

Ken Ng

From: Craig Nicholson
Sent: Friday, 13 September 2019 11:23 am
To: Lonnie Dalzell; Greg Lee
Cc: Sree Harsha Nutulapati
Subject: RE: Te Ahu a Turanga - toll assessment
Attachments: RE: Te Ahu a Turanga Toll Modelling Scope

Hi Lonnie,

Good timing! (I was just speaking to Greg about the toll assessment yesterday afternoon.)

It would be good to meet next Tuesday, although I'd prefer the morning (any time before your lunchtime presentation) rather than the afternoon is that's ok?

FYI, after my email to you (below), I added some commentary/suggestions to the scoping document that ^{section 9(2)} had sent me, and he and I met on 20th August to discuss/agree the scope. It was very constructive and we agreed on a more limited (and I thought more sensible/appropriate) scope definition that he had seemed to be heading towards. We agreed to exclude any calculation of the impact on the economic benefits, and to limit the reporting to a brief summary of the assessment and a few toll revenue and/or traffic diversion figures, which would still be fit for purpose, but I was also more comfortable that it was closer to what Greg and I had originally discussed.

I'm currently waiting for ^{section 9(2)} to revise the scope document, so I can then finalise the cost estimate for you and Greg before I proceed further – see my email to ^{section 9(2)} attached.

I see you've sent me a meeting invitation for 2:30pm on Tuesday. I can probably make that time work if it's your only option, but as above, I'd prefer the morning if that works for you?

Cheers,

Craig

From: Lonnie Dalzell <Lonnie.Dalzell@nzta.govt.nz>
Sent: Friday, 13 September 2019 11:03 AM
To: Craig Nicholson <Craig.Nicholson@nzta.govt.nz>; Greg Lee <Greg.Lee2@nzta.govt.nz>
Cc: Sree Harsha Nutulapati <Sree.HarshaNutulapati@nzta.govt.nz>
Subject: RE: Te Ahu a Turanga - toll assessment

Kia ora Craig,

My apologies but I have lost sight of this.

Can we please catchup next Tuesday to discuss this?

Ngā mihi nui

Lonnie

Lonnie Dalzell | Owner Interface Manager
Te Ahu a Turanga: Manawatū Tararua Highway

From: Craig Nicholson <Craig.Nicholson@nzta.govt.nz>
Sent: Monday, 12 August 2019 7:57 AM
To: Lonnie Dalzell <Lonnie.Dalzell@nzta.govt.nz>; Greg Lee <Greg.Lee2@nzta.govt.nz>
Subject: RE: Te Ahu a Turanga - toll assessment

Thanks Lonnie.

I agree it's a good idea to meet to clarify the scope.

Attached is a scoping document that section 9(2) sent me last week, for me to add to, which sets out his current thinking.

I'm generally happy that it captures what he and I have discussed, but the key elements where I think the scope "growth" needs to be controlled are:

- Key scope item #3 – There appears to be a need to undertake separate traffic diversion assessments for cars and trucks, which is probably ok, but requires twice as much analysis (and presumably reporting).
- Key scope item #5 – As I noted in my original scoping email, any assessment of the change in economic benefits as a result of tolling would be very time consuming, because the existing WSP-Opus spreadsheet model doesn't include any assessment of the economic benefits of the new route, so any assessment of the impact of tolling on the benefits would need to calculate the project benefits from scratch.
- Key scope item #6 – I am unclear how much reporting is required, but as the analysis expands, I expect the reporting requirements will too.

Greg – section 9(2) and I are already trying to arrange another meeting. I have indicated to him that the only times I'm available to meet him this week are tomorrow morning, or Wednesday afternoon (after 3:00pm) if either of those suit you?

Regards,

Craig

From: Lonnie Dalzell
Sent: Monday, 12 August 2019 6:53 AM
To: Craig Nicholson <Craig.Nicholson@nzta.govt.nz>; Greg Lee <Greg.Lee2@nzta.govt.nz>
Subject: RE: Te Ahu a Turanga - toll assessment

Hi Craig,

Thank you for keeping me informed. Keep on going but we need to sit with section 9(2) and clarify what he is after.

Greg – it sounds like section 9(2) is trying to do a full analysis on what basically a traffic model from a spreadsheet. This can't be used for a full detailed assessment, and it was my understanding this was only an initial assessment. Can you organise a meeting for the 4 of us (I may have to call in), to discuss.

