

Post Implementation Review

Lake Road Widening

Auckland Transport



May 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

This project widened part of the busy Lake Road on Auckland's North Shore to reduce congestion, lower travel times and improve network resilience.

Summary assessment of project outcomes

This Post Implementation Review found the project improved travel times, reduced turning conflicts and provided better pedestrian and cycling facilities. Travel time savings were, however, less than expected due to peak time traffic queuing along Lake Road and adjoining Esmonde Road heading to Auckland's Northern Motorway.

Project delivery and cost

The originally approved cost in May 2006 for the project was \$11.8 million. The Stage 1 works were undertaken in 2007/08. After which a price adjustment was made approving an increase in overall project cost to \$16.5 million, including cost of land purchase.

The more substantial Stage 2 works were undertaken between June 2010 and April 2011.

The project was completed within estimated timescale for a final outturn cost of \$16.2 million, slightly below budget by 2.2 percent.

Recommendation

We recommend that Auckland Transport works closely with the NZ Transport Agency (Highways & Network Operations) on its Lake Road Corridor Management Plan, to consider the wider network effects of any potential future interventions.

Lessons learned

Some examples of good practice were observed in relation to this project, which included the use of quantified forecasts, and the review of original assumptions prior to implementation of Stage 2.

Lessons with relevance for other future projects are listed below and discussed in more detail in *Section 4: Lessons Learned* of this report:

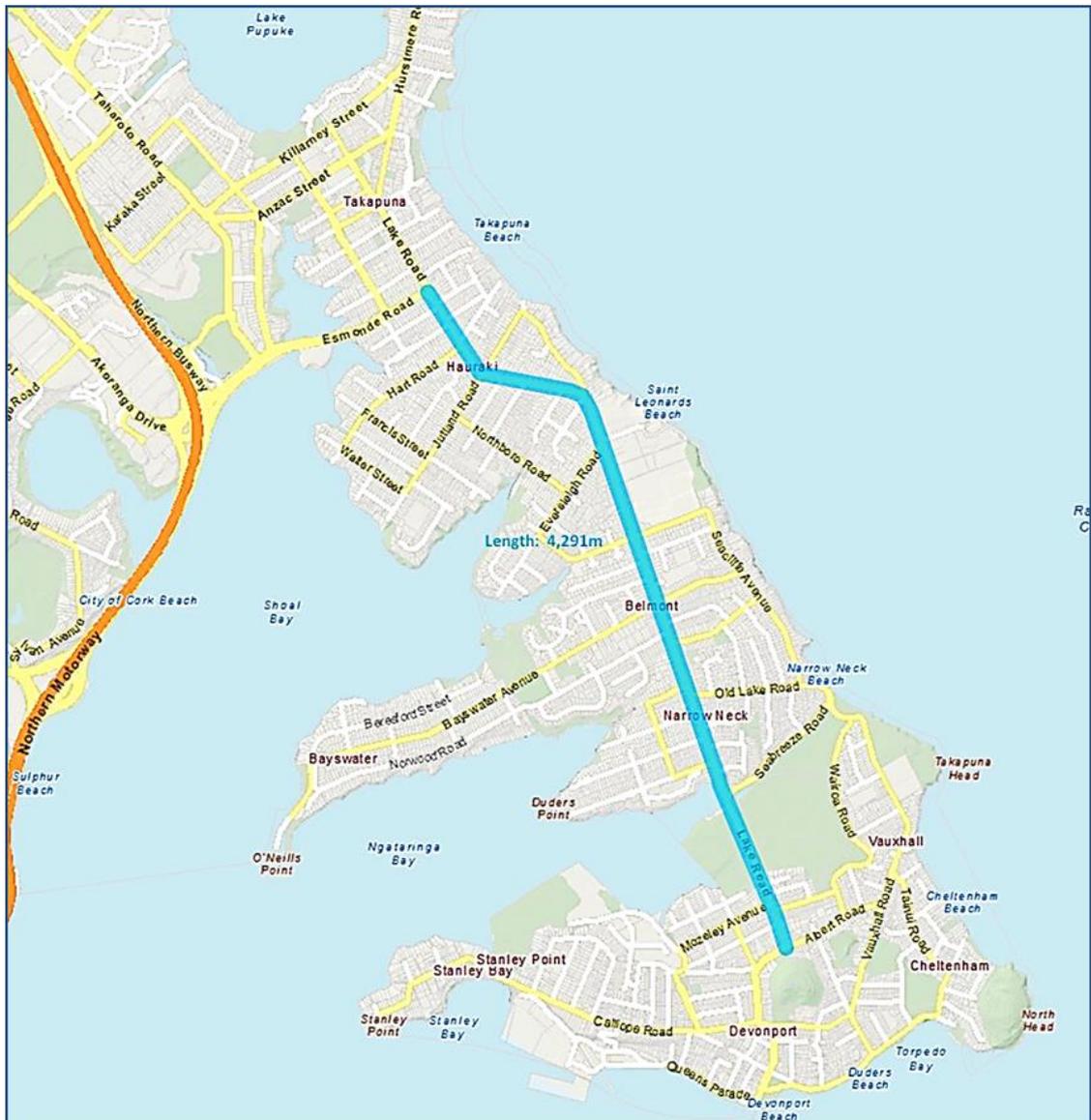
- Pre implementation data should be maintained in a consistent and accessible format.
- Modelling should be updated if significant network changes have occurred since the original Scheme Assessment Report was prepared.
- Project traffic models should be available for review when required.
- Forecasting assumptions should be evidence based.
- Post implementation monitoring of key outcomes should be undertaken to evaluate whether predicted project benefits have been achieved.
- Wider network impacts should be considered when evaluating projects

