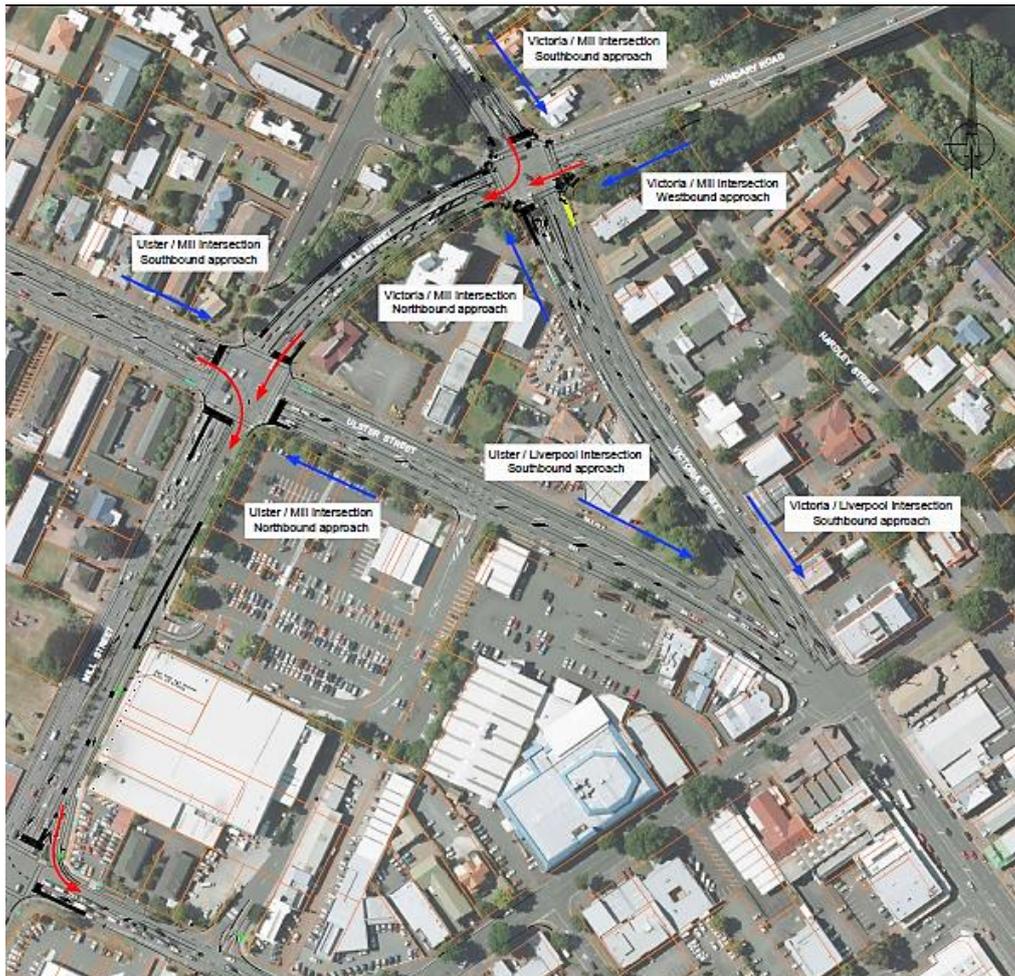


Post Implementation Review

Mill Street Intersection Upgrades

Hamilton City Council



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

This project involved the improvement of Mill Street and its intersections with three key radial routes in Hamilton. The project is located just to the north of the Hamilton central business district (CBD), close to the Waikato Stadium.

Key components of the project included: the provision of additional lane capacity, lane marking changes, the restriction of some right turning movements, and provision of cycle and pedestrian facilities.

The project was completed in two phases, separated by a monitored trial to assess and determine the precise form of proposed phase 2 traffic management measures.

Figure 3 on page 7 shows the areas of work for the Mill Street Intersection Upgrades project.

The context for the need for the work included:

- The limited number of river crossings between the western and eastern parts of the city which concentrates demand on certain links, including Mill Street which forms part of the 'Cross City Connector'.
- The need to reduce traffic flows currently channelled onto sensitive sections of Victoria Street through the CBD.
- The intention to reroute traffic from the Victoria Street and Ulster Street southbound approaches:
 - i) Initially to the Willoughby Street/Anglesea Street route to and through the CBD
 - ii) In the longer term, to an upgraded Tristram Street route

Longer term changes on the road network are also likely to affect traffic patterns including: the Waikato Expressway, new local roads, revocation treatment of state highways (especially the existing SH1), and decisions concerning the northern Hamilton City 'gateway' to direct traffic from the north towards the city centre.

