

STATE HIGHWAY 58 SAFETY IMPROVEMENTS

STATE HIGHWAY 2 TO LANES FLAT

EXECUTIVE SUMMARY & BUSINESS CASE ALIGNMENT REPORT

Prepared for NZ Transport Agency

June 2016



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Project Executive Summary

State Highway 58 (SH58) is a regional state highway which connects the major urban centres within Kapiti and Porirua to the west to the urban centres of Hutt City and Upper Hutt to the east. State Highway 58 is narrow, windy and in places undulating and has many unprotected roadside hazards.

This has contributed to a large number of high severity crashes in recent years and it is therefore classified as a high risk rural road – when a crash does occur there is a higher likelihood of a high severity outcome. The five year crash history includes three fatal and nine serious crashes, and 13 deaths and serious injuries (DSI).

The occurrence of high severity crashes is also causing travel time reliability problems from crash related delays and closures of the road.

Transmission Gully (TG) and the Petone to Grenada Link Road (P2G) state highway projects will result in significant changes to traffic volumes on this link and the overall function of this route in the future. In the three year period after TG opens (2020) but prior to P2G Link Road opening, forecast volumes on SH58 increase significantly. This additional traffic is expected to result in travel time reliability issues as volumes are close to the capacity of the highway. In addition it will increase crash occurrences and also crash related travel time reliability issues.

At least an additional six DSI (or two DSI/year) are estimated to occur on SH58 in the time between TG and P2G Link Road opening as a result of the increased volumes on a KiwiRAP 2 star road. The additional 2 DSI per year is in addition to the 2.6 DSI/year, which is already occurring.

Once the P2G Link Road is open, traffic volumes are not forecast to create travel time reliability or congestion issues on SH58, as capacity does not exceed demand in the future periods to at least 2041.

The project objectives for any improvements to SH58 were developed to be:

- *To enhance safety of travel on the Wellington State Highway network, and specifically SH58;*
- *To maintain or improve journey times and journey time reliability between SH2 in the Hutt Valley, and Transmission Gully;*
- *To enhance resilience of the Wellington State highway network; and*
- *To appropriately balance the needs of local and state highway traffic,*

By developing and constructing a cost effective roading solution consistent with a standard expected for a Regional state highway under the One Network Road Classification.

A number of options have been tested and analysed to determine alignment with the project objectives. The recommended scope of works includes an improved road cross section inclusive of median and median barrier, wider road shoulders and edge barrier, intersection improvements and alterations (with two new roundabouts proposed on the corridor), five sections of horizontal curve realignment to provide a consistent and contextual horizontal alignment, and improvements to existing structures. The NZ Transport Agency also expects to reduce the posted speed limit from 100km/h to 80km/h in advance of the main physical works.

The scheme is expected to deliver (i.e. the investment outcomes):

- An increase in KiwiRAP star rating from 2.7 to 3.5-4 stars
- 45-66% reduction in high severity crashes
- An estimated 12-17 DSI saved over 10 years
- Travel time reliability improvements (given reduced incidence of closures and delays resulting from crashes)

A reasonable balance between local access and regional traffic flow can be achieved through the design by providing a high standard highway that maintains an adequate level of local access at side road intersections and is consistent with the standard expected for a regional state highway. The

recommended option will deliver marginal resilience benefits through works at the highest risk locations around Haywards Hill.

The project works are expected to cost around \$50M and will yield a BCR of 1.3. The next stages of the project will be to commence design for consenting and submit for consents prior to commencing detailed design and construction.

In respect of capacity on SH58, with the P2G Link Road in place there are no forecast issues in the longer term. In the period after TG opening but prior to P2G Link Road, flows increase significantly on SH58 and there are capacity concerns, with congestion problems (in the AM peak) for traffic approaching SH2. This will require a management plan for the interim period including Travel Demand Management (TDM) measures and, potentially, localised capacity improvements (for example on the eastbound approach to SH2). Should P2G Link Road not occur, or be delayed for an extended period beyond the 3 year lag currently expected between TG opening, then TDM measures or minor capacity improvements are expected to become less effective.