Figure 1: Location map of the Lake Road Widening project, North Shore, Auckland



Sourced from Auckland Transport, Lake Road Widening Project

Figure 2: Extent of the Lake Road Corridor Management Plan, North Shore, Auckland



Sourced from Project Brief, Lake Road (Esmonde Road - Albert Road) Corridor Management Plan

1. Project benefits

Project description

This project widened Lake Road between Esmonde Road and Hauraki Corner in Auckland's North Shore. This road carries high volumes of traffic between Takapuna and the Devonport Peninsula and also accommodates substantial turning movements to and from the Auckland Harbour Bridge.

Longer term Auckland Transport aspirations for the wider network include treatment of unimproved sections of Lake Road, and the development of an alternative strategic route to relieve network pressures in peak hours.

The need for the work was driven by the high traffic volumes on the project section of Lake Road, and the need to reduce congestion, improve travel time reliability and increase network resilience.

The location of the project is shown in Figure 1 on page 3.

The rest of this section discusses the findings of this review about how well the project has achieved its expected outcomes.

Network impacts

At the time of funding approval in May 2006, the project was assessed with insufficient consideration of the wider network issues. In this case, queueing of traffic approaching the Auckland's Northern Motorway (SH1) has reduced the benefits achieved by the project.

During the site visit, the review team was informed that there was a Corridor Management Plan being developed for Lake Road. We were subsequently supplied with a Project Brief of Lake Road (Esmonde Road – Albert Road) Corridor Management Plan, August 2014. In our view, the problem with this corridor originates from traffic queuing to gain access to the motorway but this issue was not recognised in the project brief. When considering interventions on Lake Road, we recommend that Auckland Transport works closely with the NZ Transport Agency (Highways and Network Operations).

The extent of the Lake Road Corridor Management Plan is shown in Figure 2 on page 4.

Expected transport benefits

The expected transport benefits from the project were: reduced delays, improved route resilience, increased walking and cycling activity and improved road safety.

The original economic evaluation forecast that travel time cost savings would account for 67% of total benefits, driver frustration 23%, vehicle operating cost savings 6%, walking and cycling 3% and crash cost savings 1%.

Accuracy of forecasts

The 2001 Scheme Assessment Report (SAR) for the project contains forecasts of peak, inter-peak and daily traffic volumes, estimated travel time savings and predicted queue lengths for 2011 and 2021. The SAR estimated traffic volumes in 2001 of 39,000 vehicles per day (vpd) and forecast growth of 2.5% pa to 42,000 vpd in 2004, growth of 1.3% pa to 46,000 vpd in 2011 and by 0.7% pa to 49,000 vpd in 2021. Most traffic growth was forecast to occur outside the peak periods. Very little reliable traffic count data exists to verify these figures, but some observations on the forecasts can be made as follows:

- Recent (2013/14) SCATS¹ data from the Lake Road/Esmonde Road intersection provides a current annual average daily traffic (AADT) estimate for Lake Road immediately south of Esmonde Road of 38,300 vehicles. This indicates that daily traffic levels have not increased as forecast.
- A comparison of traffic counts undertaken for the original SAR in 2001 with 2012 data indicates that over this period there has been a decline in peak hour traffic.

