



Staging and Sequencing Considerations, options and next steps

To inform LGWM Design of the Transport System
Transformation workstream

29 November 2018

With Addendum report – issued October 2019



ADDENDUM REPORT

To compliment the release of the LGWM programme in May, an addendum to the 'Staging and Sequencing considerations, options and next steps' report was prepared. This addendum report is appended to this report.

This addendum is not intended to replace or repeat the analysis of the Recommended Programme of Investment contained in the LGWM Staging report, nor does it provide analysis of potential staging and sequencing of the Indicative Package as announced on May 16 2019.

The addendum is intended to highlight key recommendations and issues that will need to be considered to guide the optimal staging and sequencing of the LGWM programme as it is further developed through the more-detailed business case work. As such it should be read in conjunction with the LGWM Staging report.

1. INTRODUCTION

1.1. Purpose

This report summarises the early considerations to guide the optimal and ongoing process to consider the staging and sequencing of the LGWM programme.

This report has been developed to inform and support the release of the Recommended Programme of Investment (RPI) or other programme options. It should be read in conjunction with the RPI and the LGWM draft Programme Business Case (PBC).

This report also explores early concepts relating to the 'design of the transport system transformation' by outlining the key considerations and ongoing work that will be required to guide the development and management of the staging and sequencing of the delivery of the programme. This is considered in the context of a 'system transformation' approach whereby the delivery of the LGWM programme will fundamentally transform the transport system and urban form opportunities of Wellington over a 15-25 year period.

The report is set out covering the following matters:

- Potential high-level staging of the programme to inform the development and release of the Recommended Programme of Investment (RPI)
- Key interdependencies of programme elements, including areas requiring further investigation
- Project delivery requirements and potential timelines
- System transformation considerations and lessons from similar programmes
- Managing change and delivery on the network
- Managing changes and disruption to service connections (3 waters, electricity, communications)
- Conclusions and next steps

1.2. Limitations

The analysis and advice set out in this note is based upon the RPI documentation and available details of the programme elements. Given the programme remains at a PBC phase of development, there are significant limitations on the level of detail available, including delivery and funding models, scope and complexity of projects.

The report has been developed for the purpose of informing the development of the RPI and subsequent stages, not as a decision-making document nor does it represent recommendations on the final form, staging or sequencing of the RPI.

This means that the analysis of potential staging and sequencing considered in the document is indicative only and will require significant and ongoing work to refine and confirm as the programme is further developed.

This report was initially commissioned to consider the whole of the RPI, however during its development further options have also been developed to look at possible phasing of delivery based on a proposed investment programme. These options are explored below, but it is noted that these have continued to evolve as options for funding and delivery are explored. The information in this report will therefore likely require further updates to help shape the delivery of the programme as commitments are made.

2. POTENTIAL HIGH-LEVEL STAGING OF THE RPI

2.1. Importance of a well-staged and sequenced programme

Let's Get Wellington Moving (LGWM) is an alliance between Wellington City Council (WCC), Greater Wellington Regional Council (GWRC), and the New Zealand Transport Agency (the Transport Agency). LGWM seeks to deliver an integrated transport system that supports the community's aspirations for how Wellington City will look, feel and function. The Recommended Programme of Investment (RPI) or a staged investment option for LGWM will be announced in early 2019.

The RPI represents the biggest transport investment programme ever in central Wellington. The full RPI would take some 15-25 years to be delivered and in the process would transform the transport system of central Wellington and enable a range of urban development, social and economic outcomes.

This scale of investment has never been delivered in Wellington. The programme is a whole-of-network solution. The success of the programme is therefore reliant on not just realising the benefits from all the individual elements within the programme, but also achieving success through the order in which they are delivered and how they are delivered.

The way in which the transport system is transformed and how this is managed will directly impact the performance of the transport system (during and post-delivery), effects on the communities of Wellington and ultimately the benefits of the programme.

Delivery, staging and sequencing of LGWM therefore must be effectively planned, managed and delivered to avoid or manage critical programme risks.

These risks include failure to deliver key programme elements, unacceptable social and economic impacts, cost escalations, project delays, failure to realise the programme benefits and loss of social licence.

2.2. Development of a staging and sequencing proposal for the RPI

To begin to plan this sequencing and to inform the RPI and other related work, such as potential financing and the delivery model, an initial view of the staging and sequencing of the programme was developed through a workshopping process involving a range of professional skills and experiences, drawing upon information in the RPI / PBC.

This has fed into and informed the development of options for phasing of the programme based on potential investment options. *It is noted that at time of completion of this report this was an ongoing process.*

2.3. Programme interdependencies

A key principle developed through consideration of staging options was that the critical interdependencies between the programme elements and lead / delivery times provides a robust starting point for development of proposed staging and sequencing of the programme.

Critical interdependencies and delivery times include the following:

- Work or projects that must be completed before another project can be delivered because they utilise the same land or roadspace (eg. The Waterfront Quays)
- Enabling works to relocate or protect services or facilities
- Enabling works or projects to create behavior change, or additional network capacity required before another project can get underway as the programme will significantly reduce network capacity during construction
- Lead times include detailed business case development, design, consenting, engagement, property and enabling works. In some cases these are very significant

- Construction times including enabling works, service relocations and mitigation works

2.4. Wider programme considerations

The critical interdependencies and assumed lead times were then informed and adjusted through consideration of a range of strategic and practical considerations, such as how staging and sequencing of the programme elements can best ensure:

- alignment with the LGWM programme principles and objectives
- realization of the LGWM benefits
- value for money (right things, right way, right time, right price) to ensure overall programme benefits
- enabling and facilitating customer behaviour change and positive experiences of the system as it transforms eg. Take people on the journey and help to change to new ways of moving in Wellington
- Equity and distribution of benefits for different communities and user groups
- minimising the system disruption to the communities of Wellington over the life of the construction and delivery process eg. Including unacceptable network disruption to residents, businesses, commuters etc
- programming constraints such as market capacity to deliver, consenting and approvals processes and social and environmental impacts eg. How long is the lead time or construction time for each programme element and how much capacity has the market got to deliver the programme

How these are balanced and weighted requires careful and ongoing consideration. Eg. is it more important to deliver PT elements early, even if this means increased network disruption during construction?

Other considerations include funding availability and cash flows. These are all legitimate considerations in the staging and sequencing of the programme, and the importance of different factors will change over time.

It is important that staging and sequencing is therefore considered as an ongoing process of refinement as the programme moves forward. As noted above, this is an ongoing process – so some elements of this report may have been superseded by ongoing work.

Based upon these interdependencies and considerations, an initial potential high-level staging was developed as set out below for further development should the whole RPI be pursued.

If a sub-set of this wider programme is confirmed as the agreed programme, further testing and analysis of this will be required, informed by this report.

2.5. Key considerations informing this proposed staging of whole of RPI

The tables below summarise the key considerations that have informed this possible staging. Key interdependencies and lead / delivery times are expanded on in subsequent sections.

The initial approach to possible staging was to group programme elements in early, medium-term, and later-term blocks. As noted above, there are a range of ways that staging of the programme could be configured, depending on strategic imperatives and funding availability. The blocks below provide a guide for developing different options.

- **Early start programme (approx. years 1-5).** These are mainly works that are considered essential early interventions that have short lead times, interdependencies, or are needed in order to prepare for the delivery of the major programme components. Most are works that should be progressed as soon as possible under any delivery or funding models due to the high benefits and enabling nature to facilitate travel behaviour change

- **Medium-term programme (approx. years 6-12).** This includes some of the most significant delivery elements of the programme, including mass transit. These works tend to have longer lead times, are more complex and have a number of interdependent projects that need to be delivered to enable reliability of the network during delivery. Smarter pricing is included in this block of time
- **Later-term programme (approx. years 11-20+).** The later-term programme includes elements that have very long lead times, significant precursor projects, may only be needed if high population projections are reached, or have lower benefit / cost ratios

2.6. POTENTIAL EARLY START PROGRAMME ELEMENTS – APPROX. YEARS 1-5.

Programme elements	Interdependencies and rationale	Lead and delivery times
<p>Early improvements</p> <p>Walkable city¹</p> <p>Connected cycleways</p>	<p>These are all early enabling works that do not have any significant interdependencies or precursor projects [N.B. Scope to be confirmed through early improvements programme] and will begin to facilitate travel behaviour change.</p> <p>Walking and cycling improvements deliver significant benefits relative to cost.</p> <p>There will be reasonable lead times in terms of planning and stakeholder engagement as they will involve significant parking and road space reallocation issues and the work needs to be designed to take account of later projects' requirements.</p>	<p>Early improvements 3-4 years planning and delivery</p> <p>Walkable city: 4-7 years planning and delivery</p> <p>Connected cycleways: 3-4 years planning and delivery</p>
<p>Better public transport connections to the north</p> <p>Public transport connections to / through the City</p>	<p>Enhanced public transport connections from the north as well as to and through the city are key to enabling travel change for a significant proportion of the travel demand in Wellington by providing a significant alternative way of moving people.</p> <p>Public transport improvements to the north have a relatively high BCR.</p> <p>The works need to be linked to rail service improvements delivered outside of the LGWM programme to deliver anticipated benefits.</p> <p>Public transport connections to and through the city will have significant planning and engagement requirements as the works will involve significant parking and road space reallocation issues. Works need to be carefully managed to mitigate business impacts and public transport service disruption.</p> <p>An aggressive approach to delivery is assumed to enable construction to begin by 2021 for public transport through the city.</p>	<p>Better public transport to the north 3-5 years planning and delivery</p> <p>Public transport connections to and through the city –</p> <p>4-5 years planning / design / consenting / property</p> <p>4-5 years for construction</p> <p>These stages can be overlapped to some degree = 6-8 years total</p>
<p>Mass transit planning and enabling works, start of construction</p>	<p>Mass transit has significant lead times in terms of planning, design, consenting, property and engagement. In addition, service relocations to enable construction are estimated to take some 2-3 years.</p>	<p>Minimum of 7 years of planning / design / consenting / property</p> <p>4 years for service relocations</p> <p>5-7 years for construction</p>

¹ Walkable city is walking improvements outside of early improvements i.e. longer-term programme.