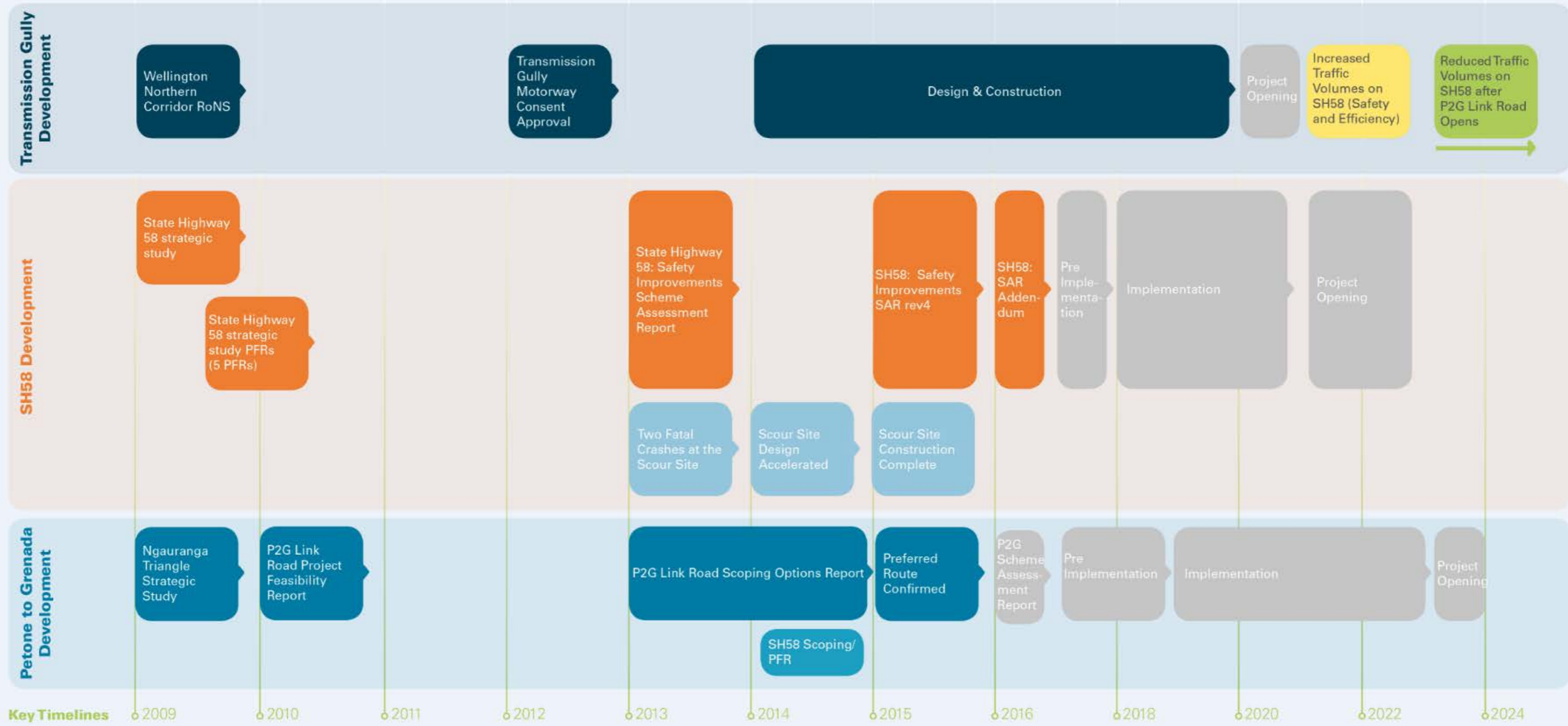
There is real urgency with the works given the existing crash record but also because the additional traffic volumes once TG opens exacerbates the safety issues (i.e. with more traffic, crash risk increases).

The recommendations are:

- A. Progress the implementation of the P2G Link Road which is critical to the medium to longer term operation of SH58.
- B. Seek internal NZ Transport Agency approval of the SAR (and Addendum), and seek approval to move to the next stage of design.
- C. Provide formal feedback to the public and landowners as to the results (and project updates) following the public consultation in late 2014 and the NZ Transport Agency's current timelines.
- D. Progress implementation of the 80km/h speed reduction.
- E. Progress the SH58 safety improvements to the next phase of design and subsequently to construction, as follows:
 - Accelerate the works needed for consenting and accurate definition of land requirement in advance of undertaking detailed design to facilitate a more condensed detailed design programme. Given the proposed opening of TG in 2020, any methods that support accelerated delivery of the SH58 improvements should be progressed.
 - Engage a property consultant to validate and update property costs / estimates (to help refine the project estimate). In addition, a property consultant can provide a first contact point for landowners seeking an update on project progress and timeframes.
 - Commence land acquisition process when design work is sufficiently advanced. Similarly, submit for Notice of Requirement and resource consents when the design is ready to do so, given these processes are expected to be protracted.
 - Develop a procurement strategy and timeline for design (pre-implementation) and construction (implementation), noting the alternative staging strategies and phasing options. For example, if a staged approach over a number of years is favoured, then a D&C type arrangement may be less suitable. In conjunction with the procurement strategy for design and construction, develop a detailed management plan for the period after TG, but prior to the P2G Link Road opening.

Scheme investigations into safety improvements along the SH58 corridor have been ongoing since 2013. The 2016 Scheme Assessment Report Addendum has been produced to record the current position and recommended improvement works. The project development graphic below demonstrates the progression of investigations for SH58, relative to TG and the P2G Link Road.

MWH. SH58 Project Development History



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Alignment to Business Case Approach

1 Project Objectives

The project objectives for the State Highway 58 (SH58) improvements are:

- To enhance safety of travel on the Wellington State Highway network, and specifically SH58;
- To maintain or improve journey times and journey time reliability between SH2 in the Hutt Valley and Transmission Gully;
- To enhance resilience of the Wellington State Highway network; and
- To appropriately balance the needs of local and state highway traffic,

by developing and constructing a cost effective roading solution consistent with a standard expected for a Regional state highway under the One Network Road Classification.

2 Problem to be Addressed & Evidence Base

Of the aforementioned project objectives, the first two are related to the specific problems that the project is seeking to address, whereas the other objectives need consideration during the development of the solution.

The main problem to be addressed by the project is the high crash risk. The secondary problem involves travel time reliability along the corridor. These issues are described further below:

2.1 Problem 1

Problem Statement:

The poor horizontal alignment (multiple low radii curves), roadside hazards and narrow cross section all contribute to the high injury crash risk, and higher chances of death and serious injury (DSI) when a crash does occur.

Evidence:

- The project length has experienced a large number of high severity (fatal and serious) crashes in recent years. In the last five-year period from 2010 to 2014 there have been a total of 118 crashes, including three fatal and nine serious injury crashes resulting in 13 deaths and serious injuries (DSI).
- Run off road and head on crashes contributed to 75% of the reported crashes and 83% of the high severity crashes. Compared to national figures, this section of highway is overrepresented in high severity crashes for wet weather, runoff road and crashes during the hours of darkness¹.
- As a result of high severity crash density, this section of highway (and the rural entirety of SH58) is classified as a high-risk rural road.
- This highway has a KiwiRAP 2.7 star rating, below the 3 star ONRC Customer Level of Service target for a Regional route.

Investment Objective:

To reduce the number of deaths and serious injuries along SH58.

¹ HRRRG, Appendix B, proportion of rural state highways severe crashes occurring in the wet for the South-west North Island region.

2.2 Problem 2

Problem Statement:

Closures and delays on SH58, as a result of crashes and other events, results in people and goods being delayed and journeys being unreliable; leading to adverse impacts on social and economic productivity. Under some future scenarios, high traffic volumes result in a significant decrease in travel time reliability.

Evidence:

For the existing situation, travel time reliability is primarily affected by crashes. Travel time reliability issues due to recurrent congestion, based on Austroads metrics², is not currently an issue along the corridor. However, the introduction of TG is likely to increase travel time reliability issues due to both increased crashes and higher levels of congestion.

A. Existing:

- Crashes: The number of crashes is causing travel time reliability issues.
 - Crashes are the most common road closure and delay event (11 closures, 3 delays, 70 caution, 2011-2015).
 - Crashes have on average caused closures three times a year, with an average closure time of 2.5 hours.
 - Crashes account for 73% of closures along the project extent.
- Highway form: the geometry of the existing road and combination of horizontal and vertical curves impacts travel time reliability with inconsistent driver speeds.
 - Travel time reliability appears to be worse in the Interpeak compared to the peak which shows that the highway form is effecting travel times more so than traffic volumes.
- Average travel times along the corridor are approximately 7 to 7.5 minutes with 95%ile travel times typically 8.5 to 9.5 minutes.

