

Post Implementation Review

Ruby Bay Bypass SH60

Tasman Highways and Network Operations



April 2014

The purpose of NZ Transport Agency Post Implementation Reviews are to:

- assess how well a project (or package) has delivered its expected benefits
- explain any variation between actual results and expected benefits and costs
- identify any lessons learned that can be used to improve future projects

Executive summary

Project description

The project is an inland bypass of the former SH60 coastal route through Ruby Bay in Tasman District.

The project consists of 10.6 km of new single carriageway, built to a design speed of 100 km/h, including overtaking lanes, side safety barriers, new access junctions and facilities for cyclists and pedestrians.

It was agreed that work was to be funded from the (then) specifically allocated regional (R) funding, with 'top-up' contribution arrangements from national (N) funding to an approved total funding limit of \$30.1 million.

Figure 1 on page 4 shows the location of the Ruby Bay Bypass project.

The context for the project includes two previous improvements immediately to the east of the project along SH60:

- Maisey Road to Trafalgar Road, and
- O'Connors Road to Maisey Road.

A network context plan and road name changes around the new bypass are shown in Figure 2 on page 5.

Summary assessment of project outcomes

This post implementation review (PIR) found the project had improved travel times, improved safety, relieved the coastal route of traffic pressures, facilitated new development and assisted walking and cycling activity.

The bypassed coastal route was revoked as a state highway on completion of the project and was rebranded as a tourist route with lower speed limits.

This review identified the following outcomes:

- State Highway travel times reduced by more than estimated, mainly because of post-implementation changes on the coastal route including the introduction of lower speed limits along the bypassed route.
- Post implementation crash reduction was higher than forecast.
- A 60% diversion of former traffic volumes from the coastal route to the bypass was achieved as expected.
- The bypass reduced traffic conflicts, thereby increasing opportunities for adjacent economic development. New sub-division activity has occurred since the bypass was opened and the coastal route has been rebranded as a tourist route.
- Conditions for walking and cycling were improved and new facilities provided.

Project delivery and cost

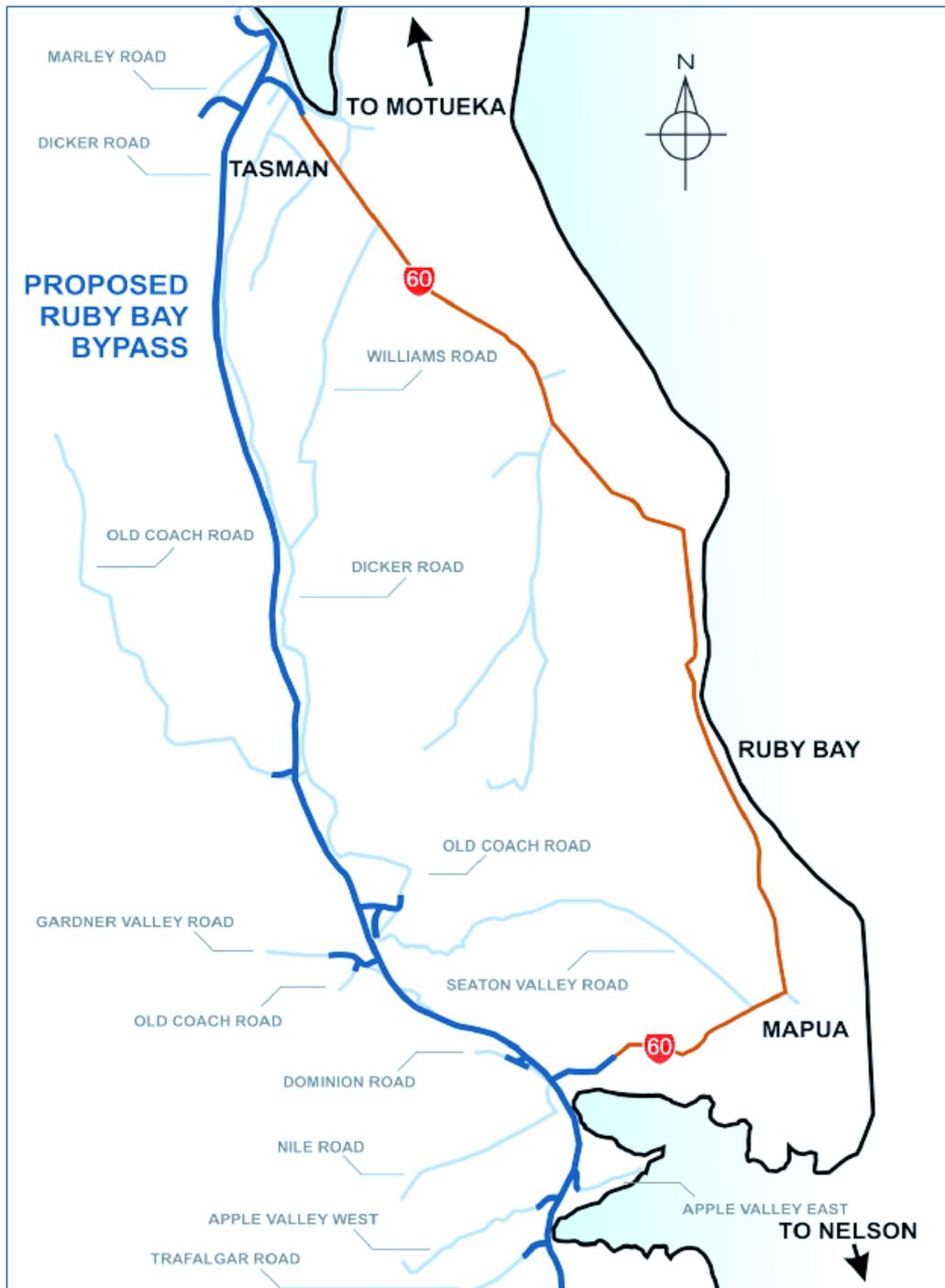
The bypass was opened in October 2010, six months ahead of the pre-tender estimate. The outturn cost for the project was \$27,647,000, 8% lower than the estimated project cost of \$30,100,000.

