abel Smith. This scenario is therefore more beneficial than scenario P.
- Scenario PV offers similar benefits to scenario P.
- Scenario PKV offers similar benefits to scenario PK. [The impact of the Ruahine Street widening on existing green spaces is addressed separately in section 2.3]
- Scenario PKVT builds on PK, creating additional space for street trees and other public space improvements along the quays. This scenario is considered more beneficial than scenario PK.

All scenarios, except for scenario P, are considered to have negative impacts in terms of visual and physical clutter, important views, and community severance:

- Scenario P is considered to be similar to a 'do minimum' scenario for these sub-criteria and therefore was assigned a neutral score.
- Scenario PK would likely add tunnel portals, signage gantries and noise walls along Karo Drive, thus increasing the existing level of visual and physical clutter associated with the State highway corridor. The grade separation (two-ways) at the Basin Reserve would result in elevated structures that contribute to visual clutter and obscure views between the Basin Reserve and nearby landmarks (eg Memorial Park and crèche, Canal Reserve, Carilion, entrance to Government House). The ramps / open trenches along Karo Drive have the potential to exacerbate community severance in a part of the city that is starting to recover from the effects of the construction of the Inner City Bypass.

- Scenario PV adds a tunnel portal and associated gantries at Mt Victoria tunnel and a one-way grade separation at the Basin Reserve. These structures add to visual and physical clutter. With regards to impacts on important views and community severance, these are considered to be less significant than the cut and cover along Karo Drive as they do not separate nearby communities to the same extent. The scoring reflects the relatively lower scale of impacts compared with scenario PK.
- Scenario PKV is similar to PK in terms of impacts on important views and community severance. In terms of physical and visual clutter, the addition of the Mt Victoria tunnel duplication means more additional structures (tunnel portals, gantries, noise walls, etc) so the option scores lower than PK for this criteria. Overall, however, the effects on views, severance and clutter are similar in scale to those of PK.
- Scenario PKVT is considered to have similar effects on important views and community severance as PKV because these effects are caused primarily by the cut and cover along Karo Drive and the grade separation at the Basin Reserve. PKVT is considered to have greater impacts on visual and physical clutter due to the addition of tunnel portals and associated signage, retaining walls and other highway-related structures at the Terrace Tunnel.

2.3 Impact on the natural environment

This was assessed using two sub-criteria:

- CO2 emissions
- Impact on existing green spaces

Due to the limited information available at this stage (number of vehicles entering the central city) it was not possible to assess the impact of the scenarios on air quality or noise and vibration. This assessment could be undertaken at the next stage of the process when vehicle kilometres travelled, fleet composition and other metrics are available.

The projected change in the number of motorised vehicles entering the central city was used as a proxy for CO2 emissions in the absence of other data. The impact of the shift to electric vehicles over the long term was not considered to affect the scoring due to the slow rate of renewal of the car fleet in New Zealand generally. CO2 emissions were assessed in the context of the City's adopted objective of reducing CO2 emissions by 80% by 2050, and the project's principle to be 'clean and green'. This means that any increase in the number of vehicles entering the central city was given a negative scoring (except where it sat at 1%, which was considered insignificant). The weight of this negative scoring was debated and this remains an area where views diverge on what level of traffic increase should be considered to have a low, moderate or severe impact. The rationale put forward was:

- Scenario P is considered to be similar to a 'do minimum' scenario for CO2 emissions and therefore was assigned a neutral score.
- Scenario PK results in a slight reduction in vehicles entering the central city and therefore was considered to deliver minor benefits.
- Scenario PV results in an increase in vehicles entering the central city and therefore was considered to have a negative impact on CO2 emission.

- Scenario PKV and PKVT both result in higher increases in vehicles entering the central city than PV and therefore were considered to have greater impacts on CO2 emissions.

In terms of the impacts of the scenarios on existing green spaces, the assessment was limited to the impact of the widening of Ruahine Street on the Town Belt which is present in scenarios PV, PKV and PKVT only (scenarios P and PK get a neutral scoring). It was assumed that the widening would result in a strip of land directly adjacent to the current road corridor being removed from the Town Belt. Given the scale of the Town Belt, this was considered to give rise to localised and limited negative effects.