A network context plan is shown in Figure 1 on page 4.

Summary assessment of project outcomes

This Post Implementation Review (PIR) found the project achieved its objectives to: reduce crashes, reduce peak period traffic delays, and improve cycling facilities.

This review found the project had the following effects on intended outcomes:

- The results from the monitored trial period and more recent post implementation (SCATS) monitoring indicates a 13% increase in Ulster Street southbound right turn movements but no increase in the westbound Mill Street left turn to Willoughby Street route.
- Queue lengths have reduced due to the introduction of more efficient traffic management arrangements. However, some problematic operational queuing remains in peak periods.
- The scale of crash savings is substantial and greater than forecast.
- Comprehensive signal controlled facilities were provided for pedestrians.
- Cycling facilities were improved.

Project delivery and cost

The project's completion in two phases, separated by a monitored trial of proposed traffic management measures, is good practice.

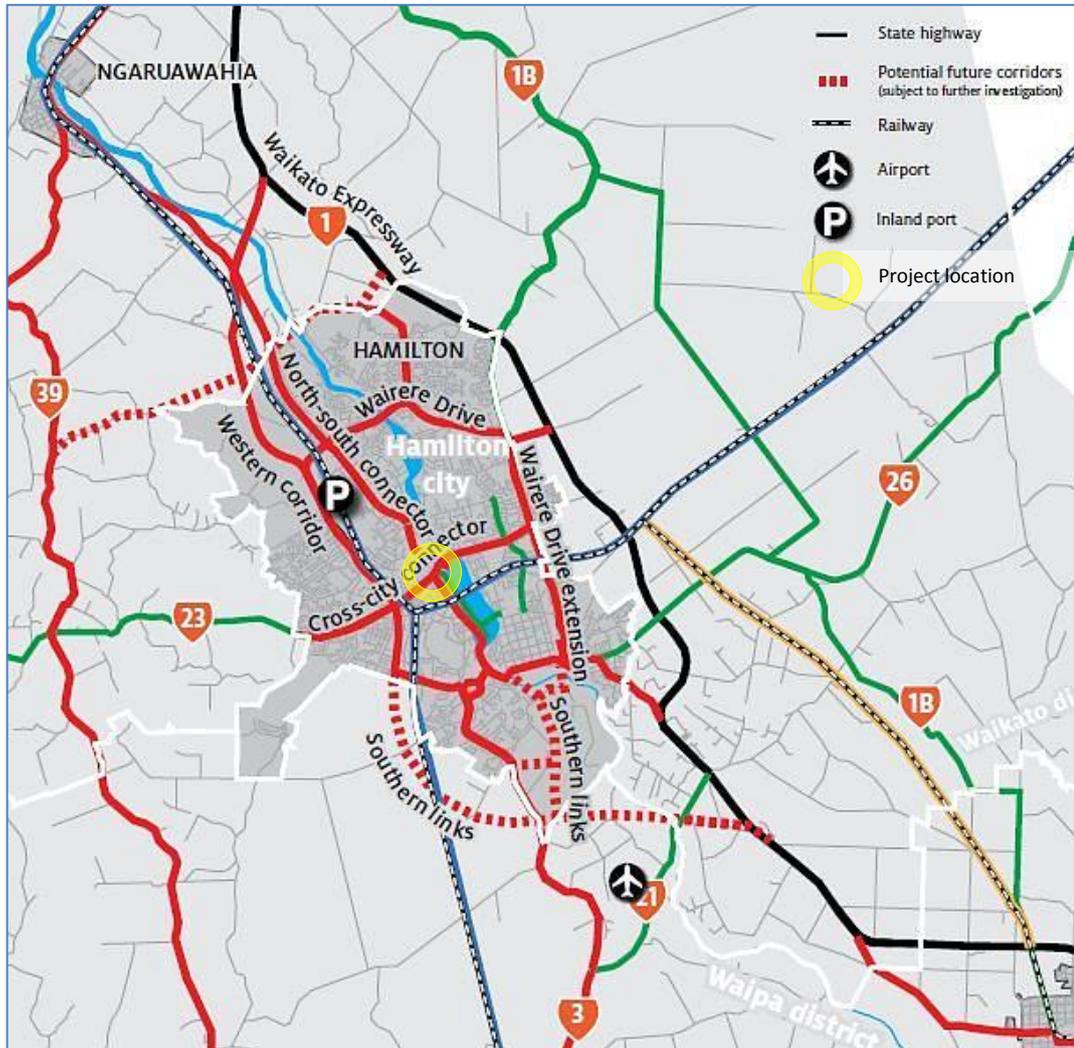
The final cost was \$958,795, which was 11% lower than its funded cost of \$1,072,000. The project was completed in May 2010, within the expected time frame.

