

Post Implementation Review

Glenfield Road Upgrade (Stage 4)

Auckland Transport



September 2017

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

This project consisted of widening and upgrading Glenfield Road between James Street and Sunset Road.

It is the fourth and final stage of the Glenfield Road Corridor upgrade which aimed to improve traffic flows and efficiency, promote alternative modes of transport, ie walking, cycling and public transport (buses), improve safety, and improve the road environment for all road users.

Summary assessment of project outcomes

Overall, this Post Implementation Review (PIR) found that the Glenfield Road Upgrade project had a positive impact in increasing traffic capacity. However, traffic volumes have practically doubled on some parts of the road between 2014 and 2016. Therefore, although average vehicle operating speeds initially improved resulting in travel time savings, average travel times are now longer than prior to the changes.

Crash rates have reduced since the opening of the project.

Project delivery and cost

Project construction for the earlier stages of the corridor project was completed before 2008. Stage 4, the final stage of the overall corridor project, started construction in May 2012 and was completed two months ahead of schedule in June 2013.

The early project completion and a lower-than-predicted tender price contributed to the project being completed for \$30.885 million, 17% (\$6.115 million) less than the budgeted cost of \$37 million approved by the Transport Agency Board in 2011.

Lessons learned

Lessons with relevance for other future projects include:

- Pre-project traffic surveys or monitoring report would have been beneficial for a more effective assessment of the project's success or failure.
- More timely review of the contingency allowance would have prevented the request for additional funding, and eventually returning surplus funds.
- Traffic growth was significant and likely to be expected. It is not immediately clear whether the traffic volume growth was the result of new trips, or distributed trips.

Figure 1: Glenfield Road Corridor Upgrade: Bentley Ave to Sunset Road Stages



Source: Auckland Transport project files

1. Project benefits

Project description and objectives

The overall aim of the Glenfield Road Corridor upgrade was to provide travel time improvements along Glenfield Road between Sunset Road to the north and Bentley Avenue to the south. The corridor provides access between the Albany Highway (the south western corner of the North Harbour industrial area including Massey University) and the Wairau Valley on the North Shore.

The project was divided into four separate stages to allow staged construction:

Stage 1: Glenfield Road (Bentley Avenue to Camrose Street) upgrade (700m)

Stage 2: Sunset Road/Glenfield Road intersection upgrade

Stage 3: Glenfield Road (Camrose Street to James Street southern end) upgrade (250m)

Stage 4: Glenfield Road (James Street southern end to Sunset Road) upgrade (1km)

Figure 1 on page 3 shows the project staging. This report covers the fourth and final stage of the corridor upgrade which aimed to improve traffic flows and efficiency, promote alternative modes of transport, ie walking, cycling and public transport (buses), improve safety, and improve the road environment for all road users. Construction started in May 2012 and was completed in June 2013.

Key expected benefits supporting the project's (original) application for funding included: travel time savings 74.9%; vehicle operating cost savings 13%; crash cost savings 0.9%; vehicle emission reduction 0.5%; walking/cycling 0.4%; and, road traffic reduction 10.3%.

Improved travel times were achieved but were not lasting

Improving travel times was the main objective of the Glenfield Road Corridor upgrade project. Stage 4 of the overall project was to achieve this through increases in capacity and improving the operation of the Glenfield Road/Wairau Road intersection and the approaches to the intersection. In planning Stage 4 of the project, it was expected to reduce average journey time from 2minutes and 23seconds to 27seconds through the intersection at the Glenfield Road and Wairau Road.

This review used historical traffic data from the TomTom Traffic Stats database to evaluate this project's travel time outcomes. This database is a collection of anonymised floating car data taken from TomTom navigation devices, in-dash systems, and apps. Its data goes back to 2008, well before the project construction period.