Lessons learned

Some lessons with relevance for other future projects were identified with this review. They are listed here and discussed in more detail in *Section 4: Lessons Learned* of this report:

- Improvements in forecasting techniques should be employed, especially when associated traffic modelling is required.
- Realistic future network assumptions should be adopted in forecasting including the effect of revocation measures.
- Post implementation monitoring of project outcomes should be undertaken to evaluate whether predicted project benefits have been achieved.

Figure 1: Project plan of the Ruby Bay Bypass project, Tasman



Sourced from Tasman HNO, Ruby Bay Bypass Project

Figure 2: Network plan and road name changes around the Ruby Bay Bypass project, Tasman



Sourced from Tasman District Council, Ruby Bay Bypass Project

1. Project benefits

The main transport benefits expected from the project were: to improve strategic travel times, relieve the coastal route of traffic pressures and to improve safety.

In terms of the original economic evaluation, travel time cost savings for general traffic accounted for 58% of total benefits, crash cost savings 16%, HCV time savings 11%, vehicle operating cost reduction 8%, passing lane benefits 5%, cycling 1% and emission reduction 1%.

This review found the project had the following impacts on outcomes:

Accuracy of forecasts

The assumed traffic growth in the original project forecasts was based on the projection of short term trends which proved to be too high at 4.8 % per annum (p.a.). Post implementation traffic count data indicates that longer term growth rates are closer to 2.5% p.a. This growth rate is consistent with the regional default growth rate advice (of 2.5%) contained in the version of the Economic Evaluation Manual at the time the project assessment was undertaken.

The project assessment did not analyse future operational conditions and relied on the difference in travel times between observed speeds on the coastal route and the project design speed. In reality, actual operational speeds on both the bypassed coastal route (in the do-minimum scenario and project scenario) varied significantly from assumed speeds.

More detailed consideration of safety was undertaken in the pre implementation assessment.

Travel time related benefits and safety benefits were higher than forecast while costs were lower than estimated.