Cheers

Lonnie

Lonnie Dalzell / Owner Interface Manager (Te Ahu a Turanga)

Project Delivery Team
System Design and Delivery

From: Craig Nicholson

Sent: Sunday, 11 August 2019 11:19 PM

To: Greg Lee <Greg.Lee2@nzta.govt.nz>; Lonnie Dalzell <Lonnie.Dalzell@nzta.govt.nz>

Subject: Te Ahu a Turanga - toll assessment

Hi Lonnie and Greg,

I'm just following up my conversation with Greg last week regarding the toll assessment for Te Ahu a Turanga, which has grown considerably in scope from what I first envisaged.

When I first scoped the toll assessment task (as per the email chain below), I envisaged simply using the existing WSP-Opus spreadsheet model and an "expert assessment" of the traffic diversion rates at different toll rates to identify the optimum/maximum toll revenue.

When Greg and I met with section 9(2)(a) and section 9(2)(a) from the toll group in late June, they were seeking a more sophisticated analysis than I had envisaged, which Greg and I noted may not be feasible, given the limitations of the data that is available about the travel patterns in the area.

Following further discussions with section 9(2) about the need for more data about the existing traffic conditions to assess the effect of a toll, I undertook an analysis of the travel time and distance savings (or increases) for each key origin-destination pair for vehicles using Te Ahu a Turanga. I then met again with section 9(2) recently, to undertake the "expert assessment" needed to then complete the final part of the toll assessment. The meeting was constructive, but despite my best efforts, section 9(2) wasn't ready for us to undertake the "expert assessment". He continues to see a need to more fully define and further broaden the toll assessment scope.

To date I have spent 25 hours on the toll assessment work, and I now envisage the total time commitment will be in the order of 50 to 75 hours, but even that is a little uncertain until I can confirm the scope with section 9(2)(a). For example, I originally envisaged only very limited reporting about the optimum/maximum toll revenue, but I now understand that Same (on behalf of the toll group) want a detailed tolling report to be prepared, which could easily take another 25 hours or more, depending on how extensive it needs to be.

I'm conscious that the initial approved time budget was only 30 hours (with a provisional allowance for another 20 hours), so I have almost expended the initial budget.

Can you confirm that you're happy for me to continue working with section 9(2) to confirm the scope and then complete the toll assessment.

Thanks

Craig

From: Craig Nicholson

Sent: Thursday, 13 June 2019 11:44 PM

To: Greg Lee <Greg.Lee2@nzta.govt.nz>; Lonnie Dalzell <Lonnie.Dalzell@nzta.govt.nz>

Subject: RE: Te Ahu a Turanga - have you got time to assist with a transport modelling question?

Hi Lonnie and Greg,

Following up the emails between Greg and I yesterday and our conversation this afternoon, I'd be happy to undertake an initial toll viability assessment for Te Ahu a Turanga if you want me to.

As I discussed with Greg, I think the best (and probably the only) approach will be to:

1. interrogate the WSP-Opus spreadsheet traffic model (which I have) to list the proportions of trips that would use the new route, Saddle Road and the Pahiatua Track for each of the assumed origin/destination pairs, for trips that cross the ranges between Manawatu and Tararua.
2. Use the two existing modelled scenarios (i.e. with and without the new route) as the “outer limits” of the tolling scenarios (since they also represent the toll scenarios with either a zero toll, or a very high toll (i.e. so high that nobody uses the new route, so the traffic pattern is as if the new route doesn’t exist).)
3. Work with [section 9\(2\)\(a\)](#) to undertake an “expert assessment” of how the proportions of traffic (for each O/D pair) using each of the three routes will change as the toll rate increases (between the defined outer limits of the two existing scenarios)
4. Identify the optimum/maximum toll revenue.

I estimate this will take approximately 20 to 30 hours, including meetings with [section 9\(2\)\(a\)](#). However, as I discussed with Greg, that time estimate excludes any assessment of the change in economic benefits as a result of tolling (which may or may not be required) which would be very time consuming, because the existing WSP-Opus spreadsheet model does not include any assessment of the economic benefits of the new route, so any new assessment of the affect of tolling would need to calculate the economic benefits from scratch.

The maximum budget of my existing/previous contract was almost full expended (to within \$2,000), so the budget will need to be extended if you want me to undertake this work.

Please let me know if/when you want me to proceed. I should be able to complete the work within two or three weeks of getting the go ahead.

Kind regards,

Craig

From: Greg Lee

Sent: Wednesday, 12 June 2019 12:50 PM

To: Craig Nicholson <Craig.Nicholson@nzta.govt.nz>

Subject: RE: Te Ahu a Turanga - have you got time to assist with a transport modelling question?