	<p>Works for Mass Transit along the Quays needs PT connections through the City to be completed to avoid significant PT disruption.</p> <p>Construction of MT through Newtown area needs the completion of better access to the East and Basin improvements to avoid significant PT disruption and to maintain network capacity. This affects both stages of MT</p> <p>An aggressive approach to delivery is assumed to enable early construction to begin by 2025.</p>	<p>These stages can be overlapped to some degree = 10-13 years total</p> <p>Timing is very dependent on the mode of MT</p>
<p>Urban development integration. Smarter Transport and Smarter pricing</p>	<p>Urban development integration, Smarter Transport (technology, integrated operations, demand management) and planning for Smarter Pricing should begin as soon as possible to enable benefit realisation through expected land use and travel behaviour changes.</p> <p>These will have some long lead times and timing of implementation of pricing is key to travel demand management and the staging of options. It is recommended that pricing is implemented following completion of improved PT from the north and to / through city c. 2024. But before MT works commence to minimise impacts on the network</p>	<p>Minimum lead times:</p> <p>Urban development 3-5 years²</p> <p>Smarter transport 3-4 years</p> <p>Smarter pricing 2-3 years³</p>
<p>Better connections to the east – Improving the Basin</p> <p>Mt Victoria Tunnel and Ruahine St</p>	<p>Improving the Basin and Better Access to the East help provide network capacity to enable construction of Mass Transit through CBD and to Newtown.</p> <p>Planning work also needs to start early to ensure Value for Money (VfM) in design and delivery aligned to design of mass transit – particularly where corridors overlap.</p> <p>The projects have significant design and property / consenting / stakeholder issues to work through meaning long lead times.</p>	<p>6-8 years of planning / design / consenting / property</p> <p>4-6 years for construction</p> <p>These stages can be overlapped to some degree = 10-12 years total</p>

² Timeframes for this element will depend on scope and project components

³ Timeframes for this element will depend on scope and project components

2.7. POTENTIAL MEDIUM-TERM PROGRAMME ELEMENTS – APPROX. YEARS 6-12

Programme elements	Interdependencies and rationale	Lead and delivery times
Public transport connections through the City	Completion of works to enable the start of Mass Transit construction along the waterfront quays and implementation of pricing.	Estimated completion by 2025
Mass transit construction of CBD to Newtown Planning and delivery Newtown to Airport	As above - an aggressive approach to delivery is assumed to enable construction to begin by 2022 and completion by 2028. Newtown to airport to be planned in parallel with CBD to Newtown. Construction to begin linked to delivery programme of CBD to Newtown to deliver VfM approach.	CBD to Newtown: Start construction 2025 and completion by 2030 Newtown to Airport: potential for start construction 2026 and completion by 2031
Smarter pricing implementation	Pricing implemented following completion of improved PT from the north and to / through the city c. 2024.	Implementation c. 2025
Better connections to the east – improving the Basin, Mt Victoria Tunnel and Ruahine St	Construction to begin by 2025 and completion by 2029. Completion of better access to the East is required before Mass Transit is constructed through Newtown to avoid significant PT disruption and maintain and network capacity.	Start construction 2025 and completion by 2029
Reclaiming Te Aro – planning and enabling works	Significant lead times for planning, design, stakeholder, property and engagement issues.	Minimum of 6-8 years of planning / design / consenting / property

2.8. LONGER TERM PROGRAMME – APPROX. YEARS 11-20+

Programme elements	Interdependencies and rationale	Lead and delivery times
Mass transit construction of Newtown to airport	Completion of construction by 2031.	Start construction c. 2026 and completion by c. 2031
Terrace Tunnel duplication Ngauranga to Aotea Quay widening	No significant precursor projects. Lower BCR so timing to be considered in relation to future demand and population growth following implementation of improvements to PT, Mass Transit and Pricing. Timing may need to be aligned to completion of Reclaiming Te Aro.	4-7 years of planning / design / consenting / property 3 years for construction These stages can be overlapped to some degree = 9 years total

<p>Reclaiming Te Aro – construction</p>	<p>Has very long lead time, including an estimated 3 years of services relocations leading into construction proper.</p> <p>Lower BCR so timing to be considered in relation to future demand and population growth following implementation of improvements to PT, Mass Transit and Pricing.</p> <p>Potentially significant network disruption during construction meaning network capacity needs to be carefully managed, including timing relative to other projects.</p>	<p>Minimum of 7-9 years of planning / design / consenting / property</p> <p>2-3 years for service relocations</p> <p>4-6 years for construction</p> <p>These stages can be overlapped to some degree = 13-15 years total</p>
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2.9. Alternatives and options to this potential staging

As noted, a range of alternative options do exist for staging and sequencing the programme.

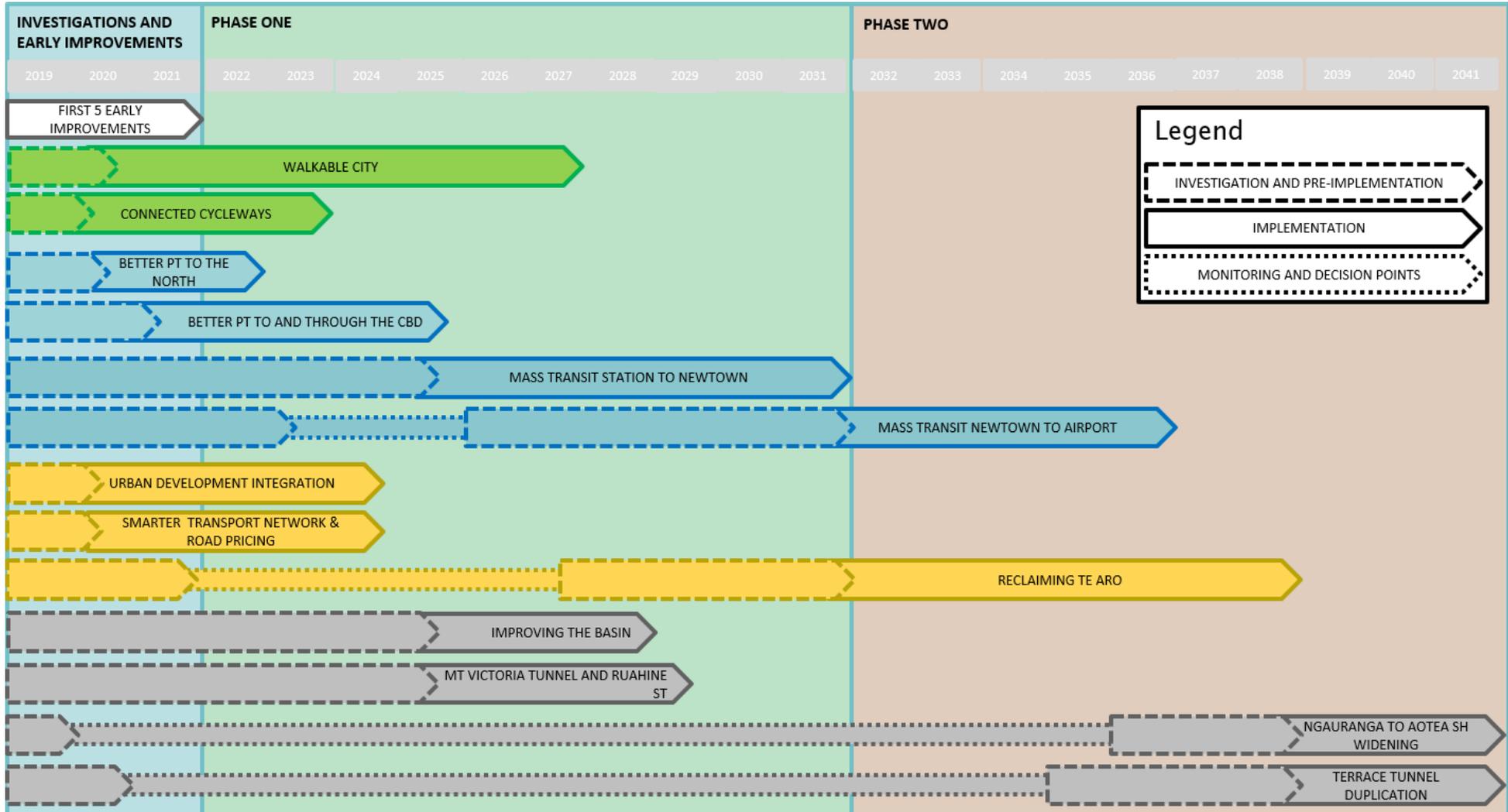
These were further discussed and considered as part of the options for phasing the programme. The main reason for this was to explore options for funding of the programme over time. Principally these include:

- Options to deliver Reclaiming Te Aro earlier
- Options to deliver both sections of mass transit earlier

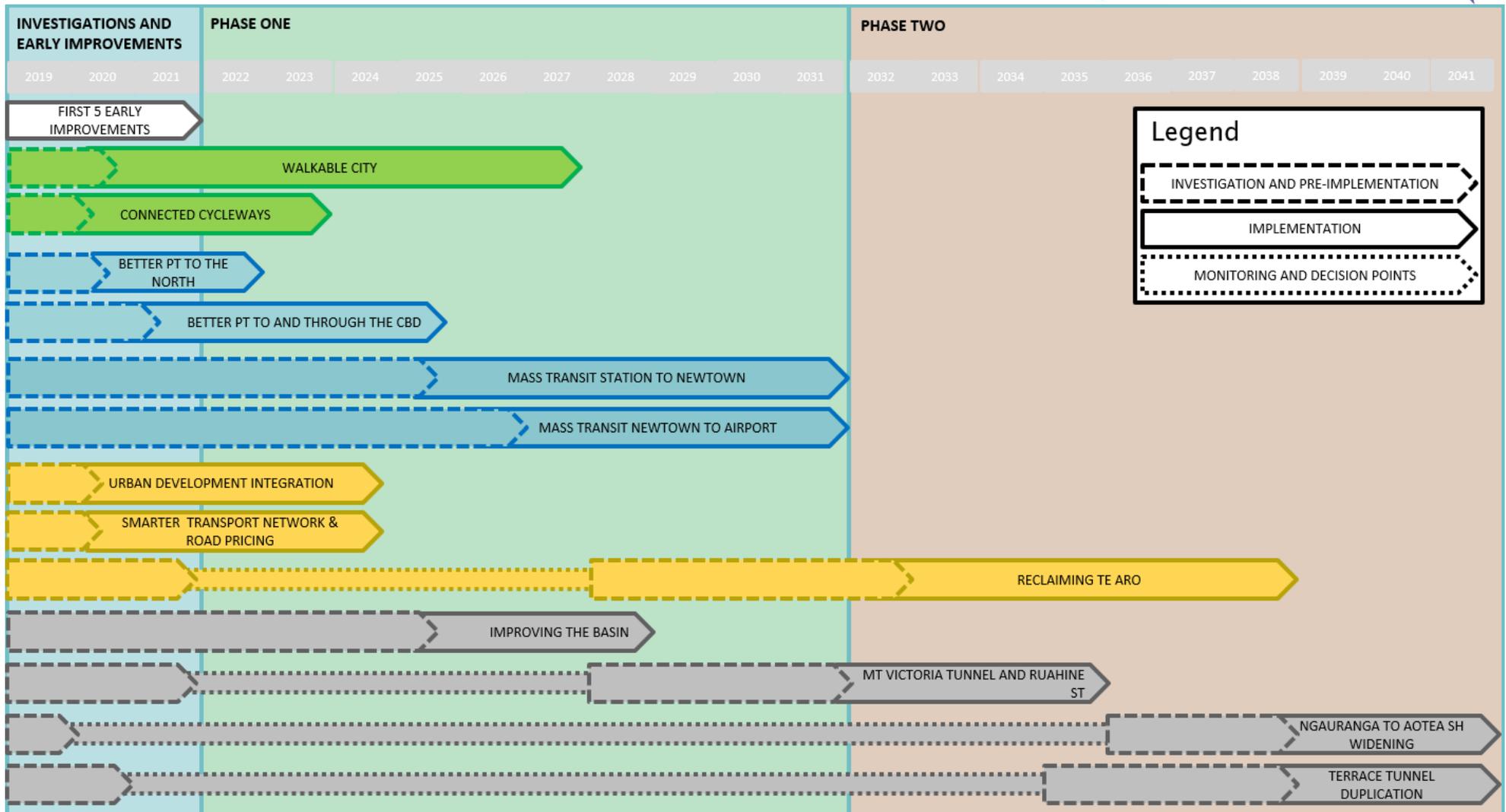
The form and route of mass transit will be confirmed through the next stage of the project. This will also lead to other potential options for staging and sequencing. Options discussed in this paper are based on an assumption of light rail. If this is not the case and another form of mass transit, such as bus rapid transit, is selected this will allow a significant reduction to the time and complexity of delivery. This is primarily due to the significant space and below-ground infrastructure impacts of construction of light rail.