Travel times

The project reduced State Highway travel times substantially. However, travel times on the bypassed coastal route were inaccurately forecast for two key reasons:

- Future traffic speed-flow effects on the coastal route were not considered.
- It was assumed that the speed limits of the bypassed coastal route would remain unchanged following revocation.

Site observations indicated that average road speed for the bypass is around 95 km/h, slightly below the assumed design speed (100 km/h).

The average coastal route speed from site observations is approximately 66 km/h, well below the assumed speed of 78 km/h.

The average state highway travel times were forecast to reduce by 2 minutes and 50 seconds; however, they actually reduced by 4 minutes based on times recorded during site visits.

Coastal route relief

The forecast diversion to the bypass from the coastal route was approximately 60% of total traffic volumes, and this appears to have been achieved.

The bypass reduced traffic conflicts, thereby increasing opportunities for adjacent economic development. New sub-division activity has occurred since the bypass was opened and the coastal route has been rebranded as a tourist route.

Pedestrian and Cycling Facilities

Off road footpaths and cycle paths were provided at some locations in parallel to the bypass. Post implementation conditions for walking and cycling have been improved on the coastal

route due to speed management measures. Better crossing facilities for pedestrians and cyclists were also provided across the new bypass in some locations.

However, it is not known what effect these facilities and management initiatives had on walking and cycling demand.

Noise

Some local residents expressed concerns over road-traffic noise levels following the laying of the second road seal in February 2012. A noise monitoring report was commissioned as a result, which demonstrated that noise levels met the designated condition requirements. Further discussions to convey this were undertaken with affected residents.

Safety

The scale of crash savings is substantial and greater than forecast. Examination of the Crash Analysis System database for total recorded crashes found that the project area experienced a reduction in annual crash rate of 53%. This post implementation reduction in project area crash rate is statistically significant and higher than the district-wide crash rate reduction of 24% over the same period (see Figure 3).

Figure 3: Record of Crashes

	Total Recorded Crashes		
	Before Period (Oct 2003-Sep 2009)	After period (Nov 2010-Feb 2013)	Change
Project Area (crash total)	90	25	
Project Area (crash type)	1 fatal, 4 serious, 25 minor, 60 non-injury	0 fatal, 2 serious, 6 minor, 17 non-injury	
Project Area (crashes p.a.)	18	7.5	-53%
District (crashes p.a.)	339	284	-24%

2. Project implementation (scope, cost, and timeframe)

Project scope

The project is a state highway bypass of the former SH60 coastal route via Ruby Bay in Tasman District, with the following characteristics:

- A new 10.6 km single carriageway inland alignment, shorter by 1.8 km than the former coastal route.
- A design speed of 100 km/h throughout, replacing the previous coastal route speed limits of between 80 km/h and 100 km/h. In practice the bypassed coastal route had a highly variable operating speed, with advisory speeds on bends down to 45 km/h.
- Protective side barriers were provided at locations on the new bypass which were assessed to be at highest risk. No central median barriers were included within the new design.
- Lane widths were standard 3.5 metres, with 1.5 metre shoulders throughout, with median and turning lane provision in some locations.

- Two intermediate overtaking lanes were provided in each direction.
- There are some significant gradients along the new route, to a maximum grade of 6%. However, the bypassed coastal route also has some short sections with significant gradients.
- Provision of 11 new local road access junctions. The coastal route had 23 local road junctions and 145 private accesses.
- Provisions of grade separated crossing facilities for cyclists and pedestrians at Harley Road, Dominion Road and Gardner Valley Road.

Project cost and timeframe

It was agreed that the work would be funded from National Land Transport Fund from the (then) regional (R) funding, with top-up contributions from national (N) funding as required, to an approved funding limit of \$30,100,000.

The tender cost awarded was \$22,856,106. However, increase in costs occurred during construction due to:

- Unforeseen ground conditions
- Environmental constraints
- Drainage
- Guardrail costs

The project therefore was delivered at an outturn cost of \$27,647,000, still \$2,453,000 or 8.15% under the originally estimated budget of \$30,100,000, as shown in Figure 3.

The project opened in October 2010, six months ahead of schedule. Favourable summer and autumn weather conditions for road construction and sealing contributed to the bypass' early completion.

