Te Ahu a Turanga; Manawatū Tararua Highway
Notices of Requirement for Designations
Volume Three: Technical assessments

NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government

1. TRANSPORT

IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Notices of requirement for designations under section 168 of the Act, in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project
BY	**NZ TRANSPORT AGENCY** Requiring Authority

TE AHU A TURANGA; MANAWATŪ TARARUA HIGHWAY PROJECT
TECHNICAL ASSESSMENT #1
TRANSPORT

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INTRODUCTION

1. My name is **David James Dunlop**.

2. I am a Principal Transport Planner and Sector Leader - Transport Infrastructure at WSP Opus in Wellington.

3. Sam Thornton, Senior Transportation Engineer and Gabriela Surja, Transport Engineer at WSP Opus assisted me in the preparation of this assessment.

4. In preparing this assessment I have relied on the assessments of **Mr Andrew Whaley** (design), and **Mr Grant Higgins** (construction methodology).

5. In developing this assessment I have worked with **Mr Whaley**, **Mr Higgins**, **Ms Amelia Linzey** (social effects), and **Ms Ainsley McLeod** (planning).

Qualifications and experience

6. I have the following qualifications and experience relevant to this assessment:

   (a) MSc in Planning Studies (focusing on Transportation), Oxford Brookes University in the United Kingdom (1996/97); and

   (b) Bachelor of Resource & Environmental Planning, Massey University in New Zealand (1992/95).

7. I have 21 years of experience in the planning, assessment and design of transportation projects in New Zealand and the United Kingdom, working for a wide range of central government organisations, local and regional authorities, and private developers, both as an employee and a consultant.

8. I have provided advice on transportation matters to the New Zealand Transport Agency ("**NZ Transport Agency**"), a number of local authorities and private developers, in respect of various proposed developments. I have provided expert transportation evidence for the NZ Transport Agency to the Boards of Inquiry for the Peka Peka to Ōtaki Expressway and Basin Reserve Bridge Projects, and have provided evidence in Environment Court proceedings, including for the Kāpiti Coast District Council in relation to the Paraparaumu Airport Plan Change 82.

9. I have also been involved in a number of significant projects within the Wellington and Manawatū-Wanganui Regions, including:

   (a) Manawatū Gorge Detailed Business Case Safety Audit and Project Economic Review, 2016-2018;

   (b) Wellington Resilience Programme Business Case, 2017-2018;

(c) Wellington Network Outcomes Contract, 2014-2018;

(d) Wellington Northern Corridor Roads of National Significance ("**RoNS**") Business Case, 2009 and 2013 update;

(e) Peka Peka to Ōtaki Scheme Assessment, Transport Assessment and evidence for the Board of Inquiry;

(f) Transmission Gully Scheme Assessment, Economic Evaluation and Transport Assessment, 2008-2012;

(g) Basin Reserve Transport Improvements Scheme Assessment, Transport Assessment and evidence for the Board of Inquiry, 2008-2013;

(h) Wellington Transport Strategy Model ("**WTSM**") and Wellington Public Transport Model 2011 update and model build, 2011-2012; and

(i) Ashmore Trust Roberts Line / SH3 Plan Change and Residential Development, 2007-2009.

10. I am a member of a number of relevant associations including:

(a) Chartered Member of the Chartered Institute of Logistics and Transport; and

(b) Affiliate Member of the Engineering NZ, Transportation Group.

Code of conduct

11. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2014. This assessment has been prepared in compliance with that Code, as if it were evidence being given in Environment Court proceedings. In particular, unless I state otherwise, this assessment is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Purpose and scope of assessment

12. My assessment addresses the following matters:

(a) Project description;

(b) the existing transportation environment;

(c) transportation assessment methodology;

(d) Project shaping;

(e) transportation effects of the Project, encompassing:

(i) general traffic effects;

(ii) resilience effects;

(iii) road safety effects;

(iv) effects on public transport users;

(v) effects on vulnerable users (ie pedestrians and cyclists);

(vi) parking effects; and

(vii) effects on private property access;

(f) temporary transportation effects during the construction of the Project, encompassing;

(i) road safety;

(ii) construction and general traffic;

(iii) parking; and

(iv) pedestrians and cyclists;

(g) proposed mitigation and revised effects;

(h) assessment of the Project against relevant transport strategies and policies; and

(i) conclusions.

Assumptions and exclusions in this assessment

13. The Project's transportation-related effects on the environment have been assessed against the 'do-minimum' scenario, which is explained in more detail below (but is largely based on the current transport network, involving use of Saddle Road and Pahīatua Track, with the Manawatū Gorge closed). The NZ Transport Agency has confirmed that the existing Manawatū Gorge route cannot safely be re-opened, and hence it is not a viable alternative to the do-minimum scenario.

14. The following supporting information is attached to the report:

(a) **Appendix 1.A**: Traffic Assumptions;

(b) **Appendix 1.B**: Trip Distribution Summary;

(c) **Appendix 1.C**: Travel Time Summary; and

(d) **Appendix 1**.**D**: Indicative Construction Site Accesses.

EXECUTIVE SUMMARY

15. This report provides a Transport Impact Assessment ("**TIA**") of the NZ Transport Agency's Te Ahu a Turanga; Manawatū Tararua Highway Project ("**the Project**"). It assesses the transport impacts of the proposed designation corridor alignment for the Project as shown on the Project Drawings included with the Notices of Requirement ("**NoR**").[1]

16. The Project is described in Part C, Volume 2 'Supporting Material', as the construction of a new road, which will form part of SH3. The Project will run from the SH3 western entry to the closed Manawatū Gorge route, across the Ruahine Ranges ("**the Ranges**") north of the Manawatū Gorge and south of Saddle Road, re-joining SH3 near Woodville – a length of approximately 11.5km. The Project replaces the section of SH3 through the Manawatū Gorge that was closed on 24 April 2017 following a large slip and ongoing stability issues in the Gorge. The Manawatū Gorge route was a critical North Island east / west link and the Project seeks to replace it, to deliver a safe, efficient and resilient transport solution that will enable economic development and regional productivity as underlying outcomes.

17. The assessment considers the existing environment of the two alternative routes running east-west over the Ranges: Saddle Road, and the Pahīatua Track (the "**existing routes**"). The closure of the Gorge has had a significant impact on the safety, efficiency and reliability of the existing routes for all modes of travel, attributed to a major consequential increase in the traffic demand. Without the Project, it is expected that the performance of the routes will continue to worsen in future years.

18. The Project will have a significant positive effect on the transport network. The Project will improve resilience, increase capacity within the wider network, and improve safety and efficiency for general traffic and freight, including public transport and emergency services. It will improve route reliability by providing a route built to a higher standard that is more resilient to incidents and events.

19. The Project will significantly reduce travel times between Palmerston North and Woodville by more than 10 minutes for light vehicles ("**LV**"), emergency services, buses and freight (approximately halving the existing time). Travel between Aokautere (SH57 South) to SH2 north of Woodville will gain an even larger travel time saving of more than 24 minutes, if compared to the current

[1] See drawings D-00 and D-01 to D-10 in Volume 4.

travel time via Pahīatua Track and Mangahao Road. Both reductions are approximately half the existing travel time and will have significant benefits to all road users and the wider economy.

20. The Project will redistribute traffic demand from the existing routes, which translates to an overall better environment for residents, pedestrians and cyclists on the local road network, particularly in Ashhurst, on Saddle Road and on the Pahīatua Track.

21. The Project will result in a significant increase in traffic on the existing SH3 Ashhurst Bridge over the Manawatū River, essentially reverting back to a situation similar to before the closure of the Gorge route. A recent survey[2] has confirmed that there is currently little use of the SH3 Ashhurst Bridge by cyclists and almost no use by pedestrians. The Project has the potential to increase adverse safety and amenity effects for any pedestrians or cyclists using this connection. Recently the NZ Transport Agency has installed cycle warning signs near the Ashhurst Bridge, which will help manage the effect for cyclists using this link. The NZ Transport Agency are currently looking at wider access issues and I recommend that the final design safeguards options for the future provision of safe access for active users to and from the Manawatū Gorge recreational area from Ashhurst and the wider Manawatū Region.

22. Irrespective of the project, the predicted traffic growth gives rise to a need to upgrade access to and from Ashhurst, either at Cambridge Avenue and/or York Street, through the implementation of traffic signals or a roundabout.

23. The proposed Project designation bisects a number of private properties, which results in a requirement for several alternative accesses to the existing road network. These properties will have a significant reduction in traffic volumes on Saddle Road, which in turn will significantly improve access. The overall impact to private property is considered neutral, however there is a need for the NZ Transport Agency to work with property owners and constructors to achieve safe access.

24. This assessment has provided an appraisal of the transport impacts that are anticipated to arise from the construction of the Project. The assessment is largely qualitative and provides an appraisal upon which preliminary mitigation measures have been recommended. Construction activities have the potential to exacerbate, temporarily, negative transport effects that have

[2] Video survey of pedestrians and cyclists demand at SH3 Ashhurst Bridge undertaken by WSP Opus between 14 September to 20 September 2018, discussed in Walking and Cycling section of this report.

been experienced on Saddle Road and through Ashhurst and Woodville since the closure of the Gorge. It is expected that construction traffic will result in an increase in overall volumes and in general have moderate negative impacts, due to the potential impacts to safety and efficiency. Construction activities are also likely to impact on users of the Manawatū Gorge walkway, both in terms of access and parking.

25. In general, it is considered that the construction traffic effects outlined in this assessment can be mitigated by developing a Construction Traffic Management Plan ("**CTMP**") and implementing a Construction Management Plan and design solutions in line with good practice. Overall, following the implementation of the CTMP and working with stakeholders and the local community, construction traffic effects are considered minor negative.

26. One relevant consideration, to be seen in the context of the critical nature of the Project (in my view), is that the faster the Project can be constructed, the faster the negative impacts of existing and construction traffic in Ashhurst and on Saddle Road will be eliminated, and the faster the Project's transportation benefits can be realised. Therefore, it will be important for the CTMP to provide a mechanism for the NZ Transport Agency and constructors to work with stakeholders and the local community to make these trade-offs once the final design and construction methodology has been determined.

27. Overall the Project will have a significant positive effect on the transport network and the users of the transport system. In transport terms, I consider the Project should be progressed as a matter of urgency, with appropriate mitigation to manage the effects of construction and operational traffic redistribution.

PROJECT DESCRIPTION

Introduction

28. A full Project description is available in the Assessment of Environmental Effects Report ("**AEE**"). The following section relies on excerpts of the AEE relevant to the assessment of traffic impacts.

29. The Project is 11.5km of new State highway running from the SH3 western entry to the closed Manawatū Gorge route, across the Ruahine Ranges north of the Manawatū Gorge and south of Saddle Road, re-joining SH3 near Woodville as displayed in **Figure 1.1**. Before it was closed, the Manawatū Gorge route (black line) accommodated 7,620 vehicles per day, of which

11.3% were heavy commercial vehicles ("**HCV**") in 2016. The Project (blue line) is expected to accommodate approximately 9,700 vehicles per day from its anticipated opening date in 2025[3].

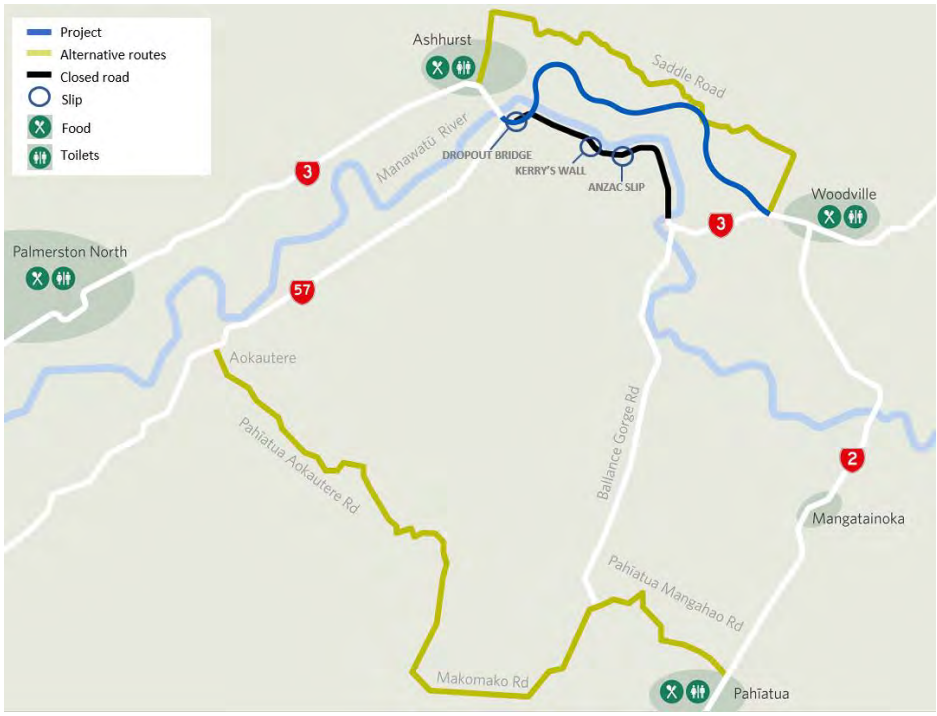


Figure 1.1: Te Ahu a Turanga Project Location and Alternative Routes

Design context

30. The Project is designed to deliver a 'national route' classification under the One Network Road Classification ("**ONRC**").[4] The ONRC is a road classification system, which divides New Zealand's roads into six categories based on how busy they are, whether they connect important destinations, or are the only route available. The importance of the provision of this national route is explained further in the Existing Environment - Transport Infrastructure & Services section below.

31. The Project incorporates design elements that are contained in the NZ Transport Agency's Action Plans, and that implement a Safe System Approach.[5] The Safe System Approach aims for a more forgiving road system that takes human fallibility and vulnerability into account. Therefore, the transport system in this Project is designed to protect people from death and serious injury.

32. The new route will be SH3, replacing the existing (closed) SH3 route.

[3] Appendix 1.A – Te Ahu a Turanga: Traffic Assumptions Memo, WSP Opus, August 2018
[4] https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/onrc/
[5] https://www.saferjourneys.govt.nz/about-safer-journeys/the-safe-system-approach/

33. The new route was selected following a multi-criteria analysis of 18 route options. The process involved a consideration of the Project's investment objectives, environmental and social impacts, and feasibility for implementation.

34. The Project's objectives are:

    (a) to reconnect the currently closed Manawatū Gorge State Highway 3 with a more resilient connection;

    (b) to reconnect the currently closed Manawatū Gorge State Highway 3 connection with a safer connection than the Saddle Road and Pahīatua Track; and

    (c) to reconnect the currently closed Manawatū Gorge State Highway 3 with a more efficient connection than the Saddle Road and Pahīatua Track.

35. Further details on the design context are available in the full Project description provided in Volume 2: AEE and supporting material.

Design details

36. The road carriageway layout includes:

    (a) a four-arm two lane roundabout connection with SH57 at Ashhurst;

    (b) a five-arm single lane roundabout connection with existing SH3 at Woodville;

    (c) a two-lane single carriageway highway (1 lane in each direction) where crawler lanes are not provided;

    (d) a four-lane dual carriageway highway (2 lanes in each direction) where crawler lanes are required due to steep grades and where extending the crawler lanes is necessary to provide a consistent corridor and reduce merge and diverge points;

    (e) 3.5-metre-wide traffic lanes;

    (f) 2.5-metre-wide outside shoulders on the single carriageway (to the face of the edge barrier), or 2.0-metre-wide outside shoulders where there is a dual carriageway with crawler lanes (from the outside of the crawler lanes to the face of the edge barrier);

    (g) a central median which will be typically between 4.0 and 6.0 metres wide; and

(h) a wire rope median barrier provided from roundabout to roundabout.

37. A design speed of 110km/h has been adopted for the main alignment. The design speeds for local roads are dependent on the existing speed environment and will be determined during the detailed design phase of the Project on a case-by-case basis.

38. Near continuous wire rope barriers are proposed along the central median to separate oncoming traffic and along the roadside – this results in limited opportunities for vehicles to cross the corridor (e.g. turn right). Higher standard barrier systems may be necessary in some circumstances, where specific hazards exist. For example, across the new Manawatū River Bridge a TL5 barrier (concrete base and steel roll bar) will be provided.

39. Emergency crossover points in the median barrier will be provided at appropriate locations to allow emergency vehicle U-turn movements. Sealed maintenance access areas will be provided behind the barriers to provide safe access and parking for maintenance activities outside of the carriageway.

40. No barriers are proposed on local roads.

41. Separated walking or cycling facilities are not specifically provided for by the Project, although it is proposed that the shoulder width and bridge widths will be sufficient to accommodate cyclists. For the purpose of this assessment it is understood that the primary cycle route between the western and eastern ends of the Manawatū Gorge will continue to be via the Pahīatua Track, which is part of the New Zealand Cycle Trail Touring Route, as detailed in the Existing Environment - Walking and Cycling section of this Transport Assessment. It is also expected that, while there are currently very low levels of usage of Saddle Road by cyclists (due to the volume of traffic and road configuration), Saddle Road will become a more suitable cycling route once the Project is constructed. Similarly, the Manawatū Gorge walking track is expected to remain as the primary walking route between the western and eastern ends of the Gorge.

42. The Project will include rest (or viewing) areas adjacent to both the east and west-bound lanes. The locations will be determined as part of detailed design, and will likely be provided in conjunction with maintenance service areas.

43. Other Project features are detailed in the full project description provided in the AEE report.

EXISTING ENVIRONMENT

Planning and policy context

44. The following national statutory and non-statutory documents apply to this Project:

    (a) Resource Management Act 1991 ("**RMA**");

    (b) Land Transport Management Act 2003 ("**LTMA**");

    (c) Government Policy Statement on Land Transport Funding, 2018/19-2027/28 ("**GPS**"); and

    (d) National Land Transport Programme 2018-2021 ("**NLTP**").

45. The following regional and district level statutory and non-statutory documents apply to this Project:

    (a) Regional Land Transport Plan, Horizons Regional Council, 2015-2025 (2018 Review) ("**RLTP**");

    (b) Regional Public Transport Plan, Horizons Regional Council, 2015-2025 ("**RPTP**"); and

    (c) Relevant district plans, including strategic transport plan and active and public transport plan, prepared by the following local councils:

        (i) Palmerston North City Council ("**PNCC**");

        (ii) Manawatū District Council ("**MDC**"); and

        (iii) Tararua District Council ("**TDC**").

Land-use

46. The proposed designation identified on **Figure 1.2** below shows that the entire proposed designation (purple line) passes through rural zoned land within the jurisdiction of the PNCC, MDC, and TDC.

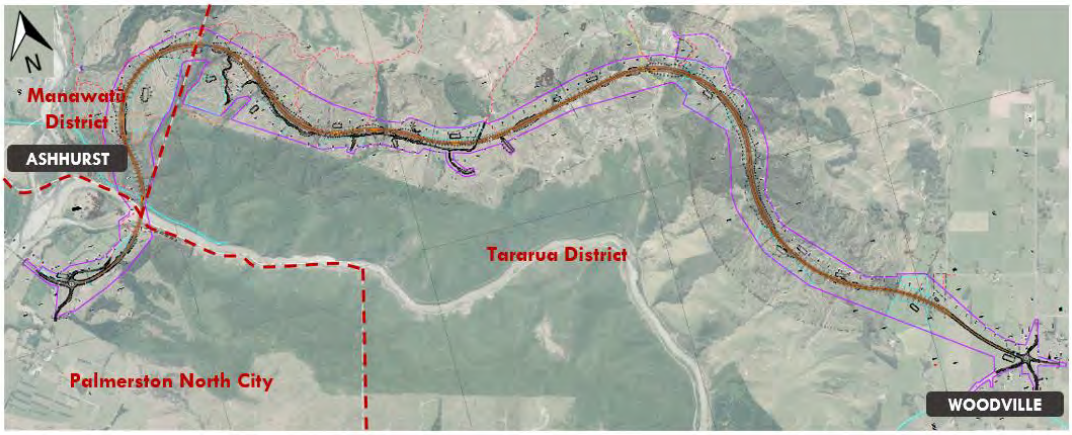


Figure 1.2: Districts Boundaries

47. The land-use along the designation is predominantly farming and power generation (Te Āpiti Windfarm), which are uses that generate a relatively low number of vehicle trips.

Transport infrastructure and services

General

48. **Figure 1.3** below shows the strategic State highway road network in the region. The SH3 connection (old Manawatū Gorge) is the only strategic east-west link between the main north-south National/Regional State highway links (SH1 and SH2) over the length between Wellington (SH58) and Napier-Taupo (SH5).

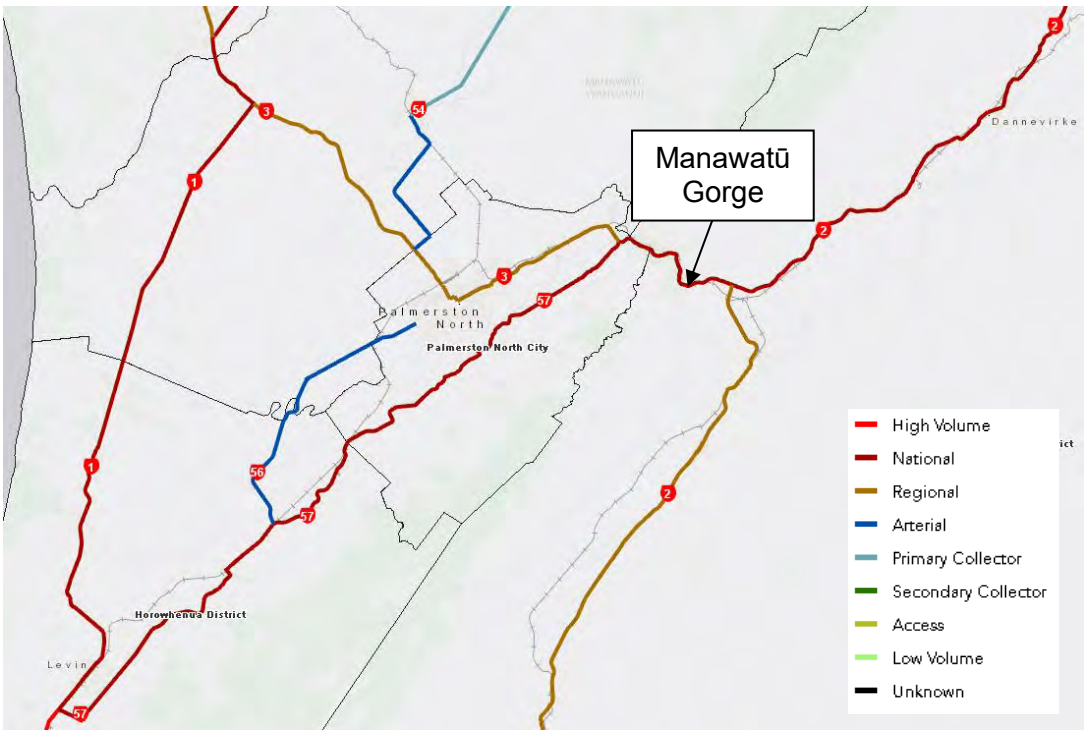


Figure 1.3: Transport Network - Strategic Context (https://nzta.maps.arcgis.com, ONRC)

49. SH57 provides a National State highway connection between SH1 south of Levin and SH3 south of Ashhurst.

50. **Figure 1.4** below shows the road network in the region. There are three east-west connections (including the closed Manawatū Gorge (SH3)). The other two are Saddle Road to the north (Arterial) and the Pahīatua Track to the south (Primary Collector). These are described in more detail below.

51. No regional public transport services are provided on either of the current east-west connections. A bus service does run between Ashhurst and Palmerston North, but is outside the proposed designation.

52. Nation-wide bus provider Intercity[6] operates bus services between the following destinations, which currently use Saddle Road:

    (a) Napier – Wellington (7 days, both directions each day);

    (b) Gisborne – Wellington (7 days, both directions each day);

    (c) Palmerston North – Tauranga (twice a week);

    (d) Palmerston North – Napier (twice a week); and

    (e) Palmerston North – Masterton (twice a day).

