Report

High Level Peer Review of Cost Estimate for Let's Get Wellington Moving

Prepared for The Let's Get Wellington Moving Alliance (LGWM) between New Zealand Transport Agency, Greater Wellington Regional Council & Wellington City Council

By Beca Limited (Beca)

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Revision History

Revision Nº	Prepared By	Description	Date
A	Barry Calvert	First Draft – for review	13/09/2018
B	Barry Calvert	Second Draft	18/09/2018
C	Barry Calvert	Final Issue	21/09/2018

Document Acceptance

Action	Name	Signed	Date
Prepared by	Barry Calvert		21/09/2018
Reviewed by	Mark Wilson		21/09/2018
Approved by	John Oscilowski		21/09/2018
on behalf of	Beca Limited		

Introduction

Beca has been commissioned to provide professional quantity surveying services to Let's Get Wellington Moving (LGWM) in the form of a high level peer review of the Aecom Feasibility stage cost estimate dated 28/08/2018.

The estimate has been produced in nine (9) parts addressing the following stages of work:

Ref.	Estimate Title	Base Est.	Cont/Risk	P95
1	SH1 Terrace Tunnel to Basin Reserve 4 Laning – Cut & Cover Tunnel Full Length	927,609,400	285,131,870	1,212,741,270
2	SH1 Mt Victoria Tunnel Duplication including Tie-In at Western Portal	252,294,100	108,570,875	360,864,975
3	SH1 Mt Victoria Tunnel to Cobham Drive 4 Lanning	147,221,500	59,674,875	206,896,375
4	Basin Reserve Reconfiguration	108,115,900	51,362,950	159,478,850
5	LTR (Light Rail) – Railway Station to Zoo via Pukeahu	768,786,500	249,061,450	1,017,847,950
6	LTR Newtown Zoo to Airport via Miramar	396,746,500	118,157,625	514,904,125
7	SH1 Terrace Tunnel Duplication	151,433,125	62,435,250	213,868,375
8	SH1 Aurora Terrace Tunnel Southbound Approach Lanes	63,345,750	32,849,875	96,195,625
9	PT (Public Transport) Through the City and to the North	245,212,325	127,713,063	372,925,388
	Totals	**3,060,765,100**	**1,094,957,833**	**4,155,722,933**

It is clear that the combined value of Aecom's estimates is included and being used to inform the LGWM Recommended Programme of Investment Summary Report (RPISR). A Programme Business Case (PBC) estimate is usually the first step in a series of business cases and by its very nature is a high level indication only and not reliable as a final cost. Therefore we do not expect the RPISR report will be used for funding or budget approval and that this peer review has been commissioned to provide LGWM with a level of comfort for the initial Benefit Cost Ratio summary.

Basis of Review

The high level feasibility estimates provided to Beca for review are presented in summary form only with no detailed item descriptions, quantities or rates. It is important to note that the in the time frame given to us to provide this review it has not been possible to undertake a thorough and definitive review of any part of the estimate.

As the estimates are based on very high level feasibility design information, not warranted or guaranteed by Beca, we have not been able to independently verify significant portions of the scope. Beca is therefore not responsible for the accuracy, completeness and currency of that information.

This report has been prepared by Beca on the specific instructions of our Client LGWM. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. This report, whether in whole or in part, may not be disclosed to any person other than the Client and any use or reliance by any person contrary to the above, to which Beca has not given its prior written consent, is at that person's own risk.

Beca also makes no assurances with respect to the accuracy of assumptions made by Aecom in the completion of their estimate. Some costs may vary significantly due to unforeseen events and circumstances. To the extent that the conditions differ from those assumed in the Aecom estimate, the comments and findings expressed by Beca in this report may no longer be valid and should be reviewed.

The unit rates referenced by us are based on extrapolation of similar project pricing, budgets for some heavy equipment items, industry unit rates and Beca's general experience. The suitability of these rates is assumed based purely on our understanding of the scope.

Review Findings

We have reviewed each of the estimate parts above and make the follow observations.

Tunnel Boring

We understand from meetings with Aecom that the assumed tunnelling methodology is to procure and operate a tunnel boring machine (TBM). While there is no reason why this work cannot be done using TBM's, we do note the likelihood that at least two of the four tunnels will be of a different size, which makes the boring option less cost effective over such short distances. We note that other tunnelling methods are available (e.g. mined tunnels) that require lower establishment costs compared to TBM's. It is our view that the business case for this project should consider such alternatives, or consider the possibility of implementing a similar size bore across all 4 tunnel locations to optimise the use of a TBM.