Figure 3: Description of project cost adjustments

Description of cost	Date	Project cost
Project cost estimate when funding approved	April 2008	\$30,100,000
Actual cost at project completion	October 2010	\$27,647,000
Variance (under budget)		-\$2,453,000 -8.15%

3. Good practice identified

This review identified a number of good practice aspects:

- A significant improvement in safety following project implementation was due to a combination of high quality new road design and effective speed management of the bypassed coastal route.
- The final cost was 8% below the approved budget and delivery was six months ahead of the originally estimated timescale representing good project management practice (e.g. innovative ways in finding solutions and dealing with issues)

4. Lessons learned

Lessons learned with relevance for future projects were identified as follows:

- **Improvements in forecasting techniques should be employed, especially when associated traffic modelling is required.** A number of the issues identified in this review stem from the need to model traffic flows and to appropriately forecast likely changes in future operational conditions. Such changes include: predicting traffic growth, forecasting traffic transfer and estimating future changes in operational speeds/conditions. In this case, project forecasting techniques were not sufficiently rigorous, and lacked any analysis of future traffic conditions and speed-flow changes. An appropriate traffic model would have greatly improved the quality of project forecasting and assessment.
- **Realistic future network assumptions should be adopted in forecasting including the effect of revocation measures.** In particular, of traffic speeds and volumes on the new road and the bypassed coastal route. In this case, although immediate revocation was a condition of funding, no changes in operational conditions on the coastal route were allowed for in the project forecasting work. As a result, the future year predictions derived from project forecasting and assessment work were incorrect.
- **Post implementation monitoring of project outcomes should be undertaken to evaluate whether predicted project benefits have been achieved.** Other than SH60 traffic volumes on the new project and the Agency' Crash Analysis System safety data, no post implementation monitoring of outcomes (such as coastal route volumes/speeds, walking and cycling demand and economic development impacts) has been undertaken.

It is acknowledged that when the project was approved for funding there were no such requirements. However, these lessons all reflect good practice and if integrated with project development, construction and operational activities, should not require significant additional resources. These lessons should be incorporated into project development for future funding applications.

5. Tasman Highways and Network Operation's response to findings

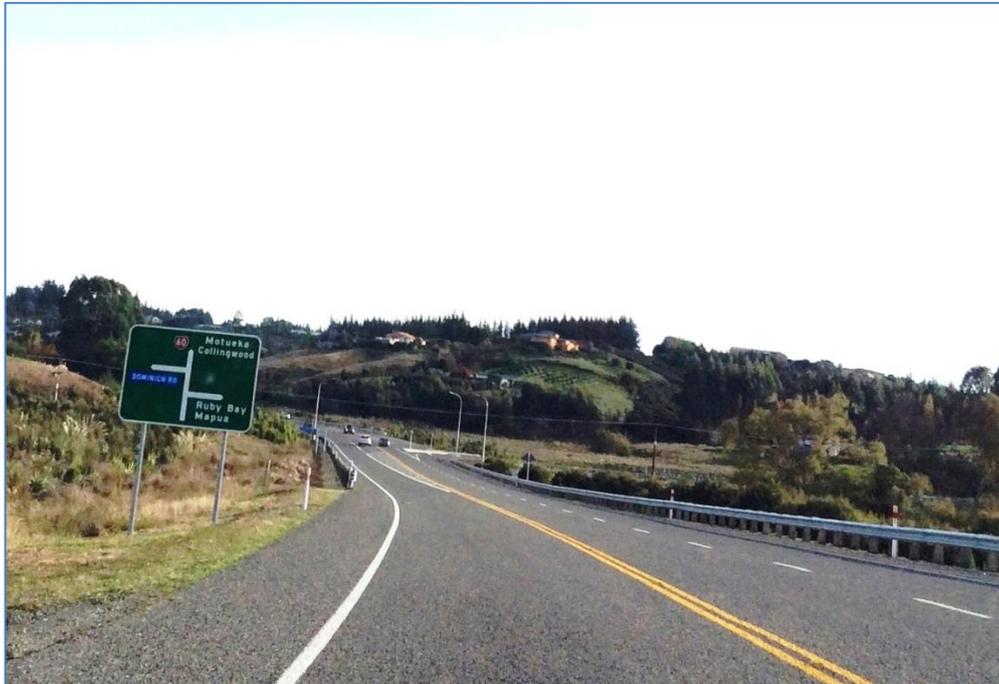
"At \$2.6 million per km length of new highway the Ruby Bay Bypass has delivered significant value for money to our customers and to Government with benefits starting immediately on opening. Four years on since opening in 22nd October 2010 the benefits predicated in the construction funding proposal have in fact been exceeded. This coupled with the final construction cost being less than funded is very pleasing. Feedback on opening has been very positive.