53. The Palmerston North – Gisborne Line railway runs through the Manawatū Gorge and connects Palmerston North with Napier with a station/sidings in Woodville (the railway line provides freight services only).

[6] https://www.intercity.co.nz/.

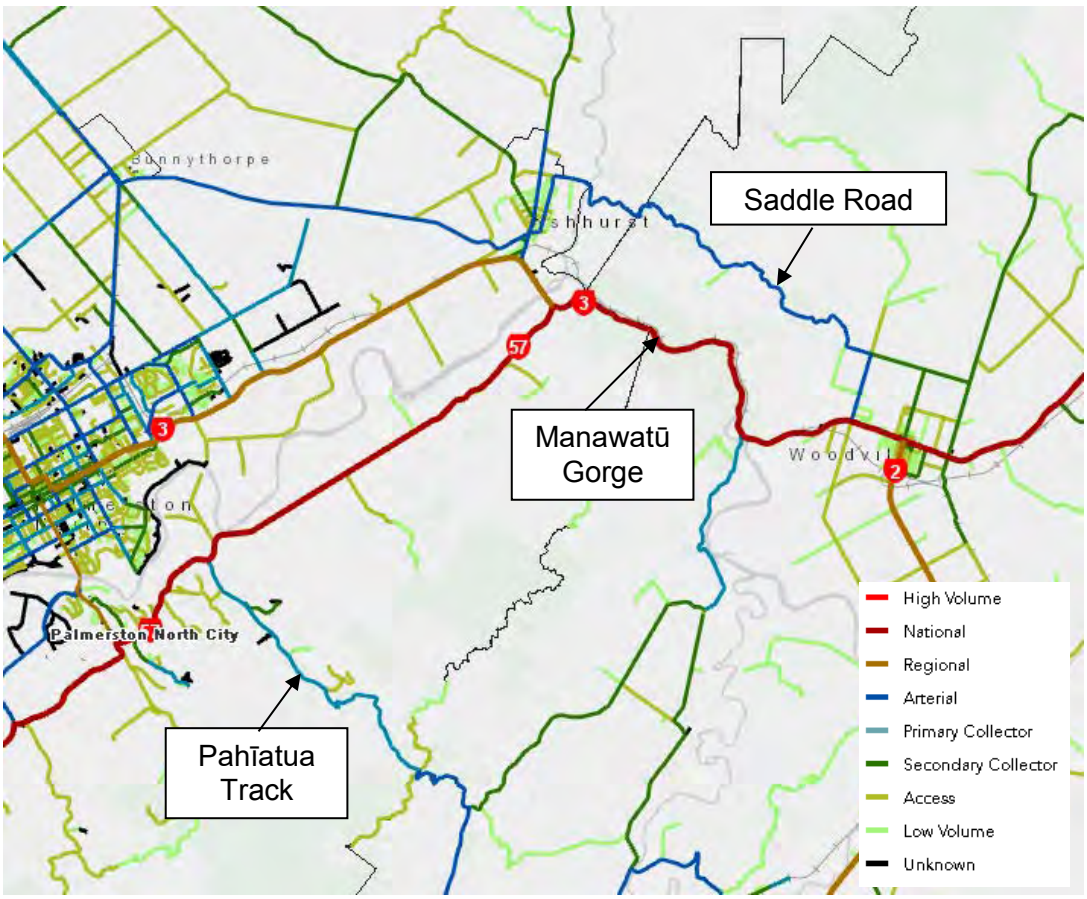


Figure 1.4: Transport Network - Regional Context (https://nzta.maps.arcgis.com, ONRC)

Saddle Road and Pahīatua Track

54. The two remaining alternative routes have been the primary 'alternatives' to the SH3 route since the closure of the Gorge; being Saddle Road and the Pahīatua Track (refer to **Figure 1.5**).

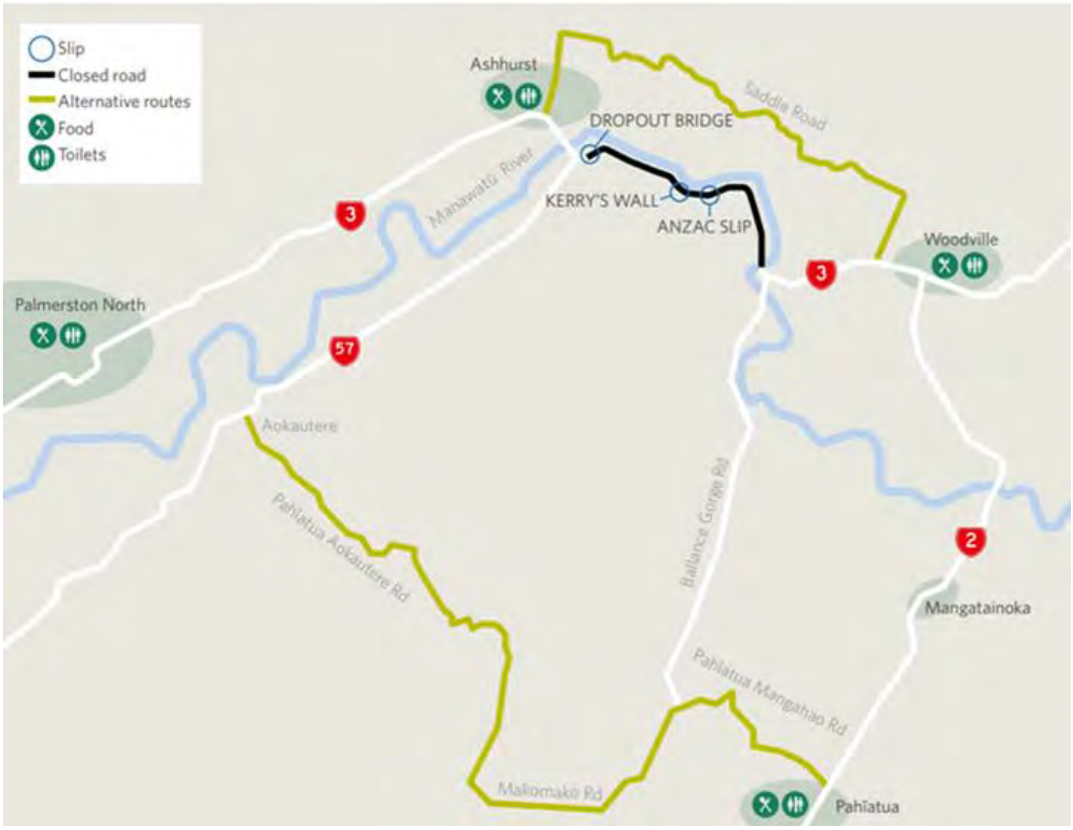


Figure 1.5: SH3 Closure and Alternate Routes. Source: NZ Transport Agency Te Ahu a Turanga Project Map

55. The closure of the Gorge has not resulted in lower traffic volumes traversing the Ranges, signifying the significance of this connection between east and west for the local communities and the region as a whole. **Figure 1.6** sets out the NZ Transport Agency data on the redistribution of traffic volumes soon after the closure, and the change in experience for traffic users.

56. However, travel times are longer since the closure of the Gorge. In general, the travel time between east and west through Saddle Road is 21.6 minutes for light vehicles, which is over 8 minutes slower than the travel time was on the closed Manawatū Gorge.

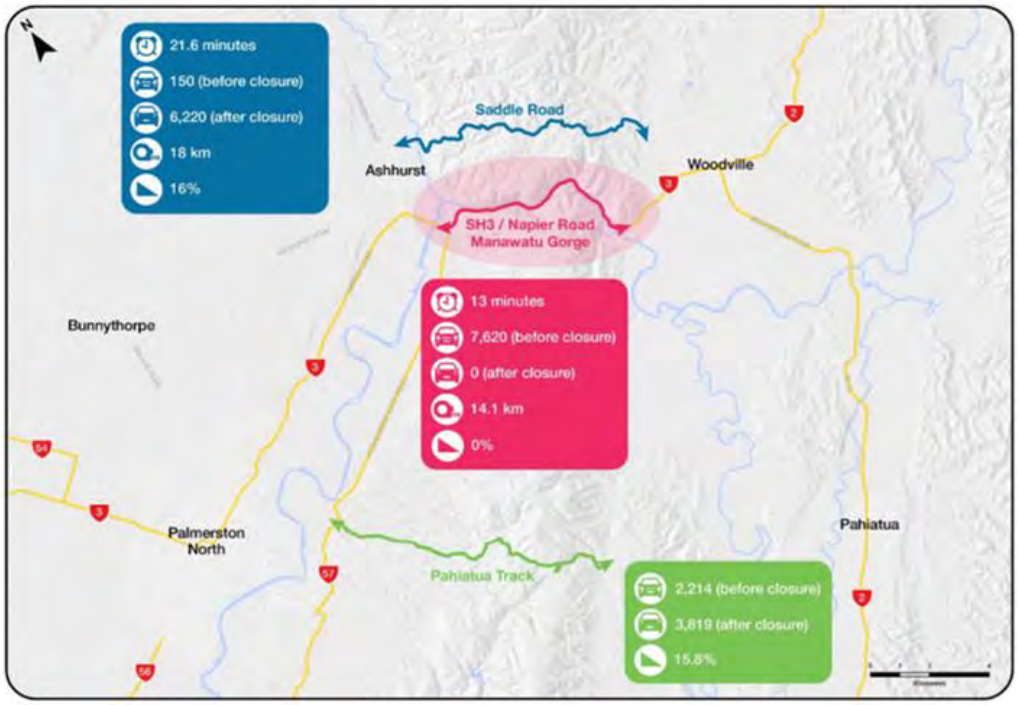


Figure 1.6: Journey experience via SH3, Saddle Road and Pahīatua Track. Source: NZ Transport Agency Business Case for Implementation

57. Saddle Road connects Ashhurst with the northern outskirts of Woodville. At the Ashhurst end, Saddle Road connects to Salisbury Street (refer to Figure 1.7), which travels through the Ashhurst residential area. Along its length, Saddle Road provides rural property access and access to the Te Āpiti wind farm. At the Woodville end of the route, Saddle Road connects to Oxford Road/Woodlands Road, with priority given to vehicles travelling to/from Woodville on Woodlands Road. Various alternative routes exist to bypass Woodville for traffic heading north, east and south (if desired, however these alternative routes are not promoted by the NZ Transport Agency or TDC).

Figure 1.7: Salisbury Street Connection with Saddle Road

58. Saddle Road has a steep curvilinear alignment with one lane in each direction (refer **Figure 1.8** below). Sporadic slow vehicle passing opportunities are provided in the uphill direction. **Figure 1.9** below shows the vertical elevation for the route from SH3 (Ashhurst) to SH3 (Woodville). The route climbs approximately 300m vertically.

Figure 1.8: Saddle Road Alignment (Western Side)

59. The severity of the terrain traversed by Saddle Road results in poor efficiency and safety outcomes. The performance of Saddle Road has been estimated using the Level of Service ("**LOS**") typical curve contained in the Highway

Capacity Manual 2010, Chapter 14 Exhibit 15-5.[7] Given the current demand and peak flow, the high proportion of HCV, and severity of the gradient, the current LOS for Saddle Road is LOS C (acceptable performance), however, the predicted performance in 2041[8] will reduce to LOS E (worst performance).

60. In reality, the current performance of Saddle Road is perceived as lower than LOS C, especially at peak times. This issue is further exacerbated by the frequency of platooning[9] HCV's on the route. This platooning makes it very difficult for LV to overtake, despite the slow speeds of the HCV, which is likely to lead to high levels of driver frustration.

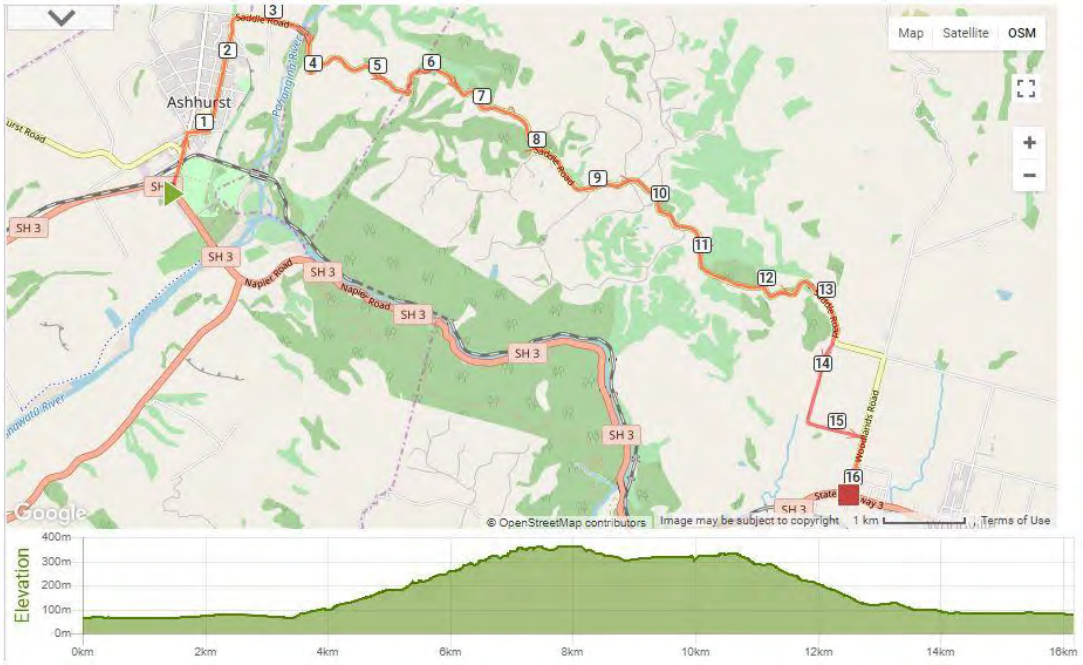


Figure 1.9: Saddle Road Vertical Profile (SH3 to SH3), https://nz.mapometer.com/

61. The Pahīatua Track (Pahīatua Aokautere Road) connects Aokautere (SH57) to Pahīatua (SH2). At the Aokautere end, SH57 provides access to the north (Ashhurst) and south/west (Levin and Palmerston North). Along the length, Pahīatua Aokautere Road provides lifestyle block and rural property access. At the eastern end of Pahīatua Aokautere Road it connects to Makomako Road, which performs a big loop to the south before heading north again,

[7] Highway Capacity Manual 2010 Chapter 14 Multilane Highways, Transportation Research Board of the National Academies, December 2010.
[8] The year 2041 has been used as the future year for transport assessment in alignment with the noise and vibration assessment. It is also beyond 10 years from the Project opening and is considered a sufficient horizon to ensure that potential network effects are captured.
[9] Grouping of vehicles due to speed or the number of vehicles, often resulting in delays, passing difficulties and potential safety concerns.

and then east to Pahīatua. There are a number of alternative routes north (to SH3) and south / east (to SH2) from the end of Pahīatua Aokautere Road.

62. The Pahīatua Track (and linkages through to Gorge Road) has a narrow curvilinear alignment with one lane in each direction (refer **Figure 1.10** below). Limited passing opportunities are provided. **Figure 1.11** below shows the vertical elevation for the route from SH57 (Aokautere) to SH2 (Pahīatua). The route climbs approximately 350m vertically.

Figure 1.10: Pahīatua Track Alignment

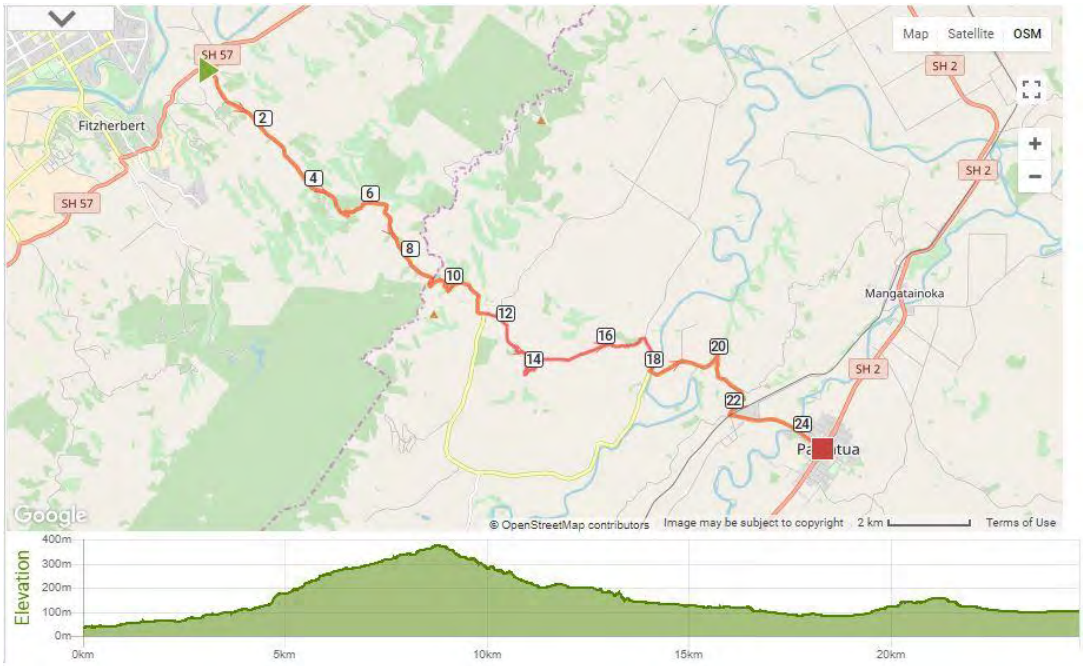


Figure 1.11: Pahīatua Track Vertical Profile (SH57 to SH2), https://nz.mapometer.com/

63. There are fundamental operational issues associated with the terrain, pavement construction and geometry of both Saddle Road and the Pahīatua Track. The extra distance and higher gradients on both routes have led to higher vehicle operating costs, particularly for HCV. This issue is aggravated by increasing traffic volumes (for example, during holidays or harvesting), other incidents or during poor weather which at times result in a total closure of the route.

64. **Figure 1.12** shows an indicative overview of the difference in vertical profile between Saddle Road and the Project.[10]

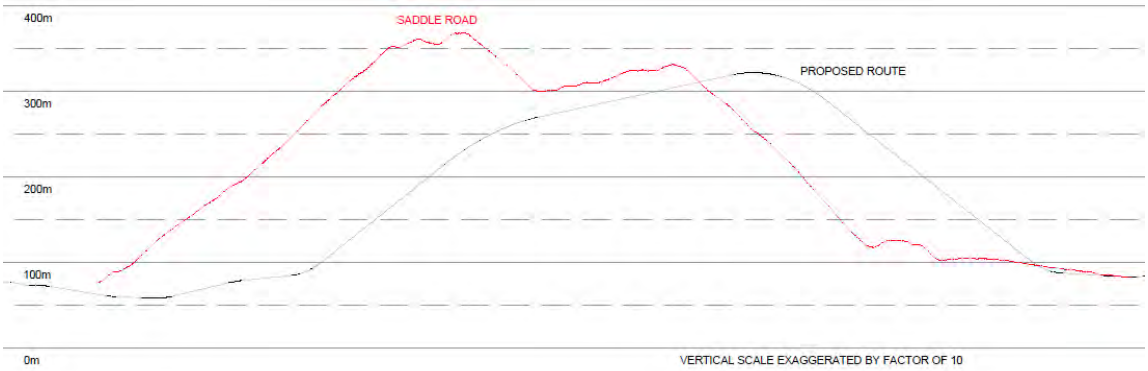


Figure 1.12: Vertical Profile Comparison between the Proposed Route and Saddle Road

[10] Vertical profile data available from the Project DBC stage was provided by GHD to WSP Opus in October 2018 in genio file format, and converted to the Figure 1.12 above by WSP Opus. Data for the Pahīatua Track is not available and therefore it is not shown. No liability is carried by GHD for the use of this data.

65. The additional direct travel costs through the use of Saddle Road (as compared with use of the now closed SH3 through the Gorge), as reported in the Detailed Business Case ("**DBC**") for the Project, have been estimated to be approximately $60,000 a day, or more than $22M per annum, and a significantly increased travel time of approximately 9 minutes for general traffic and 15 minutes for freight per trip. There are many anecdotal examples of impacts to local businesses and access to amenities including additional travel times for ambulances and access to essential services. During situations where both roads are closed, people can no longer traverse the Ranges without taking extensive detours to the north or south. A particular issue relates to the impacts on those who require access to medical services, including hospitals, when one or both routes are closed.

66. There are also significant costs to delaying the Project, with Ernst & Young (EY) having estimated that, in terms of 2016 Net Present Value ("**NPV**")[11], the economy would lose $279M of output over the next 40 years, if nothing were done to restore a State highway connection.[12] This estimate is made up of effects on Gross Domestic Product of lost investment of $82 M (or $7 M per annum), another $130 M (or $9 M per annum) from the impact of increased freight costs on output, and the agglomeration efficiencies forgone (relative to a Gorge-open scenario) of $67 M (or $5 M per annum). These costs are in addition to the direct travel costs outlined in the preceding paragraph above.

67. The Saddle Road route, as the current main route through the Ranges, cuts directly through the centre of Ashhurst along Salisbury Street. Increased traffic through the town centre results in additional noise and vibration, which causes disturbances to the local community and general nuisance. Increased traffic also increases traffic delays and raises safety risk, particularly around Ashhurst School area. A large number of Ashhurst residents have expressed a desire to maintain 'a quiet village' character, and the presence of additional general and freight traffic does not support this aspiration.

68. Previous community engagement sessions have revealed that a number of residents living in Ashhurst, Woodville or further north or south east within the Tararua District may consider relocation if the current transport network remained the only option, which would have a further impact on local businesses and the economy.

[11] Net Present Value is a measurement of profit calculated by subtracting the present values of cash outflows from the present values of cash inflows over a period of time.
[12] Assessment of the Wider Economic Benefits of the Shortlisted Options (EY, 2018).

Walking and cycling

69. **Figure 1.13** and **Figure 1.14** below show the walking and cycling routes around the Project area. Particularly relevant routes to the Project include:

    (a) Manawatū River shared path between Ashhurst and Palmerston North;

    (b) walking trails around Ashhurst Domain (west of Manawatū River) and through the Manawatū Gorge (east/south of Manawatū River); and

    (c) the cycle route traversing Pahīatua Track, which forms part of the New Zealand Cycle Trail Touring Route.[13]

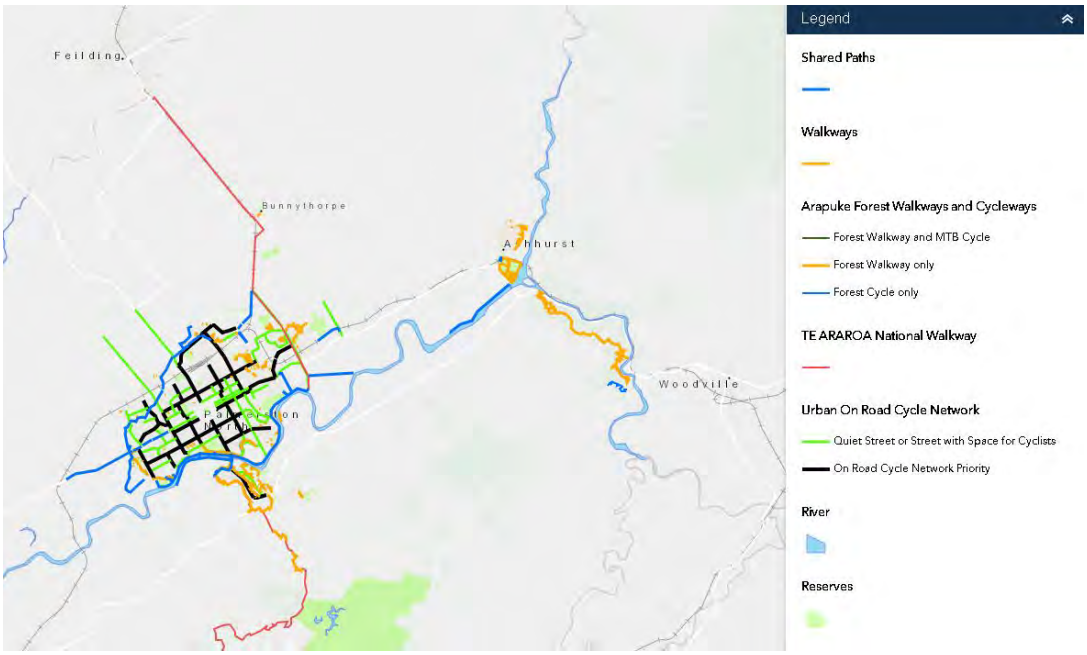


Figure 1.13: PNCC walking and cycling routes (https://geosite.pncc.govt.nz/MapViewer/)

[13] The New Zealand Cycle Trail – Pahīatua Road forms a 10km part of the Tararua Traverse Heartland Ride, which is part of the New Zealand Cycle Trail: https://www.nzcycletrail.com/explore-trails/. Currently the 10km section on Pahīatua Road is closed due to the increased volumes of traffic since the Gorge closure.