Yip, but [section 9\(2\)\(a\)](#) and Opus are conflicted for time being at least.

Greg Lee/ Principal Planner

System Design and Delivery

[section 9\(2\)\(a\)](#)

From: Craig Nicholson

Sent: Wednesday, 12 June 2019 12:49 PM

To: Greg Lee <Greg.Lee2@nzta.govt.nz>

Subject: RE: Te Ahu a Turanga - have you got time to assist with a transport modelling question?

Hi Greg,

That will be more than a bit tricky...

You may recall that the “traffic model” is just a spreadsheet with some assumptions [section 9\(2\)\(g\)\(i\)](#) [section 9\(2\)\(a\)](#) (and/or his team) at Opus and then “sense checked” by me about what proportion of traffic would divert to the new route / stay on Saddle Road / stay on the Pahaitua Track for each different O/D pair (with approx. start/end points to the west of the Gorge, and three to the east).

Any “toll model” will essentially just alter the assumed proportions to use the different routes.

I think section 9(2)(a) team would be best placed to do this, perhaps with section 9(2)(a) input. I suggest they should consider the proportions using each route for each O/D pair for different incremental toll costs.

The existing "modelled" route proportions obviously corresponds to no toll. Assess changing proportions on each route for toll of say \$1.00, \$1.50, \$2.00, \$2.50 and \$3.00. With each increment, the proportions would presumably move further away from the current "with the new route" scenario, and closer to the current "do minimum" scenario.

I'm happy to get involved if you want me to, but I think the two section 9(2)s are probably the best placed to look at it.

Cheers,

Craig

From: Greg Lee

Sent: Wednesday, 12 June 2019 12:12 PM

To: Craig Nicholson <Craig.Nicholson@nzta.govt.nz>

Subject: RE: Te Ahu a Turanga - have you got time to assist with a transport modelling question?

Need someone to undertake first cut assessment as to whether tolling is viable or not. First step is to re-run the traffic model with some tolling assumptions, working with section 9(2)(a) and investment colleagues to establish assumptions and agree outputs.

Greg Lee/ Principal Planner

System Design and Delivery

section 9(2)(a)

From: Craig Nicholson

Sent: Wednesday, 12 June 2019 12:09 PM

To: Greg Lee <Greg.Lee2@nzta.govt.nz>

Subject: RE: Te Ahu a Turanga - have you got time to assist with a transport modelling question?

Of course... what's up?

From: Greg Lee

Sent: Wednesday, 12 June 2019 10:27 AM

To: Craig Nicholson <Craig.Nicholson@nzta.govt.nz>

Subject: Te Ahu a Turanga - have you got time to assist with a transport modelling question?

Greg Lee/ Principal Planner

System Design and Delivery

section 9(2)(a)

From: Craig Nicholson
Sent: Wednesday, 4 September 2019 8:49 pm
To: section 9(2)(a)
Subject: RE: Te Ahu a Turanga Toll Modelling Scope
Attachments: Example Distributions.xlsx

Hi section 9(2).

Thanks for the clarification.

I have been thinking about the WTP value stuff and the related statistics "theories" quite a bit since we met.

I have been thinking that we should perhaps use around 75% or 80% of the EEM travel time value (so that on average, people still get a small (20%-25%) benefit from using the route, even if they pay a toll), but I'm happy to use 100% of the EEM value if you consider that is the most appropriate value.

In terms of the range/variability of WTP values, I have considered using either a normal, rectangular and triangular distribution - see the simple spreadsheet illustration attached.

At a practical level, a triangular distribution is an assumed/artificial distribution, but has a very similar cumulative distribution "s-curve" to a normal distribution. I can't see any real value in moving from a statistically valid/realistic normal distribution to one that is obviously artificial, when it has virtually the same "s-curve" so will produce virtually the same volume and revenue predictions. On that basis, I don't think a triangular distribution should be considered any further.

A rectangular distribution could generate either a wider distribution (i.e. more people further away from the mean WTP value) or a narrower distribution (i.e. more people closer to the mean WTP value), whichever is preferred... in the example in the spreadsheet, the rectangular distribution ends at 2.5 standard deviations away from the mean. It would be easy to widen (and lower) the rectangular distribution, which would give a wider spread of WTP values, but that would move the cumulative distribution "s-curve" further and further away from a "normal" distribution s-curve, which implies it would be getting more and more "artificial" (which is probably right). It would also be easy to narrow (and raise) the rectangular distribution, but that would assume even less range/variability in the WTP value. On balance, I think a rectangular distribution also seems too "artificial".