B. Future:

- Crashes: Crash events continue to occur and will increase with higher traffic volumes
- High traffic volumes
 - As a result of TG and nearby growth areas, traffic volumes will be increasing over the next 20 years. However no noticeable change in travel time reliability is envisioned if the P2G Link Road is in place.
 - However if the P2G Link Road isn't constructed, this could result in traffic volumes in excess of 20,000 vehicles per day once TG opens (increasing to 23,000 vpd by 2031), with SH58 expected to be operating near capacity (and over capacity by 2031). This will result in travel time reliability problems.

Investment Objective:

To maintain travel time reliability along the corridor by reducing the number of journeys impacted by delays and closures and ensuring that the highway has adequate capacity in the medium to long term

² Coefficient of variation in peak periods ranges between 0.08 and 0.15, this correlates to a 'Low / Low-Medium' band according to Austroads metrics.

3 Timing of the problem (when are the improvement works required)?

3.1 Problem 1: Crash History

The consequences of not investing are:

- A. Continued crashes: (2.7 star rating – estimated crashes vs actual crashes):
 - o Actual crashes: 12 high severity crashes (**13 DSI**) 2010-2014
 - o Estimated Crashes (based on Star Rating): 22 high severity crashes (**26 DSI**)
 - o Therefore, based on the low star rating on SH58, we could expect up to **twice as many DSI (or 80% more high severity crashes)** in the next 5 year period, (i.e. the current 5 year safety performance may be 'better' than expected and not be a realistic indicator of future safety performance)

- B. Increase in traffic resulting in increased crashes
 - o When TG opens in 2020, traffic volumes increase from 14,250 vpd to over 20,000 vpd. By 2031, without the P2G Link Road, traffic volumes are expected to be over 23,000 vpd.
 - o With the P2G Link Road in place (est. 2023), traffic volumes reduce from over 20,000 vpd and return to base levels. By 2031, traffic is expected to be approaching 17,000 vpd.
 - o **At least an additional six DSI (or two DSI/year)** are estimated to occur on SH58 in the time between Transmission Gully opening (est. 2020) and Petone to Grenada opening (est. 2023) as a result of the increased volumes on a KiwiRAP 2 star road. The additional 2 DSI per year is in addition to the 2.6 DSI/year, which is already occurring.

3.2 Problem 2: Travel Time Reliability

Failing to invest in the project will result in the following travel time reliability issues:

- A. Traffic volume increase (Transmission Gully, development & growth)
 - o Decrease in travel time reliability as a result of higher traffic volumes resulting in SH58 reaching capacity resulting in congestion.
 - SH58 is expected to operate near capacity in the peak periods once TG opens (LoS E) and over capacity by 2031 without P2G (LoS F).
 - With the P2G Link Road in place, traffic volumes on SH58 are expected to return to approximately existing levels and no capacity concerns are predicted in the longer term, although volumes may approach 17,000 in 2031.

- B. Closures and delays
 - o Closures and delays on SH58 are expected to continue due to the high crash risk along SH58
 - o Increased crashes on SH58 due to additional traffic in future year scenarios (i.e. due to additional traffic post-TG opening) are expected.

3.3 Summary

As evidenced above for Problem 1 & 2, the timing of this project is critical as ideally improvements should be complete on SH58 before TG opens. Accordingly, there is a need to progress now given it is anticipated that improvements may take up to three to four years from approval of the SAR to construction completion.

4 Is the problem specific to this investment?

Other investments cannot solve the problems on SH58. This investment is part of a wider regional plan, including TG, SH2/SH58 and P2G.

- A. Problem 1: The safety problem is specific to this investment as crashes are occurring on SH58 and relates to site specific issues. I.e. investment in other areas cannot solve the safety issue.
- B. Problem 2: The Travel Time Reliability problem is specific to SH58 insofar as it relates to crash impacts, and although a wider perspective has been undertaken (e.g. TG, P2G Link Road, SH2/58) these projects, on balance, do not solve the crash related reliability problem (as even with interventions elsewhere, but no works on SH58, there would remain a problem). The potential traffic volume travel time reliability issue will be addressed by the P2G Link Road.