Figure 1.14: National Cycle Routes (https://www.nzcycletrail.com/map/?trail-id=993)

70. A current gap in the cycling/walking network is across the Manawatū River at Ashhurst (the Ashhurst Bridge is shown in **Figure 1.15**), which would otherwise connect the recreational areas in the Manawatū Gorge with the wider walking and cycling network. An Indicative Business Case ("**IBC**"[14]) was prepared in 2016 which considered new facilities adjacent to the existing SH3 road bridge. The IBC estimated the demand (pre-closure of the Manawatū Gorge) to be zero with the potential future demand associated with an improved facility to be 120 pedestrians and 90 cyclists per day. Following the closure of the Manawatū Gorge in 2017 and the associated reduction in traffic on the road bridge, electronic cycle warning signs were installed at the bridge (earlier this year) to improve cycle safety.

[14] Manawatū River Bridge (Ashhurst) Walk/Cycleway Indicative Business Case, Opus, 2016.

Figure 1.15: Ashhurst Bridge

71. A video survey of the use of the SH3 Ashhurst Bridge by pedestrians and cyclists has been undertaken between 14 September and 20 September 2018, between 6am – 8pm, to understand the actual current demand at the location. This survey indicates that currently there is limited use of the bridge by active users. Within this one week period, there was a total of 3 pedestrians and 125 cyclists, with the peak day being Saturday. There is no significant hourly peak flow pattern during the weekdays surveyed which indicates that this is likely a recreational route that is not used by commuter cyclists. The weather during the survey week was largely dry and therefore is not considered influential to the low demand numbers. The daily demand summary obtained from the survey is documented in Table 1-1.

Table 1-1: Pedestrians and Cyclist Demand Survey Summary

Pedestrians and Cyclists Demand Survey at Ashhurst Bridge Survey Period : 1 week, between 6am - 8pm daily Weather : Generally dry throughout the week								
Day	**Fri**	**Sat**	**Sun**	**Mon**	**Tue**	**Wed**	**Thu**	**Week**
Date	**14/09/2018**	**15/09/2018**	**16/09/2018**	**17/09/2018**	**18/09/2018**	**19/09/2018**	**20/09/2018**	**Total**
Pedestrians	0	1	1	1	0	0	0	3
Cyclists	9	41	26	2	15	9	23	125
Total	**9**	**42**	**27**	**3**	**15**	**9**	**23**	**128**

Key traffic routes – existing and proposed

72. The following figures identify the key routes for trips across the Ranges, both in the existing situation and with the proposed Project.

73. Figure 1.16 below shows the primary routes between various origins/destinations on the western side of the Ranges and SH2 north (Woodville and Dannevirke) on the eastern side of the Ranges. Figure 1.17Figure 1.17 below shows the primary routes between the same origins / destinations on the western side of the Ranges and SH2 south (Pahīatua and Eketahuna) on the eastern side of the Ranges. The origins/destinations to the west of the Ranges are:

    (a) North via SH54 / SH1 (red) (assumed to include Pohangina);

    (b) West via SH3 (yellow) (assumed to include Feilding);

    (c) Palmerston North (green); and

    (d) South via SH57/SH1 (blue).

74. There is also a demand to/from Ashhurst itself (not shown due to the scale of the figure).

75. The solid lines show the existing routes with the dashed lines indicating the expected changed routes with the proposed Project. The key changes expected for trips to/from SH2 north (Woodville and Dannevirke) on the eastern side of the Ranges (shown on Figure 1.16) are:

    (a) all Saddle Road trips (north, west and Palmerston North) are expected to transfer to the new road with minor routing changes around Ashhurst; and

    (b) trips to/from the south are expected to transfer from the Pahīatua Track to the new road (via SH57).

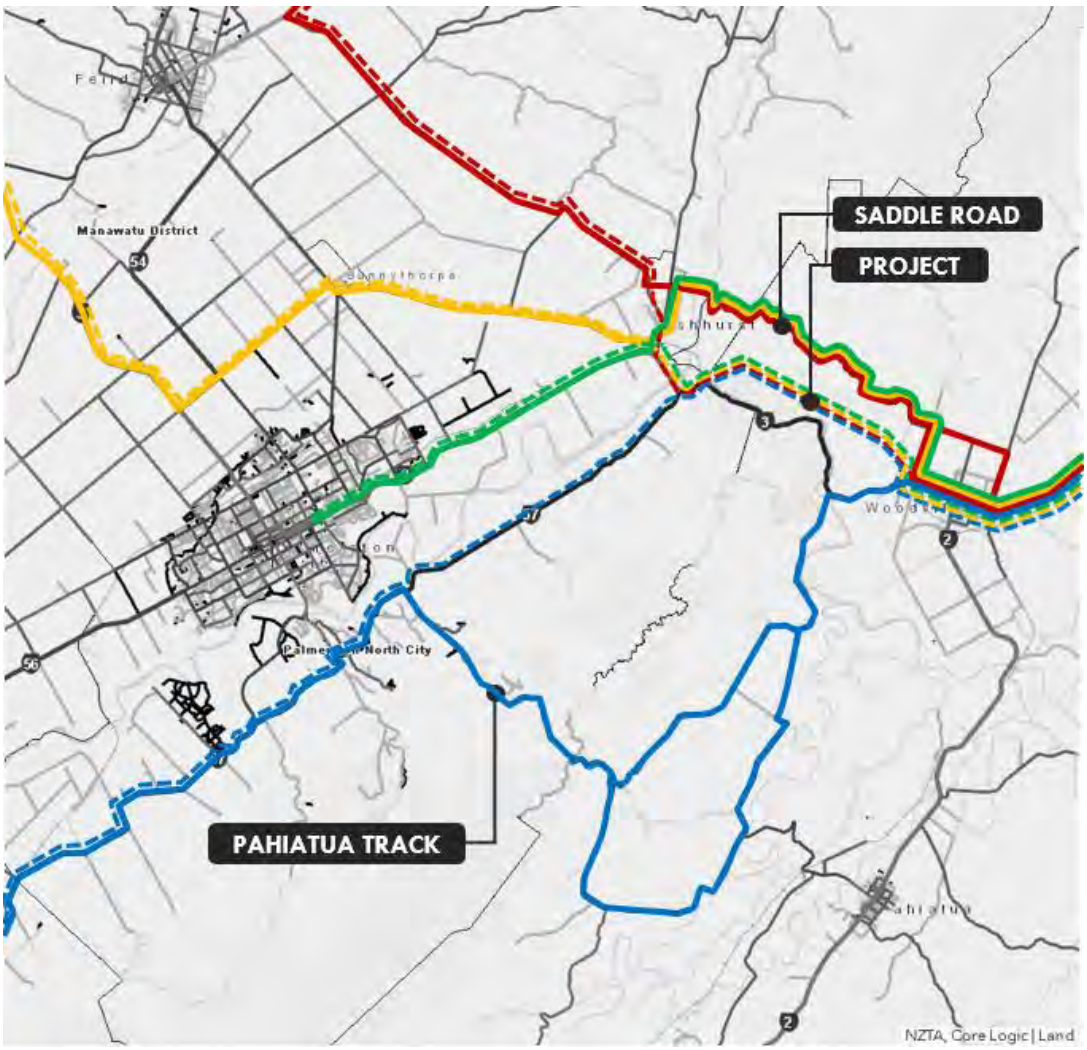


Figure 1.16: Routes to and from SH2 north (Woodville and Dannevirke) (https://nzta.maps.arcgis.com, ONRC)

76. The key changes expected for trips to/from SH2 south (Pahīatua and Eketahuna) on the eastern side of the Ranges (shown on Figure 1.17) are:

    (a) Trips to/from the north and south that currently use Saddle Road are expected to transfer to the new road.

    (b) Some the trips from the south and Palmerston North that currently use the Pahīatua Track are expected to transfer to the new route

    (c) Some of the trips from the west that currently use the Pahīatua Track or Saddle Road are expected to transfer to the new road.

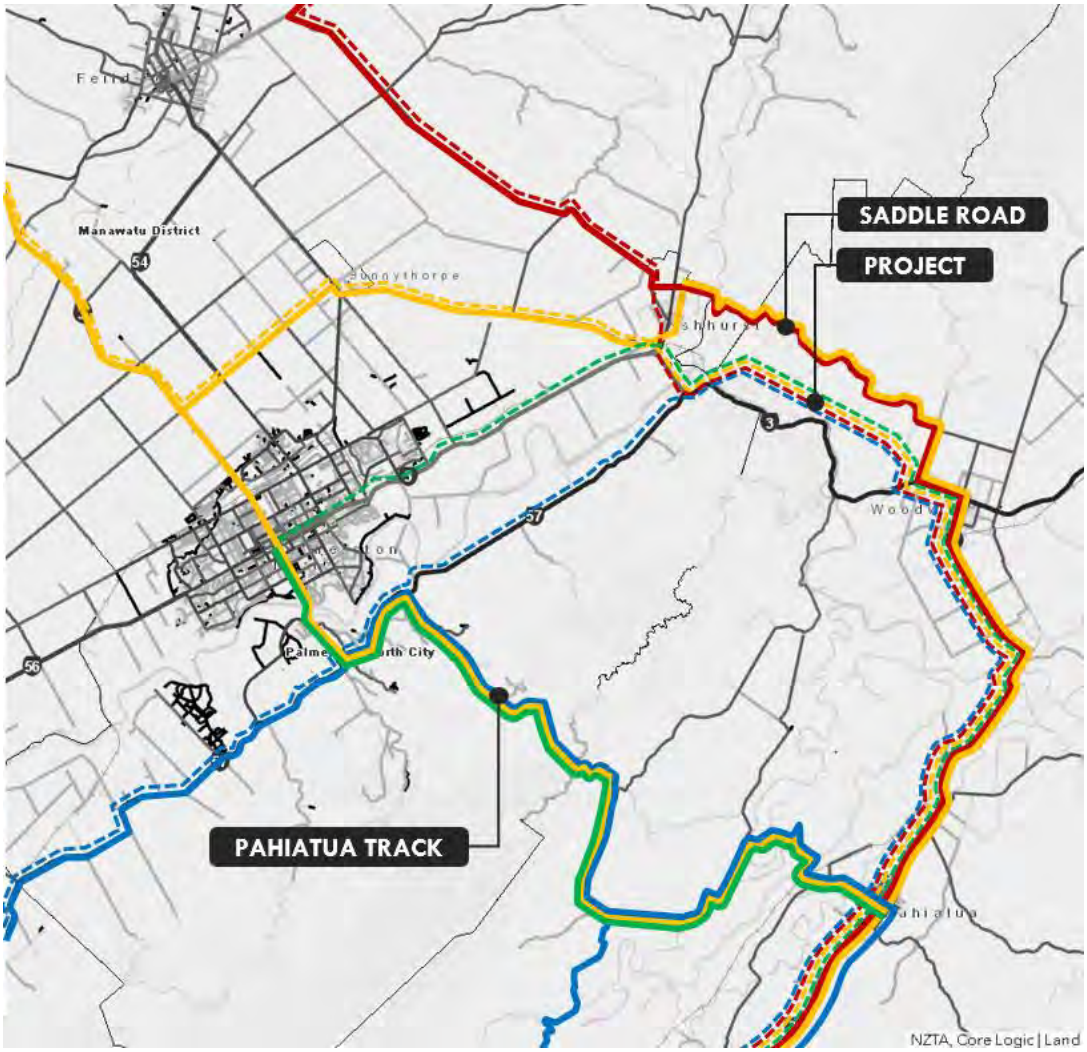


Figure 1.17: Routes to and from SH2 south (Eketahuna and Masterton) (https://nzta.maps.arcgis.com, ONRC)

Travel to work

77. The most recent available travel to work data is from the 2013 census.[15] The demand between east and west has been summarised in **Table 1-2** below. The table focuses on the three key territorial authorities (PNCC, MDC and TDC) but also considers adjacent authorities (Central Hawkes Bay, Whanganui, Rangitikei, Horowhenua, Kāpiti Coast, Masterton and Carterton).

78. Approximately 1,000 people usually work and live on different sides of the Ranges; 65% of those work in the west and live in the east, with the majority commuting to Palmerston North from the Tararua District.

[15] http://archive.stats.govt.nz/Census/2013-census.aspx

Table 1-2: East-west travel to work (2013 census)

	Usual workplace						
Usual residence	2013 Census	Palmerston North City Council	Manawatū District	Other Territorial Authorities (west)	Tararua District	Other Territorial Authorities (east)	**Total**
	Palmerston North City Council	n/a	n/a	n/a	210	36	**246**
	Manawatū District	n/a	n/a	n/a	60	-	**60**
	Other Territorial Authorities (west)	n/a	n/a	n/a	39	9	**48**
	Tararua District	510	54	27	n/a	n/a	**591**
	Other Territorial Authorities (east)	54	6	6	n/a	n/a	**66**
	Total	**564**	**60**	**33**	**309**	**45**	**1011**

Future land-use and growth

79. No significant land-use changes that would affect transportation demands on the proposed route have been identified.

80. The average annual growth rates for the districts that the proposed route traverses have been obtained through an analysis of available census data between 2001 and 2013, as follows:

    (a) Palmerston North City: 0.6%;

    (b) Manawatū District: 0.6%; and

    (c) Tararua District: -0.5% (indicating population decline).

81. It is noted that the net immigration has been at high levels since the 2013 census, and therefore has translated into relatively high levels of population growth throughout the country.

82. A review has also been undertaken of the applicable district plans and proposed growth areas (e.g. Feilding Growth Precinct), which has identified

no potential impact on the demand on the Project area. Changes in Palmerston North residential property prices and supply are anecdotally increasing demand in surrounding areas such as Ashhurst, however these changes are considered to be in line with conservative growth predictions.

83. Assumptions around traffic growth have been documented in the Traffic Assumption Memo in **Appendix 1.A**.

'Do-minimum' transport network

84. The do-minimum transport network is as per the existing transport network described above, with the exception of some changes in and around Ashhurst that have recently been discussed with the community, and are currently being developed for implementation.

85. Safety improvements are being constructed around Ashhurst as shown in **Figure 1.18** below.

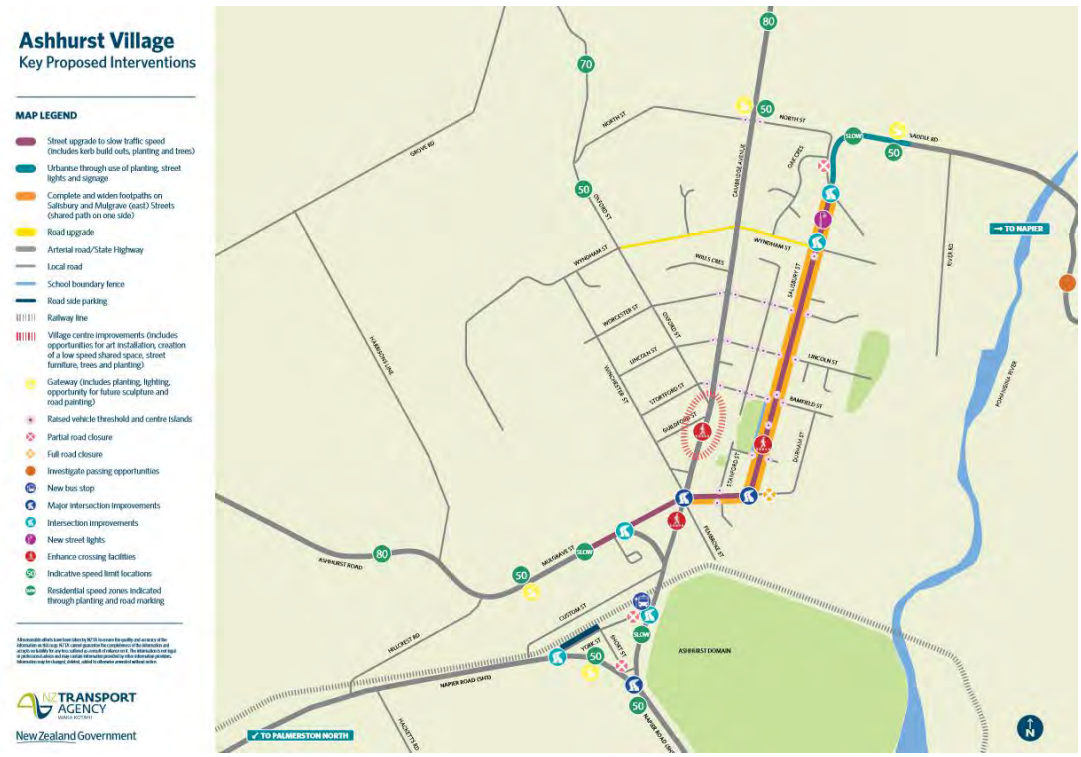


Figure 1.18: Ashhurst Village – Key Proposed Interventions (https://www.nzta.govt.nz/assets/projects/sh3-manawatu-gorge/ashhurst/16-ashhurst-poster-key-proposed-interventions-strategy.pdf, 2018)

86. The Palmerston North Ring Route is currently at the Programme Business Case stage and is expected to include new sections of highway to allow traffic (particularly freight) to bypass Palmerston North. This has not been included in the do-minimum scenario, as details have yet to be confirmed, however any traffic redistribution that occurs as part of a proposed ring route

is unlikely to significantly affect the ability of the Project to accommodate such a change. The outcomes of this investigation may also result in changes to active mode travel patterns accessing the Manawatū Gorge western carpark/access.

Road safety

87. **Figure 1.19** to **Figure 1.22** below (from the NZ Transport Agency's SafetyNet[16]) provide context around the road safety on the State highway network in the area surrounding the Project. Due to the limitation of the system,[17] the following safety ratings are based on the crash data from the period 2013-2017, which included a period of the Manawatū Gorge being open and a period of it being closed. Risk ratings vary from low (green) to high (black) and star ratings vary from 5 (green) to 1 (black).

88. **Figure 1.19** shows that the State highways around Palmerston North (3, 54 and 56) all have high collective risk sections. SH57 and the State highways east of the Ranges generally have lower risk ratings with the exception of the south and east approaches to Woodville.

89. **Figure 1.20** shows that all of the State highways have isolated medium-high/high personal risk sections.

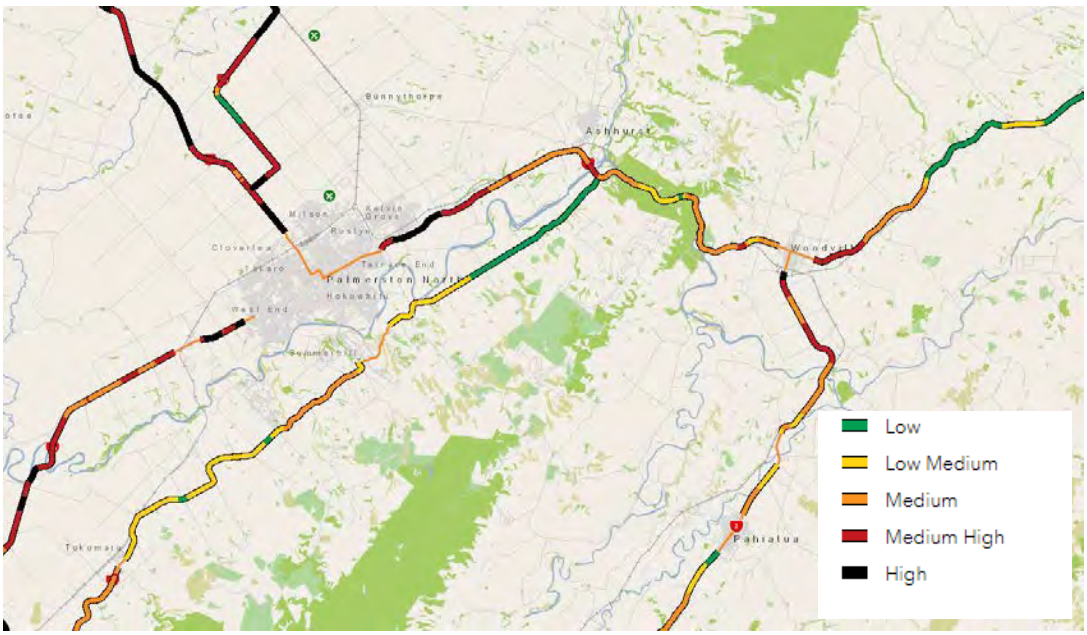


Figure 1.19: Collective Risk Map (https://nzta.maps.arcgis.com/, SafetyNet, 2013-2017)

[16] http://www.safetynet.org.nz/.
[17] The system provides ratings based on 5-year datasets only, meaning we were unable to use this data to compare the periods from before and after the closure of the Gorge.

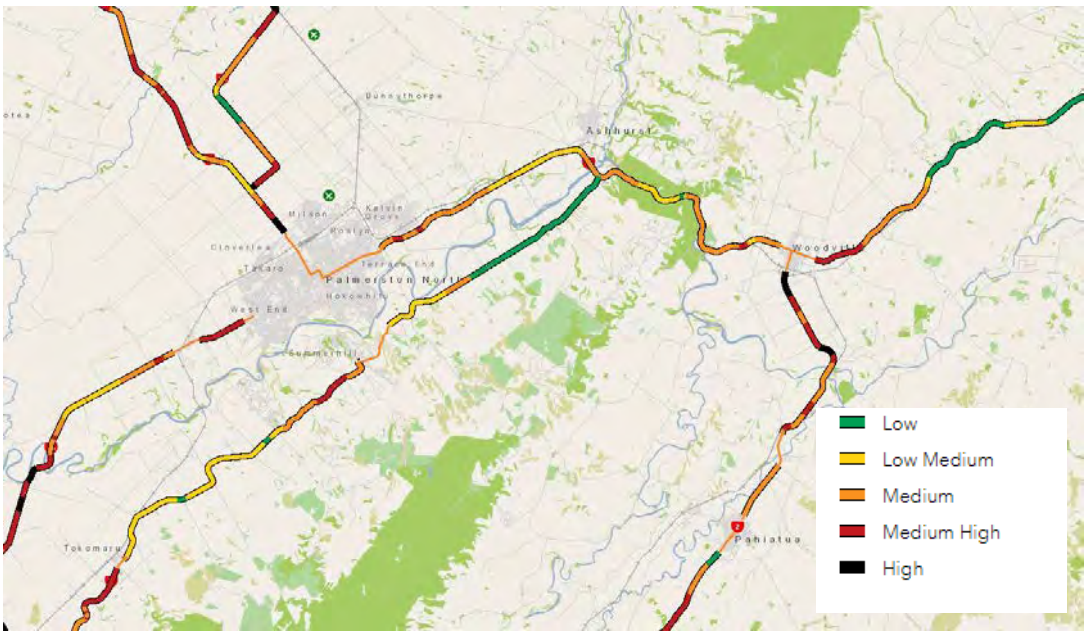
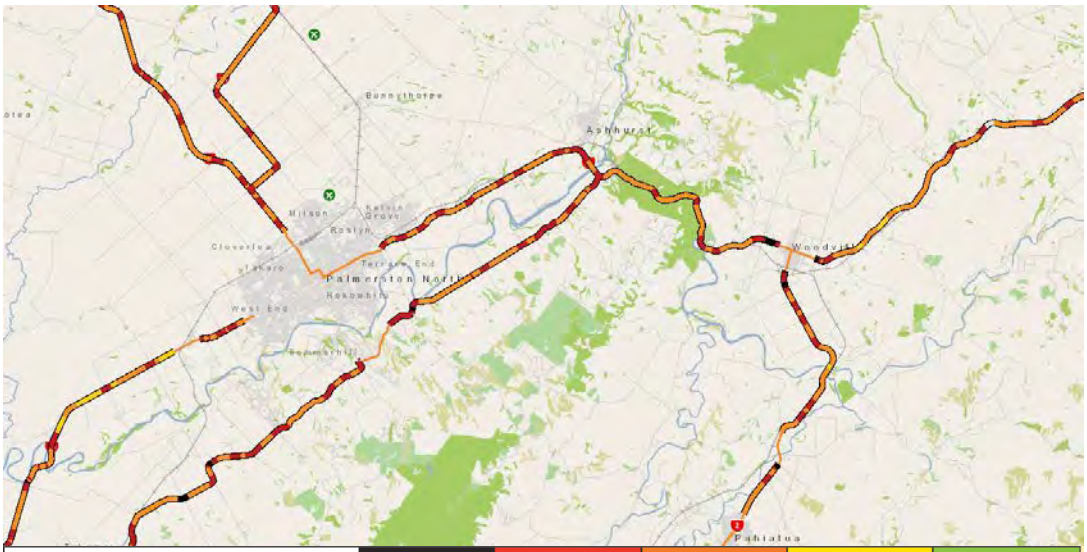


Figure 1.20: Personal Risk Map (https://nzta.maps.arcgis.com/, SafetyNet, 2013-2017)

90. **Figure 1.21** below shows the star rating for the State highway network. The majority of the network is made up of 2-3 star roads, with isolated sections of 1 star road around Woodville, Pahīatua and on SH57.