Overall then, I favour using a normal distribution, which has the benefit of having quite a wide range/variability, while also being a statistically valid/realistic distribution.

If you agree with that, the only question then becomes how "wide" we want to make the normal distribution (in dollars and cents, rather than in number of standard deviations).

A normal distribution has 68.3% of people/values within 1 standard deviation (s.d.), 95.4% within 2 s.d., 99.7% within 3 s.d. and 100% within 3.9 s.d. of the mean value. In essence, although it has long tails at both ends, nearly everyone (95.4%) of values are within 2 s.d. so I think we should set 2 s.d. to somewhere between \$0.50 and \$1.00. It would be fairly easy to test both if you like?

I've worked out the basics of a calculation spreadsheet, which will essentially have either 14 or 21 columns (representing 14 or 21 O-D pairs, depending on whether we combine "Woodville and North" or keep them separate., with each one having a total "population" number (to represent the daily number of vehicles between that O-D pair) and then have a cumulative distribution curve, centred about the mean WTP value for that O-D pair (using the average travel time saving for that O-D pair). The only things that need to be decided before I do a "test run" populating it are to decide:

- Whether to use 75%-80% or 100% of the EEM value as the mean WTP value; and

- How wide to “spread” the normal distribution.

Finally, there was one other action that I thought you were going to take/do after our last meeting. I thought you were going to update the toll modelling scope document, based on our discussion, so I could then finalise my cost estimate for Lonnie and Greg.

Let me know your thoughts, or perhaps we could catch up early next week to discuss?

Cheers,

Craig

-----Original Message-----

From: section 9(2)(a)
Sent: Wednesday, 4 September 2019 4:46 PM
To: Craig Nicholson <Craig.Nicholson@nzta.govt.nz>
Subject: RE: Te Ahu a Turanga Toll Modelling Scope

Hi Craig

Just a short note to confirm that the WTP should be the EEM values as a base. We can look at regional variability in later stages (or sensitivity tests at this stage if requested). Hopefully this confirmation then allows the development of the spreadsheet model. Let me know if you need anything else please?

Thanks

section 9(2)

-----Original Message-----

From: Craig Nicholson
Sent: Tuesday, 20 August 2019 10:56 AM
To: section 9(2)(a) @nzta.govt.nz>
Subject: Te Ahu a Turanga Toll Modelling Scope

Hi section 9(2)(a)

I've annotated some additions in the scope document you sent me, for our discussion this afternoon. I have also included indicative costs, but they are subject to change following our discussion. See you at 2:30pm.

