NZTA Industry Briefing 18/11/16

High risk rural road – 4km of road with 71 recorded crashes over past 10 years

Regular lengthy delays – 12
12 full and partial closures (11 greater than 12 hours in duration) over 5 years with detour routes having excessive additional travel time

Increased travel time -
High heavy vehicle numbers and tight geometry with limited passing opportunities

Project Objectives

- Reduce the number of deaths and serious injuries from crashes
- Reduce the number and duration of road closures
- Improve journey tme predictability
- Improve drivers experience along SH#

Topography
Necessary to go up and over, or around Mount Messenger

Shortest route with greatest travel time benefit is west of existing road

Indicative Business Case

2.2.1 Defining the problem (Awakino Gorge to Mt Messenger)

1. Narrow lanes no shoulder & poor geometric alignment causing a high number f crashes, unforgiving alignment results in deaths, serious injuries & road closures
2. Natural events cause a high number of road closures resulting in significant delays
3. Lack of passing opportunities leads to driver frustration & poor journey experience

2.3.1 Poor Geometry Resulting in Crashes

Trucks over represented in crashes – 26% = double national average.

GIS data showed high number of deaths and serious injuries north of Mt Messenger

Road Closures

Crashes cause 31% of partial and full closures 2009 – 2014. HCV overrepresented – 16% c.f light vehicles 15% (Trucks only 20% of the fleet)

55% of 20 full closures caused by crashes with 45% being truck crashes. Closures due to truck crashes are long.

61% of all closures due to slips

Overtaking Metrics

Highways capacity manual 2000 300m (relatively short)

EEM – 450m (more comfortable)

With AADT of 2200vpd gaps in opposing traffic stream are likely

Table 2.4

Journey time relatively consistent through the day

5.5.6 Site E Mount Messenger & Tunnel

Appendix E

Realignment – high alignment with objectives but very hgh cost, therefore low value for money/

Activity E 7 Realignment

Description: Investigated in a 2002 Scheme Assessment, the Mt Messenger Realignment would provide a new 4.7km long route to the western side of the current highway that would bypass an 8.3km length of windy, narrow and steep highway which includes the Mt Messenger Tunnel. The current scheme design for the realignment incorporates a passing lane on the uphill section in each direction.

Potential Impact: This option provides a high alignment to all of the project objectives. It would be designed/built to a much higher standard of geometric alignment than the existing highway and significantly improve resilience along the route, and it would do away with the Mt Messenger Tunnel. The high standard alignment would significantly reduce crashes and provide improvements to journey experience. The route shortening would make a major improvement to travel times. The cost is very high for a short length of the total route and will still be through unstable topography that may still entail resilience risks. The overall BCR is likely to be less than 1 as a result of high costs, but meets the objectives well, hence recommended to be considered as an 'alternative' short list activity.

Recommendation: Recommended to proceed as an 'alternative' short list option.

The two Alternative programmes are summarised below. **Error! Reference source not found.** shows the locations of the activities within the programmes.

Table Error! No text of specified style in document.**–1: Recommended Alternative Programmes D & E**

Programme in priority order	Description	Rough Order Cost & Funding	Proceed to DBC?	Commentary
Programme D	**Awakino Tunnel Realignment** A 700m long realignment of the highway, incorporating two bridges and a significant length of river realignment, to go around the Awakino Tunnel and high rock bluff, avoiding rock fall hazards and easing the tight corner on northern approach (Alternative to activities proposed as part of Programmes B & C)	**$10.7M** **$9.3m incr** NLTF $1.4M FIF $9.3M	**Yes** [CM1] Error! Bookmark not defined.	**Alignment to Objectives:** H/H/H/M **IAF Profile:** H/L/1 to 3 A 700m long realignment that bypasses the Awakino Tunnel and the SB approach corner with high crash risk. Although expensive it has a BCR=2.5 and an incremental BCR of 2.1 due to resilience benefits. It has and strong alignment to all project objectives, A reasonably attractive alternative, if funding can be obtained outside the NLTF.

Programme in priority order	Description	Rough Order Cost & Funding	Proceed to DBC?	Commentary
Programme E	**Mt Messenger Realignment** A new 4.7km long route to the west of the existing Mt Messenger that would bypass an 8.3km length of windy, narrow and steep highway, along with the Mt Messenger Tunnel (Alternative to activities proposed as part of Programmes B & C)	**$89.3M** **$80.2 incr** NLTF 8.7M FIF $80.6M	**Yes**[Error! Bookmark not defined.]	**Alignment to Objectives:** H/H/H/H **IAF Profile:** H/L/1 to 3 A 4.7km realignment that avoids the worst of Mt Messenger and shortens the route by 3.6km. It provides strong gains in all objectives, but is expensive and has a marginal BCR.