	1-star	2-stars	3-stars	4-stars	5-stars
Star Ratings	0%	39%	56%	5%	0%

Figure 1.21: Star Rating Map (https://nzta.maps.arcgis.com/, SafetyNet, 2013-2017)

91. **Figure 1.22** shows the collective risk rating for intersections. Generally the risk ratings are low with some high risk intersections around Palmerston North.

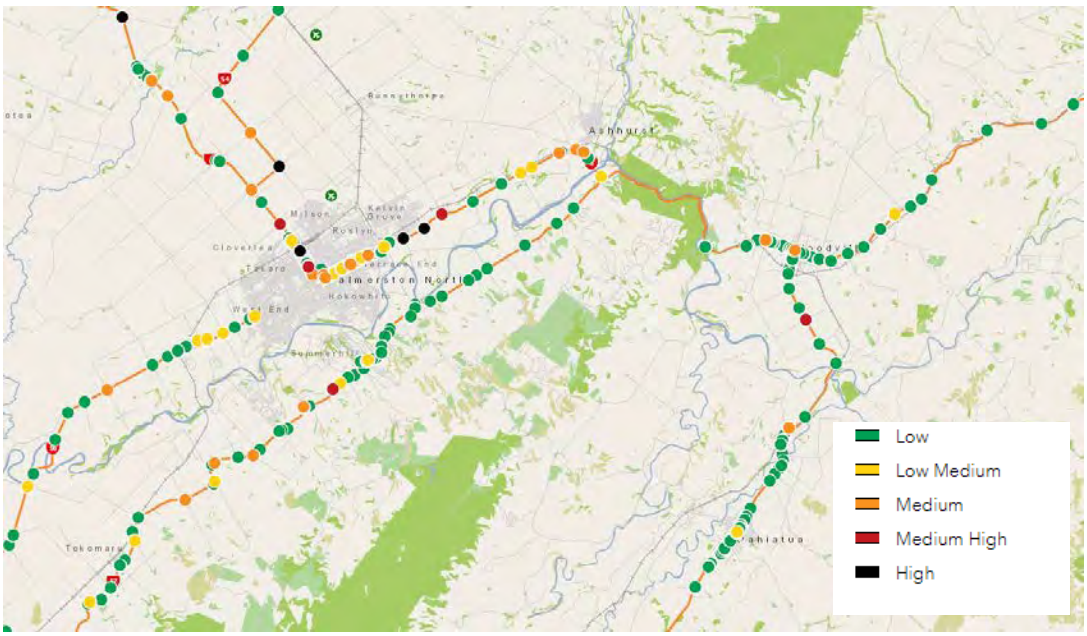


Figure 1.22: Intersection Collective Risk Map (https://nzta.maps.arcgis.com/, SafetyNet, 2013-2017)

92. Crash data has been retrieved from the NZ Transport Agency's crash analysis system for the key alternative routes across the Ranges where traffic volumes are expected to change (as shown in **Figure 1.16** and **Figure 1.17**) as follows:

    (a) Saddle Road from Ashhurst to Woodville;

    (b) Pahīatua Track from Aokautere to Woodville; and

    (c) SH57 from Aokautere to SH3.

93. Crash data has been retrieved[18] for the following periods, as the existing situation has not been operating for a standard five-year period:

    (a) each of the years from 2012 to 2016 inclusive (five one-year periods with Manawatū Gorge open); and

    (b) May 2017 to May 2018 (a one-year period with Manawatū Gorge closed, noting that some non-injury crashes from April – May 2018 may not be processed in time for inclusion into the record for this specific period).

94. The retrieved crash data for Saddle Road, SH57 and Pahīatua Track are summarised in Table 1-3, Table 1-4, and Table 1-5 below.

[18] On 27 June 2018.

Table 1-3: Summary of Crash Data for Saddle Road

SADDLE ROAD					
Year	Fatal	Serious	Minor	Injury	Non-injury
2012	0	2	7	9	18
2013	0	0	4	4	0
2014	0	0	2	2	0
2015	0	0	0	0	3
2016	0	0	1	1	2
2017-2018	0	2	7	9	18

Table 1-4: Summary of Crash Data for SH57

SH57					
Year	Fatal	Serious	Minor	Injury	Non-injury
2012	0	2	0	2	2
2013	0	0	1	1	3
2014	0	0	3	3	5
2015	0	0	1	1	5
2016	0	1	0	1	7
2017-2018	0	0	2	2	5

Table 1-5: Summary of Crash Data for Pahīatua Track

PAHIATUA TRACK					
Year	Fatal	Serious	Minor	Injury	Non-injury
2012	0	1	5	6	11
2013	0	1	4	5	7
2014	0	1	0	1	10
2015	0	1	1	2	14
2016	0	0	3	3	13
2017-2018	0	0	7	7	16

95. **Figure 1.23** shows that crashes on Saddle Road from Ashhurst to Woodville have spiked since the closure of the Manawatū Gorge in April 2017, which is likely to be attributable to the significant increase in traffic using Saddle Road. The historic crash data regarding Saddle Road is not representative of the expected number of crashes in a do-minimum situation. Further, there is insufficient data to confirm whether the recent improvements on Saddle Road[19] are resulting in a reduction in crashes, however the first known fatal

[19] These include measures such as surfacing, speed limits, removal of corners and additional passing/stopping areas for trucks.

crash occurred on the 5th of October 2018, and has not been recorded in the official (above) statistics.

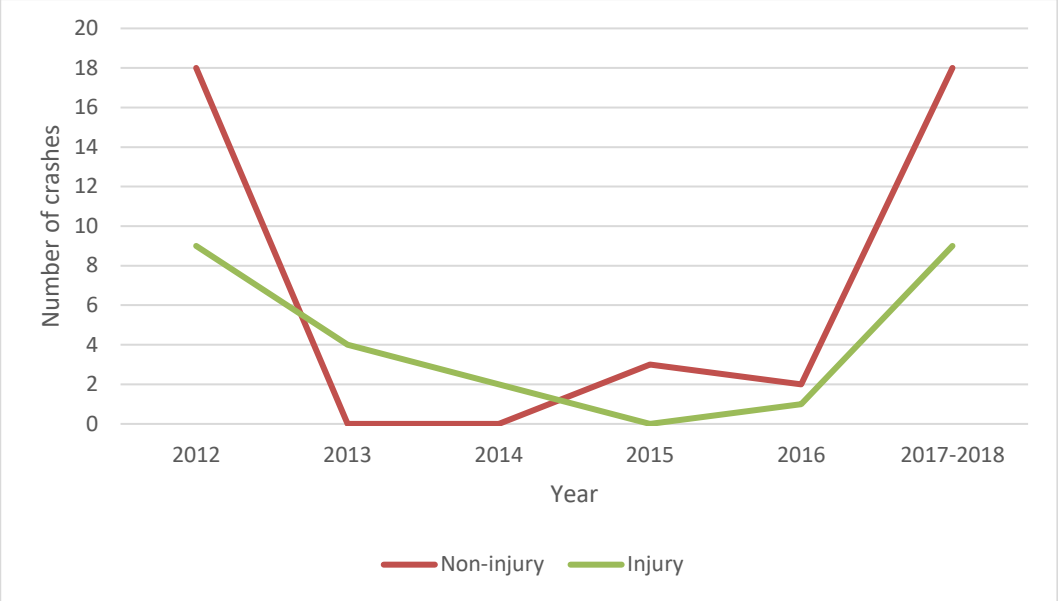


Figure 1.23: Crash trends on Saddle Road

96. **Figure 1.24** below shows no significant change in crash numbers on SH57 from Aokautere to SH3 since the closure of the Manawatū Gorge. The historic trend is expected to be representative of the number of crashes in a do-minimum situation.

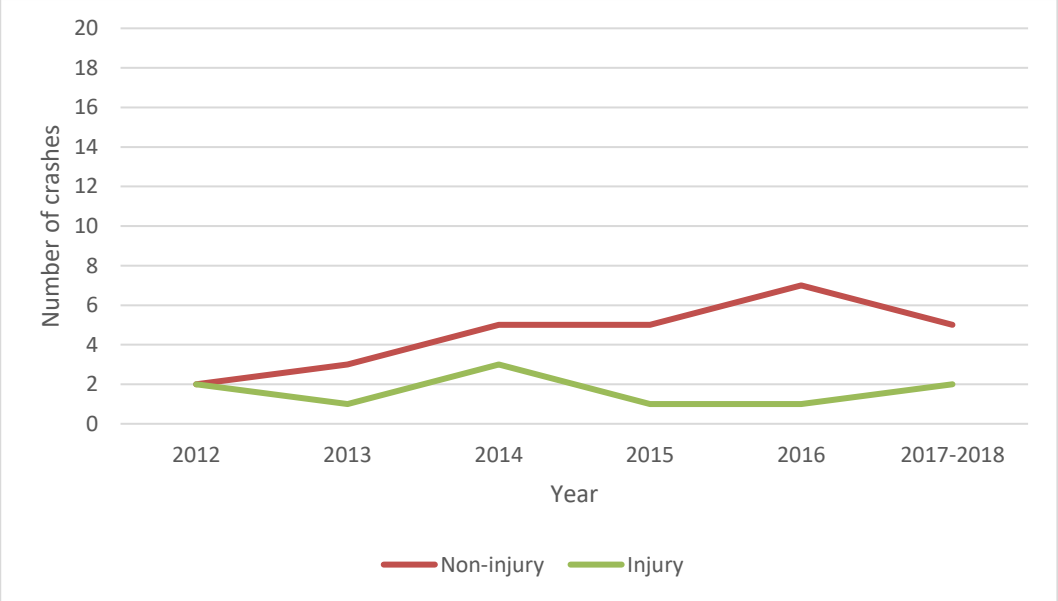


Figure 1.24: Crash trends on SH57

97. **Figure 1.25** below shows a small increase in the number of crashes on Pahīatua Track from Aokautere to Woodville since the closure of the

Manawatū Gorge. Given that the extent of increase in traffic on Pahīatua Track is less than Saddle Road and the Pahīatua Track is designed to a higher standard, this trend indicates that there has been a deterioration in road safety relative to the traffic demand. The historic trend is expected to be broadly representative of the number of crashes in a do-minimum situation. These trend lines are consistent with changes in traffic volume as a result of Gorge closures historically, and more recently with the permanent closure in 2017.

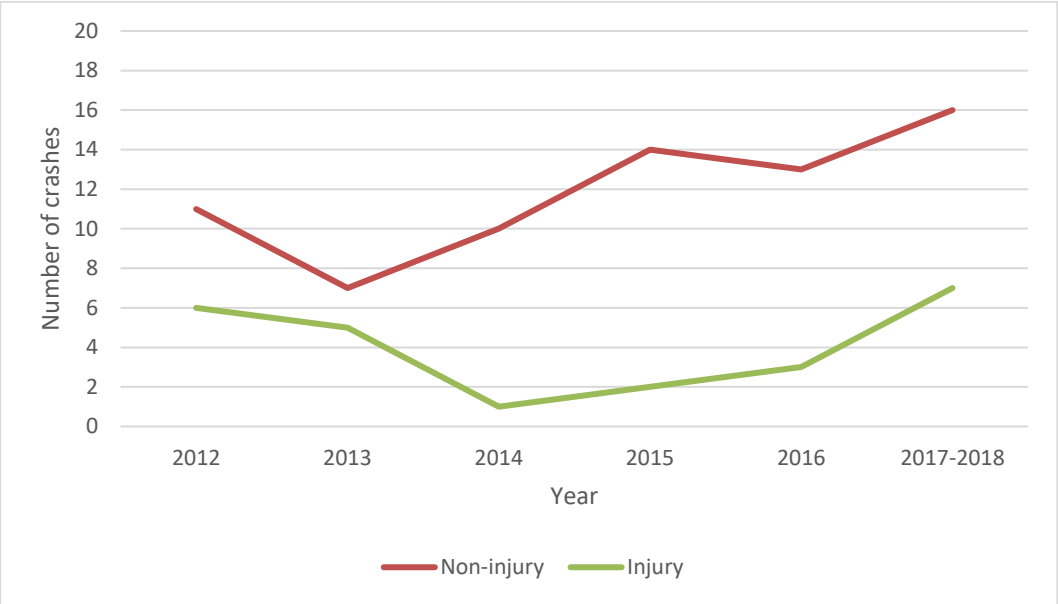


Figure 1.25: Crash trends on Pahīatua Track

98. During the period in which there were no long-term closures of the Manawatū Gorge (2013-2016), there were a total 12 injury crashes and 40 non-injury crashes across all three east / west connections (annual average of 3 injury crashes and 10 non-injury crashes respectively). This is significantly less that the numbers displayed in Figures 1.21 and 1.23 combined during periods in which SH3 Manawatū Gorge has been closured, confirming that safety has been compromised by the volumes using both Pahīatua Track and Saddle Roads.

Current and future transport demands

Current transport demand

99. Prior to its closure, the Manawatū Gorge route carried approximately 7,620 vehicles per day, with HCV making up 11.3% of the traffic. Following the Manawatū Gorge closure, 80% of its total traffic shifted to Saddle Road, while

the rest rerouted along the Pahīatua Track. Consequently, the daily traffic volumes on Saddle Road and the Pahīatua Track have significantly increased from approximately 150 to 6,220 and from approximately 2,214 to 3,819 vehicles respectively.[20]

100. The Pahīatua Track is the preferred alternative route for commuters travelling between Palmerston North, Pahīatua and areas further south. However, in the absence of the Manawatū Gorge connection, Saddle Road bears the vast majority of traffic travelling between Ashhurst, Hawke's Bay and Woodville due its shorter distance and travel time.

101. The 2017 hourly flow on Saddle Road (post-Manawatū Gorge closure) has been obtained from MetroCount.[21] This data has been used to generate a flow profile for the route, as shown in **Figure 1.26**, which also shows the traffic and directional composition of the daily flow.

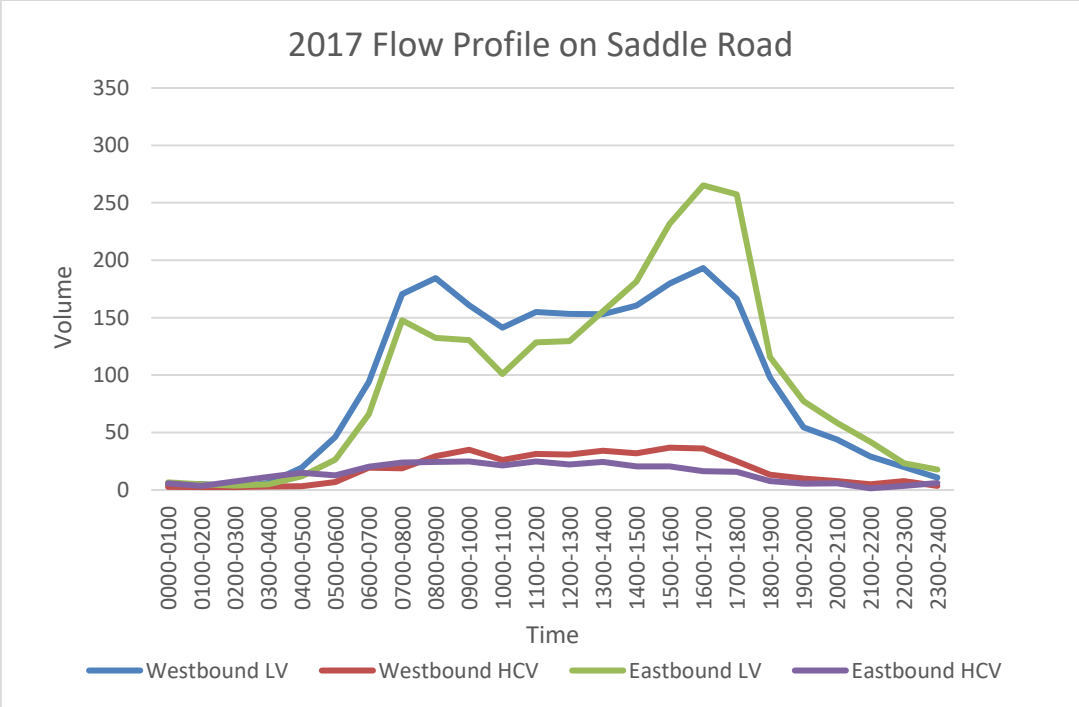


Figure 1.26: 2017 Flow Profile on Saddle Road

102. The flow profile shows that the morning peak flow of 370 vehicles per hour ("**vph**") generally occurs between 8.00-9:00, where the afternoon peak flow of 510vph occurs between 16:00-17:00. The peak directional flow split in the morning peak is approximately 55% westbound and 45% eastbound, and vice versa for the afternoon peak.

[20] Manawatu Gorge Alternative Detailed Business Case, NZ Transport Agency, 2018.
[21] Metrocount Data for July 2017 provided by the Palmerston North City Council to WSP Opus on 7 August 2018.

103. As discussed above, Saddle Road currently forms part of the Intercity bus routes between Napier, Wellington, Gisborne, Palmerston North, Tauranga and Masterton. Several school buses also travel between Dannevirke and Palmerston North daily via Saddle Road.

104. The main fire station and St Johns ambulance service are located in Palmerston North. These services rely on Saddle Road to provide connection to the adjacent eastern districts such as Tararua.

105. As mentioned above, the Pahīatua Track is currently part of the New Zealand Cycle Trail Touring Route, running between the western and eastern ends of the Manawatū Gorge. The closure of the Gorge and associated increased traffic levels on Pahīatua Track have resulted in The NZ Cycle Trail closing this link and advising users to utilise a shuttle as an alternative mode of travel over this link[22]. Saddle Road currently has very low utilisation by cyclists due to the traffic volume and terrain.

106. The Manawatū Gorge walking track is the primary walking route between the western and eastern ends of the Gorge, and has remained open and accessible following the closure of the Gorge. The track is accessible from SH3 and carparks for recreational users are located at the western and eastern ends of the Gorge. Figures from 2016 indicate that the Manawatū Gorge recreational area has over 100,000 visitors annually, with walking track numbers increasing by 350 percent since 2012.[23]

Future transport demand

107. In the do-minimum scenario, the above flow profile on Saddle Road is expected to remain through to the future years. **Figure 1.27** shows the predicted 2022[24] flow profile (volume and time of day) on Saddle Road, based on a medium growth scenario as discussed in the Traffic Assumption Memo (**Appendix 1.A**). The 2022 peak hour flows in the AM and PM peak on Saddle Road (mid-point) are predicted to increase to 430vph and 600vph respectively.

[22] https://www.nzcycletrail.com/trails/tararua-traverse/.
[23] http://www.teapiti.com/updates/2017/11/2/additional-facilities-enhance-te-apiti-manawatu-gorge-visitor-experience.
[24] The year 2022 has been considered as a fair representative of a short-medium future scenario, as well as estimated to be the mid-point of the Project construction period.

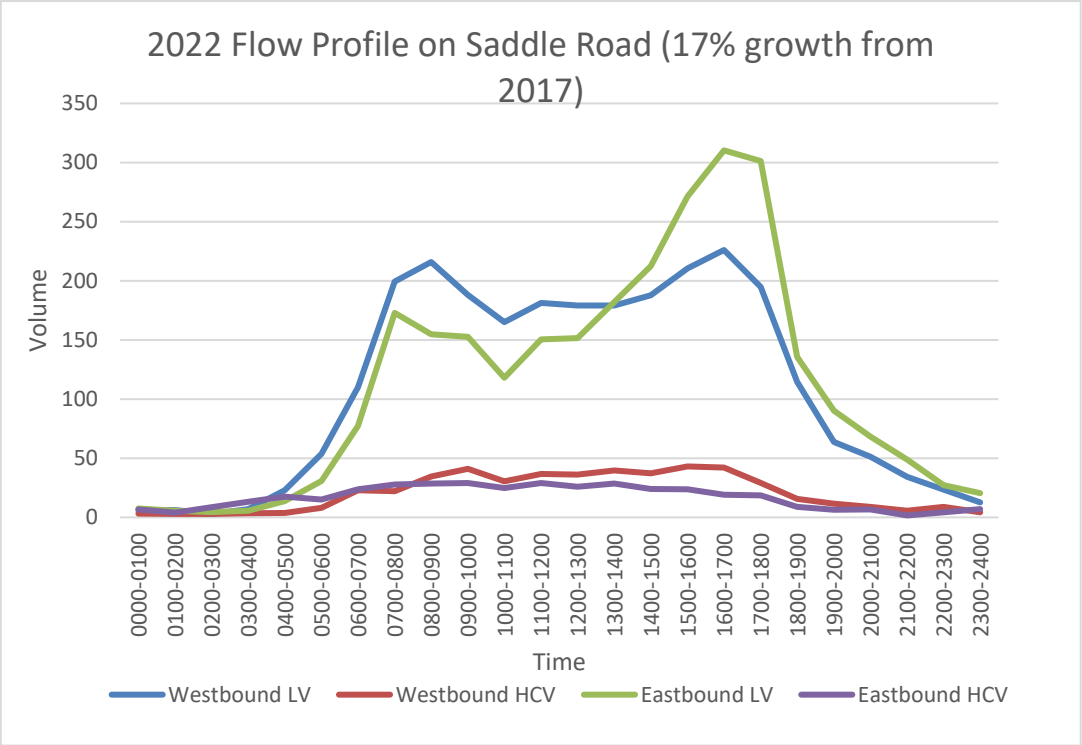


Figure 1.27: 2022 Flow Profile on Saddle Road

108. As discussed above, given the main features of Saddle Road, at this level of peak flow condition the performance of the link will continue to be placed under strain, both in terms of operational efficiency and road safety. Though minor upgrades to Saddle Road form part of the do-minimum scenario, this will not bring the road up to a State highway standard and therefore it is anticipated to provide a progressively lower level of service in the future years.

109. Buses and emergency services will continue to travel on Saddle Road in the do-minimum scenario. There is no available information on the future demand of these services, however, given the low growth rate forecast for the adjacent districts, no significant demand increase is expected.

110. It is expected that cyclists will continue using the Pahīatua Track as the primary east / west route, particularly as the level of traffic on Saddle Road grows further in the future. However, as noted in paragraph 103 earlier, the "*Tararua Traverse Heartland Ride on the Pahīatua Track is temporarily closed because of dangerous traffic conditions*".[25]

111. An increase is also expected in the recreational use of the Manawatū Gorge walking track, as well as the need for parking space.

[25] https://www.nzcycletrail.com/trail-updates/2018/tararua-traverse-section-closure/.

ASSESSMENT METHODOLOGY

112. The following assessment methodology has been used to assess the operational transportation effects of the Project:

    (a) Safety effects have been assessed by comparing actual and predicted crash risks to determine the relative safety risk and effects of the Project.