Queuing was observed during site visits, the most substantial of which related to congestion on the wider network approaching the northern motorway which backed to Esmonde Road. Although not directly project related, this queuing materially affected travel times in the local area and was observed to impede traffic travelling to the west in the evening peak period. The full extent of this queuing was not forecast in the traffic modelling undertaken for the project, and observed travel times through the project area were approximately one third higher than forecast.

Economic benefits were estimated by this review to be lower than forecast, primarily due to lower travel time related benefits.

Congestion

Traffic levels were observed during site visits in a 'non-typical' week (given the proximity of the Easter Holidays) and traffic demands were sufficiently high to allow operational problems to be observed.

Overall, the project sections (Lake Road and Esmonde Road) were observed to work reasonably well in peak periods, despite queueing at the following locations:

- Esmonde Road approach to Lake Road in the evening peak,
- Lake Road northbound approach to Jutland Road/Hauraki Road in the morning peak, and
- Lake Road southbound exit from the Jutland Road/Hauraki Road signals, due to the effect of merging from two lanes to one lane, causing slow-moving southbound queues in the evening peak.

Travel time savings

No quantified data was available to confirm that the scale of travel time savings was a result of project implementation. However, comparing site observations with 2001 travel times (SAR, Appendix B), travel times through the localised project area on Lake Road and the immediate connection with Esmonde Road have reduced.

The reduction in travel times is likely to have occurred due to:

- Additional stop line capacity on intersection approaches,
- Provision of right-turn bays on Lake Road to reduce lane blocking effects on 'through traffic' movement, and
- Side road traffic management restrictions reducing right turning conflicts with Lake Road 'through traffic' movement.

Queuing has reduced for local traffic (30% of users). However, due to the lack of post implementation monitoring, there was no evidence that the project has significantly reduced peak travel times for the 70% of traffic travelling through the Lake Road/Esmonde Road intersection to or from the northern motorway.

The probability is that local public transport travel times improved in proportion to general travel time savings. This is because the bus priority lane is very short and therefore unlikely

¹ SCATS – short for Sydney Coordinated Adaptive Traffic System – is an intelligent transportation system mainly used for timing the phases of traffic signals and intersections.

to significantly affect bus travel times. However, no quantified data was available to confirm the effect of the project on bus travel times.

Cycle facilities

Cycle lanes and advance stop line facilities were provided by the project, although from site observations, younger and local cyclists prefer to use the footpaths.

Longer-distance cyclists appeared more likely to use the on-road cycle lanes.

The short northbound bus priority lane on the Lake Road approach to the Esmonde Street signals appeared to be effective in terms of separating cyclists from general traffic.

Pedestrian facilities

Signalised pedestrian crossing facilities were provided at the two main intersections and at the mid-block pedestrian crossing. During the site visits, these facilities appeared to work well.

Safety

An examination of the Crash Analysis System database in terms of total recorded crashes indicates the project area experienced a reduction in the annual crash rate of 35 percent (see Figure 3 below). Over the same period, the region-wide crash rate fell by 36 percent. It should however be noted that the post implementation period is relatively short and prevents a full evaluation of the project's effect on the motorway.

As the project was not a safety initiative, we are satisfied that it has not created safety issues.

Figure 3: Record of Crashes

| Total Recorded Crashes | | | |
|--|--|--|--------|
| | Before period (May 2005 - Apr 2010) | Actual after period (Jun 2011 - May 2013) | Change |
| | <i>5 years</i> | <i>3 years</i> | |
| Project Area (crash totals) | 116 | 45 | |
| Project Area (crash type) | 0 fatal, 6 serious, 22 minor, 88 non-injury | 0 fatal, 3 serious, 11 minor, 31 non-injury | |
| Project Area (crashes p.a.) | 23 | 15 | -35% |
| Region (crashes p.a.) | 16,914 | 10,743 | -36% |

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

Project scope

The Lake Road project was undertaken in two stages:

Stage 1

- Widening of Esmonde Road approach Lake Road to two lanes, with flaring to three lanes immediately before the Lake Road signals.
- Provision of two left turn lanes from Lake Road into Esmonde Road on an improved alignment.
- Improvements at Lake Road/Esmonde Road intersection, including provision of pedestrian, cycle and bus priority facilities.