2.4 Impact of motorised transport in the CBD

At the time of the assessment, the data provided to support the scoring of this criterion was the number of vehicles crossing 'screenlines' at the edges of the central city. Consequently, the scores are identical to those assigned to the scenarios under the CO2 emissions criterion.

At the moderation workshop, it was agreed that this criterion was intended to address the impact of motorised traffic on the 'core' CBD, ie the area of highest pedestrian activity around the high rise office buildings and shopping precinct in the northern part of the central city. It was therefore suggested that new screenlines that better reflect the 'core' CBD (eg east of the urban motorway and north of Vivian Street) be used.

The assessment against the new screenlines data has yet to be undertaken.

2.5 Impact on the built environment

This was assessed using two sub-criteria:

- Impact on heritage (including heritage areas; heritage buildings, objects and trees; sites of significance to tangata whenua and other Maori; inner city pre-1930s areas; Pukeahu National War Memorial Park and Home of Compassion crèche; Basin Reserve; entrance to Government House; Canal Reserve; and archaeology)
- Number of buildings impacted and/or people displaced

The potential for redevelopment and private investment facilitated by the scenarios is assessed separately in section 2.6.

All scenarios, except for scenario P, are considered to have negative impacts on the built environment using the above criteria:

- Scenario P is considered to have no impact on heritage items and does not require the demolition of any buildings so was assigned a neutral score. This is based on the assumption that double-decker or other larger buses will be implemented under a 'do minimum' scenario and that any impacts on verandahs (for example) are already part of the base situation against which the potential future scenarios (P, PK, PV, PKV, PKVT) are assessed.
- Scenario PK results in the demolition or relocation of individually listed heritage buildings and buildings covered by NZTA / Heritage New Zealand covenants to accommodate a cut and cover along Karo Drive. It would also likely affect buildings in the Cuba Street Heritage Area, protected trees (listed in the District Plan) and areas of interest to tangata whenua (Hawaii cultivation area). These impacts would affect numerous heritage items and are

considered to be significant. The cut and cover would also require the demolition of non-heritage buildings and the displacement of numerous residents and building users. Grade separation at the Basin is likely to have adverse impacts on archaeology, the Canal Reserve, Basin Reserve, Pukeahu National War Memorial Park, the House of Compassion Creche and the entrance to Government House – all of which underpin the negative scoring of this scenario.

- Scenario PV results in the demolition or relocation of houses on Paterson Street and the effects associated with grade separation at the Basin Reserve. These impacts are considered to be less significant than those of the Karo Drive cut and cover as they affect fewer heritage items and non-heritage properties.
- Scenarios PKV and PKVT are similar to PK in terms of impacts on heritage items and displacement. The addition of the Mt Victoria or Terrace tunnel duplications do not affect the scoring as the effects of the Karo Drive cut and cover and Basin Reserve grade separation already warrant a significantly negative scoring.

2.6 Providing access to identified growth areas / regeneration benefits

In addition to the criteria pertaining to the liveability objective, the technical experts also discussed the extent to which the scenarios open up opportunities for investment in new or existing buildings (ie urban regeneration). Such investment is especially desirable in areas identified for intensification in the Wellington Urban Growth Plan – these include the central city (particularly Te Aro), the Adelaide Road corridor and the rest of the growth spine that stretches between Johnsonville and the airport.

Using the criteria “the extent to which the scenario improves access to identified growth areas”, all scenarios are beneficial to a greater or lesser extent:

- Scenario P is considered to deliver some benefits in that it improves public transport access to the hospital and therefore improves the attractiveness of the Adelaide Road corridor for development.
- Scenario PK builds on scenario P and creates opportunities for redevelopment along/above the Karo Drive cut and cover in addition to unlocking the potential of Adelaide Road. It would also likely encourage further private investment along Vivian Street and Cambridge and Kent terraces as a result of the removal of State highway traffic. For these reasons, this scenario gets a higher score than scenario P.
- Scenario PV improves public transport access both to the hospital and the airport, thus making Adelaide Road and the eastern suburbs more attractive to developers. It is considered to have benefits similar in scale to those of scenario PK.
- Scenarios PKV and PKVT deliver more development benefits than PK and PV in that they combine redevelopment opportunities in Te Aro (Vivian Street, Cambridge and Kent terraces, Karo Drive cut and cover), along Adelaide Road (mass rapid transit to the hospital) and in the eastern suburbs (mass rapid transit to the airport). The duplication of the Terrace Tunnel provides limited additional benefits to growth areas as Johnsonville is already well connected to the CBD by rail. Both scenarios get a higher score than PK and PV.