    (b) Traffic effects have been assessed by considering the future link/intersection performance and combining that with travel time savings to determine the traffic effects associated with the Project.

    (c) Public transport effects have been assessed by considering the potential benefits or dis-benefits to public transport users associated with the Project.

    (d) Effects on vulnerable users (pedestrians and cyclists) have been assessed by considering the provision of facilities and outcomes proposed by the Project compared to the do-minimum scenario.

    (e) Access effects have been assessed by considering the impact of the proposed alignment on the properties surrounding the Project.

113. The following assessment methodology has been used to assess the construction transportation effects of the Project:

    (a) Construction traffic demands have been estimated based on an assumed construction methodology (other methodologies are also available which could adjust the traffic volumes).[26]

    (b) Safety effects have been assessed by considering the number and location of construction vehicle movements associated with constructing the proposed Project and the associated safety.

    (c) Traffic effects have been assessed by considering the number and location of construction vehicle movements associated with constructing the proposed Project and the associated travel times.

    (d) Parking effects have been assessed by considering the potential disruption of the Manawatū Gorge parking facility by construction activity.

[26] Manawatu Gorge Replacement Project, Construction Traffic Estimate, Higho Consultants, August 2018 (attached to this assessment as part of **Appendix 1.D)**.

(e) Vulnerable user effects have been assessed by considering the movement of construction vehicles in areas where active users activities occur.

PROJECT SHAPING

114. The DBC and the AEE report outline the problems that have been identified with the existing east/west connection, the investment/Project objectives, and the process followed in order to devise the Project.

115. As described in those documents, wide-ranging processes have been undertaken by the NZ Transport Agency to gather information to inform its choice of route for the Project. Those processes included multi-criteria analyses of a long list and short list of options. I was not directly involved in providing transportation-related inputs to those processes, which was a task overseen by specialists at GHD Limited. I was, however, involved in the review of various components of this process, including the Road Safety Audit and Project Economic Assessment of the preferred option.

Designation shaping

116. Although I have not been involved directly in the option assessment for alternative routes and the associated analysis, I have been involved in the processes through which the preferred option has been developed into what is now proposed as a designation corridor. That has involved considering alternatives for the intersections at either end of the Project, and other constraints to ensure good safety and accessibility outcomes for pedestrians, cyclists and vehicles. This process involved:

(a) review of the proposed DBC design;

(b) identification of transport demands and desired outcomes;

(c) development of assessment tools such as Excel Spreadsheets and SIDRA[27] traffic models;

(d) traffic effects being assessed by considering the future link/intersection performance combined with travel time savings to determine the traffic effects associated with the Project;

(e) assessment of options and alternative solutions relating specifically to intersections and safety (road and active travel); and

[27] Intersection Modelling and Assessment Tool.

(f) safety effects being assessed by comparing actual and predicted crash risksto determine the relative safety risk and effects of the Project.

117. In the development of the AEE and the associated Transport Assessment, I have been involved in a number of critical workshops and meetings, including:

(a) initial Project team briefing and Project overview;

(b) design workshop with the technical assessment and design teams;

(c) group and individual site visits;

(d) specialist safety meeting;

(e) stakeholder mitigation workshops (two of these have occurred) where I presented information regarding transport outcomes, effects, and effects management;

(f) Ashhurst improvements interface workshop;

(g) pre-lodgement workshop with the wider stakeholder group and specialists engaged by the local councils;

(h) a transport specific meeting with Harriet Fraser (transport specialist engaged by the councils for the application process) to provide background information relating to the TIA and respond to specific questions raised by Harriet, and

(i) ongoing interaction and communication with the teams involved in the Project design, indicative construction methodology, social impact assessment, and noise assessment.

118. The consideration of alternatives in relation to transport has resulted in refinement of the designation alignment, while also allowing flexibility as the Project design develops and evolves into construction outcomes. Specific areas of focus include the intersections at either end of the Project, and the carpark and Gorge access at the western end.

ASSESSMENT OF OPERATIONAL TRANSPORTATION EFFECTS

119. The following sub-sections outline the assessment of transportation effects with regard to the operational outcomes of the Project. Refer to **Appendix 1.A**, the Traffic Assumptions Memo, for a detailed list of assumptions and methodology relevant to the assessment of traffic effects.

Traffic effects

120. The assessment of traffic effects has been undertaken considering the efficiency Project objective, which is to *"reconnect the currently closed Manawatū Gorge State Highway 3 with a more efficient connection than the Saddle Road and Pahīatua Track"*.

Traffic demands and distribution

121. The introduction of the new Project route will have a significant effect on the traffic demands and distribution within the surrounding areas. It is expected that traffic that previously used the SH3 Manawatū Gorge route will transfer to the new route, which as a result will alleviate traffic demand on the existing travel routes between Ashhurst and Woodville (i.e. Saddle Road and the Pahīatua Track) and the surrounding local roads at both ends. This will return the use of the two existing routes (and associated linkages) back to their original functions as arterial and primary collector routes, respectively.

122. Refer to the trip distribution summary table in **Appendix 1.B** for the summary of the predicted traffic demand between the routes under the do-minimum and Project scenarios.

123. The key traffic demand reductions will be on Saddle Road, primarily between Salisbury Street and Woodlands Road, and the Pahīatua Track between SH57 and Balance Valley Road. In 2041, the Project will result in a demand reduction of up to 97% on Saddle Road and up to 43% on the Pahīatua Track.

124. The Project will also alleviate the demand on key local roads in Ashhurst (notably Cambridge Avenue, and Salisbury Street) and Woodville (notably Woodlands Road and Oxford Road). The corresponding significant increase in traffic demand on the SH3 section around Ashhurst (particularly between Cambridge Avenue and SH57) and Woodville (between Woodlands Road and SH2) will be well-catered for by the new route. The growth in traffic through Woodville will be consistent with growth that would have occurred prior to the Manawatū Gorge closure.

Link performance

125. The link performance of the proposed Project has been evaluated using the HCM 2010 Multilane Highway Chapter 1428 method for assessing LOS

[28] Highway Capacity Manual 2010 Chapter 14 Multilane Highways, Transportation Research Board of the National Academies, December 2010.

based on the base speed and estimated flow rate (Exhibit 14-5, Equations 14-3 and 14-4).

126. The predicted daily traffic that will be travelling on the Project route in 2041 is 14,000 vehicles.[29] The peak hour flow, based on the current flow profile of Saddle Road, is up to 10% of the average daily flow, and therefore, an upper limit estimate of a one-way peak flow on the Project route in 2041 is 770 vehicle/hour. Considering the high proportion of HCV, the terrain, and the typical peak hour factor, and given there are crawler lanes in addition to the single lane in each direction, the predicted typical flow rate in 2041 is 450 vehicle/hour/lane. According to the LOS Curve in HCM 2010 Chapter 14 Exhibit 14-5, assuming that the base speed on the new route is 80km/h, this flow rate is equivalent to a LOS A, which would be expected for a road of this standard.

127. It is noted that the basis for providing a crawler lane in each direction on the new route is primarily to accommodate the slower travel speed of HCV, given the gradients of the terrain, as well as to allow the provision of a median barrier along the corridor.

128. The new route will offer a higher level of efficiency for emergency service vehicles travelling between Palmerston North and Tararua District.

Intersection performance

129. Five intersections have been identified and assessed to understand their future performance with and without the Project. Refer to **Figure 1.28** and **Figure 1.29** below for the locations of assessed intersections on the western and eastern sides of the Project.

[29] Refer to Appendix A – Te Ahu a Turanga: Traffic Assumptions Memo, WSP Opus, August 2018.

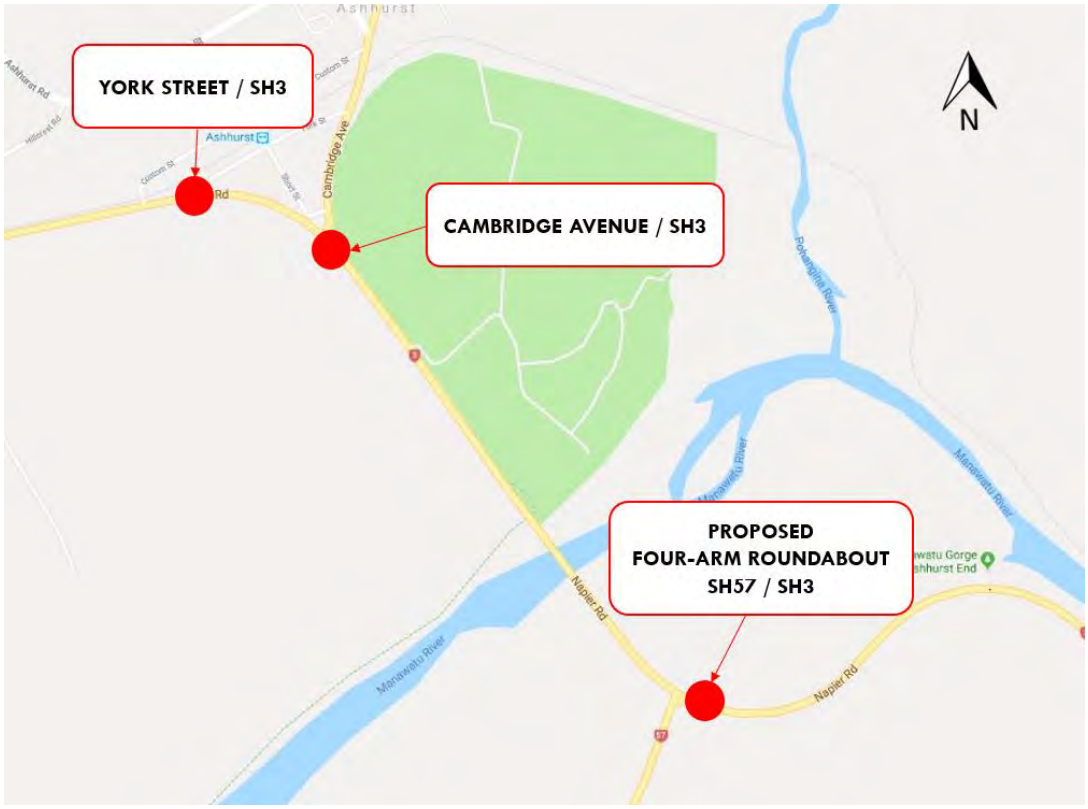


Figure 1.28: Assessed Intersections - Western End (Ashhurst)

Figure 1.29: Assessed Intersections - Eastern End (Woodville)

130. At the western end of the Project, the intersections that connect Ashhurst to SH3 (York Street and Cambridge Avenue) have been assessed. In the current and future do-minimum situation, the majority of traffic uses the York Street intersection (predominantly traffic to/from Palmerston North heading to/from Ashhurst itself and to the east (e.g. Saddle Road)). The Cambridge Avenue intersection has lower traffic demands associated with flows to/from SH57. The NZ Transport Agency is currently looking at options for both of these links prior to construction of the Project.

131. If the current network configuration was retained in Ashhurst, the future performance of the SH3/York Street intersection is expected to be unacceptable both with and without the Project. The SH3/Cambridge Avenue intersection is expected to perform at an acceptable level without the Project, but will perform unacceptably with the Project. Intersection improvements, either carried out at both locations or focused solely around Cambridge Avenue intersection, have been assessed and are able to be accommodated within the existing road reserve to provide an acceptable level of performance. Improvements could take the form of signals or roundabouts at both York Street and Cambridge Avenue, or concentrate all demands into a single set of signals or roundabout at the Cambridge Avenue/SH3 intersection. As the trip distribution analysis shows that the Project will result in a reduction in traffic demand on Cambridge Avenue, it is noted that the need for these improvements arises from the predicted traffic growth around and travel demand to/from Ashhurst (and associated areas such as Feilding), as opposed to being the outcome of the Project. The NZ Transport Agency are currently investigating options for these intersections and traffic flows to and from Ashhurst.

132. The Project proposes to construct a four-arm roundabout at the intersection with SH57. This roundabout has been assessed and has sufficient capacity to cater for the future traffic demands expected with the Project. It will also provide safe access to and from the Manawatū Gorge entrance and parking area.

133. The Project proposes to construct a five-arm roundabout at the intersection with Woodlands Road. This roundabout has been assessed and has sufficient capacity to cater for the future traffic demands expected with the Project, while also improving access and safety for those using Napier Road, Woodlands Road and Troup Road.

134. East of the Project, the current intersection between SH2 and SH3 in Woodville has been assessed. The future performance of this intersection is expected to be unacceptable both with and without the Project. As a result, it will be important for the NZ Transport Agency to ensure the intersection performs safely and efficiently in the future, and this will need to form part of a future State highway improvement programme.

Travel times

135. The introduction of the new route will see a significant reduction in travel times for key trips between SH3 West, Ashhurst, Palmerston North, SH57 South, SH2 North and South, and Woodville. Refer to the travel time summary in **Appendix 1.C** for the improvements between the current and the proposed travel time for the key trips around the Project area.

136. The typical time saving for travel between Palmerston North and Woodville is predicted to be 10.8 minutes. This extent of saving is considered significant, as it essentially reduces the current travel time by nearly half. Travel between Aokautere (SH57 South) to SH2 north of Woodville will see the maximum time saving of up to 24 minutes, if compared to the current travel via Pahīatua Track and Mangahao Road.

137. Travel time savings for HCV travel between Palmerston North and Woodville is predicted to be 10.6 minutes. While HCV travel time savings between Aokautere (SH57 South) to SH2 north of Woodville will see a greater predicted saving, of up to 27.7 minutes, if compared to the current travel via Pahīatua Track and Mangahao Road.

138. Reliability in travel time will also improve significantly, with capacity to ensure there is little or no difference between travel times in peak or off-peak periods.

139. Overall, the significant travel time savings are primarily a result of the improvements in alignment and access efficiency attributed to the Project. The provision of dual carriageway in areas with steeper grade will reduce the delay imposed by slower HCV on the travel time for general traffic.

140. The new route will offer a higher level of efficiency for emergency service vehicles and buses travelling between Palmerston North and Tararua District.

141. Overall the traffic effects are **Significant Positive**.

Resilience effects

142. The assessment of the resilience effects has been undertaken considering the resilience Project objective, which is to *"reconnect the currently closed Manawatū Gorge State Highway 3 connection with a more resilient connection than the Saddle Road and Pahīatua Track."*

143. The Project will provide a high-quality alternative route to the existing non-state highway routes (i.e. Saddle Road and the Pahīatua Track), that customers are currently required to use since the closure of SH3 through Manawatū Gorge.

144. The Project route is a more reliable link, designed to a high standard, and is more resilient to incidents, minimising the risk of road closure and extent of disruptions. This includes meeting the standard for pavement design, which allows the Project route to carry large volumes of HCVs with significantly reduced maintenance activities, compared to the ongoing pavement maintenance required on the existing routes. Most notably, the Project's compliance with the higher seismic design standards for State Highways, compared to that of local roads, means that the new route will be much more resilient to seismic activities.

145. The inclusion of shoulders and crawler lanes for HCVs provides additional resilience, both in terms of incidents (crashes) and natural disasters (e.g. slip/earthquake damage etc.), where traffic can be diverted into the other lane/shoulder or even into a contraflow[30] using the other direction over longer periods.

146. The existing Saddle Road and Pahīatua Track will remain available as alternative routes, in the event that the new route is closed. Altogether, this significantly increases the resilience for the overall road network.

147. Moreover, in the case of emergency that causes a complete blockage along the Project route (for example, in the event of a major slip), there will be opportunities to utilise local roads and Meridian access roads with links to the project for emergency/evacuation access. There are also a number of locations in which the Project designation borders the Saddle Road which could allow for emergency access between the Project and Saddle Road. A number of construction access points could be considered for an upgrade

[30] Running 2-way traffic within the same side of the carriageway using traffic management (e.g. dropping the wire rope barrier / cones etc).

during detail design, if deemed necessary, to be utilised as emergency access.

148. There may be times when wind/snow/ice may cause issues and necessitate partial or full closure of the route. This is a common issue to many passes in New Zealand and can be managed through the use of weather stations and a Variable Messaging System (VMS) as a mean for alerting road users of closures or other forms of Intelligent Traffic System (ITS).

149. Overall the resilience effects are **Significant Positive.**

Safety effects

150. The assessment of the safety effects has been undertaken in consideration of the safety Project objective, which is to *"reconnect the currently closed Manawatū Gorge State Highway 3 connection with a safer connection than the Saddle Road and Pahīatua Track."*

Existing routes

151. As reported in the do-minimum section, it is apparent that there has been an increase in crash risk on Saddle Road and Pahīatua Track, which is primarily associated with the sharp increase in traffic volume travelling through both routes not designed for these traffic volumes following the Manawatū Gorge closure. Traffic demand on these routes is expected to reduce significantly following the opening of the Project. It is anticipated that the crash risks on these routes will then revert to the levels prior to the Manawatū Gorge closure, and indeed safety will improve due to the ongoing upgrades that are occurring.

Proposed route

152. The Project will be constructed to modern highway standards and will have an improved crash performance compared to the existing routes. The key features of the new route include the provision of wider sealed shoulders, a higher number of lanes and passing opportunities, median and edge barriers, and improved design speed and sight distances.

153. An indicative assessment of the proposed route has been undertaken using the KiwiRAP tool, guided by the NZ Transport Agency KiwiRAP Summary Report.[31] This assessment indicates that the proposed Project should achieve a KiwiRAP star rating between 4.1 – 4.5. This compares very favourably to the current 2 and 3-Star rating for the majority of the existing

[31] KiwiRAP Summary Report Final V3, NZ Transport Agency, May 2011.

network, as discussed in the do-minimum section. Therefore, the likely future crash risk along the new route is assessed to be significantly lower than the current crash risks on the network, particularly on Saddle Road and the Pahīatua Track.

154. The increase in traffic volume may impact the crash risk on the western and eastern approaches to the Project. As discussed previously, historically on SH3 between Cambridge Ave and SH57, and between Woodlands Road to SH2 there have been a number of intersection-type and loss of control crashes. The conversion of the SH3/SH57 and SH3/Woodlands Rd intersections to roundabouts as part of the Project will improve the overall safety at the intersections. This is because there will be reduction in crossing conflict points and approach speeds at the roundabouts. According to the High Risk Rural Roads Guide, upgrading a rural sign-controlled intersection to a roundabout should reduce injury crashes by up to 82%.[32] These roundabouts will also act as a threshold treatment for traffic entering existing sections of State highway in Ashhurst and Woodville that have a lower design standard. This will help to reduce the risk of 'crash migration' to areas outside of the Project due to a potential slower operating speed and therefore reduction in loss-of-control crash risk.

155. The increase in traffic demand on the section of SH3 between Woodlands Road to SH2 may have an impact on safety for all road users within the Woodville central area. However, I understand there was a strong community desire for traffic to remain through Woodville and the installation of the proposed roundabout will reduce access conflicts and vehicle speeds through this area, improving the existing situation.

156. Without the Project, the local roads within Ashhurst and Woodville will carry large traffic volumes on links that are not designed for such volumes, and therefore pose a much higher safety risks to road users.

157. Overall the safety effects are **Significant Positive**.

Public transport effects

158. The public transport effects associated with the Project are positive, as the proposed Project will provide a safer, more resilient, more reliable, and faster route. This could attract more users towards public transport in the area and, subject to sufficient demand, potentially lead to new public transport routes and services being introduced.

[32] High-risk Rural Roads Guide, NZ Transport Agency, September 2011.

159. Overall the public transport effects are **Minor Positive**, with the potential for much greater benefit should new services be provided in the future.

Vulnerable user effects

160. Vulnerable user effects can be split into two types of effects:

    (a) Positive effects associated with new facilities on the proposed road; and

    (b) Effects associated with changes in traffic distribution on other routes which enhance or degrade the provision and safety of vulnerable user trips.

161. The new road will provide (as a minimum) 2.0m-wide shoulders[33] on both sides of the road along its entire length, which is a significant enhancement on either of the existing east-west routes. The route will be relatively long and steep, but is expected to attract recreational road cyclists and touring cyclists.

162. For most of the Project route, there will be a crawler lane in each direction to provide a consistent 4-lane corridor without multiple merge and diverge points. There is limited guidance in this area, however according to Austroads Guide to Road Design[34], assuming that the maximum speed of vehicles using the outside crawler lanes is 60km/h, then the minimum width needed for cyclists (comprising of an exclusive bicycle lane width and lateral clearance to the outside of traffic lane) is 2.2m. Therefore, given that the Pahīatua Track and Saddle Road will offer good cycling facilities between Palmerston North/Ashhurst and Woodville, the cyclist numbers using the route are predicted to be low and an exclusive cycle lane is not proposed, the available width of a 2.0m-wide shoulder (as a minimum) is considered sufficient for the Project route, and a significant improvement on the existing situation.

163. The changes in traffic distribution, as detailed in **Appendix 1.B**, result in significant reductions in traffic on most key local road links. These reductions in traffic will make walking/running and cycling along these roads safer and more enjoyable. It is also envisaged that the NZ Cycle Trail, which is routed via Pahīatua Track, will be re-instated (as it is currently closed due to traffic safety concerns, as a result of increased traffic following the closure of the Gorge).

[33] Te Ahu a Turanga: Project Description (Draft), NZ Transport Agency, August 2018.
[34] Part 3 Figure 4.28 and Table 4.18.

164. It should be noted that overall, the new road does not preclude cycle use and is not intended to substitute the main cycle route between the west end and east end of the project, as discussed above, which will be provided via the well-established Pahīatua Track. This is consistent with the road hierarchy principles, where generally active users are to use an available alternative route that is safer, more convenient, and parallel to the Project route with similar distance.

165. There will be a significant increase in traffic on the existing SH3 bridge over the Manawatū River east of Ashhurst. The recently completed business case[35] estimated a potential moderate demand for improved pedestrian/cycling facilities on the bridge (pre-closure of the Manawatū Gorge). The walking and cycling demand on the bridge following the closure of the Gorge has been surveyed over a period of 1 week, in September 2018.[36] As discussed previously, the walking and cycling demand is already restricted, despite the reduced traffic demand on the bridge. It is noted that the survey was undertaken in a spring month, where numbers may be lower than the annual average and may not be an accurate representation of the actual use of the Bridge.

166. While warning signage has been installed to increase safety for cyclists, the additional traffic demands arising from the Project have the potential to have an effect on the safety of cyclists currently using the bridge (and any pedestrians, especially given that the bridge currently provides no walking facility), and may discourage users to the Gorge recreation and cultural area.

167. The Project will provide a linkage for active modes between the SH57 intersection to the western Gorge entrance which will be away from the State highway, providing improvement for vulnerable users.

168. Overall the vulnerable user effects are **Neutral.**

Parking effects

169. The main access to and from the Manawatū Gorge walking track is currently via the western end, where there is a car park and information area. This area is the location in which the proposed new bridge abutment will be located on the south side of the river. This will result in the relocation this parking area, which is currently still well-used despite the Gorge closure.

[35] Manawatu Gorge Alternative Detailed Business Case, NZ Transport Agency, May 2018.
[36] Refer to the Walking and Cycling section of this report for details of the Pedestrians and Cyclist Survey carried out by WSP Opus between 14 September to 20 September 2018.

Conversely, the Project provides the opportunity to enhance access to this parking area and create a dedicated facility for Gorge access.

170. Overall the parking effects are **Neutral.**

Access effects

171. The main access effects are associated with properties that that are severed by the proposed Project designation. The following figures identify the scope of the access effects.[37] The overall principle applied has been to limit direct access to and from the new road in order to improve safety. Where access has been removed, alternative access arrangements have been identified, and property may be purchased or an agreement established to ensure an alternative access is provided (e.g. right of way).

[37] Source: Preliminary Drawing No: 51-38113-C-951 to 959 from Te Ahu a Turanga Indicative Construction Access/Areas, NZ Transport Agency/GHD, July 2018.

Figure 1.30 (shows the properties affected at the western end of the proposed alignment.