5 Have the benefits that will result from fixing the problem been adequately defined?

- A. Problem 1: Crash History
 - a. Investment Benefit 1: Safer Journeys for all users
- B. Problem 2: Travel Time Reliability
 - b. Investment Benefit 2: Efficient reliable journeys

The quantified investment benefits are detailed in Section 13.

6 Are the benefits of high value / strategic importance?

Table 6-1: Alignment with Strategy

Organisation	Strategy	Benefit 1: Improved Safety	Benefit 2: Efficient reliable journeys
NZ Transport Agency	NZTA's Statement of Intent 2014-2018	Objective 4: Implement the Safe System approach to create a forgiving land transport system that accommodates human error and vulnerability.	Objective 8: Deliver consistent levels of customer service that meet current expectations and anticipate future demand.

Safety improvements are also aligned with the Safer Journeys Strategy and the current GPS for Transport.

7 Key Project Performance Indicators

The following Key Performance Indicators have been proposed for the project, and they relate directly to the project works. The safety KPIs are directly attributable to the project works. The travel time reliability KPIs are partly attributable to the project works but are also influenced by the TG and P2G Link Road projects.

A. Problem 1: Crash history: *Investment Objective – Improved safety*

- i. KPI #1: Number of DSI
 - o Baseline: **13 DSI (10-14)**
 - o Trend: Reduce/improve
- ii. KPI #2: KiwiRAP
 - o Baseline: **2.7 Star (2 star published)**
 - o Trend: Increase/improve

B. Problem 2: Travel Time Reliability³: *Investment Objective – Maintain travel time reliability*

- iii. KPI #1: Travel Time Reliability
 - o 95% travel time: 9.5 minutes (AM peak)
 - o Average Travel time: 7.4 minutes (AM peak)
 - o Buffer time⁴ (diff between 95% and avg): 29% (AM peak, westbound – to Porirua)
 - o Trend: Maintain

The investment benefits are detailed in Section 13.

8 Alternatives Assessment and Selection

Transport planning work on the wider region (Regional Land Transport Plan⁵, Ngauranga Triangle Study⁶, Wellington Northern Corridor RoNS Business Case⁷) involved assessing a range of future scenarios in terms of supply and demand and considered a range of strategic alternatives in order to solve the wider efficiency problems on SH1, SH2 and SH58.

These documents all recommended that part of the strategy for the region is to provide an additional east-west link between Petone and Grenada. This project would therefore resolve much of the efficiency concerns along the SH58 corridor. Four laning of SH58 was considered prior to deciding to proceed with the P2G Link Road, but P2G was agreed as being the preferred East-West link.

Accordingly, the remaining predominant problem along SH58 is safety and this is reflected in the problem statements for this investigation project.

The strategic alternative for this project is therefore to implement safety improvements to the existing corridor. This is confirmed by the Regional Land Transport Plan⁵ and the Ngauranga Triangle Study⁶.

These are proposed as the most effective treatment to counter the risk of fatal and serious crashes occurring.

Other strategic alternatives and options would not adequately address the safety problem. For example, whilst land use changes, public transport provision, traffic management, information provision or pricing

³ Whilst the travel time reliability KPI can be measured post-implementation, it is not possible at this stage. For the purposes of scheme assessment current and future LoS has been used as a proxy on the basis that a reducing level of service indicates more congestion and therefore less reliable journeys (accepting that there are limitations with this approach).

⁴ The *buffer index* represents the extra time (or time cushion) that travellers must add to their average travel time when planning trips to ensure on-time arrival.

⁵ Wellington Regional Land Transport Plan 2015, Greater Wellington <http://www.gw.govt.nz/rtplan/>

⁶ Ngauranga Triangle Study Technical Report, SKM, Jan 2010 and Ngauranga Triangle Study Long List Assessment Report, SKM, November 2009. <https://www.nzta.govt.nz/resources/ngauranga-triangle-strategy-study/ngauranga-triangle-strategy-study.html>

⁷ Wellington Northern Corridor RoNS Business Case Addendum, NZ Transport Agency, October 2013, <https://www.nzta.govt.nz/assets/Uploads/wnc-business-case-addendum-full-report-2013.pdf>

changes, may have a small impact on the demand for travel along this corridor, they would not significantly reduce the crash rate or the individual risk to a driver along this route.

9 Are the proposed alternatives and options the most effective response to the problem?

The proposed solution of online safety upgrades to the existing corridor is the only strategic option identified that will address the predominant problem of safety.