Let's Get Wellington Moving

Scenarios

Assessment criteria	Measures	Do Min	Scoring					Rationale				
			0	P	PK	PV	PKV	PKVT	P	PK	PV	PKV
A transport system that enhances the liveability of the central city												
Walkability in the CBD and access to the waterfront		0	+	++	+	++	+++					
	Pedestrian levels of service	0	+	++	+	++	+++	Remove general traffic from parts of Lambton Quay and Willis	P + facilitate pedestrian access across Vivian St / Karo Drive	Same as P	Same as PK	PK + better walkability across the Quays to the waterfront
	Spatial coverage of speed limit under 50kph		+	+	+	+	+	The same for all scenarios	The same for all scenarios	The same for all scenarios	The same for all scenarios	The same for all scenarios
Bikability in the CBD		0	+	+	++	+++	-	Speed reduction, assume PT lanes are not bus only	P + cycling facilities at Basin, detuned Vivian St.	PK + better connectivity going East thru' Mt Vic tunnel and Ruahine St	Combination of positive elements of PK and PKV.	Induced car traffic entering CBD negatively impacts travelling by bike.
Quality of the urban environment												
	Space re-allocated from motorised vehicles to public space and greening	0	+	++	+	++	+++	Footpath widening Willis, Lambton, Lower Cuba	P + improve Cuba, Victoria, Abel Smith, Vivian, Cambridge & Kent	Same as P	Same as PK	PK + Quays
	Visual and physical clutter	0	0	-	-	--	---	No change	Tunnel portal and gantries at Karo Dr	Tunnel portals and gantries at Mt Vic T	Tunnel portals and gantries at Mt Vic T & Karo	Tunnel portals and gantries at Terrace T and Mt Vic T
	Important views	0	0	--	-	--	---	No change	Basin grade separated 2-w	Basin grade separated 1-w	Basin grade separated 2-w	Basin grade separated 2-w
	Severance	0	0	---	-	---	---	No change	Ramps and open trenches + grade separated at Basin	Basin Grade-sep 1-way	Ramps and open trenches + grade separated at Basin	Ramps and open trenches + grade separated at Basin
Impact of motorised transport in core CBD												
	Number of vehicles entering core CBD	0	+	+	+	-	+	Low decrease: am peak - 1.8% (-762 veh), pm peak - 0.9% (-404 veh)	Low decrease: am peak - 2.6% (-1088 veh), pm peak - 0.9% (-404 veh)	Low decrease: am peak - 1.2% (-509 veh), pm peak - 0.2% (-105 veh)	Low increase: am peak +1.8% (+750 veh), pm peak 0.3% (-140 veh)	Low decrease: am peak -3% (-1271 veh), pm peak -3.4% (-1472 veh)
	vkt within CBD											
Impact on natural environment												
	CO2 emissions in central area	0	0	+	-	--	---	Insignificant change (+1%, +1%)	Low decrease (-3%, 0%)	Low/moderate increase (+7%, +1%)	Moderate increase (+7%, +4%)	Moderate increase (+7%, +5%)
	Impact on existing green spaces	0	0	0	-	-	-	No change	No change	Widening of Ruahine St eats into green belt	Widening of Ruahine St eats into green belt	Widening of Ruahine St eats into green belt
Impacts on built environment												
	Heritage (heritage areas, listed buildings / objects / trees, sites of significance to tangata whenua and other Maori, inner city pre-1930s areas, Pukeahu National War Memorial Park & creche, Basin Reserve, entrance to Gov House, Canal Reserve, archaeology)	0	0	---	---	---	---	Visual clutter assessed under 'quality of the urban environment'	Demolition or relocation of 25+ heritage buildings, loss of 4+ listed trees, impact on Hauwai Cultivation Area / Cuba Street Heritage Area. Assume grade separation effects similar to BOLI.	Relocation of houses on Paterson Street, impact on Hauwai Cultivation Area / Cuba Street Heritage Area. Assume grade separation effects similar to BOLI.	Same scale of effects as PK	Same scale of effects as PK
	Buildings impacted / people displaced	0	0	---	---	---	---	No change	Demolition along ICB/Karo	Demolition on approach to Mt Vic Tunnel	Demolition along ICB/Karo + on approach to Mt Vic Tunnel	Demolition along ICB/Karo + on approach to Mt Vic Tunnel & Terrace Tunnel
A transport system that provides more efficient and reliable access to support growth												

Let's Get Wellington Moving

Transport Assessment of Illustrative Scenarios

1 Introduction

The Let's Get Wellington Moving programme has developed five draft scenarios and are currently undertaking analysis of these.