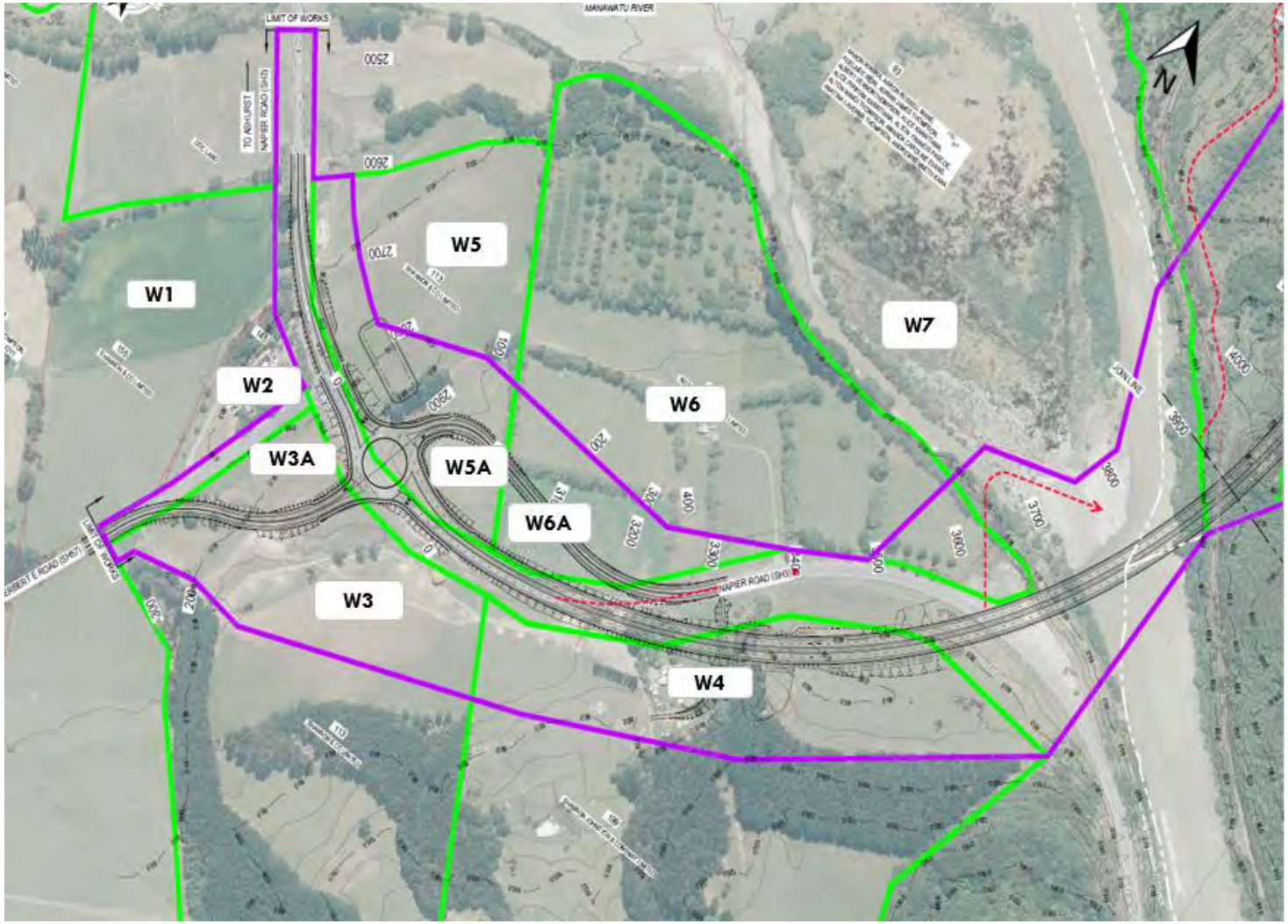


Figure 1.30: Properties at western end of proposed alignment

172. The following Table 1-6 contains information on the existing access for each adjacent property and the impact of the proposed designation on that access, as understood at the time this transport assessment is undertaken.

Property	Existing Access	Impact of Proposed Designation
W1	Existing access off SH57	No change other than formed entrance to required standard off SH57 where it is realigned as it approaches proposed roundabout.
W2	Existing access off SH57 (primarily used)	No change other than formed entrance to required standard off SH57 where it is realigned as it approaches proposed roundabout.
W2	Entrance off SH3	It is proposed that the entrance is closed as it is within the merging area east of the proposed roundabout.
W3	Existing access off SH57	No change other than formed entrance to required standard off SH57 where it is realigned as it approaches proposed roundabout.
W3	Entrance off SH3 adjacent to stock yards	Intention is to close this entrance as it is within the dual carriageway length and very close to the likely roundabout location.
W3A	Severed parcel within designation	No access currently required – subject to property disposal strategy.
W4	Access off old SH3. Severed without further works	Proposed access off old SH3 via roundabout. New overpass (SH over) to be constructed off old SH3. Design vehicle (height) to be agreed with landowner. Larger vehicles would require access via property W3, or via rural entrance off area by gorge carpark.
W5	Existing off SH3	Replacement of access off old SH3.
W5A	Severed parcel within designation	No access currently required– subject to property disposal strategy.
W6	Existing off SH3	Existing access off old SH3 to remain.
W6A	Severed parcel within designation	No access currently required – subject to property disposal strategy.
W7	Existing from SH3	Proposed access off old SH3 via roundabout.

Table 1-6: Impact to properties through the western section of the Project

173. **Figure 1.31:** shows the properties affected through the middle section of the proposed alignment.

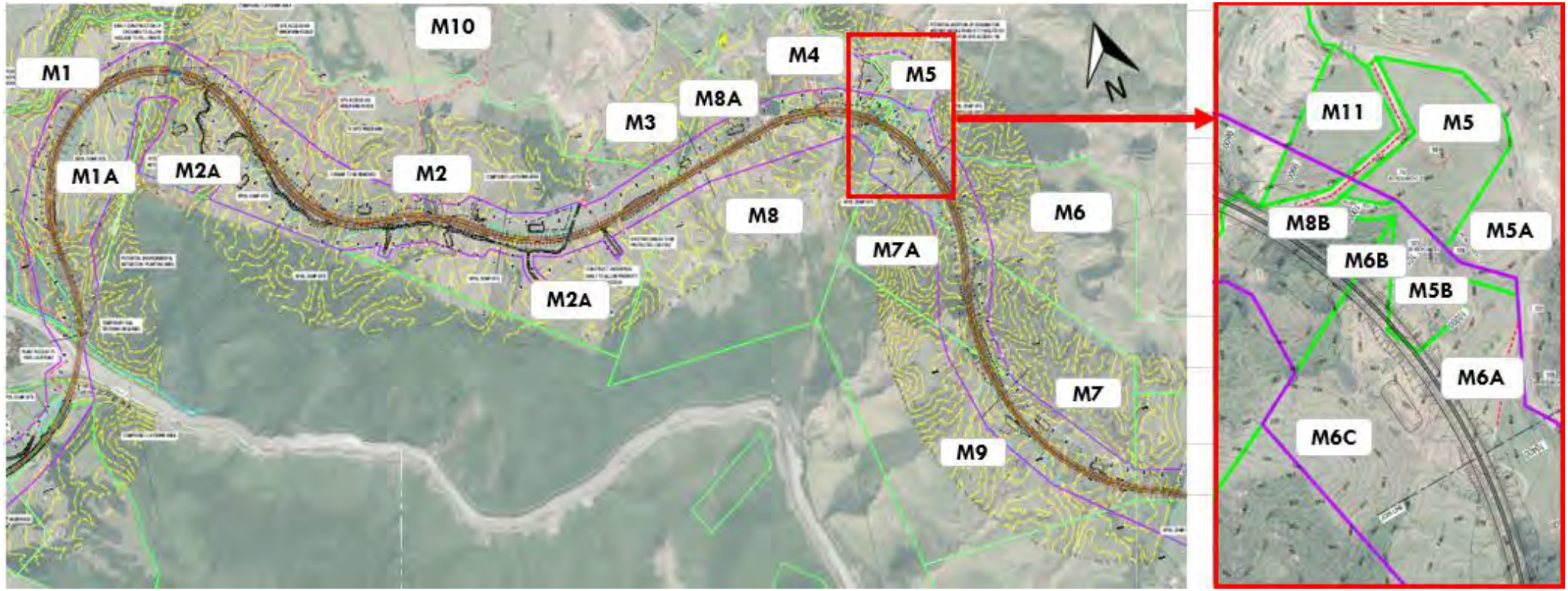


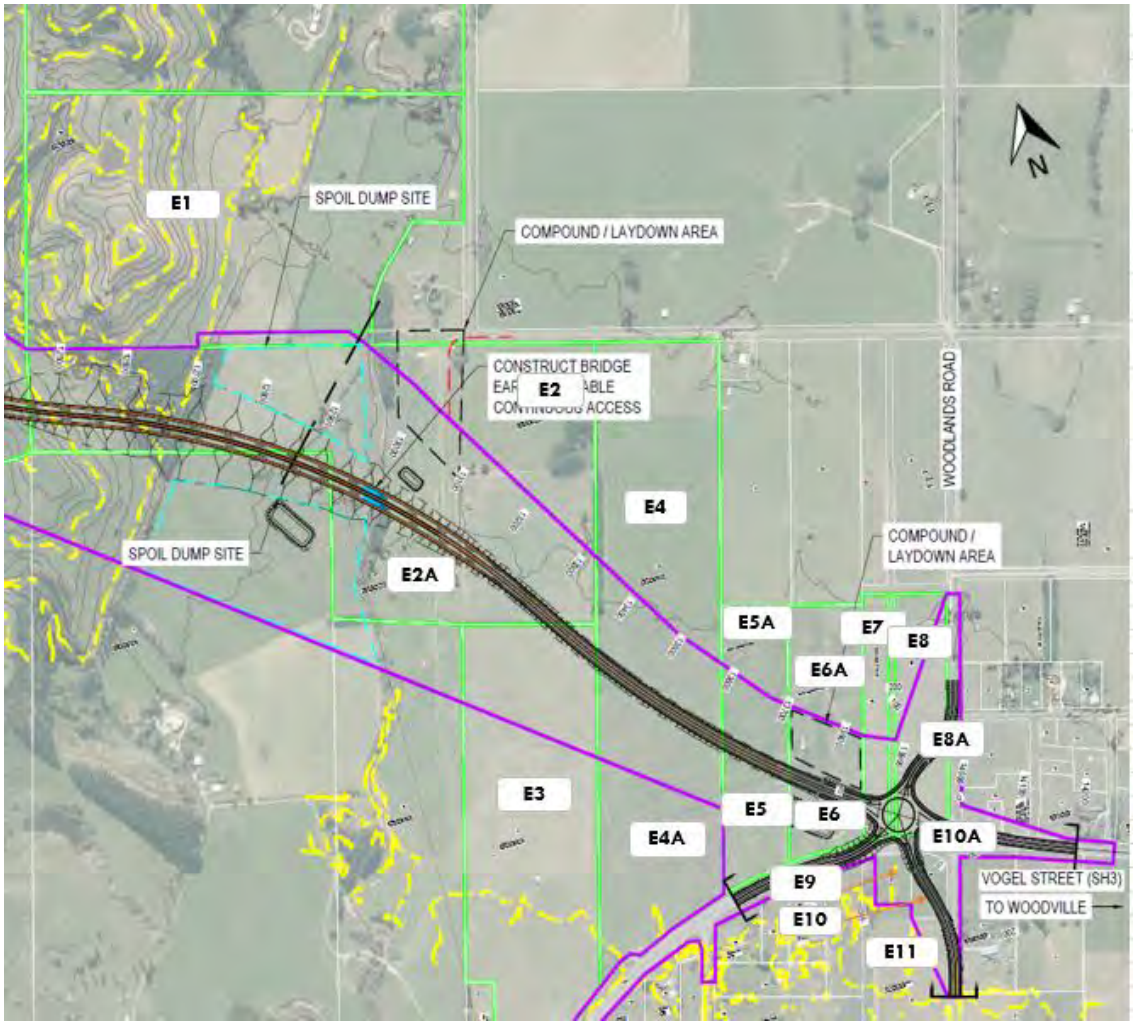
Figure 1.31: Properties through middle section of proposed alignment

174. The following Table 1-7 contains information on the existing access for each adjacent property and the impact of the proposed designation on that access, as understood at the time this transport assessment is undertaken.

Property	Existing Access	Impact of Proposed Designation
M1	Existing access off Saddle Road	No change.
M1A	Severed parcel	Used as disposal site. No access is planned, however the Transport Agency will investigate as part of disposal strategy, noting that may be used for ecological mitigation planting.
M2	Existing access off Saddle Road via Cook road plus easement (right of way) over M10 (need to confirm legal status)	No change
M2A	Existing access off Saddle Road via Cook road plus easement over M10 (need to confirm legal status)	Primary access to be off Saddle Road and M2 via overpass adjacent to Cooks Road. Height of underpass to be agreed with property owner/easement holder. Over-dimension/Large vehicle access provided by left in/left out access of SH. Note: Primary and routine access of Saddle road. Non-routine off SH.
M3	Existing access of Cook Road	No change.
M4	Existing access off Saddle Road Access also off Morgan Road via M8 (Need to confirm legal status) Morgan Road may be part of M8 title)	Access off Saddle Road retained.
M5	Existing access off Saddle Road	No change.
M5A	Existing access off Saddle Road	No change.
M5B	Existing access off Saddle Road and Morgan Road	No change.
M6A	Existing access off Saddle Road and off Ag Research internal track which extends east as far as Hope Road	Access of Saddle Road retained. Internal access track potentially severed. Opportunity exists to potentially reconnect through accommodation works.
M6B	Currently access from adjacent rural/pasture areas from M5B and M6C	Severed parcel within designation. Land purchase/disposal discussion required.

M6C	Existing access off Saddle Road and off Ag Research internal track which extends east as far as Hope Road	Access will be provided via underpass from parcel M6A.
M7	Landlocked parcel	Land purchase/disposal discussion required.
M7A	Landlocked parcel	Land purchase/disposal discussion required
M8	Existing access off Saddle Road via Morgan Road and via Cook Road and internal road network within M2 and M4 (Don't know if these are legalised)	Access from Morgan Road and M4 severed. Internal road access from M2A retained, however not legalised.
M8A	Existing access off Saddle Road via Morgan Road and via Cook Road and internal road network within M2 and M4 (Don't know if these are legalised)	Severed. Potential access via M4s internal access road to northern corner. Not legalised.
M9	Landlocked parcel however farmed as unit by owner with access from adjacent titles	No change. No access proposed from SH.
M10	Access off Saddle Road	No change.
M11	Access off Saddle Road at intersection with Morgan Road	No change.

Table 1-7 : Impact to properties through the middle section of the Project

175. 

176. Figure 1.32 shows the properties affected at the eastern end of the proposed alignment.

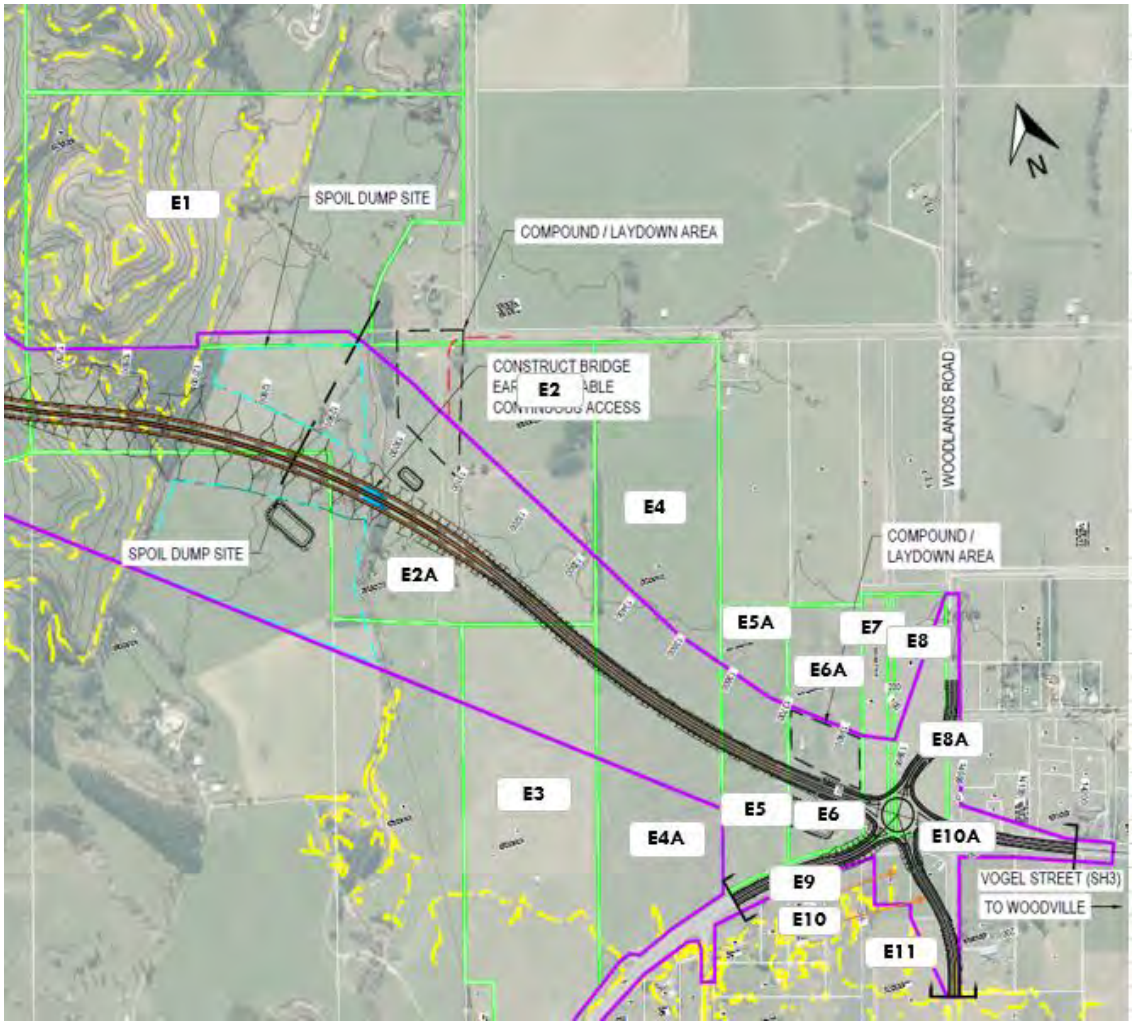


Figure 1.32 : Properties at eastern end of proposed alignment

177. The following Table 1-8 contains information on the existing access for each adjacent property and the impact of the proposed designation on that access, as understood at the time this transport assessment is undertaken.

Property	Existing Access	Impact of Proposed Designation
E1	Existing access off Hope Road Design development no longer requires land form E1	No change.
E2	Existing access off Hope Road	No change. Potential to maintain access between E2 and E2A under bridge that crosses stream providing access for farming activities either side of highway.
E3	Existing access off Napier Road SH3.	No change.
E4	Existing access off Hope Road.	Property split. Northern operation will retain access off Hope Road.
E4A	Property split	Access proposed via Napier Road (old SH3)
E5	Existing access of Napier Road SH3	No change.
E5A	Severed parcel	New access from Woodlands Road to be provided. Land purchase/disposal discussion required.
E6	Existing access of Napier Road SH3 via E5. No formed access to E6 frontage.	Property split. Northern section severed. Southern section (within designation) access off Napier Road SH3.
E6A	Severed parcel	New access from Woodlands Road to be provided. Land purchase/disposal discussion required.
E7	Current access via paper road not fenced. Farmed with E8.	No change. Access of new SH3 frontage will not be possible if roundabout is located as per NoR base option.
E8	Existing access from Woodlands Road	No change.
E8A	Existing access from Woodlands Road	Likely severed parcel within designation, no current access requirements, although could retain access. Land purchase/disposal discussion.
E9	Frontage on Napier Road SH3, but no formed access.	Currently fenced and farmed as single paddock with E10, with access to E10 being from Troup Road Access not possible from new SH corridor.

E10	Access from Troup Road. Frontage on SH3 Napier Road, but no formed access.	Likely severed parcel within designation. Currently fenced and farmed as single paddock with E9, with access being from Troup Road Access not possible from new SH corridor. Land purchase/disposal discussion
E10A	Existing access from Woodlands Road	Likely severed parcel within designation, no current access requirements, although could retain access via Woodlands Road. Land purchase/disposal discussion
E11	Existing access from Troup Road	New access from realigned Troup Road to be provided.

Table 1-8 : Impact to properties through the eastern section of the Project

178. It is noted that all severed properties will either be purchased by the NZ Transport Agency, have alternative access to the existing road network provided, or be subject to agreements to provide alternative access via existing links to Saddle Road or other local roads. Negotiation and further considerations will be undertaken during the detailed design stage of the Project.

179. Overall the access effects are largely **Neutral** due to the significant improvements to access that will be experienced on Saddle Road following completion of the Project.

ASSESSMENT OF CONSTRUCTION TRANSPORTATION EFFECTS

180. The following sub-sections outline the assessment of transportation effects with regard to construction of the Project. A suite of proposed mitigation measures corresponding to the adverse effects of construction traffic below is outlined in the subsequent section of the assessment.

181. Given the context of the critical nature of the Project (in my view), the faster the Project can be constructed, the faster the negative impacts of general and construction traffic in Ashhurst and on Saddle Road will be eliminated, and the faster the Project's transportation benefits can be realised.

Construction methodology

182. The indicative Project construction sections have been identified as the following: Bridge to Bridge, New Manawatū River/Gorge Bridge, Western Slope, Te Apiti Wind Farm and Ridge, Eastern Slope, and Woodville Gateway. Access to the construction sites will be primarily via Saddle Road. The indicative potential site accesses are included in **Appendix 1.D**.

183. The approach taken to assessing effects of construction traffic movements and suggested mitigation was to assess the proposed construction access locations for safety and efficiency, considering the typical construction traffic volumes given the scope of the Project.

184. Given the stage of the Project development, there is uncertainty regarding the construction duration and methodology. The assessment was undertaken with a reasonable degree of conservatism to consider the Project uncertainties identified earlier.

185. A detailed programme and methodology will be finalised in the CTMP. Construction traffic will need to be managed as appropriate to ensure that safety and efficiency of the affected roads and intersections are maintained.

Construction traffic demands

186. It is acknowledged that the construction traffic will have a high level of interaction with the general through traffic on Saddle Road, as well as the local roads leading to Saddle Road on the Ashhurst and Woodville sides. This translates to a significant increase in the overall traffic demand in these areas, particularly if the construction traffic movements occur during the general peak periods.

187. Construction traffic demands have been estimated based on an assumed construction methodology,[38] it is predicted that up to 224 construction vehicles per day (with 40% of these being HCV) would travel between Ashhurst and Saddle Road at one phase[39] during construction, before entering or exiting the site through various construction access points along Saddle Road. Up to 224 construction vehicles per day (50% being HCVs) would travel on the other end of Saddle Road/Woodlands Road, to/from Woodville.

188. **Figure 1.33** shows an indicative scenario of peak construction traffic demand on Saddle Road between the indicative construction access points, based on the construction traffic estimate and methodology referred to above.

[38] Manawatu Gorge Replacement Project, Construction Traffic Estimate, Higho Consultants, August 2018 (at **Appendix 1.D**).
[39] The busiest phase during construction being the Pavement Construction and Sealing phase according to the Construction Traffic Estimate provided. It has also been assumed that the pavement construction and sealing stage is undertaken simultaneously across all Project sections, for an indicative scenario with fair degree of conservatism.

Figure 1.33: Indicative construction demand on Saddle Road

189. There may be some impact to the operation of the railway line east of the Manawatū River during the construction of the new Manawatū River bridge, due to the access requirements of the construction traffic. It has been assumed that a temporary bridge could be constructed, however other access options may be achieved and agreed with KiwiRail once there is more certainty around the bridge and the construction methodology.

Safety effects

190. Construction traffic will primarily be travelling along and accessing the Project site off Saddle Road. Given the steep grade and curved alignment, there are potential safety issues around limited sight distances and insufficient space for larger construction vehicles to manoeuvre into and out of site accesses in some locations. These effects will need to be managed by the contractor in conjunction with the road controlling authorities. Refer to later section discussing the mitigation of the adverse safety effects on site accesses as required by the NZ Transport Agency and local authorities.