1.2 DESCRIPTION OF THE PROJECT

1.2.1 Mt Messenger is located along the existing State Highway 3 (SH3), approximately 58km north of New Plymouth and 183km south of Hamilton.

1.2.2 The overarching project objective is to avoid the worst stretch of Mt Messenger's current road layout, characterised by a narrow and winding road including the narrow tunnel. The Agency anticipates that this objective is optimally achieved through the development and construction of a bypass of the existing Mount Messenger tunnel and tunnel approaches on State Highway 3.

1.2.3 This contract is for the planning, consenting, stakeholder liaison, design and construction works of the bypass.

1.2.4 The form (length, configuration) and location of the bypass will be developed further and finalised as part of the commission, however is expected to be up to approximately 7km long and likely consist of a four lane highway including passing / slow vehicle lanes.

1.2.5 The bypass should be consistent with the receiving environment in terms of the natural and social character, the speed environment, and the landscape and ecological values which are highly represented in the area.

Opportunities for Cost Reduction Through Reducing Design Standards						
Option	Lower Design Speed		No Passing Lanes		Lower Seismic Return Period	
A		Terrain dictates alignment		Grades up to 10% but low volumes and modelling could demonstrate acceptability		
E		Terrain generally dictates alignment but better fit achieved in north with a lower spped		Grades 7.o% & 7.5%. Sight distance of 450m or more over xx m of route		Fills < 6m high. Return period of 500 years OK.
F	P is a proxy for F, hence Option F not considered further					
P						
Z						

Opportunities for Cost Reduction Through Design Changes						
Option	Horizontal Alignment		Vertical Alignment		Earthworks in Lieu of Structures	
A						
E						Lower alignment permits 4 of the 5 bridges to be removed. Cut in lieu of tunnel is consentable.
F						

Opportunities for Cost Reduction from MCA2 By Reducing Design Standards					
Option	Lower Design Speed	Lower Stopping Sight Distances	No Passing Lanes	Lower Resilience	Potential Saving ($ millions ROC)
A	• Alignment follows terrain along scarps north and south of Waipingau Valley. • Reducing design speed would require fills on deep alluvium, a bridge over a valley and increased cut volumes in scarps.	• Horizontal curves appropriate for an operating speed of 100kph but SSD currently suitable for 70kph. • SSD of 85-90kph would be acceptable but requires local widening of verges. Hence, cost increase over MCA2 design.	• Grades up to 10% over ~ 600m but low volumes and modelling might demonstrate acceptability. • 450m sight distance?	• A reduced return period for structural, drainage and geotechnical design could produce more economical designs, but at the expense of reduced resillience and an increased risk of flooding for a lifelines route. • No alternative route - questionable whether a departure is appropriate. • Progressive landslide feature in southern flank of Waipingau valley is a significant resilience risk.	•
E	• Terrain generally dictates alignment but better fit achieved in north with a lower speed.	• Horizontal curves appropriate for an operating speed of 100kph but SSD currently suitable for 70kph. • SSD of 85-90kph would be acceptable but requires local widening of verges with some increase in cost.	• Grades 7.0% & 7.5%. • Sight distance of 450m or more over xx m of route	• Not applicable to earthworks as fills < 6m high. Return period of 500 years OK. • A reduced return period for structural and drainage design could produce more economical designs, but at the expense of reduced resilience and an increased risk of flooding for a lifelines route	
F	Option P is a proxy for Option F, hence Option F not considered further				
P	• Alignment dictated by terrain. • Reducing curve radii south of Waipingau Valley reduces fill required across a transverse valley, but require a large increase in cut volumes in scarps and climb up to Waipingau south ridge. • North of tunnel reduced curve radii result in sub-optimal alignment in terms of terrain and earthworks quantities.	• Horizontal curves appropriate for an operating speed of 100kph but SSD currently suitable for 70kph. • SSD of 85-90kph would be acceptable but requires local widening of verges. Hence, cost increase over MCA2 design	• Grades up to 10% over ~ 1.3km,but low volumes and modelling might demonstrate acceptability. • 450m sight distance?	• A reduced return period for structural, drainage and geotechnical design could produce more economical designs, but at the expense of reduced resillience and an increased risk of flooding for a lifelines route. • No alternative route - questionable whether a departure is appropriate.	
Z	• Design speed currently 70 kph, no opportunities for savings.	• Horizontal curves appropriate for an operating speed of 70kph.	• Grades up to 10% over > 1km,but low volumes and modelling might demonstrate acceptability. • 450m sight distance?	• A reduced return period for structural, drainage and geotechnical design could produce more economical designs, but at the expense of reduced resillience and an increased risk of flooding for a lifelines route. • No alternative route - questionable whether a departure is appropriate.	

