

**“Let’s Get Wellington  
Moving” - Ngauranga  
to Airport (N2A)  
Programme Business  
Case Peer Review of  
Economics**

New Zealand Transport Agency

Reliance Restricted

13 September 2018

Pete Clark  
New Zealand Transport Agency  
HSBC House  
No.1 Queen St  
Auckland

13 September 2017

## Let's Get Wellington Moving - Ngauranga to Airport Programme Business Case Peer Review of Economics

Dear Pete,

On 30 August 2018, EY was asked to prepare a peer review (Peer Review) of the *Let's Get Wellington Moving (LGWM) Economic Report* (updated version 5, dated 3 September 2018) and associated modelling. The scope of the Peer Review is outlined below:

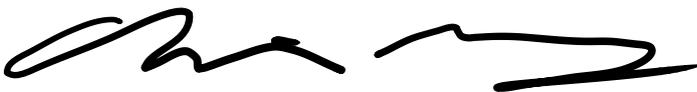
- ▶ Review the economic model for any errors or omissions in line with the Agency's Economic Evaluation Manual (EEM)
- ▶ Assess the assumptions and constraints applied and whether these would make any material difference to the analysis of the programme.
- ▶ Assess whether new methodologies currently under consideration by the NZTA for the EEM would make a material difference to the benefit cost analysis of the programme and advise what that potential impact may be.
- ▶ Work with the LGWM project team to provide interim revisions of the benefit cost analysis to reflect the points above.

This Peer Review is necessarily conducted within the timing limitations and has focussed on identifying the consistency of the approach taken with best practice. Notably, this Peer Review does not include a detailed audit of any inputs or calculations used in the Cost Benefit Analysis model (i.e. this is not a cell-by-cell review). The review does also not include a review of costs as this is being undertaken by Beca. Comments in this peer review are focussed on the input assumptions and the applications of these to the modelling task.

Overall we find that the work is appropriate to a Programme Business Case of this size and complexity, but have made a number of observations as to where further work can be done in both the short term, but also as part of any Detailed Business Case. We would anticipate that many of these changes would materially increase the benefits of the overall programme and the projects within it.

If you would like to clarify any aspect of this peer review or discuss other related matters then please do not hesitate to contact me on 027 592 1364.

Yours sincerely,



Chris Money  
Partner, Infrastructure Advisory

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# Executive Summary

## 1.1 Key Findings

This peer review is of the *Let's Get Wellington Moving Economic Report* (the Economic Report) and associated excel model completed by the Lets Get Wellington Moving project team (the team) on 3 September 2018, as requested by the New Zealand Transport Agency (NZTA). The timing limitations have necessitated a targeted review of the report and associated spreadsheets.

This report summarises EY's peer review of the Economic Report and an overview of EY's findings are set out in the table below:

Table 1: Summary of findings

Reference	Comment
General	<p>No material issues have been found with the economics in accordance with the NZ Transport Agency's Economic Evaluation Manual (EEM). There are some minor issues which are addressed in this report. In the context of the entire programme, the majority of these minor issues would see only small changes to the Benefit Cost Ratio (BCR).</p> <p>We also find the level of detail and analysis to be materially more from what would be expected in a Programme Business Case. This, however, is appropriate, given the complexity, cost and profile of the Lets Get Wellington Moving Programme</p>
Comments	<p>While the current assessment is in line with the EEM, the approach, <u>as reviewed<sup>1</sup></u>, almost certainly underestimates the benefits in terms of emerging best practice.</p> <p>Some of this best practice is presently being written into the EEM, so it is important that decision makers are aware that if they were considering the programme six months later, the benefits would be significantly higher.</p> <p>Moreover, we would expect these EEM changes to have more relevance in a Detailed Business Case (DBC), which affords a much more comprehensive economic analysis when combined with the more detailed transport planning, design and costing approaches.</p> <p>There are 3 areas where we would expect to see significant changes to the benefits, relative to how they are currently presented, once looked at in any detailed business case. They are;</p> <ul style="list-style-type: none"> <li>(1) Agglomeration</li> <li>(2) Reliability</li> <li>(3) Dynamic Wider Economic Benefits (WEBs)</li> </ul> <p>These are discussed in more detail in the report.</p> <p>We also consider that decision makers would benefit from an understanding of the impact third party revenues will have on the costs central and local government funders are being asked to consider. Given that the BCR is a decision guide on the return on investment for a given funder, it makes sense that the funder only consider the costs that they would incur as part of the BCR. The NZTA EEM has a well-established process for showing BCR's net of third party revenues and it is routinely used for tolling projects. We believe this approach would add to decision makers' understanding of the benefits and costs to them.</p>

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<sup>1</sup> We would note that the project team over the last week have been making changes to the analysis based on our observations.