This technical note outlines the initial draft assessment of the following Tier 1 criteria:

- A transport system that provides more efficient and reliable access to support growth
- A transport system that reduces reliance on private vehicle travel
- A transport system that improves safety for all users

The assessment has been undertaken using Wellington Transport Strategy Model outputs, rather than the Wellington AIMSUM model as the AIMSUM model is currently being refined and was not ready for use in this assessment.

2 Criteria and Analysis

The following table outlines:

- the Tier 2 criteria being assessed;
- the measures originally identified by the Let's Get Wellington Moving project team to assess the criteria;
- the modelling outputs that are being used at this stage as a proxy for the measures;
- my assessment of the score for this measure based on the modelling outputs and professional judgement.

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Rev. No.	Date	Description	Prepared By	Checked By	Reviewed By	Approved By
1	19/9/17	Draft	Phil P			
2	26/9/17	Final Draft	Phil P			

Tier 1 (Objective)	Tier 2 (Assessment Criteria)	Measure	Modelling Outputs	Score and Rationale				
				P	PK	PV	PKV	PKVT
A transport system that provides more and efficient and reliable access to support growth	Journey Time reliability and access to and from CBD	Travel time and delay (all modes)	AM peak PT travel times: <ul style="list-style-type: none"> Mirimar to Wellington Station Island Bay to Wellington Station Golden Mile (NB) AM peak PT travel times area to area	1 Around 5% improvement on key routes and <3% on all to/from CBD	2 Around 25-35% improvement on key routes and <6% on all to/from CBD	2 25-40% improvement on key routes and <6% on all to/from CBD	2 30-40% improvement on key routes and <8% on all to/from CBD	2 30-40% improvement on key routes and <8% on all to/from CBD
			AM peak car travel times: <ul style="list-style-type: none"> Airport to/from Johnsonville Newtown to/from Johnsonville AM peak car travel times area to area	0 Less than ~ +/-5% difference for all routes	2 Benefits for EB SH traffic and trips from CBD to East and South	1 Benefits for A->JV	3 Benefits for most movements and trips from CBD to East and South	3 Benefits for most movements and trips from CBD to East and South
		Travel time variability (all modes)	WTSM doesn't provide measures for variability. Can assume that decreasing travel time results in decreasing variability.	0	2	1	2	2
		Accessibility: Households within 30 minutes of CBD	No current modelling capability for this but it can be developed over the next few weeks.	-	-	-	-	-
	Consistent with the Urban Growth Plan and Wellington Regional Strategy	Qualitative assessment	Being assessed by another specialist.	-	-	-	-	-
	Throughput of people and goods on strategic corridors	People throughput on major corridors	AM Peak Inbound Northern and Southern Screenlines	0 <1% increase through Nthn and Sthn	0 <1% increase through Nthn and Sthn	1 1% increase through Nthn; 6% increase through Sthn	2 2% increase through Nthn; 9% increase through Sthn	2 2% increase through Nthn; 8% increase through Sthn
		Change in goods service access to CBD (time and space)	No modelling outputs can provide this. Assume most happens outside of peak periods. Consider loss of loading zones (need to confirm if assessment by others applies to all scenarios).	-1 Based on loss of 23 loading zones	-1 Based on loss of 23 loading zones	-1 Based on loss of 23 loading zones	-1 Based on loss of 23 loading zones	-1 Based on loss of 23 loading zones
		Operating Gaps all mode values (NOF)	Don't have NOF yet – likely by the end of the month.	-	-	-	-	-
	Reliability and access to and from the airport, hospital and port	Accessibility: Households within 30 minutes of key destinations	No current modelling capability for this but it can be developed over the next few weeks. But can be inferred from AM peak travel times as per above	0	2 Better travel times to the east and south in particular	1	2 Better travel times to the east and south in particular	2 Better travel times to the east and south in particular