Let's GET Wellington MOVING

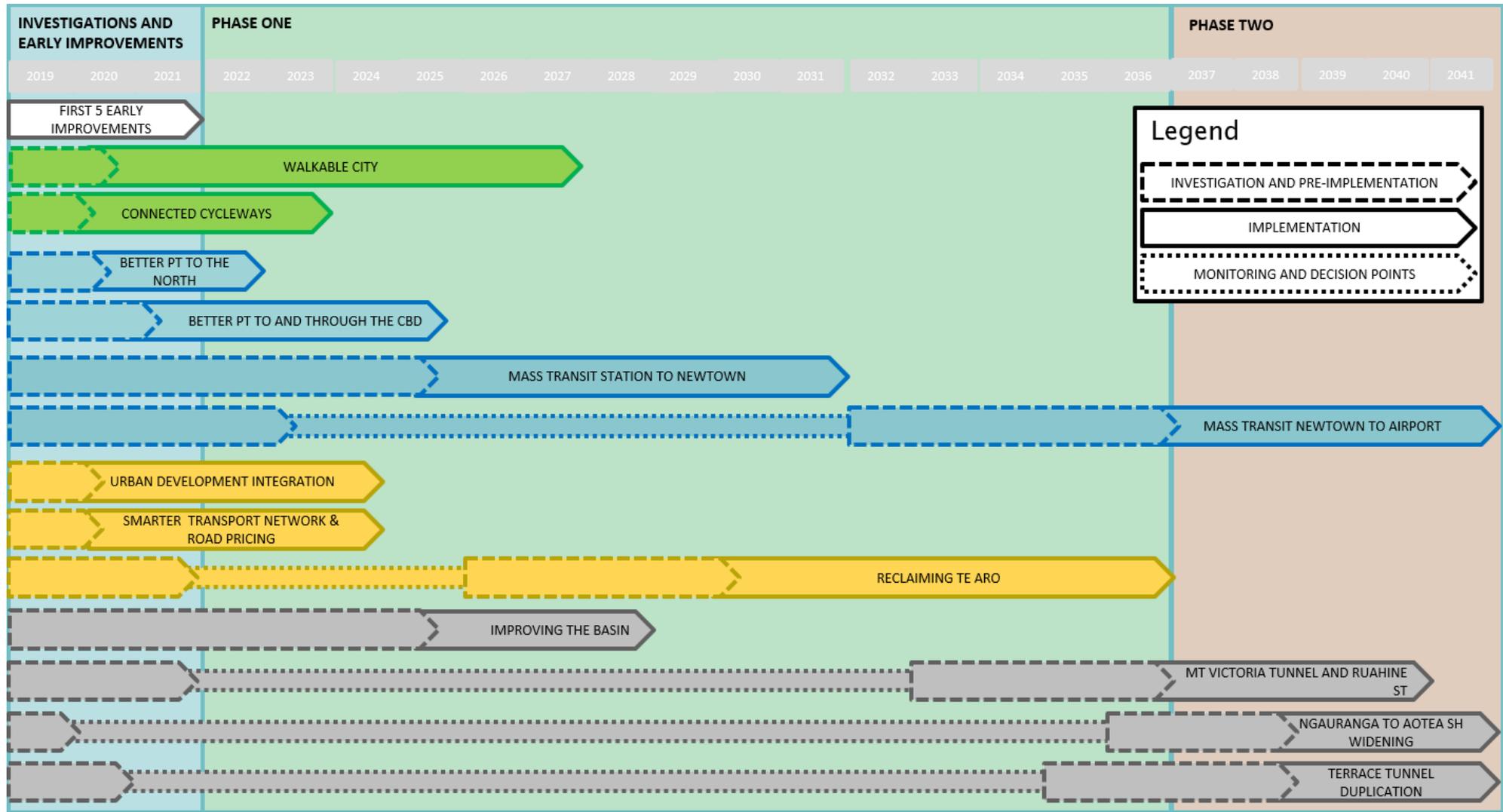
Programme Phasing Option 1: Deliver Mass Transit to Newtown phase 1, mass transit and reclaiming Te Aro Phase 2



Programme Phasing Option 2: Deliver Mass Transit to Airport phase 1, reclaiming Te Aro Phase 2



Programme Phasing Option 3: Deliver Mass Transit to Newtown and reclaiming Te Aro phase 1, mass transit to Airport Phase 2



Legend

- Investigation and Pre-Implementation (dashed line)
- Implementation (solid line)
- Monitoring and Decision Points (dotted line)



3. KEY INTERDEPENDENCIES OF PROGRAMME ELEMENTS AND AREAS FOR FURTHER CONSIDERATION

3.1. Tension points in the proposed staging

There are some critical tension points in any possible sequencing that will require further and ongoing testing. Once the phasing of the programme is confirmed, a full review of optimal staging and sequencing will be needed.

Considerations include:

- Clarifying the independencies of the project elements – this will be informed by the detailed business case phase, detailed design, statutory and property requirements and the delivery model(s)
- More certainty of the lead and delivery times of projects – needs same information as above (see section 4)
- Mass Transit - when can early start of construction and delivery occur. This will be largely informed by final route and form decisions for mass transit. It will be challenging to begin construction before 2022 with main works more likely from 2023-24
- Form and route of Mass Transit also has major impacts on the wider programme delivery – cost, time, complexity, risk, stakeholder impacts, services. Until this is finalised, the staging of the wider programme cannot be confirmed
- Transport Pricing – the timing of pricing relative to the delivery of other projects. Pricing may encourage mode shift and the degree of change will need to be modelled under different scenarios. This may remove some interdependencies if it can free up sufficient network capacity
- Delivery of longer-term State Highway corridor improvements – in particular Terrace Tunnel, Ngauranga to Aotea. What triggers should be considered for these in terms of network reliability and population or demand growth?
- Rail network and service improvements to the north need to be delivered in synch with the LGWM programme. These will be delivered outside of the LGWM programme, but provide critical enabling capacity for alternatives to car use

3.2. Other considerations needing further testing

Other considerations that this proposed sequencing will need to test and refine further include:

- Ensuring value for money (right thing, right time, right way) and ensuring that the staging and sequencing helps to ensure a positive BCR across the life of the programme and manage cash flows. This includes carefully managing the timing of the high-cost elements of the programme such as Mass Transit and reclaiming Te Aro
- Opportunities may exist to connect procurement and delivery of Mass Transit with CC2A light rail in Auckland may provide capacity and value for money opportunities
- Managing the impacts of parallel delivery of multiple major projects, including how many worksites are feasible or acceptable at any time – this includes from both market capacity and public acceptance considerations
- Managing network capacity and reliability throughout the delivery of the programme for all modes to ensure people and goods can still move through the city, including minimum requirements for PT as well as resilience and lifeline functions

- Capacity of the professional services, construction and materials (e.g. concrete) industries to deliver the programme as well as other work planned in the region such as Airport and CentrePort works (see section 4.4 below)
- Aligning wider infrastructure maintenance programmes and upgrades such as 3 waters, telecommunications, power, road maintenance etc
- Stakeholder engagement, consultation, consenting and property challenges are significant and will have major implications for staging, sequencing and realistic timeframes. There may be opportunities for fast track approaches to statutory approvals
- Equity in terms of when different communities of Wellington or user groups get benefits from the programme e.g. residents to the east and south receive limited benefits until either improved access to the East or Mass Transit to Newtown are completed = later than 2026

3.3. Further interdependencies and testing these

The tables of the sequencing blocks above outline a number of key interdependencies. It is likely that there are further interdependencies that have not yet been identified. Further investigation into interdependencies will be undertaken as part of the process of developing the programme.

It is proposed that the interdependencies will form part of a set of MCA criteria that are used to continuously test and refine the staging and sequencing of the programme.

For interdependencies this could be based on the reasons for the interdependency. The criteria could be:

- Impact on travel equity
- Extent to which construction of subsequent elements is enabled
- Mitigating effects of travel during construction
- Alignment with political expectations
- Reduces project risk
- Mitigating effects of travel after construction

There is also further work required to test and understand the nature of the interdependency.

4. PROJECT DELIVERY REQUIREMENTS AND POTENTIAL TIMELINES

4.1. Approach

Developing accurate lead and delivery times is challenging at this point in time as there remains significant detail to be developed which has impact on a range of issues such as legislation, design, consenting, property, construction risks and stakeholder engagement.

Based upon what is known about each of the programme elements, and drawing upon experience and knowledge of similar projects, the estimated delivery times for each programme element has been estimated.

These include breaking each project down into appropriate delivery phases including:

- Business Case, Investigation, and Reference Design
- Consultation
- Consenting
- Property
- Specimen design and service relocation strategy
- Specifications and detailed design
- Early works
- Construction
- Handover

4.2. Assumptions

This process identified a wider range of assumptions and issues that would require further investigations or confirmation, such as property availability, consenting issues, scope of elements, construction methodology etc.

All of these would require further consideration as each programme element moved through the stages outlined above. As a project moves through these stages, more is known about the scope, risks and timeframes. At this point, all the projects in the LGWM programme remain relatively conceptual and a number of assumptions must therefore be made about scope and delivery approach.

This has informed the estimation of project timeframes, which are considered relatively robust for this stage of the programme. It will however be possible to refine these moving forward – which may present some opportunities for time and cost savings.

4.3. Estimated delivery times

Based upon this process, ranges for total time to deliver any programme element can be developed and factored into different options for staging and sequencing any agreed programme. The times outlined below are from year 1 and do not take into consideration the staging and sequencing of a total programme as outlined above. As a result, there may be opportunities to accelerate some projects if delivered as part of a considered sequence, and some projects may be determined to need to wait for other elements to be implemented before commencing construction.

Further discussion on the potential assumptions, challenges and timelines for the biggest projects – mass transit and Reclaiming Te Aro are set out in Appendix 2.

Estimated Delivery Times

Programme elements	Total years to complete	Key assumptions ⁴
Early improvements	3 to 4 years	Assumes large corridor work (e.g. Golden Mile and Hutt Road/Thorndon Quay) is undertaken to a trail installation level of finish. Does not implement placemaking or beautification initiatives. Large volume of simultaneous work assumes that industry has capacity and disruption is manageable.
Walkable City	4 to 7 years	Assumes some typical urban improvements like lighting and areas of paving, improved access across roads.
Connected cycleways	3 to 4 years	Intended to be delivered as part of early improvements packages.
Public transport to the North (Hutt Road / Thorndon Quay)	3 to 5 years	Assume corridor width reallocation, minor priority and civils. Scope includes cycling improvements and some pedestrian improvements. Assume no widening beyond road reserve, hence no designation.
Public transport to / through the city	6 to 8 years	Assumes minor civil work, some signal changes, and associated placemaking enhancements (Golden Mile assumes full placemaking enhancement). Assumes moderate level of complexity for related services work but not full service relocation/upgrade. Assumes only WCC land is needed.
Mass transit to Newtown	10 to 14 years	Assumes, for the purpose of evaluation, LRT along LGWM preferred alignment with no feasibility issues. Assume investigation includes entire mass transit system and related bus changes. Assume a planning alliance to deliver planning and consenting. Assume once consents are granted the physical works are procured separately. Assume simplified construction sequence of services, slab and stations, track and rolling stock. Assume that three different sections can be worked on simultaneously. Assume funding for property available from outset, and acquisition starts on properties that are highly likely to be required (risk of alignment change as part of BC). Assume property industry capacity (risk). Assume planning alliance is established to undertake planning, consenting and reference design for route to Newtown. Assume traditional consenting path as nationally significant without legislation (board of inquiry without high/supreme court appeals). This programme is courageous, there is an extreme risk of rework and sunk cost from design acceleration and service relocation prior to obtaining consents. Assume road closures through Newtown township and centre are accepted by community. Assume two large TOD style stations and one medium station between station and Newtown (railway station, Te Aro Park, Basin respectively). Assume interdependencies between slab and large stations are well understood and mapped.