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Reference	Comment
Recommendations	<p>For short term changes to the programme;</p> <ol style="list-style-type: none"><li>(1) Look to show a range on benefit cost ratios from high to low</li><li>(2) As part of the range of BCR's, add the evidential experience from Australia for Dynamic WEBs (ie rule of thumb 5%-30%)</li><li>(3) Review the timing and sequencing of the lower net value items in the programme</li><li>(4) Present information as BCR(N) and BCR(G). Third Party Revenues can be estimated using international evidence from projects such as CrossRail, Gold Coast Light Rail and panel data summaries including the Grattan Institute report</li></ol> <p>Longer term, as part of a Detailed Business Case;</p> <ol style="list-style-type: none"><li>(1) Better understand the regional economic growth projections. In particular the growth dynamics between the Wellington Region and its neighbouring regions, and update analysis to better understand the potential economic opportunities and risks that currently underpin the do-minimum scenario</li><li>(2) Reconsider agglomeration elasticities. In particular take a more granular approach on industry and location responses</li><li>(3) Consider a behavioural approach to travel time reliability</li><li>(4) Consider consumer surplus, sub-optimal mode choice (disbenefits) and externalities in calculating the BCR, in a similar manner to what has been done for ATAP.</li><li>(5) Adopt a full Dynamic WEBs approach (soon to be released EEM guidelines), and re-look at timing and sequencing of projects in light of this.</li><li>(6) Consider economic costs of delay around programme in conjunction with timing and sequencing changes (to balance any technical arithmetical benefits created through discount rates from delaying elements of the programme)</li><li>(7) Include a suite of benefits fully in line with the EEM, including NoX, PM10, and noise</li></ol>

Notwithstanding the comments above, we consider that the economic evaluation and accompanying Cost Benefit Analysis (CBA) are fit-for-purpose, and provide an acceptable basis for decision-making.

## 2. Introduction

### 2.1 Background

Let's Get Wellington Moving (LGWM) is a joint initiative between the New Zealand Transport Agency (NZTA), Greater Wellington Regional Council (GWRC) and Wellington City Council (WCC).

The key aims of LGWM are to reduce the reliance on private vehicles and to consider a multi-modal approach for the Wellington transport network, as the current transport system is starting to adversely impact on Wellington's liveability, economic growth and productivity.

The scope of LGWM is from Ngauranga Gorge to Wellington International Airport, encompassing the Wellington Urban Motorway and connections to the central city, hospital, and the eastern and southern suburbs. The project involves significant state highway improvements, investment in a rapid transit system and wider network upgrades.

The approximate costs of LGWM are \$4.5 billion over the next 15 years, with the two major components being the rapid transit (\$1.7 billion) and state highway improvements (\$2.2 billion)

### 2.2 Scope of the Peer Review

On 30 August 2018, EY was asked to prepare a peer review of the project's *Let's Get Wellington Moving Economic Report* (updated version 5, dated 3 September 2018). The scope of the Peer Review is outlined below:

- ▶ Review the economic model for any errors or omissions in line with the Agency's Economic Evaluation Manual (EEM)
- ▶ Assess the assumptions and constraints applied and whether these would make any material difference to the analysis of the programme.
- ▶ Assess whether new methodologies currently under consideration by the NZTA for the EEM would make a material difference to the benefit cost analysis of the programme and advise what that potential impact may be.
- ▶ Work with the LGWM project team to provide interim revisions of the benefit cost analysis to reflect the points above.

This Peer Review is necessarily conducted within the timing limitations and has focussed on identifying the consistency of the approach taken with best practice. Notably, this Peer Review does not include a detailed audit of any inputs or calculations used in the Cost Benefit Analysis model (i.e. this is not a cell-by-cell review). In addition, we have not been asked to review costs. These are being reviewed by Beca.

Comments in this peer review are therefore focussed on the input assumptions and the applications of these to the modelling task. We would also note that the project team, in the course of the last week has been making changes in line with our comments. We have not examined those changes in detail (although we have inputted into them), and as such, this report refers only to the documents referred to above, and not subsequent drafts.

This Peer Review is specifically for the above purpose and should not be used to in conjunction with any other analysis or decision-making.