	Transport demand spread across the day	Proportion of trips made during peak periods	Trips by time period – Car, to/from CBD Trips by time period – PT, to/from CBD	0 Little change likely	0 Little change. Mass Transit may result in additional trips in peak	0 Little change. Mass Transit may result in additional trips in peak	-1 Increase in capacity likely to increase car trips in peak and off peak. Mass Transit may result in additional trips in peak.	-1 Increase in capacity likely to increase car trips in peak and off peak. Mass Transit may result in additional trips in peak.
	PT travel time variability	Covered in above measure (journey time reliability and access)	Covered above	-	-	-	-	-
A transport system that reduces reliance on private vehicle travel	Mode share (by mode and by time of day)	Mode share (non car driver)	Current WTSM model outputs aren't showing significant mode shift – this is a known issue with the model. Instead, professional judgement is being made based on the elements of the scenarios.	0 Improved walking Improved cycling Bus lanes TDM	2 Improved walking Improved cycling Improved walking at Karo Drive and Vivian Basin Reserve Mass transit PT Spine TDM	2 Improved walking Improved cycling Mass transit PT Spine Partial Basin Reserve TDM	1 Improved walking Improved cycling Improved walking at Karo Drive and Vivian Basin Reserve Mass transit PT Spine Mass transit North TDM	1 Improved walking Improved cycling Improved walking at Karo Drive and Vivian Basin Reserve Mass transit North Quays traffic calming TDM
		Pedestrian mode share						
		Public transport mode share						
	Cycling mode share							
		Number of people within 30mins of CBD by PT	See above – this can be developed over the next few weeks.	-	-	-	-	-
	Motor Vehicle occupancy	Average motor vehicle occupancy by time of day on major corridors	Can't get this from modelling – will be used as a performance measure post implementation.	-	-	-	-	-
A transport system that improves safety for all users	Road Safety	Safety for pedestrians and cyclists (crashes by severity)	Engineering judgement. Not a large number of fatal and serious pedestrian and cycle crashes on the network so the assessment based on risk. Engineering judgement	1 Speed reduction within CBD Improved walking priority and infrastructure Improved cycling infrastructure As above	2 Speed reduction within CBD Improved walking priority and infrastructure Improved cycling infrastructure Basin Reserve Improvements Improvements along Vivian Street and across Karo Drive	1 Speed reduction within CBD Improved walking priority and infrastructure Improved cycling infrastructure Basin Reserve Improvements	2 Speed reduction within CBD Improved walking priority and infrastructure Improved cycling infrastructure Basin Reserve Improvements Improvements along Vivian Street and across Karo Drive	2 Speed reduction within CBD Improved walking priority and infrastructure Improved cycling infrastructure Basin Reserve Improvements Improvements along Quays
		Total casualties by severity and by mode						

Memorandum

To	Tony Innes	Page	1
CC	Adam Nicholls		
Subject	Let's Get Welly Moving - Implementation Assessment for Different Scenarios		
From	Graeme Doherty		
File/Ref No.		Date	29-Sep-2017

Hi Tony

With regard to the technical evaluation of the scenarios presented by the Let's Get Welly Moving (LGWM) team on Monday the 18th and Friday the 22nd of September 2017, the following sets out the rationale for the scoring provided by the technical specialists associated with the "Implementability" objective.

The technical specialists involved in assessing and scoring the implementability of each scenario were:

- Soon Kong from Wellington City Council;
- Robert Schofield from Boffa Miskell;
- Kerryn Merriman from GWRC;
- Harriet Shelton from GWRC;
- Graeme Doherty from AECOM

Implementability was reviewed in terms of:

- Consentability – qualitative assessment about the likely RMA issues involved with each scenario, and how high is the risk that consents will be difficult to obtain;
- Feasibility – qualitative assessment of known or unknown impediments to implementation.

The information reviewed by each specialist was provided by the LGWM team dated 11 September 2017. Each specialist reviewed each major intervention and provided a single score within the range of -3 (significantly adverse) to +3 (significantly positive) for each scenario.

Graeme Doherty from AECOM collated the Technical Specialist's scoring and presented that to the LGWM team at a moderation workshop on the 22nd of September 2017.

No weighting of interventions, scenarios or objectives was undertaken.