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:

- Pre-implementation data relating to key outcomes, such as travel times, junction delays and queue lengths should be measured and recorded.
- Intended future outcomes should be clearly identified.
- Details of the assumptions, methodology and forecasts used in the original project assessment should be maintained and kept available for review purposes.
- Project traffic models should be made available for review purposes when required.
- Project specific post implementation monitoring should be undertaken to confirm project benefits.

Figure 1: Network context plan of the Mill Street intersection upgrades, Hamilton City



Sourced from Hamilton City Council,
Mill Street Intersection Upgrades Project

1. Project benefits

The main transport benefits expected from the project were: the re-routing of some traffic from using Victoria Street within the CBD, and to improve the efficiency and safety of this section of the Cross City Connector.

In terms of the original (pre implementation) cost-benefit evaluation, travel time savings accounted for 84% of total benefits, safety 15% and vehicle operating costs 1%.

This review found the project affected outcomes as follows:

Accuracy of forecasts

The forecast traffic growth of 1% per annum (p.a.) is consistent with post implementation monitoring (using SCATS information) which indicates an increase of around 3% over a four year period in the project area. The Economic Evaluation Manual advice (at the time) indicated a default urban traffic growth range in Waikato Region of between 1% and 2% p.a.

No forecasts (or targets) for travel time reductions or reduced traffic volumes on Victoria Street were identified by this review.

Observed post implementation queue lengths were greater than forecast (compared with available SIDRA model outputs) particularly in the evening peak period.

Overall economic benefits were similar in scale to forecast although travel time related benefits were lower than estimated, and safety benefits substantially higher than forecast.

Traffic re-routing

The results from the monitored trial period and more recent post implementation (SCATS) monitoring indicates a 13% increase in Ulster Street southbound right turn movements but no significant increase in the westbound Mill Street left turn to Willoughby Street. Post implementation flows on Ulster Street (south of Mill Street) were 8% higher than pre-implementation levels.

Travel times

During some periods within the peak hours, observed queues were greater than forecast and queues did not always clear within one signalised cycle. Some blocking-back from signal stop-lines also meant that queues affected other junctions on occasion.

Queue length comparisons between SIDRA results and site observations indicate that the improvement in operational conditions was less than forecast. Problematic operational queues were observed to remain in some locations during peak periods. From site observations and consideration of the type of works undertaken, it can be inferred that the project reduced travel times compared with pre implementation conditions. This was primarily due to the elimination of uncontrolled turning movements, more efficient traffic management arrangements and increased traffic capacity.

Pedestrian and Cycling Facilities

Improved cycling facilities were provided in the form of advanced stop boxes at signals and dedicated roadside shoulder lanes. The cycle lanes provided are of minimum width (1.2 metres), and from site observations, appear to be unattractive to some cyclists. A proportion of cyclists cycled on footpath to either approach or bypass some junctions; more generous cycle lane widths may have encouraged more cyclists to use them. The **NZ Supplement to Austroads Guide to Traffic Engineering Practice, Part 14: Bicycles September 2008** (relevant at the time of project design) said *“1.2 metres is the absolute minimum width and should only be used in low speed environments (85th Percentile speed of 40 km/h and below) and when it is not possible to achieve a wider cycle lane”*.

Comprehensive pedestrian crossing facilities are incorporated into signal controlled junctions, although on the basis of SIDRA modelling, average pedestrian delay is higher than vehicle delay in peak periods.

Safety

The scale of crash savings is substantial and greater than forecast. An examination of the Crash Analysis System database in terms of total recorded crashes has been undertaken. This found the project area experienced a reduction in the annual crash rate of 50% (comparing crashes since project completion with crashes recorded in a five year pre-project period - see Figure 2). The reduction in project area crash rate is statistically significant and proportionately higher than the district-wide crash rate reduction of 27% over the same period.