### 2.3 Process

The Peer Review was prepared based on the work performed from 3 September 2018 to 7 September 2018. It does not take into account events or circumstances arising after 7 September 2018 and EY is not responsible for updating this analysis for such events and circumstances.

### 3. Technical Review

Our approach to the peer review has the following guiding principles;

- ▶ If there is a technical issue we have identified it.
- ▶ If the approach is technically correct, albeit different to how we would have approach it, we have considered it acceptable.
- ▶ Let's Get Wellington Moving is a complex project, but it is currently at the Programme Business Case (PBC) stage. It is not relevant at this stage to consider marginal costs and marginal benefits.

#### 3.1 Economic Analysis

There have been two scenarios evaluated as part of the economic analysis (although we note that these scenarios may be re-packaged and renamed as the team works through issues in the short term);

- ▶ Core scenario

This scenario assumes a medium level of population growth in the region, equivalent to 50,000 additional residents in Wellington City in 2046 compared to 2013 and population growth of around 100,000 across the region as a whole during the same time period. This approach is consistent with other transport and land use planning projects across the Wellington Region. The construction period is assumed to be 10 to 12 years, with benefits assumed to increase at 1% per annum past 2036 (the evaluation horizon is 2036).

- ▶ Alternative scenario

The alternative scenario assumes 80,000 additional residents in Wellington City in the Do Minimum in 2046 compared to 2013 (equivalent figure for medium growth is 50,000) and additional re-distribution of growth as a result of the programme. This is a project specific scenario reflecting the fact that an improvement programme of this scale is likely to catalyse additional growth and result in re-distribution of population and employment

Benefits quantified include;

- ▶ Travel time benefits
- ▶ Safety benefits
- ▶ Health and environment benefits
- ▶ Wider Economic Benefits (WEBs)
- ▶ Disbenefits

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Our review findings is included in the table below:

Table 2: Detailed Findings

Benefit	Comment
General	<ul style="list-style-type: none"> <li>▶ Most of the benefit categories that are typically considered (including relevant WEBs) have been captured. This includes some that are often omitted, including land value uplift / amenity improvements, Move to More Productive Jobs (M2MPJ) and agglomeration.</li> <li>▶ Dynamic land use change is partially considered, although the alternative scenario envisions faster population growth.</li> <li>▶ Reliability is partially considered. This is proxied through a standard 'wait time' calculation that assumes a greater value to time (x2) spent waiting than traveling in a private motor vehicle. It would be useful to explore reliability in greater detail, particularly how certain you are that a service is going to run on time, to understand the value of a more reliable PT network.</li> </ul>
Do Minimum	<p>The do-minimum is appropriate for the purposes of a PBC, but decision makers should note that the appropriate EEM process undertaken here may underestimate the benefits of the do something options.</p> <p>Like many do-minimums on large and complex urban projects, the economic forecasts that underpin them can significantly impact the net benefits of the "do something" options. The Wellington "do-minimum" is impacted by a combination of existing transport capacity and available development space that effectively means fewer people demand to come into the city, compared to if these factors are unconstrained.</p> <p>While clearly the do-something options are designed to remove those constraints, it still works with a base potential demand that has been influenced the by the constrained scenario (i.e. the denominator is fixed to the do minimum). As such, the do-minimum has the potential to unintentionally constrain demand for the options when modelled.</p> <p>A number of innovative approaches to do-minimums, most notably the Auckland City Centre Future Access Study in 2013 (which was ratified by NZTA, MoT and Treasury) have been able to look-through the constraint-based do-minimum to gauge the real level of potential demand for the options under consideration.</p> <p>This issue could be further explored as part of the detailed business case phase as it is too complex and time consuming for the PBC, and we are not presently certain there would be a clear change in the benefit profile (it is more that the do-minimum has the characteristics where one might expect to see change if investigated further)</p>
Health & Environmental Benefits	<p>The health benefits would appear to be overstated. The distance walked to PT (300-400 metres) is captured as a benefit, with \$27+ million of benefits relative to the base case. It is debatable whether that level of health benefits would actually occur from a 300 metre walk, even twice a day, every day. However, any change in this assessment is likely to only impact the programme at the margins.</p>
WEBs - Agglomeration	<p>The approach to calculating agglomeration and move to more productive jobs (M2MPJ) is unclear based on the information reviewed to date. The link to density is not obvious and there doesn't appear to be an elasticity for productivity. The approach appears predicated on a maximum of \$19 million in benefits per annum for the region, which seems low.</p> <p>The approach to calculating M2MPJ should be reconsidered when looking at a Detailed Business Case. It currently appears to move workers arbitrarily into the CBD, with the assumption that this will result in higher wages.</p>