Craig

# Std Dev's from Mean	Normal Values	Normal Distribution	Rectangular Values	Rectangular Distribution	Triangular Values	Triangular Distribution
-3.9	0.0000	0.0000		0.0000	0.0000	0.0000
-3.8	0.0001	0.0001		0.0000	0.0000	0.0000
-3.7	0.0000	0.0001		0.0000	0.0000	0.0000
-3.6	0.0001	0.0002		0.0000	0.0000	0.0000
-3.5	0.0000	0.0002		0.0000	0.0000	0.0000
-3.4	0.0001	0.0003		0.0000	0.0000	0.0000
-3.3	0.0002	0.0005		0.0000	0.0000	0.0000
-3.2	0.0002	0.0007		0.0000	0.0000	0.0000
-3.1	0.0003	0.0010		0.0000	0.0000	0.0000
-3.0	0.0003	0.0013		0.0000	0.0000	0.0000
-2.9	0.0006	0.0019		0.0000	0.0000	0.0000
-2.8	0.0007	0.0026		0.0000	0.0000	0.0000
-2.7	0.0009	0.0035		0.0000	0.0000	0.0000
-2.6	0.0012	0.0047		0.0000	0.0000	0.0000
-2.5	0.0015	0.0062	0.0000	0.0000	0.0000	0.0000
-2.4	0.0020	0.0082	0.0200	0.0200	0.0016	0.0016
-2.3	0.0025	0.0107	0.0200	0.0200	0.0032	0.0048
-2.2	0.0032	0.0139	0.0200	0.0600	0.0048	0.0096
-2.1	0.0040	0.0179	0.0200	0.0800	0.0064	0.0160
-2.0	0.0049	0.0228	0.0200	0.1000	0.0080	0.0240
-1.9	0.0059	0.0287	0.0200	0.1200	0.0096	0.0336
-1.8	0.0072	0.0359	0.0200	0.1400	0.0112	0.0448
-1.7	0.0087	0.0446	0.0200	0.1600	0.0128	0.0576
-1.6	0.0102	0.0548	0.0200	0.1800	0.0144	0.0720
-1.5	0.0120	0.0668	0.0200	0.2000	0.0160	0.0880
-1.4	0.0140	0.0808	0.0200	0.2200	0.0176	0.1056
-1.3	0.0160	0.0968	0.0200	0.2400	0.0192	0.1248
-1.2	0.0183	0.1151	0.0200	0.2600	0.0208	0.1456
-1.1	0.0206	0.1357	0.0200	0.2800	0.0224	0.1680
-1.0	0.0230	0.1587	0.0200	0.3000	0.0240	0.1920
-0.9	0.0254	0.1841	0.0200	0.3200	0.0256	0.2176
-0.8	0.0278	0.2119	0.0200	0.3400	0.0272	0.2448
-0.7	0.0301	0.2420	0.0200	0.3600	0.0288	0.2736
-0.6	0.0322	0.2742	0.0200	0.3800	0.0304	0.3040
-0.5	0.0343	0.3085	0.0200	0.4000	0.0320	0.3360
-0.4	0.0361	0.3446	0.0200	0.4200	0.0336	0.3696
-0.3	0.0375	0.3821	0.0200	0.4400	0.0352	0.4048
-0.2	0.0386	0.4207	0.0200	0.4600	0.0368	0.4416
-0.1	0.0395	0.4602	0.0200	0.4800	0.0384	0.4800
0.0	0.0398	0.5000	0.0200	0.5000	0.0400	0.5200
0.1	0.0398	0.5398	0.0200	0.5200	0.0384	0.5584
0.2	0.0395	0.5793	0.0200	0.5400	0.0368	0.5952
0.3	0.0386	0.6179	0.0200	0.5600	0.0352	0.6304
0.4	0.0375	0.6554	0.0200	0.5800	0.0336	0.6640
0.5	0.0361	0.6915	0.0200	0.6000	0.0320	0.6960
0.6	0.0343	0.7258	0.0200	0.6200	0.0304	0.7264
0.7	0.0322	0.7580	0.0200	0.6400	0.0288	0.7552
0.8	0.0301	0.7881	0.0200	0.6600	0.0272	0.7824
0.9	0.0278	0.8159	0.0200	0.6800	0.0256	0.8080
1.0	0.0254	0.8413	0.0200	0.7000	0.0240	0.8320
1.1	0.0230	0.8643	0.0200	0.7200	0.0224	0.8544
1.2	0.0206	0.8849	0.0200	0.7400	0.0208	0.8752
1.3	0.0183	0.9032	0.0200	0.7600	0.0192	0.8944
1.4	0.0160	0.9192	0.0200	0.7800	0.0176	0.9120
1.5	0.0140	0.9332	0.0200	0.8000	0.0160	0.9280
1.6	0.0120	0.9452	0.0200	0.8200	0.0144	0.9424
1.7	0.0102	0.9554	0.0200	0.8400	0.0128	0.9552
1.8	0.0087	0.9641	0.0200	0.8600	0.0112	0.9664
1.9	0.0072	0.9713	0.0200	0.8800	0.0096	0.9760
2.0	0.0059	0.9772	0.0200	0.9000	0.0080	0.9840
2.1	0.0049	0.9821	0.0200	0.9200	0.0064	0.9904
2.2	0.0040	0.9861	0.0200	0.9400	0.0048	0.9952
2.3	0.0032	0.9893	0.0200	0.9600	0.0032	0.9984
2.4	0.0025	0.9918	0.0200	0.9800	0.0016	1.0000
2.5	0.0020	0.9938	0.0200	1.0000	0.0000	1.0000
2.6	0.0015	0.9953	0.0000	1.0000		1.0000
2.7	0.0012	0.9965		1.0000		1.0000
2.8	0.0009	0.9974		1.0000		1.0000
2.9	0.0007	0.9981		1.0000		1.0000
3.0	0.0006	0.9987		1.0000		1.0000
3.1	0.0003	0.9990		1.0000		1.0000
3.2	0.0003	0.9993		1.0000		1.0000
3.3	0.0002	0.9995		1.0000		1.0000
3.4	0.0002	0.9997		1.0000		1.0000
3.5	0.0001	0.9998		1.0000		1.0000
3.6	0.0000	0.9998		1.0000		1.0000
3.7	0.0001	0.9999		1.0000		1.0000
3.8	0.0000	0.9999		1.0000		1.0000
3.9	0.0001	1.0000		1.0000		1.0000