A review of the project was undertaken following Stage 1 (in March 2008) and this confirmed the form and details of the Stage 2 works.

Stage 2

- Road widening on Lake Road to retain two lanes in each direction between Hauraki Road and Esmonde Road.
- Traffic management restrictions on side road turning movements.
- A central painted median (2.5 metres) and right turning bays to provide a safer driving environment and easier right turns for vehicles entering side roads or properties.
- Recessed bus stop bays on either side of Lake Road.
- On-road kerbside cycle lanes (1.5 metres) in each direction on Lake Road.
- Pedestrian crossing facilities at Lake Road/Hauraki Road signals and introduction of Lake Road 'mid-block' signalised pedestrian crossing between Napier Avenue and Cameron Road.

Longer term Auckland Transport aspirations for the wider network include:

- Comprehensive treatment of other (as yet unimproved) sections of Lake Road.
- Development of an alternative strategic route, to relieve network pressures in peak hours and when issues arise.

Project cost and timeframe

The initial estimated cost for the project in May 2006 was \$11,776,672. The smaller Stage 1 works were undertaken in 2007/08. A subsequent price adjustment was made in October 2008 which increased the estimated cost of the overall project to \$16,519,192 including land purchase (see Figure 4 on page 9).

The more substantial Stage 2 works were undertaken between June 2010 and April 2011.

The final outturn cost for the overall project was \$16,159,908, two percent less than project cost estimate prior to the Stage 2 works commencing, but 37 percent higher than the originally approved budget.

The project was completed within the estimated timeframe.

Figure 4: Description of project cost adjustments

| Description and explanation of cost adjustments | Date | Cost implications | Revised total project cost |
|--|----------------|-------------------|----------------------------|
| Project cost estimate when funding approved | May 2006 | | \$11,776,672 |
| Funding for design (includes all costs relevant to Stage 2 such as the remaining safety audits, peer reviews, traffic surveys, consent fees, design reviews and mitigation works associated with property purchase agreement). | November 2006 | +\$600,000 | \$12,376,672 |
| Land purchase | September 2008 | +\$3,783,236 | \$16,159,908 |
| Total final project cost (at date funding completed) | | +\$359,284 | \$16,519,192 |

3. Good practice identified

Good practice aspects identified include:

- The 2001 SAR includes quantified travel time saving forecasts, traffic volume forecasts and predicted queue lengths.
- In view of the time that elapsed since the original SAR was undertaken, a review of the project was sensibly undertaken in March 2008, before the Stage 2 works started.
- The original economic evaluation was reviewed four times (2002, 2004, 2006 and 2008) to allow for changing circumstances in order to update the project's benefit cost ratio.

4. Lessons learned

The post implementation review identified some lessons with relevance for other future projects.

Need for consistent pre implementation data

A traffic count was reported as having been undertaken in 1998 although apart from a stated AADT, no details of this were available. Peak link counts for 2001 are contained in Appendix B of the SAR.

While some before and after loop count information was obtained for a nearby section of Lake Road, it was not for the project section itself. The available data is not consistent or reliable and this means that establishing an accurate baseline for performance measurement purposes was difficult and time-consuming. Pre implementation data should be maintained in a consistent and accessible format.

Updating of project model

Modelling should be updated if significant network changes have occurred since the original SAR was prepared. The original project modelling was based on a 2001 model validation. Following this, significant works were undertaken to improve the SH1/Esmonde Road

intersection and to widen Esmonde Road. In view of these major changes, the project traffic model should have been updated when the project was reviewed in 2008.

Expected outcomes for the project have been derived from assumptions contained in the SAR and SATURN traffic model outputs. However, no details of any other junction modelling (for example SIDRA analysis) were available and the relevant models could not be located. Access to the project SATURN traffic model and junction models would allow expected outcomes to be measured against post implementation data. Project traffic models should be available for review when required.

Forecasting assumptions

Some forecasting assumptions were not substantiated, for example the assumption that cycling demand would double on scheme opening.

Expected outcomes from project implementation should be clearly identified and quantified, for example, with respect to traffic 'flow to capacity' ratios, queue lengths and cycling demand.

Forecasting assumptions should be evidence based.

Wider network impacts

This project was evaluated with insufficient reference to the wider network. Reduced travel time benefits were achieved due to peak traffic queues to and from the northern motorway.

Wider network impacts should be considered when evaluating projects.