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Benefit	Comment
	<p>The approach to calculating agglomeration is acceptable, but appears to omit an agglomeration elasticity. This is relevant as Wellington is a distinct city with clear professional zones. The most inelastic being the public service. The most dynamic being creative and digital. The biggest changes in the programme positively impact the area where the most elastic of the labour market work, so arguably we will see a greater positive response with a more delineated elasticity calculation.</p>
WEBs - Amenity Improvement	<p>This appears to be understated. The calculations with respect to traffic reduction benefits, green space benefits and street trees appear to have taken a relatively simple approach (consistent with a PBC).</p> <p>The impact of the cycleways and train stations themselves should be considered as part of the DBC. Part of these benefits will be captured in agglomeration. However, the accessibility and certainty benefit for businesses and the town centre, that reflects better trading/better amenity, isn't captured in a productivity calculation.</p> <p>This was an area of critical debate in the <i>An Accessible City</i> programme business case that underpinned changes to the Christchurch City Centre.</p> <p>A critical question (one which was factored into the AAC PBC) is whether there is a "network factor" associated with a programme of amenity improvements that acts as a multiplier on individual improvements.</p>
WEBs - Land Value Uplift	<p>Interim guidance is forthcoming on how to calculate and include Dynamic Wider Economic Benefits into transport projects. Effectively, Dynamic WEBS look at behavioural responses, particularly around land use as a result of the investment. The net result of incorporating Dynamic WEBS is the potential for more people, and more development as a result of the project, which has the potential to improve benefits.</p> <p>A preliminary (and reasonable) approach to Dynamic WEBS has been undertaken that provides increases in demand and value uplift. The results are at the lower end of the spectrum, based on evidence from Australia. As such, for the PBC we would recommend that the evidence-based upper ranges also be included to give a view of the full range of benefits.</p> <p><b>Cordon Charge</b> - It is stated that cordon charge benefits and costs will be considered at the next stage of modelling. For completeness it is worth noting that a cordon charge would be expected (based on international experience) to;</p> <ol style="list-style-type: none"> <li>1. Increase land values and development on the inner boundary due to a combination of financial gains (or no net losses), combined with decongestion effects</li> <li>2. Decrease land values on the immediate outer boundary (due to extra financial costs and potential trip diversion)</li> <li>3. Have ambiguous (but usually positive) effects on the 'middle distance' suburbs.</li> </ol> <p>Programme Certainty - It is expected that there would be positive investment benefits to having a committed programme. This is likely to be reflected in part in an acceleration of land value increases (as prices are 'bid up' in anticipation of the new network), but also around planned stations.</p> <p>Calculations around programme certainty, and uncertainty - in effect the behavioural response of developers, employers and other major investors is likely to have a material cost and benefit impact in any Detailed Business Case</p>

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Benefit	Comment
Disbenefits - Parking Loss	Parking loss disbenefits appear to be somewhat understated. There is a reasonable likelihood that removing on-street parking will have some (modest) impacts on housing prices and trade.
Other	We consider that decision makers would benefit from an understanding of the impact third party revenues will have on the costs central and local government funders are being asked to consider. Given that the BCR is a decision guide on the return on investment for a given funder, it makes sense that the funder only consider the costs that they would incur as part of the BCR. The NZTA EEM has a well-established process for showing BCR's net of third party revenues and it is routinely used for tolling projects. We believe this approach would add to decision makers' understanding of the benefits and costs to them.

### 3.1.1 Summary of findings

No material issues have been found with the economics in accordance with the NZ Transport Agency's Economic Evaluation Manual (EEM). There are some minor issues which are addressed in this report. In the context of the entire programme, the majority of these minor issues would see only small changes to the BCA.

We also find the level of detail and analysis to be materially more from what would be expected in a Programme Business Case. This, however, is appropriate, given the complexity, cost and profile of the Lets Get Wellington Moving Programme.

While the current assessment is in line with the EEM, the approach almost certainly underestimates the benefits in terms of emerging best practice. Some of this best practice is in the process of being written into the EEM at present, so it is important that decision makers are aware that if they were considering the programme six months later, the benefits would be significantly different.

Moreover, we would expect these changes to have more relevance in a Detailed Business Case, which affords a much more comprehensive economic analysis when combined with the more detailed transport planning, design and costing approaches.