However, it is acknowledged that this is predicated on the P2G Link Road being constructed. If this is not able to be progressed then other strategic options will need to be considered for this corridor, such as large scale capacity improvements.

The recommended safety improvements have been chosen based on:

- A. The ability of the measures to address the safety concerns along the route
- B. The need to provide a consistent and readable road and speed environment
- C. Economic efficiency
- D. The need to mitigate impacts (i.e. provide appropriate turn around facilities to mitigate for wire rope median barrier)

The overarching preferred option to treat the identified problems on the SH58 Corridor includes cross section improvements, intersection improvements and horizontal curve realignments.

10 Range of Options

A variety of options were tested, ranging from improved shoulder widths and realignments only to the highest standard of wider shoulders, flush median and a full median barrier protection (with intersection improvements to facilitate access and vehicle turnarounds die to median barrier), intersection improvements and bridge widening.

The project options are:

1. Option 1: 1.5m shoulders, 4 curve realignments
2. Option 2: As per Option 1 with 2m flush median
3. Option 3: As per Option 2 with median barrier included
4. Option 4: As per Option 3 with removal of Site 1 realignment and 80km/h do-min
5. Option 5: As per Option 3, plus 80km/h do-min, roundabout at Flightys/Murphys, addition of realignment Site 5 & bridge improvements

A reasonable range of options have therefore been assessed throughout the investigation process for the SH58 safety improvements, with a clear assessment process demonstrated throughout the SAR and SAR Addendum investigations.

11 Option Assessment

A matrix-type assessment of the five project options has been undertaken, considering alignment of each option to the project objectives. This includes the four main project objectives, together with the two other sub-objectives (relating to a cost-effective solution and consistency with the One Network Road Classification) – to ensure all aspects are adequately considered.

A rating score is applied to each objective listed in the tables below, which compares each option generally against the other options. The rating system uses a five point scale -2, -1, 0, +1 & +2, with -2 the most negative, zero as neutral and +2 most positive. Despite using a five point scale no option was scored below a zero as this was considered to be little to no alignment with project objective and negatives beyond this were not necessary. The six objectives considered were:

- **To enhance safety of travel on the Wellington State Highway network, and specifically SH58:** *subjectively considers the relative safety of each option.*
- **To maintain or improve journey times and journey time reliability between SH2 in the Hutt Valley, and Transmission Gully:** *considers overall journey time and journey time reliability relative to the current situation and against the other options. For example, the impact of crashes causing delays or closures of the road is considered.*
- **To enhance resilience of the Wellington State highway network:** *considers whether aspects of the options would improve or worsen likely route resilience.*
- **To appropriately balance the needs of local and state highway traffic:** *considers whether a reasonable level of balance for both sets of users is achieved, or whether one is favoured to the detriment of the other.*
- **By developing and constructing a cost effective roading solution:** *considers the BCR achieved by the project.*
- **consistent with a standard expected for a Regional state highway under the One Network Road Classification:** *considers whether the option aligns with the levels of service for a regional highway in terms of mobility, safety, amenity and accessibility*

An option summary is provided in Table 11-1 below.

Table 8-1: Summary of MCA Scoring

Option	Enhance safety on State Highway Network, Specifically SH58	Maintain or improve journey times & Reliability	Enhanced Resilience	Appropriately balance the needs of local & state highway traffic	Total score MAIN OBJECTIVES	Cost effective roading solution	Consistent with a regional highway ONRC standard	Total Score ALL OBJECTIVES
Option 1: 1.5m shoulders, 4 curve realignments	+1	-	+2	+1	4	+2	-	6
Option 2: As per Option 1 with 2m flush median	+1	-	+2	+1	4	+2	+1	7
Option 3: As per Option 2 with median barrier included	+2	+1	+1	+1	5	+2	+1	8
Option 4: As per Option 3 with removal of Site 1 realignment and 80km/h do-min	+2	+1	-	+1	4	+2	+1	7
Option 5: As per Option 3, plus 80km/h do-min, roundabout at Flightys/Murphys, addition of realignment Site 5 & bridge improvements	+2	+1	+1	+2	6	+1	+2	9

On the basis of alignment to the project objectives, the recommended option is therefore considered to be Option 5, as this scores highest against both the four main objectives and the total six criteria.