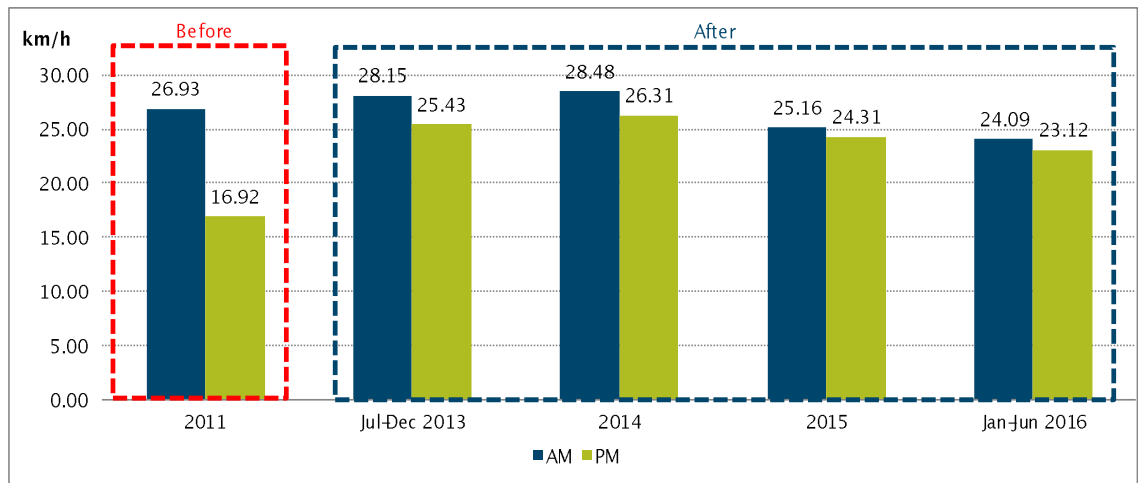
Average southbound speeds initially improved resulting in travel time savings

Average southbound speeds initially improved on Glenfield Road between Sunset Road and Kaipatiki Road (just south of the project site) after project completion.

Average vehicle operating speeds during the morning peak period (7–9am) increased slightly from 27km/h in 2011 to 28km/h in 2014 (Figure 2). Average speeds on this road have, however, deteriorated since 2015 (just two years following construction completion) and were worse than before construction.

Average vehicle operating speeds during the evening peak period (4–6pm) increased from 17km/h in 2011 to 25.5km/h in 2014.

Figure 2: Comparison of average vehicle speeds heading south on Glenfield Road before and after the Stage 4 upgrade



Source: TomTom Traffic Stats

Peak period averages on northbound speeds have decreased since the completion of work and continue to do so. This is potentially due to increased traffic volumes in the area (which is discussed below).

Average speeds across all stages for southbound traffic improved as a result of the upgrade and initially lowered average travel times during peak hours (both AM and PM). Average travel time for northbound peak traffic increased as evident in Figure 3 below. The main issue prior to the upgrade seems to have been the evening peak congestion travelling southbound. Before the upgrade, on average it took more than eight minutes during evening peak (4–6pm) to travel the 2.3km from Sunset Road to Kaipatiki Road by motor vehicle. This average travel time was reduced to around five and a half minutes after the upgrade was completed.

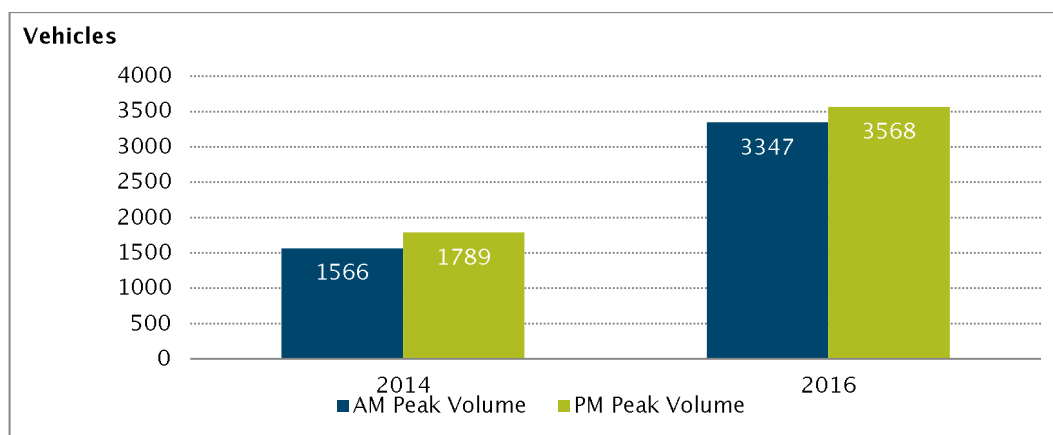
Figure 3: Average travel times along Glenfield Road (all stages) before and after Stage 4 upgrade (minutes:seconds)

	Northbound			Southbound		
	Non Peak	AM Peak	PM Peak	Non Peak	AM Peak	PM Peak
2011 (prior to Stage 4)	3:22	4:29	5:05	3:44	5:12	8:17
After stage 4 completed:						
Jul-Dec 2013	3:52	4:40	6:01	4:11	4:58	5:30
2014	4:05	4:55	6:21	4:18	4:55	5:19
2015	3:36	5:33	6:50	3:44	5:34	5:45
Jan-Jun 2016	3:44	6:16	7:15	3:49	5:48	6:03

Source: TomTom Traffic Stats

Average travel times have generally increased. However, this is likely reflective of increased traffic volumes. Although traffic volume data is limited, manual counts carried out on Glenfield road between James Street and Sunset Road have doubled during peak hours between 2014 and 2016, as shown in Figure 4 on page 6.