There are three areas where we would expect to see significant changes to the benefits, once looked at in any detailed business case. They are;

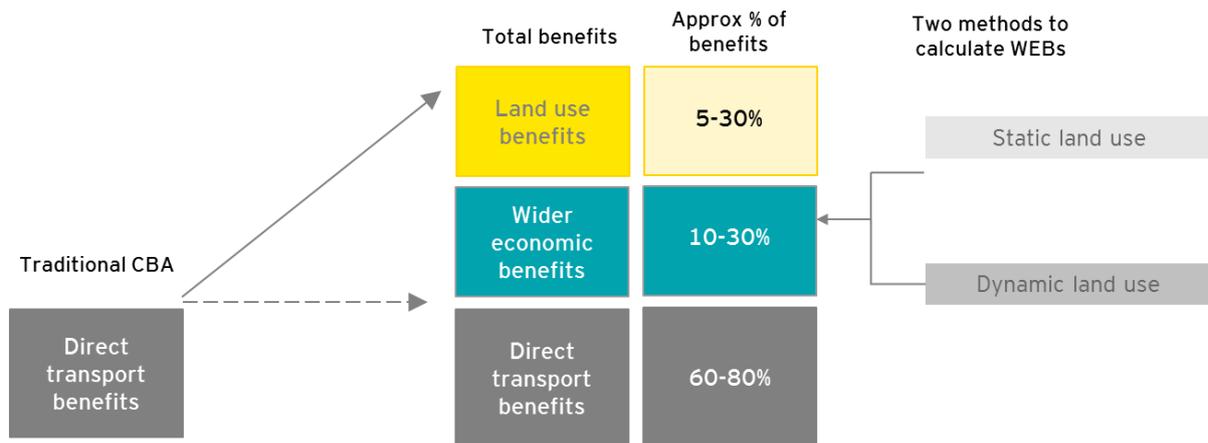
1. Agglomeration
2. Reliability
3. Dynamic WEBs

## 4. Emerging Best Practise

### 4.1 Dynamic WEBs and Land Use Benefits

WEBs are productivity benefits that accrue to the economy as a whole from alleviating market failures outside the transport market. They are productivity benefits that arise through a change in effective density and improved accessibility. They are measured by static or dynamic approach. A static approach calculates productivity benefits from a change in accessibility to people and jobs (with fixed land use). A dynamic approach calculates productivity benefits from a change in location or level of jobs/workers as a result of changing land use (dynamic).