⁴ If any of these assumptions prove incorrect, this has the potential to impact significantly on timeframes, risks and scope of programme elements

Mass transit Newtown to Airport	11 to 15 years	<p>Assumes, for the purpose of evaluation. LRT along LGWM preferred alignment with no feasibility issues.</p> <p>Assume investigation includes entire mass transit system and related bus changes. Assume a planning alliance to deliver planning and consenting. Assume once consents are granted the physical works are procured separately.</p> <p>Assume simplified construction sequence of tunnel, services, slab and stations, track and rolling stock.</p> <p>Assume that three different sections can be worked on simultaneously.</p> <p>Assume funding for property available from outset, and acquisition starts on properties that are highly likely to be required (risk of alignment change as part of BC). Assume property industry capacity (risk).</p> <p>Assume planning alliance is procured to undertake planning, consenting and reference design for route to Airport.</p> <p>Assume traditional consenting path as nationally significant without legislation (board of inquiry without high/supreme court appeals).</p> <p>Assume one medium station at the Airport.</p>
Ngauranga to Aotea Quay southbound 4 laning	5 to 7 years	<p>Assume scope is four-laning with rebuilt Aotea Quay off-ramp lane drop and additional work to provide specialised port access (Thorndon overbridge seismic performance out of scope).</p> <p>Assume a simple process with no property issues and related delays with GWRC and Kiwirail.</p>
Terrace tunnel duplication	8 to 10 years	<p>Assumes some variation of duplication scheme.</p> <p>Assume minor property requirements resulting from additional investigation. Main risk is potential to need town belt land.</p>
Reclaiming Te Aro	12 to 16 years	<p>Assume funding for property available from outset, and acquisition starts on properties that are highly likely to be required (risk of alignment change as part of BC).</p> <p>Assume alliance delivery model that is lined up during BC approvals. Alliance scope to deliver planning, consenting, design and construction.</p> <p>Assume traditional consenting path as nationally significant without legislation (board of inquiry without high/supreme court appeals).</p> <p>Potential fatal flaw in traditional consenting pathway as heritage not covered by Bol process and project likely to have significant heritage impact.</p> <p>Assume cut and cover methodology due to grades and access points.</p>
Improving the Basin	9 to 11 years	<p>Assume that scope includes a structure, and grade separation of westbound movements as a minimum.</p> <p>Assume Bol consenting process with some opposition.</p>
Mt Victoria tunnel duplication and Ruahine St widening	10 to 12 years	<p>Assume duplication methodology similar to previous scheme.</p> <p>Assume Bol consenting process with some opposition.</p>

4.4. Interconnected programme enabling works - public transport to the north

As noted above, a key programme of work outside of LGWM that is considered critical to enabling modal shift and thereby reducing network impacts during delivery of the RPI is the Unlocking Network Capacity programme of rail improvements to be delivered between GWRC and KiwiRail.

The timing and risks of delivery of this programme will need to be confirmed working with GWRC and KiwiRail and fed into ongoing analysis of the staging of the programme. It is noted that these works may be identified as part of the Early Start programme.

4.5. Other major construction projects

In addition to LGWM, there are a number of other major infrastructure programmes planned for delivery over a similar period of time. These will have impacts on the potential staging, sequencing and delivery times of LGWM (such as competition for professional services and construction capacity) and will have requirements in terms of the transport network for construction (eg. reliability for construction vehicles).

Some of the key projects that need to be considered are listed below. Analysis should consider the inputs and resource requirements of each project, delivery timelines and transport system / stakeholder interdependencies with LGWM.

- CentrePort resilience and rebuild programme
- Ferry terminal redevelopment, including access requirements from SH1 and local network
- Wellington Airport runway extension
- Cross Harbour pipeline
- New Petone to Grenada SH link
- Petone to Ngauranga SH2 resilience / cycleway
- Riverlink / Melling interchange
- Otaki to Levin SH1 corridor

5. SYSTEM TRANSFORMATION CONSIDERATIONS AND LESSONS FROM SIMILAR PROGRAMMES

5.1. Thinking about urban comfort and keeping a vibrant city for people

Appendix 1 is a think piece relating to how to manage and minimise the disruptive effects of big infrastructure programmes on businesses and communities.

This think piece highlights the following issues and considerations:

- Big infrastructure is disruptive. Disruption is more than the road, it's how livelihoods of everyday businesses in the city are affected by major infrastructure investment
- Mass transit projects (such as Sydney Light Rail) have been very challenging to deliver – running into cost and time overruns and significant stakeholder impacts
- This impacts on 'urban comfort' – people enjoyment and use of the city, and on businesses
- LGWM programme needs to consider how to provide alternative places for people and businesses to exist and thrive during delivery
- This can draw upon lessons from the Christchurch rebuild and disaster relief responses elsewhere to consider opportunities for business relocations and people places.eg
 - How can LGWM help businesses adapt to/transition away from affected areas during periods of major, disruptive construction.
 - Where can LGWM create vibrant micro-communities?
 - Can these micro-communities be centred around or located close to future permanent communities and transport hubs?
- The think-piece also explore how disruption may or may not be a given outcome depending on technological innovations in the next few years. Regardless of the type of mass transit system LGWM chooses to invest in, the project should consider corridor transformation from the outset in order to realise the true benefits of the investment in public transport that comes later. Designing the corridor and planning a series of vibrant micro-communities in stages can lead to less disruption, and provide business with a pre-project choice to move or stay should significant infrastructure investment occur.

These considerations need to be factored into the resourcing, funding and mandate of the LGWM programme as it moves into the next phases of planning and delivery.

6. MANAGING CHANGE AND DELIVERY ON THE NETWORK

6.1. Managed and coordinated change

The RPI programme proposes fundamental change to the operation of the transport system – this will be an ongoing process of change over the next 15-25 years during delivery of LGWM. Delivery of the RPI will also require a fundamental change to both how the system is operated and how this change is managed to ensure benefits realisation, minimisation of the impacts of change and construction and retain an agile approach to the future programme needs.

For example:

- Impacts of delivery of very significant projects that will impact on multiple corridors for extended time periods
- Managing multiple concurrent work sites and projects and the impacts these have on transport, amenity, health and economic vitality of the City
- Managing significantly reduced network capacity during construction
- Impacts and reliability of construction traffic
- Needs and impacts of different modes, including reliability of public transport and safety for pedestrians and people on bikes
- The need to monitor and measure the changes on the network as programme elements are delivered – this is needed to inform and shape decisions on whether to deliver the whole of the RPI or when and how to make changes as the programme is delivered. It is also needed to inform day to day delivery of projects

6.2. A step change is needed

Wellington currently has in place a range of capability (people, systems, tools, information) to manage transport operations. This includes the JTOC, Wellington City permits systems and staff, as well as GWRC's management of the public transport system (including real time information). It also includes how parking is managed – both by WCC and private operators.

However, problems and limitations of the current capability include:

- This system is not fully coordinated and is designed primarily to manage BAU operations, events (such as crashes and weather impacts) and localised construction projects.
- The system is also not designed to plan for, manage and respond to change over a range of time periods from longer term to day to day, or between modes, in an integrated way.
- Powers and controls for managing the transport system are also limited and fragmented, which may mean they are too slow to be able to respond in an agile way to the level of change planned.

Change is needed to manage the challenges of delivering the RPI, this needs to be treated as a full change process and further tested and investigated. Key shifts needed are likely to include those outlined in the table below. It is recommended that as part of developing the delivery model for LGWM, these are further explored and tested to confirm how these can be integrated into the delivery model (see section 6.3 below).

Potential key shifts in network change management

From	To	Considerations
Fragmented resources and systems across multiple agencies	Coordinated and seamless capability – taking whole of city and customer approach	Currently the system works together but is not fully integrated or coordinated. A whole-of-city, whole -of-system, multi-modal customer focused approach is required
Limited or slow powers and controls e.g. parking controls	Sufficient power and controls to deliver the outcomes needed	This will need to be considered in relation to the powers of what the delivery agency for LGWM is, residual powers of the partners and where these fail to provide sufficient leverage to manage the network, or responsiveness for the speed of change needed
Focused on operations and not fully linked to strategic planning	Strategic and operational view integrated	The system needs to be able to integrate a long-term strategic view (10-15 years), with a tactical plan for the next 2-5 years, with a detailed programme for the next 24 months and operational management for the next 6 months including day to day network optimisation. Staging and sequencing of the programme and programme elements needs to be considered an essential and ongoing part of the delivery of LGWM
Limited capability and capability	Significant and well-resourced capability and capacity	This will be needed to help manage impacts of multiple work sites, but also integrate from strategic to operational. It will need sufficient people, systems and tools to manage this challenge
Systems focused on operational needs	Enhanced systems, planning tools and information to enable both day to day operations and tactical planning	There is a need to not only manage delivery impacts, but to also monitor and model transport system change to inform and shape the sequencing and priority of the programme elements to follow – this is key to ensure that the forward programme continues to be tested and refined to maximise benefits and ensure value for money

6.3. Change process

These challenges and shifts will have to be integrated into the consideration of the integrated delivery vehicle (IDV) for LGWM and what this means for the accountability of this organisation in relation to the LGWM partners and the capability and systems that they will continue to manage.

Potential considerations and process for this may need to include:

- Engage and involve key people from across the partner organisations, including from the JTOC and journey managers
- Conduct a scan of existing capability (people, processes, information and systems)
- Consideration and review of international best practice
- Informed by the review of other significant transport programmes outlined in section 5 above, undertake design of future transformational capability requirements considering levels of operations and strategic planning are required
- Develop plan for the operational, programming and information tools required
- Design the change and capability building process needed
- Co-location or integration of functions from across partners

7. MANAGING CHANGES AND DISRUPTION TO UTILITIES SERVICE CONNECTIONS (3 WATERS, ELECTRICITY, COMMUNICATIONS)

7.1. Background

The RPI programme proposes the implementation of major initiatives that will have a significant impact on existing utility networks.

The implementation of projects like Mt Victoria tunnel duplication, Terrace Tunnel duplication, Basin Reserve will present significant risks to the programme from cost and timing perspectives due to the inevitable utility services conflicts across Wellington.

However it is the most disruptive projects, such as Reclaiming Te Aro and Mass Transit will raise the utility services risks to very high levels. An example of this is shown in Sydney Light Rail where the contractor is suing the Government for failing to adequately resolve service issues.

Spanish builder claims state failed to reveal full facts on light rail

7.2. Mass Transit - Light Rail - learning from overseas

Mass transit is an urban development project that will be very complex during its design and construction phases.

A proposal to build the mass transit as a light rail system would require significant planning and there have been some recent projects in Australasia that can be learnt from to ensure that similar or the same mistakes are not repeated, and that the decision makers involved in the delivery are well supported.

There are many examples of projects that experience these challenges; including the following.

7.2.1. Sydney Light Rail

"For every redundant utility find we have to go through a two- to four-week process to validate it, because if we snip it, something really bad could happen and we could take a telecommunication cable or something," said Transport for NSW CBD coordinator general Marg Prendergast.

'In documents tendered to the court, the contractor claimed a "critical part and key delivery risk" of the project was how they would deal with underground electricity infrastructure, including those owned by Ausgrid and other water and gas companies.'

The Sydney Light Rail Project is very similar in scale and scope to the potential Wellington mass transit project and therefore is an excellent case study to explore in detail at the early planning stages of the project.

The Sydney project has encountered significant issues (project time delays, cost increase, commercial business disruption, public impact etc.) with underground services. The extent of the problem as large as a \$1.1 billion claim and a law suit between the contracted parties.