Cost Reduction Unlikely
Cost Reduction Possible
Cost Reduction Achievable

Opportunities for Cost Reduction from MCA2 By Design Changes				
Option	Horizontal Alignment	Vertical Alignment	Earthworks in Lieu of Bridges and Tunnels	Potential Saving ($ millions ROC)
A	• Moving southern end of alignment to the east would reduce volume of cut in scarps, but require more fill and consequently ground improvements to deep alluvium. Likely to be a more expensive solution. • Connecting to existing route south of Mt Messenger across landslide removes need for 2 bridges with a reduction in earthworks. • A realigned route would cross the major landslide but risk of displacement in a seismic event could be mitigated by constructing a toe buttress using surplus fill from south. • Route north of the new tie in would be to a lower standard than the MCA2 route. Curves on existing road to north would need some improvement to produce an acceptable alignment.	• Alignment largely dictated by optimising bridge/tunnel length. Lowering alignment would shorten bridge length and reduce earthworks, but increase tunnel length >240m necessitating expensive FLS provision. • · Grade from south currently 10%.	• COSTS? • Significant fill in Waipingau valley and cut through northern ridgeline deemed to be fatally flawed at MCA1.	
E	• Moving alignment to east side of 'Happy Valley' provides significant savings. • Aligns route across eastern scarps of valley permitting alignment to be lowered and minimising ground improvements.. • Minimises acquisition of Pascoe property and allows home to be retained. • Existing verge width south of route commencement would require widening to improve sight lines.	• Significant opportunity for savings by lowering the alignment • Reduces fill heights enabling earthworks and ground improvement costs to be balanced, particularly north of summit. • Lower height earthworks allow fills to be designed for a return period of 500 years instead of 1000 years. • Allows most MSE fills to be replaced by less expensive structural fill. • Reduces summit level from 120m to 110m with consequent benefits for heavy vehices.	• IS IT CHEAPER? • Alignment changes remove the need for 4 of the 5 bridges (bridge over wetland retained, but shortened). • Cut in lieu of tunnel would be acceptable in environmental terms. • Current access to Beard property severed, but feasible to provide an alternate to existing from new alignment.	
F	Option P is a proxy for Option F, hence Option F not considered further			
P	• Alignment dictated by terrain. • Moving southern end of alignment to the east would reduce volume of cut in scarps and in the ridge approaching Waipingau valley, but would require more fill, and consequently ground improvements, Any savings likely to be marginal. • Connecting to existing route north of Mt Messenger and north of landslide removes need for 2 bridges with some reduction in earthworks. • The realigned route would run along the head scarp of the major landslide but risk of displacement in a seismic event could be reduced by constructing a toe buttress using surplus fill from south plus an additional xxm^3 of fill from within the site. • Route north of the new tie in would be to a lower standard than the MCA2 route and would need some improvement to produce an acceptable alignment.	• VA largely dictated by optimising bridge/tunnel length. Lowering alignment would shorten bridge length and reduce earthworks, but increase tunnel length >240m necessitating expensive FLS provision. • · Grade from north currently 10%.	• Costs? • While not assessed at MCA1 fill in Waipingau valley and cut through northern ridgeline likely to be assessed as fatally flawed.	

Z	• Realigning the route from the southern tie-in and connecting to the existing at the north portal of a new tunnel will improve the length of the road where approximately 70% of crashes have occurred over the last 5 years and produce significant cost savings. • The realigned route would run along the head scarp of the major landslide but risk of displacement in a seismic event could be reduced by constructing a toe buttress using xxm^3 of fill won from within the site. • Route north of the new tunnel would be to a lower standard than the MCA2 route. Alignment of existing road to north and south would need some improvement to produce an acceptable alignment. • An alignment avoiding Ngati Tama land has been developed but more expensive than MCA2 alignment.	• Grades of 10% and 8% governed by tie-ins to existing road with a climb to 175m at the summit in the vicinity of Mt Messenger.	• Design generally optimised at MCA2 to facilitate construction and achieve most economic balance of earthworks and structures. • Fills added	

Cost Reduction Unlikely
Cost Reduction Possible
Cost Reduction Achievable