Table 3: key categories of benefits induced by transport projects

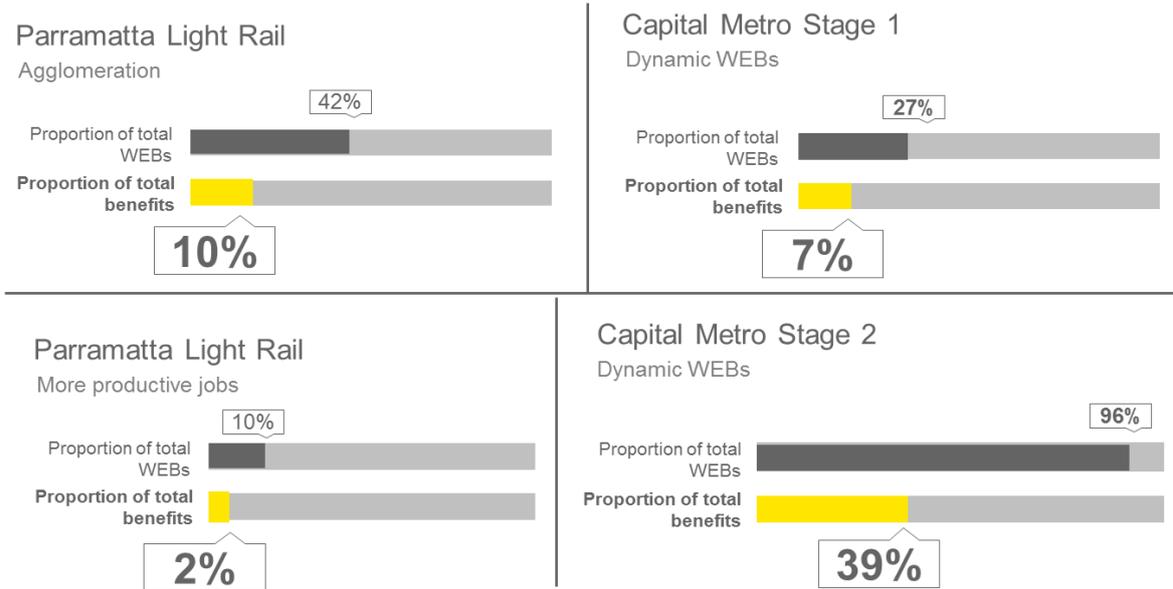


The Transport Agency recently commissioned EY to undertake a review on the preferred approach, focusing on short-term / interim needs, for the estimation of land use changes as well as the evaluation of dynamic wider economic benefits (WEBs) and land use impacts (benefits) in transport business cases. This is intended to ultimately form part of the guidance provided for economic appraisals in the Economic Evaluations Manual. It is anticipated that these guidelines will be published in the near future.

Interest in understanding land use change as a result of transport investment has been increasing over the past decade. Importantly, these impacts may give rise to a range of costs and benefits that are additional to those currently captured in conventional appraisal methods. These may include dynamic WEBs (such as dynamic agglomeration and move to more (or less) productive jobs), changes in land value and a number of city-shaping effects. Being able to predict the extent and magnitude of land use impacts—and therefore any additional costs and benefits—is critical to ensuring both accurate and comprehensive appraisal of infrastructure projects.

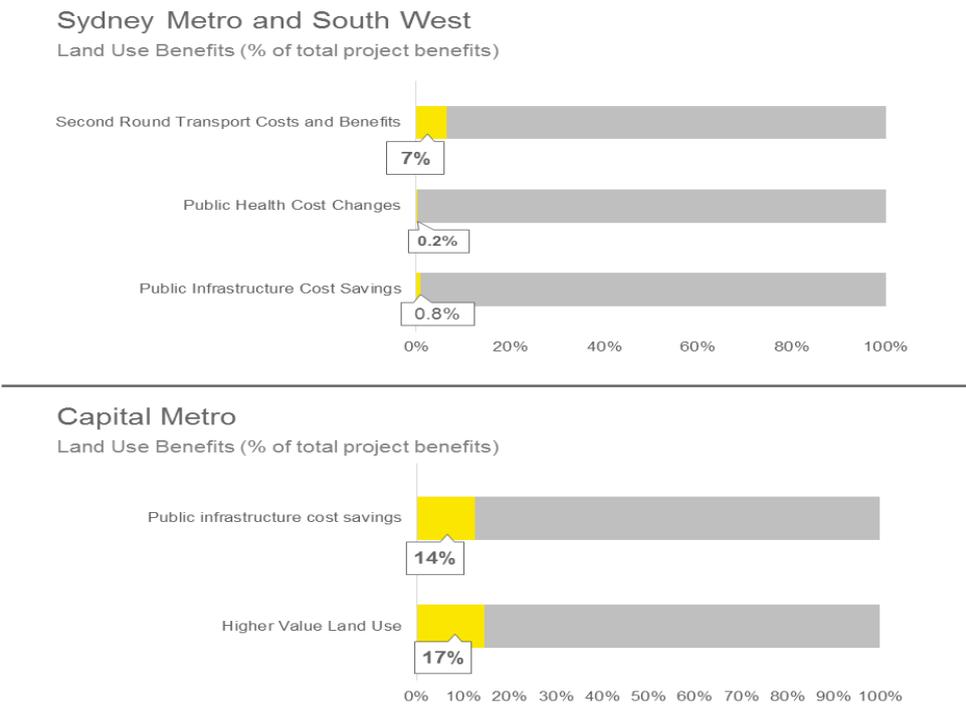
Historically, transport projects have considered the 'traditional' direct transport benefits and 'static' wider economic benefits. However there is less evidence and experience in considering 'dynamic' wider economic benefits and land use benefits. Although the range can of benefits (or disbenefits) can vary significantly, in Australia dynamic WEBs have shown to account for 5-30% of total benefits (and up to 40% in the case of projects with land use change objectives such as Capital Metro Stage 2 in Canberra). Similarly, land use benefits can compromise of 5-30% of the total benefits, especially for transport projects with strong land use objectives.

Table 4: case studies for evaluation of Dynamic WEBs



- ▶ Almost 40% of total benefits for Capital Metro Stage 2 are comprised of Dynamic WEBs; this is significant due to the land use focus and objectives of the project. The land use modelling estimated a relocation of jobs and workers such that they would be far more agglomerated.
- ▶ The proportion of Dynamic WEBs for Parramatta Light Rail and Capital Metro Stage 1 were lower (5-10% of total benefits) but still material in absolute terms.
- ▶ Parramatta Light Rail also quantified a move to more productive jobs - this benefit was 10% of WEBs and 2% of total benefits.