The significant disruption caused during the Sydney Light Rail Project has triggered experts and thought leaders to review current industry standards and practices. New Zealand went through a similar experience during the Ultra-Fast Broadband Rollout and Christchurch Rebuild, resulting in better awareness and improved practices nationally. While the Sydney Light Rail Project has highlighted a significant risk perception around Wellington undertaking a similar Light Rail Project, it

has also created an opportunity to learn from Sydney's experience and apply those leanings to de-risk the Wellington mass transit project.

Clear out of senior bureaucrats overseeing Sydney light rail project

7.2.2. Canberra Light Rail

Capital Metro Minister Simon Corbell said the work is part of a broader \$1.3 million program of investigations that will inform the final business case for the first stage of the Rail Project.

"This was a major gas line strike and we have significant concerns around how Canberra Metro and subcontractors are identifying, recording and protecting utilities along the project route," Mr. Jones said.

Although there was a considerable investment in the pre-design investigations to limit the risk of utility strikes and an informed design; major strikes still occurred, leading to the project being shut down.

This case study confirms the need for a wider understanding of Australian and other international best practices and again creates an opportunity for the Wellington mass transit to set the best practice standard.

There are many other examples across Australia including the Melbourne Light Rail Project and internationally which identify the significant utility services risks presented with dense and urban environments.

7.3. Understanding and Managing Utility Services risk

To understand and manage the risk of utilities the development of a Utilities Strategy is essential. The high-level utilities strategy should consist of the following three chapters:

- Utilities engagement strategy
- Utilities investigation & Location strategy
- Utilities enabling works strategy

7.3.1. Engagement with Network Utility Owners

The Government Road Powers Act sets out the powers of the Road Controlling Authority (RCA), . These allow the RCA to direct the Network Utility Operators (NUOs) to carry out work and commit funding as per legislated requirements.

Impacts of transport projects on the NUOs internal planning and programming can be significant and has historically resulted in relationship issues and protracted decision-making by RCAs and NUOs. Aligning RCAs and NUOs around a shared objective of "best value" being achieved by everyone, while being cognisant of the RPI objectives must be prioritised by the RPI delivery team.

The relationship with the NUOs in reference to the RPI initially will be one which works through necessity rather than a genuine desire to achieve the best possible outcome.

The challenge for the RPI delivery team is to take the existing way of working with the NUOs and to grow it into something which results in the NUOs being proactive members of the RPI development and delivery team, to take the NUOs on the journey and encourage alignment between the RPI and the NUO's respective forward works programmes, to facilitate future urban growth through planning

network utilities upgrades outside of the just RPI, to achieve the best value for the public purse, and at all times to be cognisant of the existing urban communities and the facilities they enjoy.

The Utilities Engagement strategy will outline the vision and approach to the engagement with NUOs to ensure high-quality relationships and organisational alignment.

7.3.2. Investigating, Locating and Mapping the utility services

A major challenge the projects like Light Rail, Reclaiming Te Aro and others face is the co-ordination and avoidance of existing underground utilities. Utility clashes and conflicts at design and construction phases will be costly and disruptive.

Damaged utilities during construction present major health & safety risks and disruption to public. Having confidence in the nature and location of these utilities is critical to the success of the project. Providing accurate data to designers will reduce significant conflict risks and avoid utility strikes at the construction phase. Moreover, it will reduce time and cost of the RPI and minimise any health & safety risks for the construction crews.

The Utilities Investigation & Location strategy will outline the vision and approach to improve the quality of utility information data within the RPI boundaries.

7.3.3. Enabling the construction

As part of the implementation of the PRI including projects like mass transit, reclaiming Te Aro, etc the construction most certainly will be delivered in a staged fashion. The enabling packages including utility services relocations will be identified and delivered prior to mainstream construction start. The objective of the enabling works is to 'clear the path' for the main construction activities.

The Utilities Enabling Works strategy will outline the vision and approach to identify 'early wins' to accelerate the delivery of the RPI and major projects.

8. CONCLUSIONS AND NEXT STEPS

This report sets out a range of considerations to guide the staging and sequencing of the LGWM programme and to begin thinking around how to successfully guide the 'design of the transport system transformation'.

The scale of these challenges should not be underestimated, and the risks are high if this work is not undertaken effectively as an ongoing process as part of the planning, design and delivery of the programme. It needs to be considered an ongoing process and resourced accordingly as a core part of the delivery agency responsible for LGWM.

Once the agreed programme for delivery is confirmed, and as the programme moves into a more detailed investigation and design phase, the following work is recommended for further scoping and development:

1. **Further refinement of the optimal staging, sequencing and timeframes** of agreed funding. This will need to integrate with the investigation and design phases, funding models and delivery model for LGWM.

This work will need to draw upon and update the information set out in section 2-4 of this report, including programme interdependencies and sector partners to understand capacity challenges. This may also include development of more detailed tools and models to help test and refine more detailed modelling of staging and sequencing scenarios (this links to recommendation 3 below)

As part of the more detailed investigation and design phase and the criteria to inform development of the projects and the scope of these, consideration and weighting should be given to the implementation challenges, timing, risks and impacts.

The estimated project timelines and impacts in this report are based on assumptions relating to scope, risks, and delivery. At this point there remains a lot of detail to work through before there can be confidence in these.

While the overall stages required for each project are not likely to change significantly, many of the factors impacting on how long each stage takes can be changed. Some factors are in the control of the programme, and some the programme partners may be able to influence

Key opportunities that are in the control of LGWM to change are:

- Scope and complexity of projects – including service model and specifications
- Locations, routes and extent of projects e.g. Stage 1 of MT to Hospital rather than through Newtown
- Technology
- Delivery model (s) for planning and construction
- Costs and funding availability

Other opportunities that LGWM may be able to influence are:

- Enabling legislation / consenting
- Public and stakeholder acceptance of disruption

2. **Ensure that staging, sequencing and transport system transformation thinking is embedded in the design, resourcing and funding of the LGWM delivery model.** This capability and mandate needs to be clearly deigned into the form, function, systems and accountabilities of the integrated delivery vehicle
3. **Develop a step change in capability to manage operations planning and coordination.** This needs to be across all three partners to ensure that this has the capability to link from strategic long term view to

day to day operations management. This needs to be integrated with the mandate and scope of the integrated delivery vehicle of the programme and will require full buy-in from all three programme partners

4. **Engage with other major infrastructure programmes in Wellington Region** (see section 4.5). This should include processes and some form of working relationships to map programme timing and delivery to consider both opportunities and constraints
5. **Engage early with utilities operators and develop a strategic approach to managing the impacts on utilities.** This should also inform the scope, location and detail of projects as outlined in recommendation 1. This needs to be well resourced and prioritised
6. **Engage with and learn from other similar transformative transport programmes** to ensure lessons and tools from these are drawn upon and utilised as part of the LGWM programme
7. **Consider, plan and deliver broader opportunities to minimise the disruptive impacts of change** through engaging with communities to understand how to provide alternative business and people place opportunities during the delivery of the programme. This will require dedicated resourcing and funding.

APPENDIX 1: MINIMISING THE DISRUPTION OF CHANGE

Note: This think-piece is intended to raise a range of considerations to inform how the disruptive effects of delivery of LGWM can be managed and minimised during delivery. Its is designed to promote discussion and does not necessarily reflect the agreed position of Let's Get Wellington Moving or the programme partners.

STREET VALUE

Urban Comfort is a term used to describe how people value and perceive the space around them. It's more than just how pretty a space looks. It's a term that describes a combination of factors such as temperature, sunlight, shade, shelter, wind, noise and safety. It also describes the uniqueness of the space.

Visit any major urban centre and you will notice that major transportation corridors occupy significant space. This space is dominated by concrete and asphalt and in many instances, does little to enhance the actual amenity of the area. You will also notice that the little lanes and side streets that feed these corridors are where you find the vibrant street life. A blend of boutique shopping, café's, pop-up stores, artisan trades, and crafts. These spaces exist because of Urban Comfort; each space striking a balance of 'unique' with an inviting environment that's sheltered from the elements and the noise of the busy transport corridor.

What then, does Urban Comfort have to do with a transport investment programme?

Big infrastructure is disruptive. This is an inescapable fact. Modern cities are built above a maze of buried services and old streetscapes. Widening roads, adding lanes, digging tunnels or building light rail means navigating and relocating old infrastructure. Once we've moved the old, we then need to install the new. All this while keeping the shops and businesses open around us, and keeping the existing transport system moving. The result of all this is significant disruption, for extended periods of time.

Almost all 'lessons learnt' articles focus on the build itself; for example, can we deliver a project more efficiently, realise better benefits, deliver urban renewal, or, the hot topic; disruption. Specifically, how can we reduce planning risks around noise, visual impact, road congestion etc? What is missed is the effect on the local business environment. Disruption is more than the road, it's how livelihoods of everyday businesses in the city are affected by major infrastructure investment.

This section of the report therefore sought to review many of these articles, as well as informally quiz infrastructure personnel directly involved with implementing disruptive projects. Information from reviews and conversations has been used to test the topic of disruption for Let's Get Wellington Moving. Specifically we're looking through the lens of businesses affected by disruption and asking; what can we do differently, how do we prevent businesses shutting shop, and can we do better?

Doing Different means Thinking Different

The old analogy as we're told, is insanity is doing the same thing over and over again and expecting a different result. A jack hammer is noisy. A concrete cutter creates dust. A digger takes up a whole road, squeaking loudly with every turn. Programme managers before us have tried to identify ways to reduce disruption; everything from 'acoustic cutting booths' to reduce noise, and off-site fabrication to accelerate construction. Has anyone noticed a reduction in disruption?

The answer is no. Big infrastructure involves closing streets, creating noise, diverting traffic, and diverting people. A jack hammer, no matter how many ways its used, creates zero Urban Comfort. Perhaps our greatest lesson from the past is that disruption is expected. To change the outcome and achieve a different result we therefore need to do something very different.

Conversations with infrastructure personnel highlighted an interesting lens. Many tried to manage disruption through active communications with businesses and retailers. However; no one had tried to relocate businesses in a proactive sense before commencing a large, long-term project such as light rail. I.E., what if we removed businesses so we could be as disruptive as we like? Discussions highlighted the fact that this was not a practical approach for every city, but the thought does give rise to a possibility for those cities undertaking multiple projects at once, or those with narrow streets where disruption is unavoidable – ***what if we could at least give businesses a choice?***

We know big transport is going to close streets and drive people away. Naturally, the loss of people means the loss of custom to business that lines the street, a loss of economic productivity, and for many, the eventual loss of business entirely. The idea behind an offering that allows business to relocate first, then building transport second is simple; we instead need to invest in the Urban Comfort of the side streets, lanes and other spaces that will one day be fed by big infrastructure investments. These areas within our city become the haven for business to relocate to while upgrades take place along transportation corridors. These havens attract people. More people attract jobs, more business, and more investment.

The analogy is simple, provide businesses with a place to weather the approaching storm, and make these places more than just an afterthought. These places should be the foundation that enables the corridor transformation process.

Give Business Somewhere to Go

Retailers and shop fronts in the Wellington CBD rely on old fashioned foot traffic. Infrastructure upgrades affect this traffic, either through street closures or through general discomfort from construction effects turning people away. Disruptive effects are reduced in cities with wide streets or pre-designated transport corridors that can be re-purposed. Effective examples are seen in parts of the Newcastle Light Rail build where an old heavy-rail corridor has been redeveloped to support Light Rail. Cities like Wellington however are different. These cities were built in already constrained environments, with narrow streets and limited opportunity to support transport infrastructure growth. These cities must work with the space they have – a shared space.