Figure 4: Comparison of peak traffic volume counts on Glenfield Road between James Street and Sunset Road – 2014 and 2016



Source: Auckland Transport – Traffic Count Data (post construction)

One of the goals of this project was to improve the safety, reliability and travel time average of the Glenfield Road/Wairau Road intersection and the approaches to the intersection. The work undertaken to achieve this has resulted in a significant increase in average travel times during the pm peak period through the intersection, as shown below in Figure 5. Improved travel time through the intersection was not achieved.

Figure 5: Average travel times through Glenfield Road/Wairau Road Intersection before and after Stage 4 upgrade (minutes:seconds)

	Northbound			Southbound		
	Base	AM	PM	Base	AM	PM
2011 (prior to Stage 4)	0:57	1:22	1:28	0:33	0:57	1:09
After stage 4 completed:						
Jul-Dec 2013	0:44	1:25	1:44	0:52	1:13	1:34
2014	0:52	1:17	2:04	0:55	1:09	1:41
2015	0:58	1:15	1:58	0:47	1:03	1:45
Jan-Jun 2016	0:55	1:17	2:03	0:45	1:03	1:47

Source: TomTom Traffic Stats

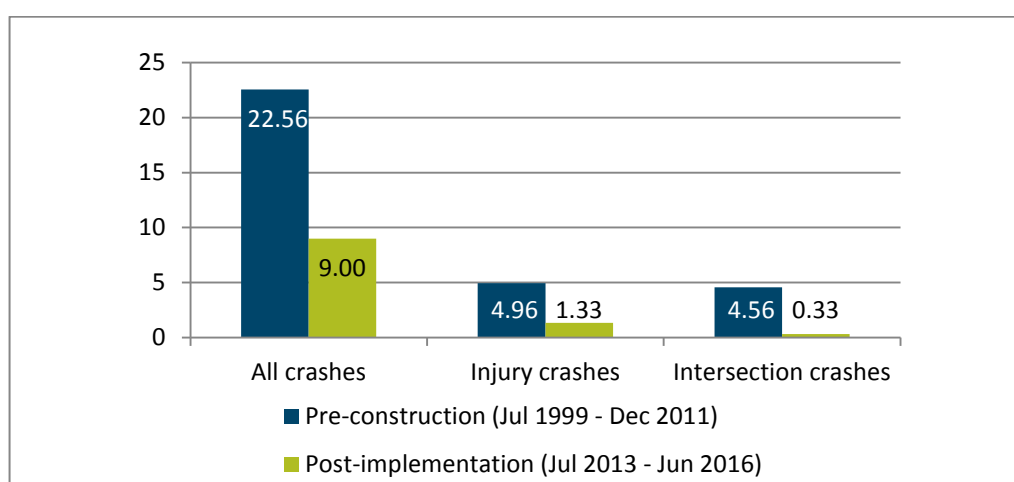
Of the projected project benefits, 10.3% was based on a reduction in road traffic volumes. As Auckland Transport has no pre-construction traffic counts for the subject section of Glenfield Road it is not possible to assess whether this benefit has been achieved. While traffic count data since 2012 on Glenfield Road is available, inconsistent month and count location precludes accurate analysis of longer-term traffic flow patterns. A 2016 traffic count on Glenfield Road (between Manuka Road and Wairau Road) suggests current traffic flows will be in the order of around 27,600 vehicles per day.

Safety outcomes were highly successful

Improving safety only consisted of 0.9% of the expected benefits.

Overall, the project has been highly successful with improving safety. As shown in Figure 6, crashes have fallen from an average crash rate of 22.56 per annum (p.a.) recorded between July 1999 and December 2011 to an average crash rate of 9.00 p.a. after project completion (covering the period July 2013 to June 2016). Comparing these same periods, the injury crash rate more than halved from 4.96 p.a. to 1.33 p.a. The realignment of the Glenfield Road/Wairau Road intersection and approaches to the intersection considerably improved the crash rate, reducing from 4.56 crashes p.a. before construction to only 0.33 p.a. since the opening of the project.