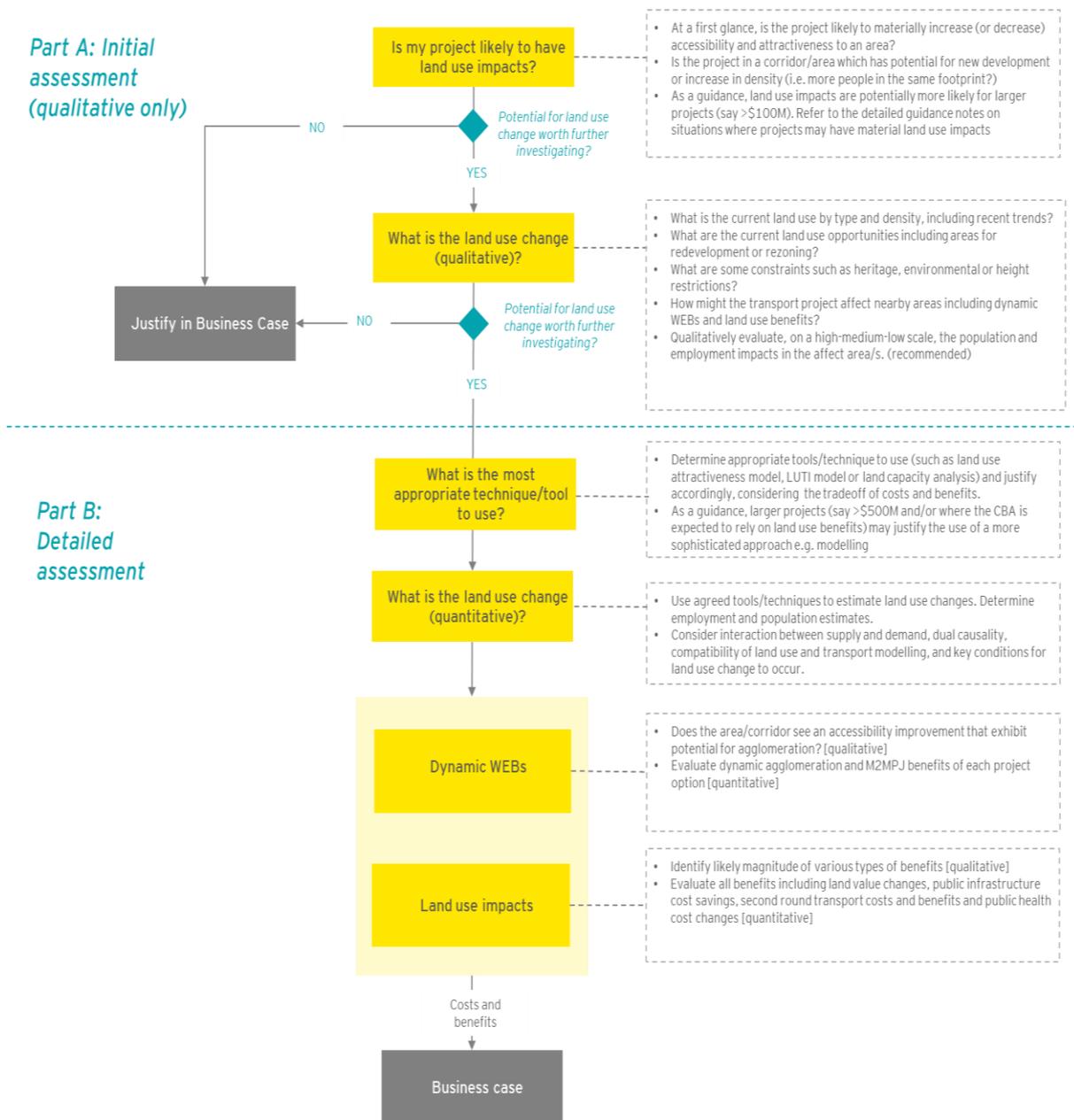
Table 5: case studies for evaluation of Land Use Benefits



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- ▶ The Economic benefits of city shaping can drive the CBA result.
- ▶ Land use benefits made up over 30% of total economic benefits for Capital Metro. This shows there may be significant benefits for a project with land use change objectives that is able to induce land use change.
- ▶ Second round transport benefits made up 7% of total benefits for Sydney Metro and South West. This is not an insignificant proportion of total benefits and highlights the importance of integrating land use change modelling into transport modelling for greater accuracy of transport benefits.
- ▶ Public infrastructure cost savings as a proportion of total benefits varies between projects. This demonstrates the localised nature and impact of public infrastructure cost savings, including dependency on land use change and unit costs of provision.