The construction phase was set up to be a model of collaboration between NTZA, its consultants and contractor as well as to encourage a partnering environment with local communities and key stakeholders. Several enhancements to the project were an outcome of this engagement with local parties. The construction phase presented many challenges to the project team who were able to work through the issues and successfully deliver the project several months early."

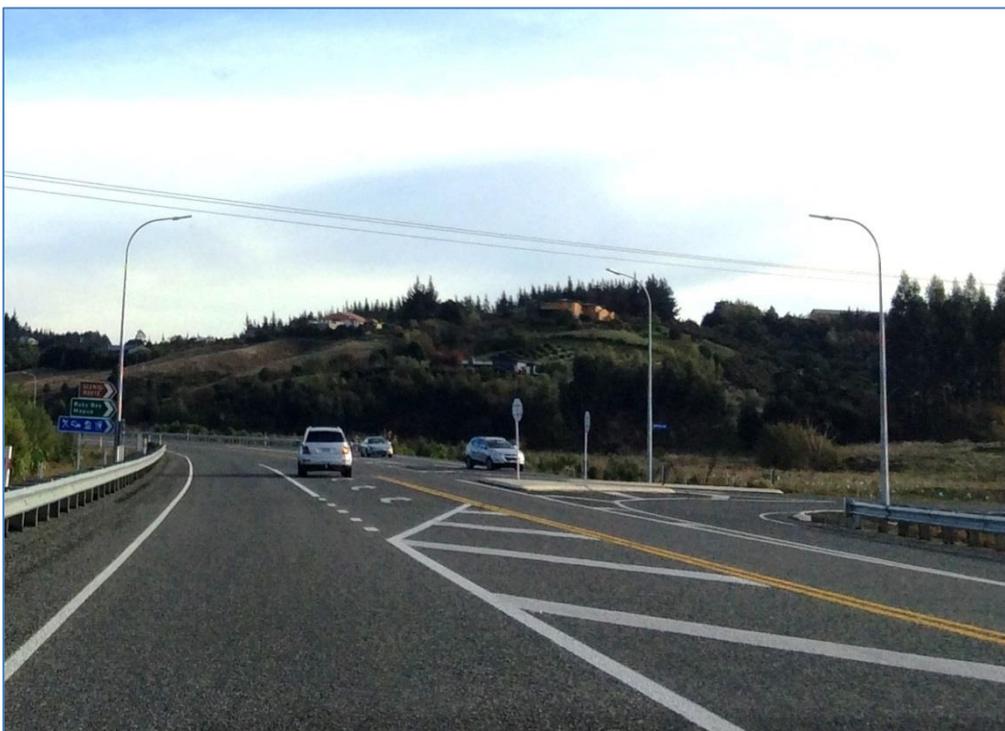
6. Post construction photos

The following are post construction photos illustrating project characteristics:

- Southern approach of bypass to junction with former coastal state highway



- Eleven new local road access junctions were provided, including access to the former coach road route from the bypass



- Lane widths were standard 3.5 metres with 1.5 metre shoulders throughout the bypass, with median and turning lanes in some locations



- Safety barriers were provided at locations on the new bypass which were assessed to be at highest risk



- The bypassed coastal route was revoked as a state highway on completion of the project and was rebranded as a tourist route with lower speed limits



- A 60% diversion of traffic volumes from the coast road to the bypass has been achieved