The qualitative scoring of each scenario is summarised in Table 1 below, with an explanation following.

Objective	Scenario				
	P	PK	PV	PKV	PKVT
Consentability	-1	-2	-2	-2	-3
Feasibility	-1	-3	-3	-3	-3

There was general discussion around public transport (PT) priority lanes in general and what “Mass Transit” was and whether that was separated from priority PT lanes and whether there were extra traffic lanes for general traffic. Clarification from the LGWM team on the following formed the basis for the scoring of scenarios:

1. Priority PT lanes are incorporated into the existing transport corridors without the need to take land;
2. Mass transit was assumed to be Bus Rapid Transit that operated within the PT priority lanes from the Golden Mile to the hospital. The BRT that would operate from the Basin to the airport would be in a dedicated lane with one general lane of traffic in each direction. This would require a 4 lane transport corridor, which meant that a second tunnel was required at Mt Victoria with 4 laning of Ruahine Street and Wellington Road to Cobham Drive needed.
3. With regard to (1) above, the Technical Specialists acknowledged that parking would require removal to create dedicated PT lanes. In scoring consentability, the Technical Specialists took the view that removal of parking was a political decision rather than an effect under the RMA and hence the scoring did not consider the difficulty of removing parking.

Consentability

All scenarios are considered to have some consenting risk. To a degree, the level of risk depends on what mitigation can be achieved (for example, relocating heritage buildings as opposed to full demolition). It is assumed that some of the buildings with highest heritage value could avoid being adversely affected through detailed design (for example, to avoid the need to demolish buildings to reduce tight corners).

Scenario P was considered to have a minor risk given the low level of additional infrastructure needed, the ability to contain work within existing road reserves and therefore the small degree of consenting that may be required to authorise the necessary changes. At the other end of the scale, scenario PKVT was considered to carry the greatest consenting risk due to the extent of work required outside road reserves, the number and value of buildings required to be demolished or affected (many of which have heritage values), and the impact on the town belt. Scenarios PK, PV and PKV were considered to have moderate consenting risks. Having both directions of travel for the state highway within Karo Drive was considered to carry a significant level of risk, as did the changes required to provide for Mass Transit from the Basin Reserve to the airport.

Feasibility

Overall all scenarios were considered to have implementation risk. This assessment was predominantly based on how difficult, and how long, it would be to construct an intervention and the potential property impacts. Scenario P was considered to have the smallest risk given the limited additional infrastructure. All interventions with Mass Transit from the Basin Reserve to the airport were considered to carry significant implementation risk due to road widening, impacts on property and likely duration of impacts, as was having both directions of travel for the state highway within Karo Drive as well as grade separation at the Basin Reserve.

Please contact the undersigned if you have any queries or require further clarification.

Regards

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APPENDIX C – ASSESSMENT SUMMARY

Let's Get Wellington Moving: Assessment Criteria and Proposed Performance Measures