The feasibility of the recommended option (Option 5) is briefly summarised below:

- **Costs:** The overall project cost is in the region of \$50M, with the base estimate \$40M, the expected estimate \$48M and the 95th percentile estimate \$60M. This is considered to be within a suitable affordability envelope for the corridor improvements.
- **Benefit:** Overall the project is economically viable with a project BCR of 1.3. This is particularly noteworthy because providing two new roundabouts on a state highway with high (over 14,000 AADT) traffic volumes (for a regional state highway) and high freight volumes creates significant travel time and vehicle operating cost disbenefits.

However, the significant safety benefits delivered offset these negative impacts.

- **Community & public perception:** Public consultation carried out on the proposed improvements to SH58 in December 2014 demonstrated a very high level of public support for the improvements. Whilst some minor projects details have changed since that point, and further consultation is required particularly with directly affected landowners, public support is anticipated to still be high. Similarly, there is a high level of awareness regionally about the safety performance of SH58 which is expected to enhance general support for action.
- **Staging:** given the geographical length of the proposed works (9km), an assessment has been undertaken as to whether the works can be staged. A number of staging options have been considered and it has been confirmed that staging is suitable, albeit the time period for the implementation of each stage should be minimised so that the entire project can be packaged together and delivered in the shortest period possible (to avoid fragmented sections of a poor standard between upgraded sections).
- **Constructability:** The construction of the works themselves do not include complex construction techniques or unproven practises. The key challenges will be: large scale earthworks of significant heights in rolling/mountainous terrain (including carting significant volumes of cut material off site), extensive service relocations including the large GWRC water main and maintaining suitable traffic flows and access in the constrained corridor with extensive temporary traffic management in place.
- **Consentability:** the consent requirements for the project are extensive but should not be difficult. A new designation will be required, noting that the existing designation is already very wide (as is the highway corridor) for a large proportion of the corridor extent. Resource consents will be required for earthworks, stormwater, structures and discharges during construction.

12 Proposals are specified clearly & fully

The preferred option is clearly specified within the SAR Addendum. The project consists of an improved cross section, median barrier provision (with turnaround facilities) and curve realignment to provide a corridor of consistent geometry that is both adequate and appropriate for an 80km/h posted speed limit (and speed environment).

Extensive and robust investigations have been undertaken for the improvements proposed, nonetheless some gaps do exist in the investigations undertaken to date in respect of geotechnical testing and design, stormwater and concept level structural design. Additional investigations on these design aspects is therefore recommended. This will support the development of consent applications and also further refine cost estimation and confidence levels in the project investigations.

13 Is the proposed solution the best way to respond to the problem and deliver the expected benefits?

If the P2G Link Road project occurs, then the safety works proposed for SH58 are considered to be the best way to respond to the current issues:

In terms of safety:

- the scheme is expected to deliver:
 - An increase in KiwiRAP star rating from 2.7 to 3.5-4 stars
 - 45-66% reduction in Injury crashes per 100M VKT
 - An estimated 12-17 DSI saved over 10 years (Based on a KiwiRAP rating of between 3.5 and 4 stars)

In terms of travel time reliability:

- The improved safety of the route will also reduce closures and delays resulting from crashes.

If the P2G Link Road project does not occur, then the safety improvements are not considered to be the best way to respond to the current issues:

- Modelling indicates that if P2G Link Road is not constructed, SH58 will be operating near capacity once TG is in place (LoS E, V/C of 90%) and over capacity by 2031 (LoS F).
- If P2G Link Road is not progressed, SH58 will need a step change in the available capacity, with four laning required to achieve appropriate LoS.

Interventions are required on SH58 now. Evidence shows that up to an additional two DSI/year could occur between the completion of TG and P2G Link Road (assuming that P2G Link Road goes ahead).

Even with the safety improvements in place, in the interim period between TG and the P2G Link Road opening (a period currently estimated to be at least three years) a management plan including the following should be considered; Travel demand management (TDM) measures, promotion of alternate modes, provision of improved driver information systems and consideration of localised capacity improvements.

Therefore the suitability of the investment for the proposed SH58 safety improvements is entirely contingent on the P2G Link Road occurring. If the project proceeds without P2G, it would necessitate significant investment that, whilst delivering significant safety benefits, results in a heavily congested highway in the peak periods with flow breakdown, which is not appropriate for a regional state highway.