The Wellington CBD is already space constrained. On top of this, businesses can't just relocate at a moment's notice. Many retail businesses have invested in shop fit-outs and are tied to term-based lease agreements. They can however relocate if given sufficient notice and opportunity to do so, or an attractive alternative community environment.

Examples of such communities have already been provided in New Zealand. The Christchurch earthquake provides once such example where the Re:Start container mall popped up in an effort to create a rejuvenated, attractive, shopping and lifestyle area while the city rebuilt. The mall was intended to operate for only six months while redevelopment plans got underway.

It was such a success however that it did not close for another six years. By the time it did, international travel guides even recommended it as a must-see tourist destination. A far cry from temporary business accommodation; this unique solution to a set of infrastructure challenges created a vibrant business and people-centric community free from infrastructure disruption.

Wellington therefore needs to consider the ***somewhere*** before it embarks on major transport upgrades. In particular:

- How can LGWM help businesses transition away from affected areas during periods of major, disruptive construction.
- Where can LGWM create vibrant micro-communities?
- Can these micro-communities be centered around or located close to future permanent communities and transport hubs?

Give People A Space to Access and Enjoy

We live in Wellington. If it's not raining then it's usually windy. There are a few sunny, summery days here and there but by in large we are at the mercy of some challenging weather conditions on more than one day of any given week. Giving business an alternative while big infrastructure digs up their street is one half of the equation. Giving people a reason to go to the space and enjoy it is the missing piece in the puzzle.

As stated, Urban Comfort is more than making a space look pretty. It has to be functional too. In Wellington, a functional space requires consideration of our environment, *in particular our weather*, and taking necessary steps in the design process to substantially remove these effects from impacting the space we are upgrading or regenerating. No one feels like sipping coffee in a quiet lane while a brisk Wellington Southerly rearranges the café furniture and blows the umbrella inside out.

This section of the report is not designed to canvas what design elements make a space enjoyable. Rather it focuses on why we should invest in creating alternative micro-communities for businesses; that also attract people. The coffee example above is the outcome. We need to dial back the clock to see how that person came to be sipping coffee in a regenerated lane in the first place (wind aside). This persons' decision to go to a space is likely made on the basis of a few quick calculations;

1. It's going to be easy to access.
2. It's going to be enjoyable and caters to needs at the time.
3. It's going to offer a mix.
4. There are no better alternatives given the current environment (time of day, weather, time of year etc).
5. It caters for more than one demographic and one market segment.

There are other factors, but these are a few of the basics. Quoted from the Courier Mail on the Gold Coast Light Rail project:

"United Firefighters Union secretary John Oliver said the congestion was "a disaster waiting to happen". "It's a nightmare," he said. "Wherever you turn, there are roadworks barriers, changed traffic conditions and stop-go people (traffic controllers)."

Closing or disrupting large tracts of Wellington's streets immediately creates an access challenge. Transport advocates may in turn suggest more frequent public transport services; however the catch is this caters only to a certain demographic. This is not going to encourage, for instance, parents with kids to jump on a bus instead of driving a car. Any parent with young kids will be able to quickly explain the reason for this.

Next, given the option, will people attempt to navigate roadworks, or find an alternative location to go? Poor access adds weight to the alternative decision. The alternative destination may normally be less desirable, but for lack of a parking space, an even footpath, or simply a quiet brunch in the weekend, people will now prioritise an alternative.

What we are trying to avoid, as quoted from the same Courier Mail article is:

Many frustrated Gold Coasters have questioned the decision to rip up roads to build the light rail, causing years of disruption and forcing some small businesses to the wall.

Wellington therefore needs to also consider **access and enjoyment** before we simply attempt to 'install infrastructure'. In particular:

- How can we still create an access-friendly city?
- How are we going to create micro-communities that are accessible?
- How is the access to these micro-communities going to be enjoyable?
- How can we effectively link these micro-communities during construction?
- How can we retain the magnetism of these spaces once the construction is moved on?

Create A Seven-Day Space

Have you ever walked along northern Lambton Quay on a weekend and noticed a lack of people? The central business district, in particular the land around parliament, is characterised by a large government-centric workforce. By day, the population in the CBD swells to over 110,000 people. By night, this population drops back to 30,000. This means many businesses in the northern-end are entirely reliant on foot traffic generated during the weekday; the same time construction crews will be putting up barriers, diverting footpaths and closing streets.

Giving people a reason to go to the city is not just a five-day reason; it's for all seven days of the week and all hours of each day. This reason doesn't just exist during a disruptive construction period either, it exists long after projects are completed.

This think piece noted above that big transport projects feed the lanes and side streets with people seeking enjoyable spaces. Phoenix, in the United States, invested in light rail back in 2008. Research identified that, although it has taken a few years, once-neglected neighbourhoods are enjoying a new lease of life. Interestingly, the light rail investment is catering to both millennials and retirees as the preferred means of getting around. It also provides a means to deliver transformation. Downtown Mesa, just east of Phoenix with a population of 450,000 also invested in a light rail system. It was a three mile (5km) system that connected the western edge of the town to the city centre. Since delivery of this project (and noting again the disruption in doing so) the city is seeing a shift from the 9-to-5 office worker image to that of a bustling hub of artists and boutique shops.

These cities were undoubtedly helped by the fact that early town planners organised their layout into a neat North-South, West-East grid with wide city streets. These same luxuries are not afforded to Wellington. However, the outcome we are trying to achieve is the still the same. We're trying to connect disparate parts of the city with a mass transit system, while encouraging investment in neglected precincts throughout the city. Investment in these precincts is directly tied to the opportunity that investors can see, and the potential of these neglected precincts to be transformed into vibrant, all-day, all-week micro communities.

There's a clear theme developing here. Give businesses an option, *somewhere* to go. Make these spaces **enjoyable and accessible** to all demographics and ages, all times of the year, and no matter the weather. Finally, make these spaces day and night, weekday and weekend spaces; make them **seven-day spaces**. By concentrating on these communities, we are minimising the prospect of economic disruption. Done correctly, we could actually create economic opportunities.

Disruption – The Other Meaning

Interestingly, Phoenix saw light rail as an opportunity to also tackle a housing problem. Mesa's state Department of Housing calculated that better financial stability could be achieved through encouraging affordable housing developments along the light rail route. The logic was quite simple, improve financial stability by reducing transportation expenses for families.

The light rail system in Mesa also increased its attractiveness to tertiary education providers. Universities saw that the combination of affordable housing (for rent) with easy transportation was a simple and attractive equation for prospective university students. Newcastle is eyeing the same value proposition for its new light rail system, with a dedicated stop providing easy access for students to the University of Newcastle in downtown Hunter Street. All around central Newcastle, significant investment has occurred in a mix of apartment and light commercial office space, all facilitated through the initial investment in the light rail corridor and improved access to the city centre. What could Wellington do for its tertiary education sector?

The theme of this article is quite simple; encourage businesses to shift away from disruption while we build mass transit or big infrastructure. However, it also recognises that we can't just shift them anywhere. There needs to be some planning and thought, particularly around Urban Comfort, access, enjoyment, and general liveability of the space. Finally, we also need to consider the corridor as a whole. Who is the corridor connecting and how can we kick start up-front investment in some of the neglected communities that will shortly be connected to a substantially improved transport network?

The best quote seen through the course of research, summing up many investments in mass transit and big infrastructure projects, is; “short term pain for long term gain”. Light Rail was disruptive not just in the physical sense to the roads and businesses on the ground, but also in the result delivered to the communities it serviced; it changed their connection with the city and the economic prosperity of neighbourhoods.

So what if we could deliver disruption, without the disruption?

This is exactly what the Chinese have been doing. First we had BRT (Bus Rapid Transit), next came LRT (Light Rail Transit), now comes ART (Autonomous Rail Transit). ART is better known as the trackless tram. The ‘rail’ in the acronym comes for the fact the system runs on virtual rails through a smart autonomous system.

These systems are neither bus nor tram. They look and feel like light rail, but run on rubber wheels, using technology derived from high speed rail innovations in recent years. Their aim is simple, deliver the best features of light rail while avoiding the worst (usually the price tag and disruption to the road its being built along).

There have been a few attempts at delivering these systems over the past decade, with arguably dismal results. The typical failing has been electrical autonomy, and raw computational capability for the vehicle to achieve true autonomy. Research and technology enhancements have however overcome these hurdles. The outcome is seen below.

The Chinese have been developing and implementing this technology, which delivers a mass transit system at a fraction of the cost per kilometre of light rail projects such as Newcastle and Canberra. So far Townsville, Hobart, Melbourne and Sydney are all eyeing up first ART trials.

As with any new technology it’s easy to tout its value when there are few working examples and even fewer war stories on failures. However, such technology, if proven reliable and cost effective, is a game-changer for cities like Wellington where the shared space of the road can be reconfigured over the weekend to accommodate an ART system. These systems also come with a big bonus. No rails means no ruts in the asphalt and concrete, which for a compact cycle-friendly city like Wellington is great news for any budding cyclist already dealing with many other road-side hazards.

The merits of ART cannot be ignored. Typical mass transit investments such as light rail come with hefty price tags due to the civil work and service relocations involved. The ART system removes this issue entirely, meaning more investment can be reallocated to city and Urban Comfort enhancements or into more rudimentary city basics such as utilities renewals and upgrades. The question that follows is interesting; if we are no longer digging up services and streets then do we need to consider disruption, and relocation opportunities for businesses in the first place as outlined in the first part of this article?

This question ultimately ties back to the value proposition and the reason for the investment in the first place.

Design a Value Proposition

If we’re investing in any form of big infrastructure or mass transit solution to simply get people from A to B then we haven’t recognised the potential of the investment, and we haven’t fully understood the consequences of the decision.

These investments are about corridors, and the people who live and work along these corridors.

An effective value proposition is not just to the people who might use the transport system, it is to the investors and developers who will design and build the street scape and micro-communities that attract people to live, work and study along the corridor. This is the **Street Value**. The value that people place on the spaces they choose to visit, every-day, and every-week.

Offering businesses a choice, regardless of whether there will be disruption from a big infrastructure investment is part of the value proposition, and a nod to successful town planning. If we take a ‘whole-of-

corridor' approach, and develop micro-communities along the way, then businesses will naturally gravitate to the location that best suits their business model, and brings them closer to their customer base.

These micro-communities offer the public choice. As we discussed above, the person sipping coffee is going to consider a space that is accessible and enjoyable; but no one wants to visit the same space all the time. People also enjoy diversity. Different micro-communities each develop different flavours (diversity). This creates two opportunities that are inter-linked with big infrastructure investments. First, diversity provides an economic buffer for cities when bear markets and downturns arrive. Naturally all businesses are affected by such events; but an economy with diversity is more adaptable than an economy with none. Second, diversity attracts people to the corridor. More people in the corridor means more patronage for public transport investments.

To conclude; disruption may or may not be a given outcome depending on technological innovations in the next few years. Regardless of the type of mass transit system LGWM chooses to invest in, the project should consider corridor transformation from the outset in order to realise the true benefits of the investment in public transport that comes later. Designing the corridor and planning a series of vibrant micro-communities in stages can lead to less disruption, and provide business with a pre-project choice to move or stay should significant infrastructure investment occur.

APPENDIX 2: PROJECT TIMEFRAMES

Why do major projects take so long to deliver?

All major projects go through a number of phases or stages between conception and completion. These are relatively consistent, but vary in time and complexity depending on each project.

At the start of a project, there is a greater level of uncertainties and unknowns to be worked through. Assumptions need to be made for these such as how long a stage will take, or what process will be followed. Professional judgement, experience and examples from other projects are used as a basis for these assumptions.