Figure 2: Record of Crashes

	Total Recorded Crashes		
	Before Period (Mar 2004 - Feb 2009)	After period (Jun 2010 - Dec 2013)	Change
	<i>5 years</i>	<i>3 years, 7 months</i>	<i>Annual crash rate</i>
Project Area (crash total)	259	93	
Project Area (crash type)	1 fatal, 6 serious, 37 minor, 215 non-injury	1 fatal, 3 serious, 24 minor, 65 non-injury	
Project Area (crashes p.a.)	51.8	26.0	-50%
District (crashes p.a.)	1,411	1,028	-27%

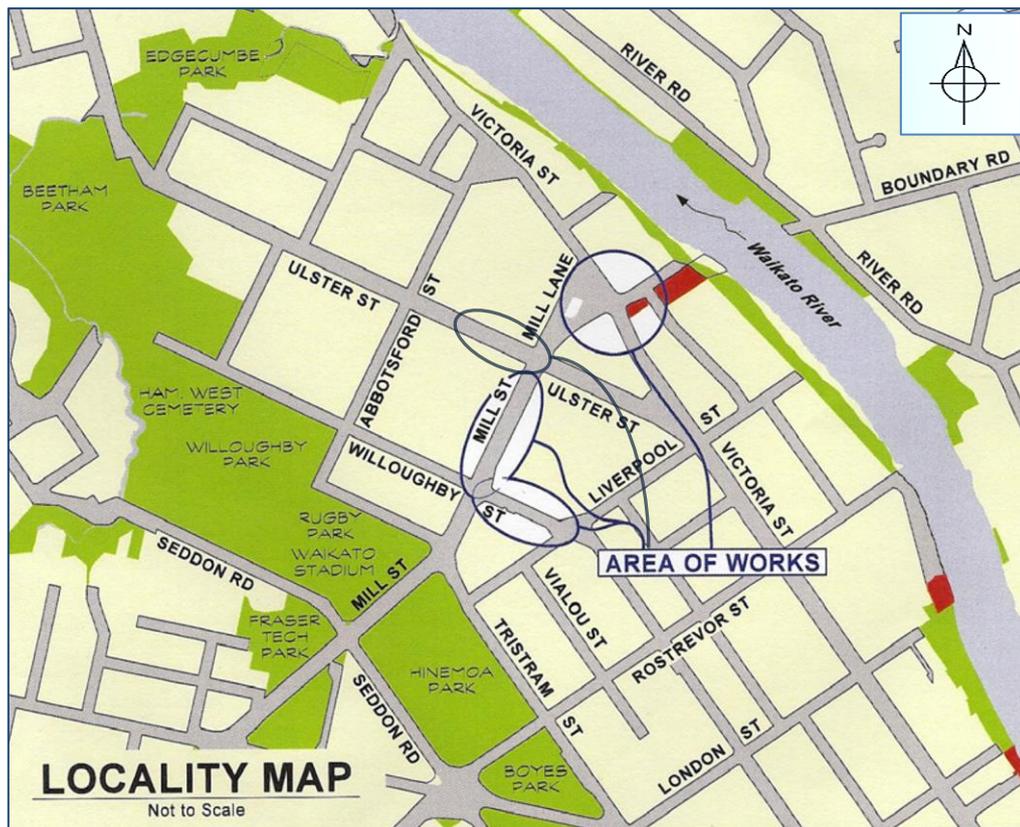
2. Project implementation (scope, cost, and timeframe)

Project scope

This project involved the improvement of the Mill Street 'Cross City Connector' and its intersections with three key radial routes in Hamilton. The project was completed in two phases, separated by a monitored trial of proposed traffic management measures.

The local area context for the project is shown in Figure 3.