Traffic effects

191. An efficiency analysis of a typical construction access and Saddle Road has been undertaken using SIDRA Intersection Software, including an assessment of the likely delay to through traffic travelling along Saddle Road.

192. For the purposes of the efficiency analysis, a worst case peak scenario has been created by assuming that 25% of the daily construction traffic will travel to site within one peak hour period in the morning, and an equal 25% will travel away from site within one peak hour period in the afternoon. The assessment assumes that the peak hour flow of general traffic consists of 10% of the daily flow, with an even split between each direction.

193. The results of our delay assessment show that access into and out of the sites onto Saddle Road is expected to operate at an acceptable level of service. However, the delay experienced by construction vehicles (particularly the larger sized trucks) turning into the site may have a significant impact on through traffic, particularly if no mitigation measures are put in place. Appropriate mitigation measures would be to install right turn bays or shoulder widening at the construction accesses (which is likely to require widening of Saddle Road) to ensure left turning construction traffic can enter and exit the site without crossing the centreline.

194. Given the current operating condition on Saddle Road, as discussed in the Existing Environment section of this assessment, it is considered that the presence of construction traffic will reduce the overall traffic performance on Saddle Road, particularly if the peak travel periods of general traffic and construction traffic coincide with each other.

195. Construction traffic effects on the travel efficiency within Ashhurst has been considered. A performance assessment on the intersection of Mulgrave Street and Cambridge Avenue has been undertaken using SIDRA Intersection Software to gauge the potential impact of the construction traffic on the intersection efficiency. This test has considered the proposed traffic signal arrangement, as part of the Ashhurst Improvements,[40] using the intersection model provided by Beca[41] as a base. The assessment shows that the construction traffic impact on the intersection is minor. This impact should be assessed further and managed accordingly as part of the CTMP.

[40] Ashhurst Improvements, include the conversion of the existing roundabout to signals, which includes turning lanes and pedestrian facilities - NZ Transport Agency file: https://www.nzta.govt.nz/assets/projects/sh3-manawatu-gorge/ashhurst/21-ashhurst-poster-mulgrave-cambridge.pdf
[41] SIDRA file name 'Mulgrave Cambridge_20180724', Beca, July 2018.

196. Construction traffic movements to and from the site will have an adverse impact on the operation of local roads, particularly at the western end of the Project in Ashhurst and at the eastern end in central Woodville, including the potential for the use of inadequate bypass routes. To improve access efficiency and accommodate increased traffic demand in the area, some improvements to the SH3/Cambridge Avenue intersection should be implemented prior to the start of Project construction, and appropriate mitigation strategies be included in the CTMP. This is discussed further in the mitigation section.

197. In general, construction traffic on the local road network (particularly Saddle Road) will result in a reduced efficiency for users of these roads during construction, however I consider this to be manageable as explained further in the mitigation section. The potential trade-off between reduction in efficiency during construction and the earlier realisation of the operational benefits of the Project is recognised as a critical consideration.

198. Overall the construction traffic effects are **Moderate Negative**.

Parking effects

199. The construction of the new Manawatū Gorge bridge and southern abutment will take place within the existing Manawatū Gorge car park by the entrance to the walkway.[42] This will have the potential to disrupt the current provision of parking. I consider it vital to maintain the provision of parking at this area for recreational users during the construction period. Given the land around this location, and the fact that the Gorge is closed to general traffic, there should be plenty of space to maintain current levels of parking.

200. Overall the parking effects are **Minor Negative**.

Vulnerable user effects

201. There will be some impact to the access to the Manawatū Gorge walking track during construction. This will have an impact on recreation opportunities in this area, which are currently in high demand.

202. Construction traffic will also contribute to the increase in traffic volume in the Saddle Road and the surrounding areas, with the most notable impact to the active users in Ashhurst. Construction traffic movements may also have an adverse impact on the central Woodville area, particularly the Woodville School immediately east of SH2/SH3 intersection. Provision for safe facilities

[42] Te Ahu a Turanga: Project Description (Draft), NZ Transport Agency, August 2018.

for vulnerable users at these locations will need to be managed by the CTMP.

203. Overall the vulnerable user effects are **Minor Negative**.

Summary rating of effects

204. The following table summarises the operational transportation assessment of the Project, as discussed in previous sections. Where negative effects are recognised, mitigation strategies are recommended to remedy and mitigate the effects. These mitigation measures are discussed in more detail in the subsequent section of the report.

Table 1-9: Summary of Operational Transportation Assessment

Area	Summary of Effect	Rating of Effect	Recommended Mitigations
Safety	<u>Existing Routes</u> Reduction in traffic demand contributing to a decrease in crash risks on Saddle Road and Pahīatua Track <u>Proposed Route</u> High quality of the new route and intersection upgrades resulting in the low predicted crash risk	Significant Positive	n/a
Traffic	The Project increases the overall transport network reliability and efficiency. The Project will, however, impose higher traffic demand particularly on the SH3/Cambridge Avenue intersection and therefore affect its future performance.	Significant Positive	Improvements to the adversely impacted intersections prior to the completion of the Project (specifically SH3/SH57, Ashhurst/SH3 access, and SH3/Woodlands Road)
Resilience	The Project provides a more resilient route that is less susceptible to incident. However, extreme events may necessitate a partial or full closure of the route.	Significant Positive	Maintain emergency access via Saddle Road should it be required. The use of ITS, such as VMS, to inform road users of roading issues including closures.
Public transport	Safer, more resilient and faster route for Public Transport.	Minor Positive	n/a

Vulnerable users	<u>Existing Links</u> Reduction in traffic demand on existing links results in better environment for cyclists and pedestrians. However, it will also result in higher traffic across the existing Ashhurst bridge, which will adversely impact active user safety and usage at this location. <u>The Project</u> The new road features a wide shoulder which will cater for cyclists.	Neutral	Not foreclose future provision of safe walking and cycling facilities on existing network.
Access	A number of properties are severed by the proposed Project, but all severed properties will have alternative access provided to the existing road network, be purchased by the NZ Transport Agency or agreements established to provide alternative access via existing links to Saddle Road. Improvements to property accesses on Saddle Road due to the overall reduction of traffic demand on the road.	Neutral	Construction of new access roads and links as soon as practicable in accordance with NZ Transport Agency and TLA standards.

205. The following table summarises the Project's construction traffic effects on the transport network. Where negative effects are recognised, mitigation strategies are recommended to remedy and mitigate the effects. These mitigation measures are discussed in more detail in the subsequent section of the report.

Table 1-10: Summary of Construction Transportation Assessment

Area	Summary of Effect	Rating of Effect	Recommended Mitigations
Safety	Safety issues with regard to construction vehicles' access on the curved and steep alignment of Saddle Road.	Minor negative	A comprehensive construction traffic management plan (CTMP) is proposed to enable the NZ Transport Agency and the Contractors to programme and manage the construction activities to maximise the efficiency of operations and minimise the effects of activities on the existing road network, active users, parking and the community. Associated with the CTMP should be an aspiration to get the bridges at either end of the Project completed as soon as practicably possible, and ideally useable prior to the pavement construction phase of the Project.
Traffic	Construction traffic will impact the operation of Saddle Road, local roads and intersections in Ashhurst, and the rail corridor.	Moderate Negative	
Parking	Accesses to the site and construction lay-down area at the entrance to the Manawatū Gorge recreational area will impact the carparks at this location.	Minor Negative	
Vulnerable users	Potential issues around the safety of vulnerable users in major centres in Ashhurst and Woodville, and Saddle Road, during the peak construction traffic period, as well as the impact to the access to the Manawatū Gorge walking track, during the peak construction traffic period.	Minor Negative	

MEASURES TO AVOID, REMEDY OR MITIGATE ACTUAL OR POTENTIAL ADVERSE TRANSPORT EFFECTS

Proposed mitigation measures

Operational

206. The following outlines the recommended mitigation strategy for the potential adverse effects resulting from the operational aspects of the Project.

207. Further to the recommended provision of alternative parking and walkway access during the construction period (discussed above), in my view a Reinstatement Plan should be prepared for a permanent replication of the original Manawatū Gorge parking provision. This would ideally be sized to meet future access demand to the walkway once the Project is completed with a like-for-like replacement consistent with the existing parking provision as a minimum**.**

208. The Project will result in a significant increase in traffic on the existing SH3 Ashhurst Bridge over the Manawatū River, essentially reverting back to a situation similar to before the closure of the Gorge route. This will in turn potentially increase adverse safety and amenity effects for pedestrians and cyclists using this connection, although it is noted that according to the survey undertaken in September 2018 as reported earlier, the use of the SH3 Ashhurst Bridge by pedestrians and cyclists is already limited. Recently the NZ Transport Agency has installed cycle warning signs which will help manage this effect for the small number of cyclists using this link. I also recommend that the final design does not hinder opportunities for the future provision of safe access for active users to and from the Manawatū Gorge recreational area from Ashhurst and the wider Manawatū Region. The NZ Transport Agency should continue to work with PNCC and other stakeholders to look at options for access, including consideration of active modes as part of the Palmerston North ring investigation which is currently ongoing.

209. I also recommend that the final design of the intersection at the Woodlands Road/SH3 on the Woodville side of the Project includes provision for pedestrians and cyclists to gain access between Woodville and the eastern end of the Gorge and local amenities.

210. Assessment of the future performance of the Cambridge Avenue/SH3 intersection shows that the Project will negatively impact its performance, particularly those exiting Cambridge Avenue once the priority shifts back to

SH3. It is crucial that an improvement is made to the Cambridge Avenue/SH3 intersection (either as part of the Project or prior) to ensure its safe and acceptable performance following the completion of the Project. Assessment undertaken has confirmed that either a signal intersection or roundabout could be accommodated and provide a safe and efficient facility in the future.

211. As identified above, the severance of accesses for existing private property will need to be addressed by establishing new access roads and underpass structure(s) as soon as practicable (unless the NZ Transport Agency purchases the severed property). Property agreements will need to be established where purchases occur with landowners and all access arrangements should be agreed and documented.

212. Once the project is opened, any disruptions to the journey via the Project route will need to be communicated to the road users as early and effectively as practicable to minimise impact on travel time and safety. On site, this will be primarily through the use of VMS or other forms of ITS accommodated within existing or proposed road reserve.

Construction

213. The Project construction traffic effects on the transport network are in general **moderately negative**, as explained above. To address those potential adverse effects, the mitigation measures set out below are recommended.

214. The following construction traffic mitigation strategy is proposed for consideration and inclusion in the CTMP, subject to liaison with key stakeholders:

    (a) Considering hours for construction traffic movement and bulk earthworks transportation through Ashhurst during peak traffic periods to minimise construction traffic impact on Ashhurst, while balancing the benefit of having the Project completed as quickly as possible. Consideration should also be given to implementing restrictions around the Woodville central area to ensure that any traffic and safety impact to the area is minimised. Consideration should be also given to a faster delivery of the new Manawatū Gorge bridge to allow alternative access from the western end of the Project (Ashhurst) as well as the smaller Hope Road Bridge to allow access to the eastern of the Project (Woodville).

(b) Minimising impact on Saddle Road by utilising site access roads on either side of the Ranges wherever possible and by limiting construction HCV during peak flow periods.

(c) The early construction of access roads to private land prior to the main alignment to minimise access restrictions during the construction period.

(d) The use of KiwiRail's infrastructure to transport large bridge components into the Manawatū River site, if possible.

Overall the CTMP will allow the construction traffic movements to be managed to minimise the impact on the network and maximise the efficiency of the construction operations.

215. To mitigate adverse effects on safety at construction site accesses, all construction site accesses are to be designed and maintained in accordance with the Accessway Standards and Guidelines attached as Appendix 5B to the NZ Transport Agency's Planning and Policy Manual.[43] Mitigation measures to address any adverse safety impacts as required by the Manual must be put in place, where appropriate. Under the Manual this includes, but is not limited to, the provision of localised road widening, safe sight distances, acceleration and deceleration lanes, and turning bays. This also includes the upgrade of any local roads (for example, Hope Road in Woodville) to accommodate construction traffic.

216. It is recommended that an agreement with KiwiRail is sought to co-ordinate the new bridge construction work with other rail closures or periods of low demand. This agreement will minimise the effect of construction activities on the railway operation.

217. It is acknowledged that construction traffic movements to and from the site will have adverse effects on the operation of local roads, particularly at the western end of the Project in Ashhurst and on Saddle Road. To improve access efficiency and accommodate increased traffic demand in the area, some improvements to the SH3/Cambridge Avenue intersection should be implemented prior to the start of Project construction.

218. The potential adverse impact of construction activities to the Manawatū Gorge Cark Park and entrance to the walkway at times is acknowledged. To mitigate this adverse effect, it is recommended that an alternative parking

[43] https://www.nzta.govt.nz/assets/resources/planning-policy-manual/docs/planning-policy-manual-appendix-5B.pdf See in particular Diagram and Perspective E.

provision and access to the walkway are provided at all times, or as specified under the CTMP.

ALIGNMENT WITH POLICIES, STRATEGIES AND OBJECTIVES

219. This section considers the alignment of the project with the following Statutory documents:

(a) the GPS;

(b) the NLTP;

(c) the RLTP;

(d) Horizons Regional Council, One Plan;

(e) Horizons Regional Council, Regional Public Transport Plan;

(f) PNCC, District Plan, Section 20 (Transportation);

(g) PNCC Strategic Transport Plan;

(h) PNCC Active and Public Transport Plan;

(i) MDC, District Plan, Section 3B (Transportation); and

(j) TDC, District Plan.

Government Policy Statement on Land Transport, **2018/19-2027/28**

220. The GPS outlines the Government's strategy to guide land transport investment over the next 10 years. It also provides guidance to decision-makers about where the Government will focus resources. The GPS operates under the LTMA, which sets out the scope and requirements for the GPS.

221. The GPS has four strategic priorities, with the first two being the stated key strategic priorities for the Government:

(a) Safety;

(b) Access;

(c) Environment; and

(d) Value for Money.

222. The safety objective is to have a land transport system that is a safe system, free of death and serious injury. As specified in the Preliminary Design Philosophy Statement[44], the detailed design of this Project is to consider all

[44] Te Ahu a Turanga; Manawatū Gorge Replacement Route Preliminary Design Philosophy Report, GHD, October 2018.

the relevant Transport Agency Action Plans (2011-2012, 2013-2015, and 2016-2020) which address the safety concerns recognised within the State highway network. The Transport Agency Technical Memorandum TM-2503 Guidelines for Edge protection and Medians on Dual Carriageway Roads (March 2013) will also be adopted into the design of the Project.

223. As discussed earlier in this report, to date alignment with the Safe System approach has been achieved primarily through the provision of following features:

    (a) Roundabouts: The project route ties in to the existing roads at both ends by an at-grade roundabout. These roundabouts will act as a threshold treatment for traffic in the immediate area, reduce conflict points and approach speeds and improve safety at the intersections.

    (b) A central median and wire rope median barrier from roundabout to roundabout: This physically separates opposing traffic streams and helps to prevent vehicles from travelling into opposing traffic lanes. Therefore, this feature will reduce head-on crashes, and shift turning movements to safer locations.

    (c) Crawler lanes on sections with steep grades: This is provided to allow for safe opportunity for overtaking.

    (d) Shoulders: Provides clearance from the traffic lanes and space for cyclists using the route.

224. There are three objectives under the access strategic priority:

    (a) A land transport system that provides increased access to economic and social opportunities;

    (b) A land transport system that enables transport choice and access; and

    (c) A land transport system that is resilient.

225. The environment objective is to have a land transport system that reduces greenhouse gas emissions, as well as adverse effects on the local environment and public health.

226. The value for money objective is to have a land transport system that delivers the right infrastructure and services to the right level at the best cost.

227. The Project has good alignment with the key strategic priorities of safety and access, particularly the access objectives of increased access for economic opportunities and resilience.

National Land Transport Plan, 2018-2021

228. The NLTP was released in August 2018. This release includes specific mention of SH3 Te Ahu a Turanga: Manawatū Gorge highway, being of highest priority both regionally and nationally. This includes a funding allocation of $122m for the 2018-21 period.

229. The Manawatū/Whanganui section of the Plan states:

> *"As a key freight and transport hub for the central North Island, the Manawatū/Whanganui region has enormous strategic value for the whole of New Zealand. This is highlighted by the fact that a key priority for the Transport Agency in this NLTP is the development of the SH3 project highway Te Ahu a Turanga: Manawatū Gorge to connect the Manawatū, Tararua district, Hawke's Bay and northern Wairarapa. It replaces the highway through the Manawatū Gorge, now indefinitely closed by a mass land movement".*

Regional Land Transport Plan, 2015-2025 (2018 Review)

230. Horizons' RLTP sets out the strategic direction for land transport in the Manawatū-Whanganui Region over the next 10 years. It describes what the region is seeking to achieve in land transport in order to contribute to an effective, efficient and safe land transport system in the public interest as required under the LTMA.

231. The RLTP also incorporates the programme of land transport activities the region wishes to prioritise for inclusion in the NLTP for subsequent funding investment.

232. The RLTP notes the following with regard to an alternative to the Manawatū Gorge (Section 3 – Regional Issues):

> *"It is critical for regional economic growth that the focus remains on the development of an alternative to the Manawatū Gorge as the principal east-west link between Manawatū and Hawke's Bay. Completion of a new route must ensure an improvement to the resilience and availability of the route as well as realising opportunities for connectivity to land use development, freight hubs and efficiency, and tourism".*
>
> *"Freight flows from the Hawke's Bay Region to the Horizons Region, of which a large proportion will come directly from the Port, are expected to increase from 0.68 million tonnes (2012) to 1.48 million tonnes in 2042. Freight going in the reverse direction is also anticipated to*

increase. Therefore the links between the two regions needs to be secure for the passage of High Productivity Motor Vehicles (HPMV)."

233. The RLTP has the following strategic priorities:

    (a) Effective and efficient road maintenance and delivery;

    (b) Improve connectivity, resilience and the safety of strategic routes to and from key destinations linking north-south and east-west, while factoring in demographic changes and impacts on land use;

    (c) An appropriate network of tourism routes;

    (d) An integrated walking and cycling network; and

    (e) Effective, efficient, accessible and affordable multi-modal transport networks.

234. An alternative to the Manawatū Gorge is the number one priority activity in the RLTP.

235. Based on the information provided above, the Project has a very strong alignment with the RLTP.

Horizons Regional Council, Regional Public Transport Plan, 2015-2025

236. The purpose of the RPTP is to set out the framework for the provision and development of services and infrastructure integral to public transport in the Manawatū-Wanganui Region.

237. The statutory purpose of the RPTP is to provide:

    (a) A means for Horizons and public transport operators to work together in developing services and infrastructure for public transport in the Manawatū-Wanganui Region;

    (b) An instrument for engaging with the public in the Manawatū-Wanganui Region about how the public transport network is designed and operated; and

    (c) A statement of the services that are integral to the public transport network, the policies and procedures that will apply to those service, and the information and infrastructure that support them.

238. The following objectives apply to all public transport services units that Horizons provides financial assistance to:

    (a) A reliable, integrated, accessible and sustainable public transport system;

(b) An effective procurement system that delivers the desired public transport services;

(c) A safe and accessible network of supporting infrastructure; and

(d) Increasing patronage.

239. The following services in Tararua District, as specified in the RPTP Appendix 1, will benefit from the provision of the Project:

(a) Order of St John Dannevirke Health Shuttle

This on-demand service serves areas around Dannevirke, as well as travels between Dannevirke and district to Palmerston North.

(b) Dannervirke to Palmerston North school service

The route of this service is from Dannevirke to Palmerston North, via Woodville. It operates Monday – Friday from 7am to 4pm.

240. Therefore, the Project provides alignment and opportunity for greater alignment with the RPTP objectives above in the future.

Horizons Regional Council, One Plan

241. The One Plan combines the Regional Policy Statement, Regional Plan and Coastal Plan for the Horizons Region. The One Plan defines how the natural and physical resources of the Region, including fresh water, air, productive land and natural ecosystems, will be cared for and managed by the Regional Council in partnership with territorial authorities and the community.

242. Objective 3-1: Infrastructure and other physical resources of regional or national importance requires that decision-makers under the RMA:

"Have regard to the benefits of infrastructure^ and other physical resources of regional or national importance by recognising and providing for their establishment, operation, maintenance and upgrading."

243. A number of policies under this objective have relevance to the Project:

(a) Policy 3-1: Benefits of infrastructure and other physical resources of regional or national importance;

(b) Policy 3-2: Adverse effects of other activities on infrastructure and other physical resources of regional or national importance;

(c) Policy 3-3: Adverse effects of infrastructure and other physical resources of regional or national importance on the environment; and

(d) Policy 3-4: The strategic integration of infrastructure with land use.

244. In summary, the above policies:

(a) ensure that infrastructure of regional or national importance, such as the proposed Project, are recognised as a physical resource of regional or national importance;

(b) ensure that adverse effects on infrastructure of regional or national importance, such as the proposed Project, from other activities are avoided as far as reasonably practicable;

(c) recognise and provide for the establishment, maintenance and operation of infrastructure of regional or national importance, such as the proposed Project, and allow for minor effects that may result from these activities; and

(d) ensure that Territorial Authorities develop and implement appropriate land use strategies to manage urban growth and infrastructure asset management to ensure the efficient and effective provision of associated infrastructure.

PNCC District Plan, Section 20 (Transportation)

245. The PNCC District Plan contains the following Transportation Objectives:

(a) to maintain and enhance the safe and efficient functioning of the roading network;

(b) to protect the roading network, as identified in the roading hierarchy, from the potential adverse effects of all land use activities;

(c) to avoid, remedy or mitigate the effects of roads and vehicles on the amenity values of the City; and

(d) to maintain and enhance the use of public transport, walking and cycling as alternative modes to the private motor vehicle.

246. The Project has good alignment with all those objectives, for the reasons explained in this report.

PNCC Strategic Transport Plan

247. The Strategic Transport Plan shows how the PNCC will contribute to achieving their goals to achieve ‘An innovative and growing city’.

248. The purpose of the Strategic Transport Plan is to provide infrastructure to enable growth and a transport system that links people and opportunities,

and provides amenity, safety, interconnectivity, accessibility, resilience and reliability.

249. The Project contributes to the fulfilment of the following desired outcomes listed in the Plan:

    (a) Provision of resilient and reliable travel routes to key destinations that meet the specific constraints for time, mode and travel purpose of users

    (b) Reliable city and regional routes/connections, including alternative routes, will be accessible to all main ports of new Zealand for heavy vehicles

    (c) A State Highway Network that goes around dthe urban area and interconnects with the regional ring road.

PNCC Active and Public Transport Plan

250. The Active and Public Transport Plan shows how the PNCC will contribute to achieving their goals to achieve ‘A creative and exciting city’,

251. The purpose of the Active and Public Transport Plan is to have a safe, efficient, and effective active and public transport system and the most active community in New Zealand.

252. The Project contributes to the fulfilment of the above desire as it provides improved access to all modes of transport, including the Project effect of lowering the traffic volumes through the Pahīatua Track, the primary route for cyclists between Palmerston North and Woodville.

MDC District Plan (Section 3B Transport)

253. The MDC District Plan contains the following Transportation Objective:

    (a) To maintain and enhance the safe, efficient and integrated operation of the transport network within the District

254. For the reasons set out in this report, the Project has good alignment with this objective.

TDC District Plan

255. The TDC District Plan contains the following Transportation Objective:

    (a) To ensure the safe, efficient and effective operation of the District's transportation networks while avoiding, remedying or mitigating adverse environmental effects.

256. The Project likewise has good alignment with this objective.

CONCLUSION AND RECOMMENDATIONS

257. The Project forms a critical piece of infrastructure in New Zealand's transport system. The closure of the Manawatū Gorge has had a significant impact on the surrounding transport network, the communities it serves, and the wider economy. In transport terms, the Project should be progressed as matter of urgency to address the impact on the existing transport network and provide long-term resilience, access and improved safety between the Manawatū and Tararua Regions of the North Island.