Figure 6: Comparison of recorded crash rate Glenfield Road Upgrade Stage 4 before and after realignment



Source: NZ Transport Agency, Crash Analysis System (CAS)

The reduction in crashes in this stretch of Glenfield Road (Stage 4) is statistically significant. This means it can be concluded with a high level of confidence that the decrease in the crash rate can be attributed to the safety improvements made by the project and not merely the result of random fluctuations in the incidence of crashes. This review also tested whether the observed reduction in crashes along this part of Glenfield Road might have been affected by wider safety trends by testing it against crash rates over all roads in the Urban North area of the Auckland region. The crash reduction at Stage 4 of Glenfield Road was still statistically significant with this trend adjustment.

The November 2011 Transport Agency board paper put forward for approval of this stage of the project stated that from the planned Stage 4 improvements, *“total crash numbers are expected to remain the same after the improvements. However fatal/serious and minor crashes are predicted to drop around 75% and 50% respectively with a moderate increase in non-injury crashes predicted”*. Actual results, illustrated in Figure 6, show a 60% decrease in total crashes in the post-construction period. Similarly, fatal/serious crashes declined by 38% and minor crashes declined by 77%.

Walking and cycling outcomes were not reviewed

The project provided for walking/cycling facilities. Due to the small contribution walking and cycling aspects made to the overall project benefits assessment, only a cursory assessment of walking and cycling outcomes was made.

On-site observations found that the combination of narrow facilities, buses and large vehicles cutting the cycle lane and general lack of maintenance (e.g. road sweeping to remove detritus) would likely discourage cyclists. In the absence of cycle counts, it is not possible to conclude whether the project has resulted in a change in cyclist activity throughout the project area.

2. Project cost and timeframe

Project construction commenced in May 2012 and was completed two months ahead of schedule in June 2013.

An estimated cost of \$22.377 million for the project was originally approved by the Land Transport NZ Board (one of the Transport Agency's legacy organisations) back in 2007 (Figure 7). This was after Stages 1 and 2 of the package of Glenfield Road improvements had been completed, and Stage 3 was under construction. This estimate was made before a detailed design of Stage 4 had been done.

North Shore City Council (the council then in charge of the project) became aware of significant problems with the design and cost estimation process during Stage 3's construction and terminated a contract for Stage 4's design. Several years of inaction with Stage 4 followed, with a new detailed design not completed until 2011. The Transport Agency Board subsequently approved in late 2011 a 73% (\$15.623 million) cost adjustment for the Stage 4 project. This increased the estimated construction cost to \$37 million. The reasons for this substantial cost increase compared with the initial estimate were:

- Significantly improved investigation and costing of geotechnical issues and utility service relocations,
- Improved cost estimations including allowances for contingencies and risk, and
- The effect of overall cost escalations between 2007 and 2011.

Auckland Transport declared a \$6.115 million surplus on the project on completion. This was due to the tender price being significantly lower than estimated in a tight market, and because the project was completed quicker than expected. The final construction cost of \$30.885 million was 17% below the revised approved project cost.

Figure 7: Construction cost estimates and variations

	Cost variations	Total cost
A. Initial cost estimate before detailed design (2007)		\$21.377m
B. Revised cost estimate after detailed design (2011)	+\$15.623m	\$37.000m
C. Surplus declared at project completion	-\$6.115m	\$30.885m
Construction cost variation*	-\$6.115m (-17%)	

* Comparison between revised estimated cost (B) and cost on completion (C)

3. Lessons learned

Lessons with relevance for other future projects include:

- Pre-project traffic surveys or monitoring report would have been beneficial for a more effective assessment of the project's success or failure.
- A timely review of the contingency allowance would have prevented the request for additional funding, and eventually returning surplus funds.
- Underestimating traffic growth forecast resulted in lower travel time savings than expected.

4. Auckland Transport's response to findings

Auckland Transport was provided a draft of this report for feedback and has indicated that:

"We believe that you have represented the project well in your report and identified some key findings that AT have also come to and are now considering when looking at other major improvement activities.

We can confirm that the facts have been disclosed correctly, no material facts have been omitted and no unfair inferences have been made.

We have no formal feedback to your report and look forward to receiving the final copy once it has passed through your process."