Figure 3: Areas of Work



Sourced from Hamilton City Council,
Mill Street Intersection Upgrades Project

The components of the project were as follows:

- Lane marking changes on the southbound Ulster Street approach to Mill Street to increase right turning and associated re-routing capacity
- Lane marking changes to provide for two right turning lanes on the northbound Victoria Street approach to Mill Street
- Lane marking changes to increase the southbound Ulster Street and Victoria Street exits (from these approaches) from one to two lanes
- Banning of the eastbound right turn from Mill Street to Victoria Street (south)
- Banning of right turns to/from the Pak 'n Save access on Mill Street, to reduce uncontrolled movement delays and conflicts
- Banning of the eastbound Liverpool Street traffic turning right onto Willoughby Street
- Extension of the left turn diverge lane on Mill Street to Willoughby Street and the introduction of a free flow left turn at this junction
- The four-laning of Willoughby Street (from Mill Street south through the Liverpool Street junction)
- Provision of cycle lanes and advanced stop boxes for cyclists
- Provision of pedestrian crossing facilities at signalised junctions

Project cost and timeframe

The project was approved at a cost of \$1,072,000.

Phase 1 of the works commenced in March 2009 and involved using temporary traffic management to observe the effects of kerbside southbound lane closures on Ulster Street (south of Mill) and Victoria Street (south of Mill).

Phase 2 of the works included the four-laning of Willoughby Street and this was undertaken between February and May 2010 following land acquisition.

There were no reported overruns in terms of time, and the project was completed within allocated budget.

Information from the Transport Agency's funding system (Transport Investment Online) confirms that outturn cost was \$958,795 as shown in Figure 4.

Figure 4: Budgeted and actual cost comparison

Description of cost	Date	Project cost
Project cost estimate when funding approved	Mar 2009	\$1,072,000
Actual cost at project completion	May 2010	\$958,795
Variance (under budget)		-\$113,205 -10.56%

3. Good practice identified

Some good practice aspects were identified including:

- Extensive modelling and a traffic management trial were undertaken. This informed the assessment of likely project effects prior to finalisation of the phase 2 project design.
- The original junction models (SIDRA) were made available for the purposes of this review.

4. Lessons learned

Some lessons learned of potential relevance for future projects are identified by this review as follows:

- **Pre implementation data relating to key outcomes, such as travel times, junction delays and queue lengths, should be measured and recorded.** Only partial pre implementation monitoring data was available, with respect to traffic volumes and capacities. It is not possible to establish a suitable baseline to measure project performance against without sufficient pre implementation data.
- **Intended future outcomes should be clearly identified.** The expected outcomes from the project were not sufficiently clear or quantified. Examples of expected outcomes that need better definition include: traffic re-routing changes, reductions in travel times, changes in queue lengths and delay reduction in peak periods. If

outcomes are not clearly identified and quantified, it is very difficult to determine whether projects were successful or if value for money was obtained.

- **Details of the original analysis, methodology and forecast assumptions used in the original project assessment should be maintained and kept available for review purposes.** In particular, confirmation of future years modelled (if any) and details of economic forecasting methods.
- **Project traffic models should be made available for review purposes when required.** Some expected outcomes for the project were derived from assumptions contained in the economic evaluation and SIDRA junction model outputs. However, no details of the overall network (PARAMICS) micro-simulation model were available and the consultants acting for the Council were unable to locate the relevant models. Access to the project PARAMICS traffic model would have enabled expected outcomes to be measured against post implementation data.
- **No project specific post implementation monitoring was undertaken.** Greater value would be obtained from this review if more comprehensive project related 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.

5. Hamilton City Council's response to findings

"The Hamilton City Council is pleased that the benefits arising from this project exceeded expectations especially those related to safety. We have found that the traffic in general has responded well to the changes introduced and we are continuing to manage the traffic signals to the best efficiency for these two important corridors.

The 'lessons learned' section is valid and we take note of all five points that are referred to in this section. Both pre and post implementation traffic data and the tabulation of assumptions are important in the measurement of achievement along with post implementation monitoring. Discussions have been held with our consultants regarding improving the quality of future project work in this regard as this will provide robust evidence of achievement or value for money.

The audit was conducted in a professional manner, was focussed on the outcomes (both claimed and achieved) and there was a very good level of discussion and exchange of ideas between the Auditors and the Council staff involved. The interactive discussion was most useful to Council staff."

6. Post implementation photos

The following are post implementation photos showing achieved primary project objectives:

- Improved lane layouts and signal phasing on the southbound Ulster Street approach to Mill Street



- Lane marking changed to increase the southbound Ulster Street approach to Mill Street from one to two lanes



- Provided cycle lanes and advanced stop boxes for cyclist



- Improved the lane layouts and signal phasing at the Mill Street/Victoria Street intersection