The below figure provides an overview of the approach to assessing land use changes and benefits in transport projects



## 4.2 Value of Time

- ▶ Value of time

The Transport Agency will shortly review the base values of time. The current values of time have a base year of 2002 and an update factor is provided annually. An increase in the base value, over and above what is assumed with the update factor, would result in an increase to the BCA. However it is not certain that this update will result in an overall increase in the base values of time.

- ▶ Value of travel time reliability

There is an increasing awareness of the importance of reliable travel. The more reliable travel is for commuters the less planning time is required. As the variability of travel reduces and the required buffer for travel decreases, this results in a benefit for travellers as the required time for travel is reduced. The Lets Get Wellington Moving programme has the potential benefit of improving and enhancing the whole public transport network. The planned improvements to the whole network may result in improved reliability across the network. The flow on effects are such that the improvements may lead to greater benefits across all modes.

## 5. Recommendations

For short term changes to the programme;

1. Look to show a range on benefit cost ratios from high to low.
2. As part of the range of BCR's, add the evidential experience from Australia for Dynamic WEBs (ie rule of thumb 5%-30%).
3. Review the timing and sequencing of the lower net value items in the programme.
4. Present information as BCR(N) and BCR(G). Third Party Revenues can be estimated using international evidence from projects such as CrossRail, Gold Coast Light Rail and panel data summaries including the Grattan Institute report

Longer term, as part of a Detailed Business Case;

1. Better understand the regional economic growth projections. In particular the growth dynamics between the Wellington Region and its neighbouring regions, and update analysis to better understand the potential economic opportunities and risks that currently underpin the do-minimum scenario.
2. Reconsider agglomeration elasticity. In particular take a more granular approach on industry and location responses.
3. Consider a behavioural approach to travel time reliability
4. Consider consumer surplus, sub-optimal mode choice (disbenefits) and externalities in calculating the BCR, in a similar manner to what has been done for ATAP.
5. Adopt a full Dynamic WEBs approach (soon to be released EEM guidelines), and re-look at timing and sequencing of projects in light of this.
6. Consider economic costs of delay around programme in conjunction with timing and sequencing changes (to balance any technical arithmetical benefits created through discount rates from delaying elements of the programme).
7. Include a suite of benefits fully in line with the EEM, including NoX, PM10, and noise.

## Appendix A Limitations & Disclaimer

### Limitations

Our work in connection with this assignment is of a different nature to that of an audit. Our work has been limited in scope and time.

The Peer Review is based on assumptions provided by, inquiries of, and discussions with representatives from LGWM. We have not sought to verify the accuracy of these assumptions, inquiries and discussions. Where applicable, we have noted the source of the data and information that we have relied upon in our peer review.

This Peer Review is based on the Economic Report issued by the LGWM project team on 3 September 2018, and its key characteristics at the time of its publication. If any of the key characteristics change our peer review may also require revision to reflect these changes.

### Purpose of our Report and restrictions on its use

This Peer Review was prepared on your instructions solely for the purpose of providing a high level review of the project's *Let's Get Wellington Moving Economic Report* (updated version 5, dated 3 September 2018) and should not be relied upon for any other purpose. As others may seek to use it for different purposes, this review should not be quoted, referred to or shown to any other parties without our prior consent in writing. In carrying out our work and preparing the peer review, we have worked solely on the instructions of you and for your purposes.

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### Disclaimer

Ernst & Young (EY) was engaged on the instructions of the New Zealand Transport Agency (NZTA) to provide a high-level peer review of the *Let's Get Wellington Moving Economic Report* completed by LGWM dated 3 September 2018. The results of EY's work, including any assumptions and qualifications made in preparing the report, are set out in this EY's report dated 7 September 2018 (the Report).

This Report contains information obtained or derived from the project team, as indicated in this Report. EY has not sought to verify the information provided or establish the reliability of those sources. You should read the Report in its entirety. A reference to the Report includes any part of the Report. Unless otherwise agreed in writing with EY, access to the Report is made only on the following basis and in either accessing the Report or obtaining a copy of the Report the recipient agrees to the following terms:

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