Tier 1 (Objectives)	Tier 2 (Assessment Criteria)	Measure (score in bold)	"Desired" direction of change	Scenario					Discussion		
				P	PK	PV	PKV	PKVT			
A transport system that enhances the feasibility of the central city	Walkability in the CBD and access to the waterfront	Pedestrian levels of service - delay at specified locations, capacity/density	Improve	+	+++	+	+++	+	+++	All of the scenarios were deemed to provide improved walkability in the CBD and waterfront. Differentiators of additional benefits were Karo Drive and the improvements to the Quays area. Taranaki Street pedestrian amenity was considered and area of degradation, but common to most scenarios. Overall options P and PV were considered to offer minor benefits and PK and PKV result in moderate benefits. Option PKVT was assessed as having significant benefits as it included upgrades to Quays.	
		Spatial coverage of speed limits in the CBD under 50kph	Increase	+	+	+	+	+	+	The assessment has assumed that all scenarios are similar and will have minor benefits.	
	Quality of the urban environment	Space reallocated from motorised vehicles to people (including to greenpace)	Increase	0	-	-	-	-	-	Whilst one specific measure has been identified, there are a number of factors considered in the experts assessment of the Urban environments quality. This included views, clutter, open space and severance. Taking these factors into account Scenario P was assessed as having no positive or adverse impact. Scenarios with Karo Road works resulted in considerable severance and cut and cover resulting in a moderate adverse impact. Scenario PKVT had the additional impacts of an additional tunnel and four laning to create even greater severance and therefore a significant adverse impact was assessed for this Scenario. Scenario PV was considered to have a minor adverse impact as it resulted in less severance than the Karo Road scenarios.	
	Impact of motorised transport in CBD	Number of vehicles entering the CBD	Reduce	+	+	+	+	+	+	The transport modelling showed that scenarios P, PK, PV and PKVT reduce traffic into the city by 760, 1006, 1330 and 1270 vehicles in the AM peak, resulting in a minor benefit as this is a reduction of between 1-3%. Scenario PKV increase traffic by approximately 750 vehicles, or 2% resulting in an assessment of a minor adverse impact.	
	Impacts on natural environment	CO2 emissions, local ambient air quality, noise and vibration, impact on green space	Improve	0	+	-	-	-	-	The traffic in the central area was taken as a proxy for this criteria, along with additional considerations such as impacts on the Green Belt and other areas of environmental significance. Tunnels were an important part of this assessment. Overall the same scores as above were concluded as the impacts on the Green Belt were already in the scenarios with the largest adverse impact.	
	Impacts on built environment	Number/Space of buildings impacted in terms of resident and working population	Minimise	0	-	-	-	-	-	Impacts on heritage buildings was a key factor for this criteria. All scenarios were considered to have an adverse impact on the built environment. The following heritage buildings were considered to be effected by each scenario, Scenario P, PK, PV, PKV, PKVT, PKVT 160, Karo Street works had the greatest impact. Other considerations included signage clutter and impacts on low areas. Overall these considerations resulted in Scenario P having a negligible impact, scenario PV a moderate adverse impact and PK, PKV and PKVT a significant adverse impact on the built environment.	
A transport system that provides more efficient and reliable access to support growth	No increase in number of vehicles in the CBD	Covered in above measure (Motorised vehicle impact)									
	Travel time and delay (PT)		Reduce	+	+++	++	+++	++	+++	This assessment has been based on key travel time routes, including PT, Mirimar to Wellington Station, Island Bay to Wellington Station, Golden Mile (NB) and travel times from areas to the CBD from the Transport model. Scenario P has a 3% reduction in travel times, whilst all other scenarios have a reduction from 20-40%, hence the moderate assessment rating.	
	Journey time reliability and access to and from CBD	Travel time and delay (Private vehicles)	Reduce	+	+++	++	+++	++	+++	This assessment has been based on key travel times for following routes: Airport to/from Johnsonville, Newmarket to/from Johnsonville, and trips from areas of jobs to the CBD in AM peak from Transport model. This has resulted in small difference (less than 5%) on many routes for scenario P, whilst scenario PV has reduction in travel time for trips from the south and eastern areas of the city.	
		Active mode usage (Cycling LOS)	Increase	+	+	+	+	+	+	Scenario P and PKVT provide additional benefits to a wider number of traffic volumes which results in a significant benefit.	
		Accessibility: Households within 30 minutes of CBD	Increase							Qualitative assessment by NZTA cycling expert, see P and PK have minor benefits due to reduced speeds and use by cyclists of new bus lanes. PV provides moderate benefits due to improvements from P to include Victoria tunnel and Ruarua Street. PKV provides a significant benefit as this includes benefits of both PK and PV. PKV increases traffic on key cycling route so have been scored down.	
	Connecting places of identified growth	Qualitative assessment	Yes/No	+	+++	+++	+++	+++	+++	Awaiting data from the model	