The overall rates for tunnelling seem high. An example of a recent TBM project in New Zealand is the two, three lane Waterview Tunnels in Auckland with a combined bored length of 4.8km and a total cost in the region of $1.4B, or $292,000 per metre. The Aecom estimate works out to be approximately $332,000 per metre which is 14% higher than the Waterview project. It is important to note that the Waterview tunnels are 14.4m in diameter with 3 traffic lanes.

Consideration should be given to the overall size of each tunnel relative to the business case requirements.

Cut and Cover

Cut and cover (C&C) rates appear to be high. What we have ascertained from the drawings is there appears to be 2.6km of 2-lane trench 8m high. Roughly 75% of this is covered. The estimated cost for this work is $530M, or $207K per metre for C&C and $183K per metre for retained cut (uncovered trench). Our expectation would be that C&C works of this size and length should have a total cost in the range of $300M to $400M.

Our experience with cut and cover sections of roading is that the cost per metre can vary significantly depending on a number of factors including geotechnical conditions impacting on the design of the structure and the displacement of in-ground volume.

Light Rail

While the Light Rail (LTR) costings appear to be a reasonable indication for an 'at grade' alignment of this scale, we require more time and information to properly review all of the estimate items in order to respond with a greater degree of certainty. There are many variables and costing risk elements within the alignment that a 'per metre' rate is difficult to determine at this time.

We note that the sums allowed for terminals and stations appear to be on the low side, although if a station only consists of a covered ramp then the allowances of between $600k and $1M each should be sufficient.

We also note that no mention is made of the rolling stock. We assume that the cost of these is taken into consideration elsewhere in the project budget, in the same way as buses have been excluded from the 'PT Through the City and to the North' estimate.

Civil Structures

The Sussex Street 190m long over-pass bridge rate of $2,000/m2 is lower than we would expect for a 4-lane concrete structure of this nature. There is also the issue of bridge approach structures which is not itemised and may not have been considered elsewhere.

The new Terrace Tunnel southbound approach bridge rates are suitable.

Roading Improvements & Reinstatement

From our interpretation of the estimate item descriptions, the roading re-build scope for reclaiming Te Aro is approx. 9,000m2 of pavement. This equates to a rate of $2,000/m2, which is very high, especially considering that landscaping is itemised separately. Assuming our understanding of the scope is correct, this allowance could be as much as $15M too high.

Contingency and Funding Risk Allowances

When analysed as a whole, the estimate Contingency adds 19% to the base estimate, and the P95 Funding Risk Allowance adds a further 17%. Beca has had no visibility of the models or calculations used to determine the levels of contingency and risk allowance, and we will therefore not be making comment on the suitability or otherwise of these values.

In Summary

Based on our briefing with Aecom estimator Graeme Doherty, their feasibility estimate appears to be well considered and relatively detailed for this early stage in the project. Even though the cost of some specific items within the base estimate may be on the high side, the scope of work is difficult to determine and at this stage we agree with a conservative approach. Beca has assumed the scope of work and risk assumptions made by Aecom are robust, and therefore agrees that the expected estimate total is not unreasonable for this feasibility stage.

In terms of the range 90% (low) and 120% (high) adopted in the economic analysis in section 9.3 of the Draft Recommended Programme of Investment Summary Report dated 23 August 2018, our view, based on historical data for projects of this magnitude is that the use of these lower and upper bound percentages creates a relatively narrow range. LGWM will need to satisfy themselves that this range is wide enough for such an early point in the feasibility design.

As noted in the introduction it is our expectation that the Recommended Programme of Investment Summary Report is not used for funding or budget approval as there is significant risk associated with using these feasibility estimate values for a funding application. The Beca peer review has

been at a very high level and has not included any detailed assessment of scope, pricing or project risk. We suggest that additional work be undertaken before funding approval is sort, including a parallel estimate by consultants with the relevant experience.

Please note that unless otherwise stated, all figures above are construction values excluding demolition, ground improvement, services relocations, surface treatments & landscaping, contractors P&G, design fees, contingencies and GST.