Monitoring of benefits

Greater value would have been obtained from this review if project related monitoring data had been available, for example with respect to changes in: traffic volumes, traffic re-routing, travel time reductions and changes in pedestrian/cyclist usage. It is very difficult to determine project performance without appropriate post implementation project related monitoring data.

Post implementation monitoring of key outcomes will enable evaluation of whether expected benefits have been achieved and will provide some valuable lessons for future investments.

We were disappointed that Auckland Transport had not undertaken any post implementation monitoring for this project. Information, although difficult to obtain, was available and was used by the review team to assess the project outcomes. The NZ Transport Agency expects Approved Organisations to monitor the impacts of their investments, as documented in the Planning & Investment Knowledge Base:

"The NZ Transport Agency (Planning & Investment) expects that Approved Organisations and the NZ Transport Agency (State Highways) will monitor the impacts of their land transport investments. This is good business practice and an important part of the delivery of any project" (Planning and Investment Knowledge Base: Benefits Realisation).

The Transport Agency now requires the setting and monitoring of performance measures for all improvement projects costing \$10 million or more.²

It is acknowledged that when the project was approved for funding there were no such requirements. However, the above points 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.

² This requirement was introduced in March 2013 and applies retrospectively to all improvement activities approved since 1 July 2012 costing \$10 million or more. Relevant projects need to have agreed performance measures and targets set as a condition of funding.

5. Auckland Transport's response to findings

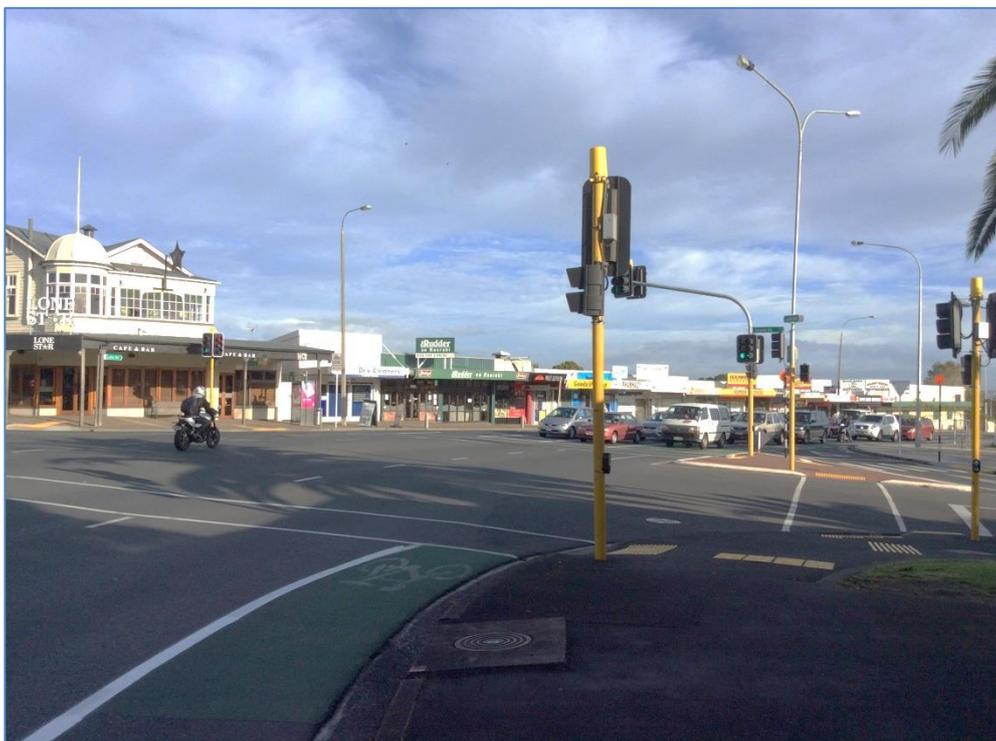
A draft of this review was provided to Auckland Transport for comment. No changes to the report were recommended and all findings and lessons learned accepted. Auckland Transport believes the review will be useful for both its lessons learned database and for other improvement work it is planning for Lake Road as part of the Corridor Management Plan.

6. Post construction photos

- Lake Road eastbound approach to Hauraki Road



- Lake Road / Hauraki Corner signals and Lake Road retail frontage



- Lake Road bus bay



- Lake Road approach to Hauraki Road



- Lake Road approach to Esmonde Street