As part of developing options for the staging and sequencing of the RPI, analysis was undertaken of the potential stages, timeframes, challenges and assumptions for the delivery of each project in the programme.

This information below illustrates how this analysis applies to three of the major projects of LGWM including key assumptions, and what the opportunities may be for reducing overall project delivery timelines.

The three projects illustrated are Mass Transit – Station to Newtown; Mass Transit – Station to Airport; and Reclaiming Te Aro.

Project phases

Key stages of major projects include the following, most of which can be run concurrently to some degree:

- Business Case, Investigation, and Reference Design
- Consultation
- Consenting
- Property acquisition
- Specimen Design and Service Relocation Strategy
- Specification and Detail Design
- Early enabling works and services relocations
- Construction
- Handover

As a project moves through these stages, more is known about the scope, risks and timeframes.

At this point in the LGWM programme, the elements in the programme remain relatively conceptual and a number of assumptions must be made about scope and delivery approach.

This has informed the estimation of project timeframes, which are considered relatively robust for a programme business case stage of the programme. It will however be possible to refine these moving forward – which may present some opportunities for time and cost savings.

Programme sequencing

Where projects exist as part of a wider programme like LGWM, consideration also needs to be given to how the delivery of a project relates to the other elements in the programme (as discussed in paper to the Governance Group on 19 September)

Sequencing considerations include:

- Work or projects that must be completed before another project can be delivered because they utilise the same land
- Enabling works to relocate services or facilities

- Enabling works or projects to create behavior change, or network capacity before another project can get underway
- Public impacts and acceptance of impacts from multiple projects
- Funding availability
- Market capacity to deliver
- Value for money
- Optimal programme delivery sequence to realise programme benefits

This means not all projects will or should start immediately. The timelines for each example are however shown as if they were to be progressed from year one of the programme delivery.

Mass Transit

As outlined below the delivery time for either the Station to Newtown; or Station to Airport sections of mass transit is potentially similar at around 13 years (based on an ambitious timeline)

This is based on assumptions that there would be significant overlap in the planning, design, consenting and delivery of both routes. This also assumes that funding and sector capacity allows for the delivery of both sections concurrently.

The Station to Newtown section is relatively more complex and disruptive than the section from Newtown to Airport.

As examples, some of the challenges the Station to Newtown stage must deal with include:

- Significant property requirements
- Complex interrelationships with other projects – including planning, design and sequencing interrelationships – especially the large programme components on the state highway
- Managing disruptive impacts on multiple parts of the network and communities
- Very challenging sections where there may be significant community disruption and property requirements such as Mt Cook area, Adelaide Road and Newtown
- Significant challenges around the coordination and delivery of service relocations

As detailed below, there may be some options to reduce the scale of these challenges.

Mass Transit – Station to Newtown scope and assumptions

Scope	Comments
Total estimated cost	<ul style="list-style-type: none"> • \$990m (for Light Rail - LRT)
Total estimated timeframe to deliver	<ul style="list-style-type: none"> • 13 years (LRT)
Key complexities and risks	<ul style="list-style-type: none"> • Service relocations – cost / time / risks • Service specifications • Station / interchange specification • Property requirements and acquisition • Consenting • Terminus and vehicle storage / servicing locations⁶

Key assumptions and issues to work through	<ul style="list-style-type: none"> • Single stage business case • Number and location of stations, final type of MT, final route • Availability of funding and property requirements • Alliance model to progress business case, planning, property issues • Consenting approach – traditional or enabling legislation • Procurement model • Construction methodology and number of build sites that can be operated concurrently
Key opportunities to reduce delivery timeframes	<ul style="list-style-type: none"> • Consenting model – enabling legislation • Specifications that do require significant service relocations • Mass transit technology to avoid significant fixed infrastructure e.g. 'Like light rail' such as trackless trams could be delivered considerably shorter timeframes • Termination of line at Hospital – the section through Newtown is very challenging and disruptive to deliver
Feasible delivery timeline	13 years is estimated for Light Rail based on a courageous delivery approach (conceivably 11 years if key issues can be worked through or if stages are run more concurrently which increases risks of redesign and rework. MT alternatives to light rail may be considerably less)

Mass Transit – Station to Newtown potential timeframes

Stage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Assumptions and Opportunities to Reduce Time
Business Case, Investigation, and Reference Design	█	█	█												Assume single stage business case. Minimal opportunity to reduce timeframe
Consultation		█	█	█	█	█	█	█	█	█	█	█	█		Consultation will be ongoing process – can overlap with other stages
Consenting				█	█	█	█								Assume traditional consenting pathway with Board of Inquiry or Environment Court. Risk of longer timeframe. Enabling legislation may shorten slightly and reduce risk
Property acquisition	█	█	█	█	█	█	█	█	█	█					Will be ongoing process. Some property requirements will not be known until design progressed further
Specimen Design and Service relocations strategy				█	█	█									Can only be progressed significantly once business case completed
Specification and Detail Design					█	█	█	█	█						Can only be progressed significantly once business case completed
Early enabling works and service relocation									█	█	█	█			Requires consents and service relation strategy to be completed
Construction									█	█	█	█	█		Requires consents and service relation strategy to be completed
Summary	█	█	█	█	█	█	█	█	█	█	█	█	█		Critical path driven by business case, consenting, design, service relations and construction.

Mass Transit – Station to Airport scope and assumptions

Scope	Comments
Total estimated cost	<ul style="list-style-type: none"> • \$1.44 billion (for Light Rail - LRT)
Total estimated timeframe to deliver	<ul style="list-style-type: none"> • 13 years (LRT)

Key complexities and risks	<ul style="list-style-type: none"> • Service relocations – cost / time / risks • Service specifications • Station / interchange specification • Property requirements and acquisition • Consenting • Terminus and vehicle storage / servicing locations
Key assumptions and issues to work through	<ul style="list-style-type: none"> • Single stage business case • Number and location of stations, final type of MT, final route • Availability of funding and property requirements • Alliance model to progress business case, planning, property issues • Consenting approach – traditional or enabling legislation • Procurement model • Construction methodology and number of build sites that can be operated concurrently
Key opportunities to reduce delivery timeframes	<ul style="list-style-type: none"> • Consenting model – enabling legislation • Specifications that do require significant service relocations • Mass transit technology to avoid significant fixed infrastructure e.g. 'Like light rail' such as trackless trams could be delivered considerably shorter timeframes • Concurrent delivery programs for both Stage 1 and Stage 2 of the MT
Feasible delivery timeline	13 years is estimated for Light Rail based on a courageous delivery approach (conceivably 12 years if key issues can be worked through or if stages are run more concurrently which increases risks of redesign and rework. MT alternatives to light rail may be considerably less)

Mass Transit – Station to Airport potential timelines

Stage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Assumptions and Opportunities to Reduce Time
Business Case, Investigation, and Reference Design	█	█	█	█											Assume single stage business case. Minimal opportunity to reduce timeframe
Consultation		█	█	█	█	█	█	█	█	█	█	█			Consultation will be ongoing process – can overlap with other stages
Consenting				█	█	█	█								Assume traditional consenting pathway with Board of Inquiry or Environment Court. Risk of longer timeframe. Enabling legislation may shorten slightly and reduce risk
Property acquisition	█	█	█	█	█	█	█	█	█	█					Will be ongoing process. Some property requirements will not be known until design progressed further
Specimen Design and Service relocations strategy				█	█	█									Can only be progressed significantly once business case completed
Specification and Detail Design					█	█	█	█	█						Can only be progressed significantly once business case completed
Early enabling works and service relocation									█	█	█				Requires consents and service relation strategy to be completed
Construction									█	█	█	█	█		Requires consents and service relation strategy to be completed
Summary	█	█	█	█	█	█	█	█	█	█	█	█	█		Critical path driven by business case, consenting, design, service relations and construction.

Reclaiming Te Aro

As outlined below the delivery time for reclaiming Te Aro is around 14 years with a critical path driven by the business case, consenting, design, service relations and construction phases.

As examples, some of the challenges reclaiming Te Aro must deal with include:

- Significant property requirements
- Consenting and heritage issues which may require enabling legislation
- Complex interrelationships with other projects – including planning, design and sequencing interrelationships
- Managing disruptive impacts on multiple parts of the network and communities
- Very significant challenges around the coordination and delivery of service relocations, potentially including the main sewer interceptor

While it is feasible that the project could be delivered in a shorter timeline, there appear fewer opportunities to significantly reduce this timeframe given the complexity and scale of the project.

Reclaiming Te Aro –scope and assumptions

Scope	Comments
Total estimated cost	<ul style="list-style-type: none"> • \$1100m
Total estimated timeframe to deliver	<ul style="list-style-type: none"> • 14 years
Key complexities and risks	<ul style="list-style-type: none"> • Service relocations – cost / time / risks • Property requirements and acquisition • Consenting and heritage issues • Traffic and social disruption from construction • Funding availability / share • Interdependencies with other projects – Basin, Mt Victoria tunnel, Mass Transit
Key assumptions and issues to work through	<ul style="list-style-type: none"> • Single stage business case • Availability of funding and property requirements • Alliance model to progress business case, planning, property issues • Consenting approach – traditional or enabling legislation • Procurement model • Construction methodology and number of build sites that can be operated concurrently
Key opportunities to reduce delivery timeframes	<ul style="list-style-type: none"> • Consenting model – enabling legislation • Early service relocations • Delivery of elements as part of other projects
Feasible delivery timeline	14 years estimated (conceivably 12 years if key issues can be worked through or if stages are run more concurrently which increases risks of redesign and rework)

Reclaiming Te Aro – potential timeline

Stage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Assumptions and Opportunities to Reduce Time
Business Case, Investigation, and Reference Design	█	█	█												Assume single stage business case. Minimal opportunity to reduce timeframe
Consultation		█	█	█	█	█	█	█	█	█	█	█			Consultation will be ongoing process – can overlap with other stages
Consenting and heritage issues				█	█	█	█								Assume traditional consenting pathway with Board of Inquiry or Environment Court. Risk of longer timeframe if High Court appeals. Enabling legislation may shorten slightly and reduce risk but may not deal with heritage issues
Property acquisition	█	█	█	█	█	█	█								Will be ongoing process. Some property requirements will not be known until design progressed further
Service relocations strategy				█	█	█									Can only be progressed significantly once business case completed. Main sewer interceptor to address
Specification and Detail Design						█	█	█							Can only be progressed significantly once business case completed
Early enabling works and service relocation									█	█	█				Requires consents and service relation strategy to be completed
Construction											█	█	█	█	Requires consents and service relation strategy to be completed
Summary	█	█	█	█	█	█	█	█	█	█	█	█	█	█	Critical path driven by business case, consenting, design, service relations and construction.



Staging and Sequencing ADDENDUM REPORT

Addendum to “LGWM Staging and Sequencing Considerations, options and next steps report” dated 29 November 2018

Issued October 2019



1. PURPOSE OF THIS REPORT

ADDENDUM REPORT

To compliment the release of the LGWM programme in May, an addendum to the 'Staging and Sequencing considerations, options and next steps' report was prepared. This addendum report is appended to this report.

This addendum is not intended to replace or repeat the analysis of the Recommended Programme of Investment contained in the LGWM Staging report, nor does it provide analysis of potential staging and sequencing of the Indicative Package as announced on May 16 2019.

The addendum is intended to highlight key recommendations and issues that will need to be considered to guide the optimal staging and sequencing of the LGWM programme as it is further developed through the more-detailed business case work. As such it should be read in conjunction with the LGWM Staging report.