		People throughput on major corridors	Increase			+	++	++	++	Scenario P was assessed as having minor benefits, due to provision of PT lanes allowing for additional development. Scenarios PK and PV provided additional identification of Cambridge/Kent and Vivian Street (PK) and Airport (PV) and so was assessed as having additional benefits, and moderate overall. Scenarios PKV and PKVT provided additional development opportunities to the above and were therefore assessed as having significant benefit.	
		Change in goods service access to CBD (time and space)	Increase	-	-	-	-	-	-	This is based on inbound northbound and southbound screenlines into the CBD and the change in private vehicle trips. Scenario P and PK result in a less than 1% change in trips. Scenario PV has an increase in throughput of approximately 6%, giving a moderate benefit, with scenarios PKV and PKVT having increases of approximately 10%, resulting in a significant benefit assessment.	
		Operating Gaps all mode values (NOF)	reduce							All scenarios have been assessed as having a minor adverse impacts due to all scenarios reducing in the order of 23 loading spaces each.	
		Accessibility: Households within 30 minutes of key destinations	Increase	++	+	++	++	++	++	NO DATA AVAILABLE AT PRESENT	
A transport system that reduces reliance on private vehicle travel	Transport demand spread across the day	Proportion of trips made during peak periods	Reduce							This is currently implied by the change in travel time as outlined above	
	PT travel time variability	Covered in above measure (journey time reliability and access)								Based on screenline trips into CBD for both private and public trips. Scenarios PKV and PKVT have a small increase in private vehicles trips in the inter peak, all other scenarios have a very small increase that has been assessed as not sufficient for a minor benefit.	
	Mode share (by mode and by time of day)	Mode share (non car driver)	Increase	++	++	+	+	+	+	An assessment of all of the criteria has been considered. Scenario P has small improvements, not considered sufficient for a minor benefit. The remaining options all resulted in moderate benefits to mode change and walking and cycling. However scenarios PKV and PKVT also resulted in lesser an increase in PT usage due to the additional roading infrastructure, this reduced the assessment of these two scenarios to a minor benefit.	
		pedestrian mode share	Increase	+++	++	+	+	+	+	As above	
		public transport mode share	Increase	+++	++	+	+	+	+	As above	
		Cycling mode share	Increase	+++	++	+	+	+	+	As above	
		number of people within 30mins of CBD by PT	Increase	+++	++	+	+	+	+	As above	
	Motor Vehicle occupancy	Average motor vehicle occupancy by time of day on major corridors	Increase							NO DATA AT THIS STAGE	
	A transport system that improves safety for all users	Road Safety	Safety for pedestrians and cyclists (crashes by severity)	reduce	+	++	+	++	+	++	All scenarios provided at least positive safety benefits. Scenarios that included Karo Drive were considered to have additional safety benefits, and overall those scenarios were assessed as having moderate safety benefits.
			Total casualties by severity and by mode	Reduce	+	++	+	++	+	++	As above
Adaptability to be able to respond and recover from unplanned events		Availability of alternative routes in case of disruption	Improve	0	+	0	+	++	++	An analysis was undertaken considering all of the implications for each option. This included considering the additional resilience and adaptability of the key elements in each scenario and arriving at an overall scenario score. The two key features that were differentiators included Karo Drive and the Terrace Tunnel duplication. Basin grade separation, Mass Transit and Mt Vic tunnel provided secondary resilience and adaptability benefits.	
		Availability of the transport system (the ability to react to short term unplanned events)	Improve	0	+	0	+	++	++	As above	
	Mitigation of identified resilience issues on major corridors	Improve	0	+	0	+	++	++	As above		
	Qualitative assessment of risk of stranded investment in case of: Sea level rise New vehicle technologies Alternative growth futures (such as?)		0	+	0	+	++	++	As above		
Implementability	Scale of RMA Requirement	Qualitative assessment: Scale and challenge of consents required	0	-	-	-	-	-	-	All scenarios considered to have some consenting risk. Scenario P was considered to have a minor risk given the low level of additional infrastructure and therefore consenting proposed. At the other end of the scale, scenario PKVT was considered to carry the greatest consenting risk, and a significant risk. This was due to the extent of the buildings required and the impact on the town belt. Scenarios PK, PV and PKV were considered to have moderate consenting risks. Karo Road was considered to carry a high level of risk, as was the Mass Transit elements of the scenarios.	
	Feasibility	Qualitative assessment: risk of known or unknown impediments to implementation		-	-	-	-	-	-	Overall all scenarios were considered to have implementation risk. This assessment was predominantly based on constructability, length of construction and potential property impacts. Scenario P was considered to have the smallest risk given the limited additional infrastructure. All options with Mass Transit were considered to carry significant implementation risk due to the likely widening impacts on property and likely duration of impacts, as were Karo Street options. Option PV was considered to have a moderate risk as it included additional infrastructure, but not to the same level as those that included Karo Street	
Affordability	Capital cost	Estimated capital cost (\$2017)								To be determined	
	Operational cost	Estimated ongoing operating cost (NPV)								To be determined	