2. IMPORTANCE OF A WELL-STAGED AND SEQUENCED PROGRAMME

Key Recommendation 1: A focus on staging, sequencing and transport system transformation must be embedded in the design, resourcing and funding of the LGWM delivery vehicle. It must also form part of the scope of all DBC processes with coordination and alignment managed as an ongoing process across these.

LGWM represents the biggest transport investment programme ever in the Wellington region. The full programme will take some 20+ years to be delivered. This programme will transform the transport system of central Wellington and enable a range of urban development, social and economic outcomes.

The programme is a whole-of-network solution. The success of the programme is therefore reliant on not just realising the benefits from all the individual elements within the programme, but also achieving success through the order in which they are delivered and how they are delivered.

The way in which the transport system is transformed and how this is managed will therefore directly impact the performance of the transport system (during and post-delivery), effects on the communities of Wellington and ultimately the benefits of the programme.

Delivery, staging and sequencing of LGWM therefore must be effectively planned, managed and delivered to avoid or manage critical programme risks.

The scale of these challenges should not be underestimated, and the risks are high if this work is not undertaken effectively as an ongoing process as part of the planning, design and delivery of the programme. It needs to be considered a core accountability and an ongoing process. It will need to be resourced accordingly as part of the delivery agency responsible for LGWM.

The risks of not doing this work well include failure to deliver key programme elements, unacceptable social and economic impacts, cost escalations, project delays, failure to realise the programme benefits and loss of social licence.

3. KEY STAGING AND SEQUENCING CONSIDERATIONS

3.1. Principles for developing the delivery programme

Key recommendation 2: A range of principles and criteria to inform the programme staging and sequencing need to be identified and agreed. Draft principles and criteria were identified in the LGWM Staging report and these should be tested and reconfirmed in the next phase of work linked to the DBC processes.

Potential principles and criteria include:

- Clarifying the independencies of the project elements – this will be informed by the detailed business case phase, detailed design, statutory and property requirements and the delivery model(s)
- More certainty of the lead and delivery times of projects (see 3.4 below)
- Mass transit - when can early start of construction and delivery occur. This will be largely informed by final route and form decisions for mass transit (such as light rail or trackless trams etc)
- Form and route of mass transit also has major impacts on the wider programme delivery – cost, time, complexity, risk, stakeholder impacts, services. Until this is finalised, the staging of the wider programme cannot be confirmed
- Delivery of any longer-term state highway corridor improvements in the sub-regional area, including any triggers for these
- Rail network and service improvements to the north need to be delivered in synch with LGWM programme. These are outside of the LGWM programme, but provide critical enabling capacity for alternatives to car usage
- Confirming the focus, timing and interdependencies of network and service improvements to the bus system.

3.2. Other considerations to guide the programme

Other considerations that the programme sequencing process will need to test and refine further include:

- Ensuring value for money (right thing, right time, right way) and ensuring that the staging and sequencing helps to ensure a positive BCR across the life of the programme and manage cash flows. This includes carefully managing the timing of the high cost elements of the programme such as Mass Transit
- Managing the impacts of parallel delivery of multiple major projects, including how many worksites are feasible or acceptable at any time – this includes from both market capacity and public acceptance considerations
- Managing network capacity and reliability throughout the delivery of the programme for all modes to ensure people and goods can still move through the city, including minimum requirements for PT as well as resilience and lifeline functions
- Capacity of the professional services, construction and materials (e.g. concrete) industries to deliver the programme as well as other work planned in the region such as Airport and CentrePort works (see section 3.5 below)
- Aligning wider infrastructure and utilities maintenance programmes and upgrades such as 3 waters, telecommunications, power, road maintenance etc (see section 5 below)
- Stakeholder engagement, consultation, consenting and property challenges are significant and will have major implications for staging, sequencing and realistic timeframes. There may be opportunities for fast track approaches to statutory approvals
- Equity in terms of when different communities of Wellington or user groups get benefits from the programme.

3.3. Further interdependencies and testing these

There will also be interdependencies between the design and delivery of programme elements. It is recommended that the interdependencies form part of a set of MCA criteria that are used to continuously test and refine the staging and sequencing of the programme. These might include:

- Impact on travel equity
- Extent to which construction of subsequent elements is enabled
- Mitigating effects of travel during construction
- Alignment with political expectations
- Reduces project risk
- Mitigating effects of travel after construction.

3.4. Estimating delivery times

Detailed analysis should be undertaken to estimate the delivery time for each of the programme elements. This should be an ongoing process to inform scope and design options. This should include breaking each project down into appropriate delivery phases including:

- Business Case, Investigation, and Reference Design
- Consultation
- Consenting
- Property
- Specimen design and service relocation strategy
- Specifications and detailed design
- Early works
- Construction
- Handover.

Each of these phases should clarify assumptions issues that would require further investigations or confirmation, such as property availability, consenting issues, scope of elements, construction methodology etc.

All of these would require further consideration as each programme element moved through the stages outlined above. As a project moves through these stages, more will be known about the scope, risks and timeframes.

3.5. Other major construction projects

Key recommendation No. 3: Engage with other major infrastructure programmes in Wellington region this should include processes and some form of working relationships to map programme timing and delivery to consider both opportunities and constraints

In addition to LGWM, there are several other major infrastructure programmes planned for delivery in the Wellington region over a similar period of time. These will have impacts on the potential staging, sequencing and delivery times of LGWM (such as competition for professional services and construction capacity) and will have requirements in terms of the transport network for construction (eg. reliability for construction vehicles).

Some of the key projects that need to be considered are listed below. Analysis should consider the inputs and resource requirements of each project, delivery timelines and transport system / stakeholder interdependencies with LGWM.

- Bus network priority and service delivery improvements
- CentrePort resilience and rebuild programme
- Ferry terminal redevelopment, including access requirements from SH1 and local network
- Wellington Airport runway extension

- Cross Harbour pipeline
- Petone to Grenada SH link
- Petone to Ngauranga SH2 resilience / cycleway
- Riverlink / Melling interchange
- Otaki to Levin SH1 corridor.

In addition, a key programme of work outside of LGWM that is considered critical to enabling modal shift and thereby reducing network impacts during delivery is the Unlocking Network Capacity programme of rail improvements to be delivered between GWRC and KiwiRail.

The timing and risks of delivery of this programme will need to be confirmed working with GWRC and KiwiRail and fed into ongoing analysis of the staging of the programme.

4. SYSTEM TRANSFORMATION AND OPERATIONS

4.1. Thinking about urban comfort and keeping a vibrant city for people

Key recommendation No. 4: Engage with and learn from other similar transformative transport programmes to ensure lessons and tools from these are drawn upon and utilised as part of the LGWM programme

Key recommendation No. 5: Consider, plan and deliver broader opportunities to minimise the disruptive impacts of change through engaging with communities to understand how to provide alternative business and people/place opportunities during the delivery of the programme. This will require dedicated resourcing and funding

Further analysis is needed on how to manage and minimise the disruptive effects of big infrastructure programmes on businesses and communities. This should consider lessons from other cities, such as:

- Big infrastructure is disruptive. Disruption is more than the road, it's how livelihoods of everyday businesses in the city are affected by major infrastructure investment
- Mass transit projects (such as Sydney Light Rail) have been very challenging to deliver – running into cost and time overruns and significant stakeholder impacts
- This impacts on 'urban comfort' – people enjoyment and use of the city, and on businesses
- LGWM programme needs to consider how to provide alternative places for people and businesses to exist and thrive during delivery
- This can draw upon lessons from the Christchurch rebuild and disaster relief responses elsewhere to consider opportunities for business relocations and people places. For example:
 - How can LGWM help businesses transition away from affected areas during periods of major, disruptive construction?
 - Where can LGWM create vibrant micro-communities?
 - Can these micro-communities be centered around or located close to future permanent communities and transport hubs?

These considerations need to be factored into the resourcing, funding and mandate of the LGWM programme as it moves into the next phases of planning and delivery.

4.2. Managed and coordinated change

Key Recommendation No. 6: Develop a step change in capability to manage operations planning and coordination across all three partners to ensure that this capability can link from a strategic long-term view to day to day operations management. This needs to be integrated with the mandate and scope of the delivery vehicle of the programme and will require full buy-in from all three programme partners

LGWM proposes fundamental change to the operation of the transport system – this will be an ongoing process of change over the next 20 years during delivery of LGWM. Delivery of the programme will also require a fundamental change to both how the system is operated and how this change is managed to ensure benefits realisation, minimisation of the impacts of change and construction and retain an agile approach to the future programme needs.

For example:

- Impacts of delivery of very significant projects that will impact on multiple corridors for extended time periods
- Managing multiple concurrent work sites and projects and the impacts these have on transport, amenity, health and economic vitality of the City
- Managing significantly reduced network capacity during construction
- Impacts and reliability of construction traffic
- Needs and impacts of different modes, including reliability of public transport and safety for pedestrians and people on bikes
- The need to monitor and measure the changes on the network as programme elements are delivered – this is needed to inform and shape decisions on whether to deliver the whole of the programme or when and how to make changes as the programme is delivered. It is also needed to inform day to day delivery of projects.

To manage these challenges will require a step change in capability (people, systems, tools, information) to manage transport operations. This includes the traffic operations centres, Wellington City permits systems and staff, as well as GWRC's management of the public transport system (including real time information). It also includes how parking is managed – both by WCC and private operators.

This will need to address challenges of:

- This system is not fully coordinated and is designed primarily to manage Business-as-Usual operations, events (such as crashes and weather impacts) and localised construction projects
- The system is also not designed to plan for, manage and respond to change over a range of time periods from longer term to day to day, or between modes, in an integrated way
- Powers and controls for managing the transport system are also limited and fragmented, which may mean they are too slow to be able to respond in an agile way to the level of change planned.

Change is therefore needed to manage the challenges of delivering LGWM, this needs to be treated as a full change process and further tested and investigated. It is recommended that this is considered as part of developing the delivery model for LGWM.

5. UNDERSTANDING AND MANAGING UTILITY SERVICES RISK

Key recommendation No. 7: Engage early with utilities operators and develop a strategic approach to managing the impacts on utilities – this should also inform the scope, location and detail of projects as outlined in recommendation 1. This needs to be well resourced and prioritised

A major challenge for LGWM is the co-ordination and avoidance of existing underground utilities. Utility clashes and conflicts at design and construction phases will be costly and disruptive.

Understanding risks and management of utilities will be critical and a Utilities Strategy will be essential. This should consider:

- Utilities Engagement strategy
- Utilities Investigation & Location strategy
- Utilities Enabling Works strategy.

Providing for utilities can be significant and has historically resulted in relationship issues and protracted decision-making for major construction programmes.

A clear strategy for engagement with Network Utility Operators to develop a genuine desire to achieve the best possible outcome should be developed early in the programme.

This should aim to engage network utility operators as proactive members of the LGWM programme, to take the utility operators on the journey and encourage alignment between the LGWM programme and the utility operators respective forward works programmes, to facilitate future urban growth through planning network utilities upgrades outside of the LGWM programme, to achieve the best value for the public purse, and at all times to be cognisant of the existing urban communities and the facilities they enjoy.

6. RECOMMENDED NEXT STEPS

A focus on staging, sequencing and transport system transformation needs to be considered as an ongoing process and embedded in the design, resourcing and funding of the LGWM delivery vehicle.

Key recommendation No. 8: review staging and sequencing in relation to the indicative package, scope of works for DBCs and design of the LGWM integrated delivery vehicle

- A high-level outline of staging and timing of the indicative package should be developed
- The scope of works for the DBCs need to include a consistent approach to staging and sequencing
- Coordination and alignment of programme staging needs to be managed as an ongoing process across these at the LGWM programme level. To give this work prominence and focus, options should be considered for how to link this into governance, reporting processes or KPIs for LGWM.