258. The following conclusions can be drawn from the transportation assessment with regard to the operational outcomes of the Project:

    (a) the significant reduction in traffic on the local road network (particularly Saddle Road, through Ashhurst and the Pahīatua Track) associated with the Project will result in a significant positive safety, efficiency, access, and resilience effect for all users of these local roads;

    (b) the new alignment will be designed to a high standard to provide a significantly safer, more efficient and resilient route for general traffic and freight when compared with the current local road alternatives;

    (c) the improved intersections at SH3/SH57 and Woodlands Road/SH3 will provide significantly improved safety and accessibility;

    (d) the changes in traffic distribution at the intersection of SH3 and Cambridge Avenue (Ashhurst) associated with the Project will result in the intersection being over capacity following completion of the Project, however various improvement options have been identified for the intersection to mitigate this effect;

    (e) the new alignment will provide a significantly improved (reliable and safe) route for the buses and critical emergency services that currently use the local road alternatives and could support future public transport routes;

    (f) the significant reduction in traffic on the local road network (particularly Saddle Road, through Ashhurst, and the Pahīatua Track) associated with the Project will result in positive safety and amenity effects for pedestrians and cyclists using these local roads;

    (g) the new alignment will also provide a wide shoulder which can be used by cyclists;

(h) the significant increase in traffic on the SH3 Ashhurst Bridge over the Manawatū River associated with the Project has the potential to reduce safety and amenity for cyclists (current pedestrian usage identified is next to nothing) using this connection (particularly those accessing the Manawatū Gorge recreational area). Recent improvements have been implemented for cyclists and is it recommended the Project does not preclude NZ Transport Agency and PNCC continuing to work together to consider options in order to improve the existing facilities for both cyclists and pedestrians;

(i) mitigation is proposed to ensure there is provision for parking and safe pedestrian and cycle access to the Manawatū Gorge recreational area from the proposed SH3/SH57 intersection. A similar provision for pedestrians and cyclists is also proposed at the SH3/Woodlands Road/Napier Road intersection;

(j) access to a number of properties is severed by the proposed Project, but all severed properties will either have alternative access provided to the existing road network, be purchased by the NZ Transport Agency, or be subject to agreements to provide alternative access via existing links to Saddle Road or alternate local road linkages;

(k) the reduction in traffic on Saddle Road associated with the Project (once operational) will result in positive safety and efficiency effects for access to properties on Saddle Road and in part other local roads due to the redistribution of traffic and freight; and

(l) the overall effect on the operational outcomes of the Project is significantly positive.

259. The following conclusions can be drawn from the transportation assessment with regard to construction:

(a) construction vehicles using the local road network (particularly Saddle Road) will result in a reduced safety, efficiency and amenity effect for users of these roads during construction, however this is deemed to be manageable, and must be considered alongside the conclusion that the faster the Project is constructed the sooner the wider operational benefits of the Project will be realised;

(b) accesses to the site and construction lay-down areas on Saddle Road and at the entrance to the Manawatū Gorge recreational area have the potential to result in a reduced safety and amenity effects for users of

these roads, access points, and carparks in these areas during construction;

(c) a comprehensive CTMP is proposed to enable the NZ Transport Agency and the contractors to programme and manage the construction activities to maximise the efficiency of operations, and minimise the effects of activities on the existing road network, active users, and parking; and

(d) the overall effect of construction is a moderate negative that will be mitigated through the construction programme and CTMP.

260. Overall it is my opinion that the Project provides a critical transport linkage with significant positive effects, with a relatively small amount of mitigation required in order to complete construction as a matter of urgency.

David Dunlop

1.A
TRAFFIC ASSUMPTION MEMO

Memorandum

To	David Dunlop
Copy	Craig Nicholson
From	Sam Thornton
Office	Wellington Civil
Date	5 October 2018
File	5-C3688.00
Subject	Te Ahu a Turanga: Traffic Assumptions

The purpose of this memo is to document the assumptions used to determine the traffic distribution, growth and travel time for the Te Ahu a Turanga project.

The traffic assessment is based on the available data prior to and post closure of the Manawatū Gorge (the Gorge). It is to be noted that as the Gorge closure occurred in April 2017, there is limited amount of traffic data in terms of distribution, growth, travel time and demand post the closure of the Gorge.

The following sections have documented the use of available data, limitations and assumptions associated with the transport assessment of the Te Ahu a Turanga project.

1 Traffic Distribution

The following bullets outline the process used to determine the current / proposed distribution of traffic, each bullet is expanded upon in the following sections.

- Estimate pre-Gorge closure traffic distribution;
- Estimate post closure traffic distribution;
- Estimate do-minimum traffic distribution; and
- Estimate traffic distribution with project.

The following bullets outline the high level assumptions used to determine the current / proposed distribution of traffic.

- The data collected by others is representative; and
- The proposed distribution is the same as the pre-Gorge closure traffic distribution.

1.1 Estimate pre-Gorge closure traffic distribution

The pre-Gorge closure traffic distribution has been estimated from the following data sources:

- Mobileroad.org.nz (RAMM) traffic counts / estimates from the various road controlling authorities (NZ Transport Agency, Tararua District Council, Palmerston North City Council) estimates are from 2014-2016;
- Traffic volumes from the Detailed Business Case (DBC prepared by GHD, original source and dates unknown);
- Estimates based on professional judgement (where no data exists); and
- Origin and destination information from BlipTrak and adjustments made based on the Cube model (information provided by GHD, date of source information unknown).

The original origin and destination data provided by GHD are illustrated in Figure 1.A.1 and Figure 1.A.2 below.

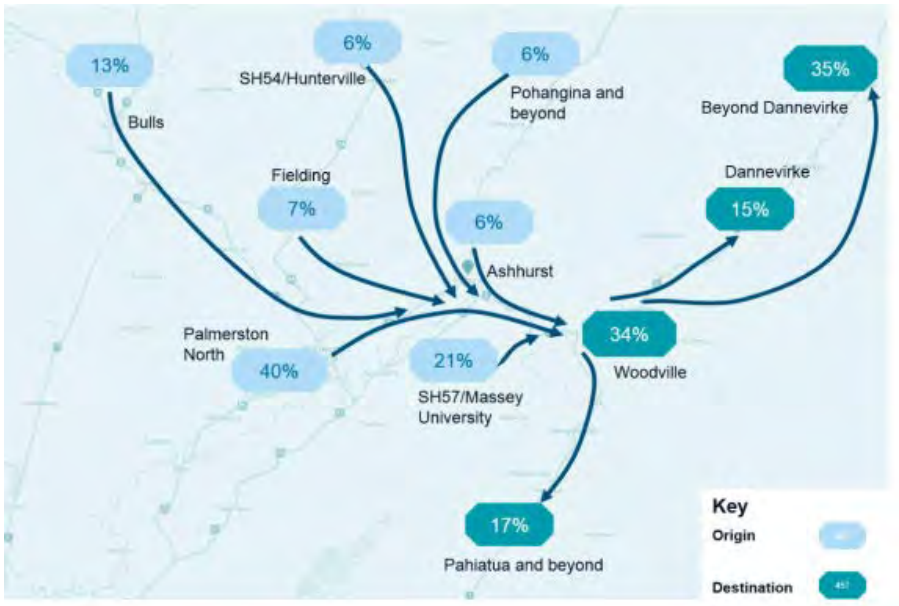


Figure 1.A.1: Origin Destination Map (Westbound), GHD

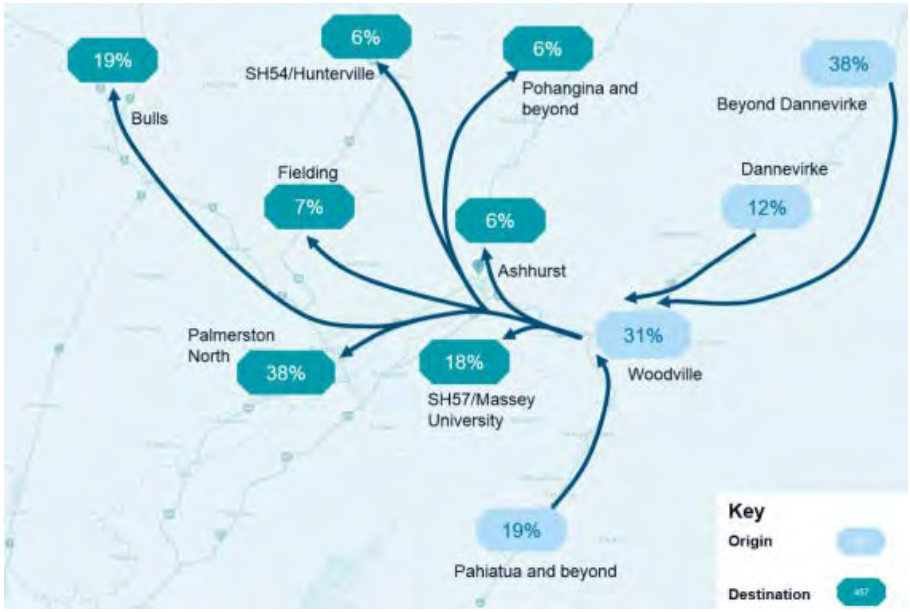


Figure 1.A.2: Origin Destination Map (Eastbound), GHD

The above origin and destination data provided by GHD was simplified down to the following two-way origin–destination matrix.

	SH2 North	Woodville	SH2 South	Total
SH54 North / Pohangina	3.3%	3.7%	4.9%	**11.9%**
Ashhurst	2.7%	2.3%	1.0%	**6.0%**
SH3 West / Fielding	10.4%	5.5%	3.9%	**19.8%**
Palmerston North	19.6%	17.8%	5.6%	**42.9%**
SH57 South	13.4%	3.0%	2.9%	**19.3%**
Total	**49.4%**	**32.3%**	**18.3%**	

The following origin and destination data shows the assumed HCV proportions for each origin and destination pair. The overall average HCV proportion of redistributed traffic is 12% which is close to the 11% in the Manawatū Gorge (pre-closure (2016)).

Higher proportions have been assumed between non-urban origin and destination pairs with lower proportions where one or both of the origin or destination was an urban area.

	SH2 North	Woodville	SH2 South
SH54 North / Pohangina	20%	5%	20%
Ashhurst	5%	5%	5%
SH3 West / Fielding	20%	5%	20%
Palmerston North	10%	5%	10%
SH57 South	20%	5%	20%

1.2 Estimate post closure traffic distribution

The post closure traffic distribution has been estimated from the following data sources:

- Traffic counts undertaken on Saddle Road and Paihiatua Track (and connecting roads) by Tararua District Council between May 2017 and November 2017;
- Traffic counts undertaken around Ashhurst by Palmerston North City Council in 2017;
- Traffic counts undertaken on the State Highway network in 2017 / 2018;
- Traffic volumes from the Detailed Business Case (DBC prepared by GHD, original source and dates unknown); and
- The simplified matrix above.

The first step was to estimate the change in the distribution of traffic assuming all pre-closure east-west trips used either Saddle Road or Paihiatua Track.

Based on the proportions of the traffic count information the following matrix shows the trips assumed to use the two different routes (blue via Saddle Road, green via Paihiatua Track).

	SH2 North		Woodville		SH2 South	
SH54 North / Pohangina	95%	5%	95%	5%	75%	25%
Ashhurst	95%	5%	95%	5%	75%	25%
SH3 West / Fielding	95%	5%	95%	5%	25%	75%
Palmerston North	95%	5%	95%	5%	25%	75%
SH57 South	50%	50%	50%	50%	25%	75%

There are various feeder routes which connect into these two key routes, the flows on these various routes have been balanced to align with available traffic count proportions.

The traffic count information provided by Tararua District Council between May 2017 and November 2017 indicated that there were fewer total trips on Saddle Road and Paihiatua Track compared with pre-closure. This implies some trip suppression and / or rerouting outside the project area. This has been ignore for the purpose of this assessment.

1.3 Estimate do-minimum traffic distribution

The do-minimum traffic distribution is the same as the post closure traffic distribution.

1.4 Estimated traffic distribution with project

The estimated traffic distribution with the project is as per the estimated pre-Gorge closure traffic distribution with the exception of the revoked sections of SH3 which become access roads.

2 Traffic Growth

Historic traffic growth has been analysed on the state highway network to determine historic growth trends.

2.1 SH3 Manawatū Gorge

Historic traffic volumes for 1975-2016 have been analysed for the SH3 telemetry site in the Manawatū Gorge. Analysis has been undertaken looking at different time periods and with and without the outlier values between 2011 and 2014 (corresponding to the last major Gorge closure).

The trend-line is relatively linear (fixed average increase in AADT per year) so the percentage growth reduces year on year. Growth rates for 40, 20, 10 and 5 years have been plotted with and without the data from 2011-2014.

- With the 2011-14 values excluded, the growth rate for each period (40, 20, 10 and 5 years) is between 1-2% (over the past 5 years).
- With the 2011-14 values included the growth rates for the 20 and 10 periods is less than 1% (over the past 5 years). The 40 year period is between 1-2% (over the past 5 years) and the 5 years is between 4-6% (over the past 5 years).

2.2 Wider Network

Historic traffic volumes for 2001-2017 (no outliers excluded) have been analysed at the following locations around the project area:

- SH2 north of Woodville.
- SH2 south of Woodville.
- SH3 east of Palmerston North.
- SH3 east of Ashhurst.
- SH57 north of Palmerston North.

As per the Gorge, the trends have been relatively linear (consistent average AADT increase per year) so the growth rate proportion reduces year on year.

The growth rate at all sites based on the time period analysed (2001-2017) is relatively low (less than 0.5% per annum) at all locations except SH57 which is closer to 1%.

2.3 Assumed rates

The historic growth tends lines have been used to predict the total growth between 2016 and 2041. Three scenarios have been assessed:

- The base scenario uses historic data from 1975-2010 and predicts approximately 50% growth (7,620 increases to 11,520).
- The high growth scenario uses historic data from 2011-2016 and predicts approximately 100% growth (7,620 increases to 15,210).
- A medium growth scenario has been assumed which is part way between the base and high growth scenarios (75%) (7620 increases to 13365). Based on this assumption, the predicted daily traffic at the time of Project opening (2025) is 9,700.

The do-minimum and project scenarios are assumed to have the same growth rate.

3 Travel Times

3.1 Routes

Based on the traffic distribution calculated, there are up to five different routes for each of the 15 origin and destination pairs (up to 75 possible unique trips).

To simplify the assessment the busiest routes have been identified as below:

Five routes carry more than 5% of trips, these are highlighted below:

- Between SH3 / West Fielding and SH2 North via Saddle Road and Oxford Road (5.8%)
- Between SH3 / West Fielding and Woodville via Saddle Road and Woodlands Road (5.2%)
- Between Palmerston North and SH2 North via Saddle Road and Oxford Road (11.0%)
- Between Palmerston North and SH2 North via Saddle Road and Woodlands Road (7.7%)
- Between Palmerston North and Woodville via Saddle Road and Woodlands Road (16.9%)

The five busiest routes are all via Saddle Road, the three busiest routes via Paihiatua Track are:

- Between Palmerston North and SH2 South via Paihiatua Track and Mangahao Road (3.7%)
- Between SH57 South and SH2 North via Paihiatua Track and Balance Valley Road (3.0%)
- Between SH57 South and SH2 North via Paihiatua Track and Mangahao Road (3.7%)

3.2 Travel distances

Travel distances have been identified from:

- DBC drawings (for proposed route); and
- Google maps / TomTom data (existing routes).

3.3 Travel speeds and times

Travel times have been calculated from the travel distance and the estimated average vehicle speed.

Estimated HCV average travel speeds on the proposed project have been calculated from the longitudinal profile of the proposed route and the speed / grade curves provided in Austroads Guide to Road Design Part 3: Geometric Design (2016) and assume that HCV speeds downhill are the same as the equivalent uphill grade. Car speeds are assumed to be 90km/h.

Travel speeds on existing routes are based on professional judgement informed by:

- The road form;
- Predicted travel times from Google maps; and
- Proportions of urban and rural road.

All estimates are rounded to the nearest 5km/h.

4 Intersection Modelling

4.1 Turning Demands

The following process has been used to calculate the turning demands:

- Average Daily Traffic (ADT) Car and HCV combined.
- Combined ADT on each approach converted to overall average vehicles per hour (VPH) by multiplying the combined ADT by 10%.
- Origin-destination (OD) matrix created from the overall average VPH assuming OD proportions to balance flows.
- OD matrix converted to overall average VPH turning flow diagrams.
- Overall average VPH turning flow diagrams converted to peak hours by:
    - multiplying the peak direction by 150%
    - multiplying the off-peak direction by 50%
- 15% HCV assumed for modelling.

4.2 Modelling Assumptions

The following assumptions have been used for the modelling:

- SIDRA 7 modelling software used.
- 85% peak flow factor (PFF) assumed.
- Default settings used.

1.B
TRIP DISTRIBUTION SUMMARY

Appendix 1.B Trip Distribution

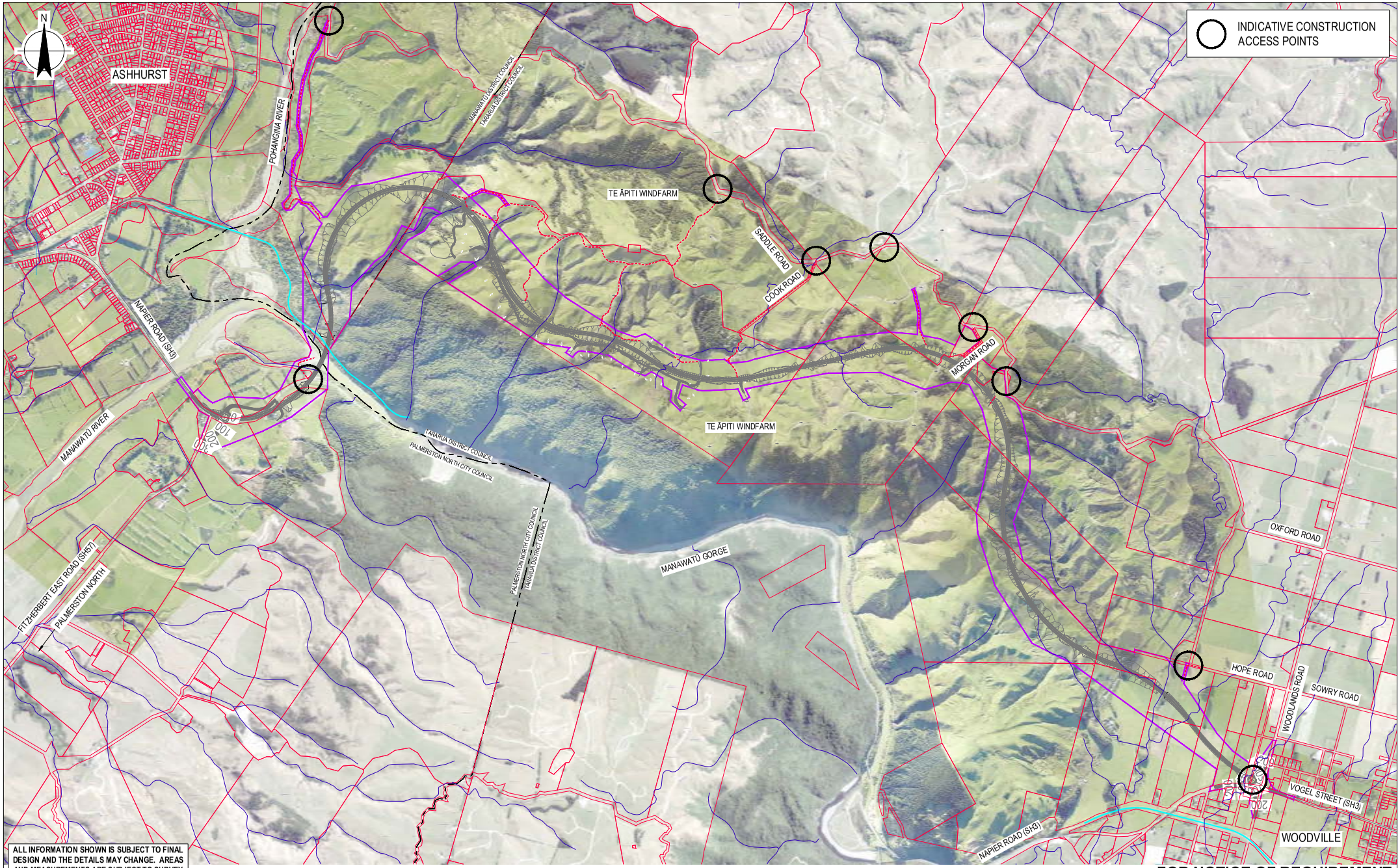
Route Data			Car				HCV			
			2016	2041 (75% growth from 2016)			2016	2041 (75% growth from 2016)		
Route	Start	End	Current	Do Minimum	Proposed	Difference	Current	Do Minimum	Proposed	Difference
Pahiatua - Aokautere Road	SH57	Balance Valley Road	3429	6001	3497	-2505	483	845	389	-456
Balance Valley Road	Pahiatua - Aokautere Road	Gorge Road	649	1136	551	-584	94	165	61	-104
Mangahao Road	Nikau Road	SH2	1834	3209	1433	-1776	277	485	159	-325
Saddle Road	Sailsbury Street	Woodlands Road	5403	9456	236	-9220	675	1181	26	-1154
Woodlands Road	Saddle Road	SH3	3875	6780	315	-6465	413	722	35	-687
Oxford Road	Saddle Road	SH2	1778	3111	357	-2754	303	530	63	-467
Cambridge Avenue	York Street	Mulgrave Street	8169	14296	12856	-1440	903	1580	1651	71
Wyndham Street	Oxford Street	Sailsbury Street	782	1369	193	-1175	167	292	87	-205
Sailsbury Street	Mulgrave Street	Wyndham Street	5677	9934	1890	-8044	662	1159	210	-949
SH3 (New Route)	SH57	Woodlands Road	0	0	11724	11724	0	0	1611	1611
SH3	Cambridge Avenue	SH57	1757	3075	11463	8388	292	510	1417	906
SH3	Woodlands Road	SH2	4028	7050	11724	4675	452	791	1611	820
SH2	Station Street	Mangahao Road	3628	6349	6841	492	744	1302	1401	99
SH57	Aokautere	SH3	1515	2650	3552	901	213	373	578	205

1.C
TRAVEL TIME SUMMARY

Appendix 1.C Travel Time Summary

Route Data			Car Travel Times (minutes)			HCV Travel Times (minutes)		
Start	**End**	**Route**	**Current**	**Proposed**	**Difference**	**Current**	**Proposed**	**Difference**
SH3 West / Fielding (Intersection of Mulgrave Street and Hillary Crescent)	SH2 North (Intersection of SH2 and Pinfold Street)	Saddle Road and Oxford Road	21.2	12.3	-8.9	25.2	16.8	-8.4
	Woodville (Intersection of SH3 and SH2)	Saddle Road and Woodlands Road	20.2	10.8	-9.4	24.1	15.0	-9.1
Palmerston North (Intersection of SH3 and York Street)	SH2 North (Intersection of SH2 and Pinfold Street)	Saddle Road and Oxford Road	22.1	11.8	-10.3	26.1	16.3	-9.8
		Saddle Road and Woodlands Road	22.6	11.8	-10.8	26.9	16.3	-10.6
	Woodville (Intersection of SH3 and SH2)	Saddle Road and Woodlands Road	21.1	10.3	-10.8	25.1	14.5	-10.6
Palmerston North (The Square)	SH2 South (Intersection of SH2 and Mangahao Road)	Paihiatua Track and Mangahao Road	38.3	34.8	-3.6	44.0	40.8	-3.2
SH57 South (Intersection of SH57 and Pahiatua Track)	SH2 North (Intersection of SH3 and Woodlands Road)	Paihiatua Track and Balance Valley Road	28.5	14.9	-13.6	34.2	18.6	-15.6
	SH2 North (Intersection of SH3 and SH2)	Paihiatua Track and Mangahao Road	40.8	16.5	-24.3	48.4	20.7	-27.7

1.D
INDICATIVE CONSTRUCTION SITE ACCESSES



FOR NOTICE OF REQUIREMENT

No	Revision	Drawn	Checked	Approved	Date
A	FOR SUBMISSION	ST	DD*	AW*	10/18

Note: * indicates signatures on original issue of drawing or last revision of drawing

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DO NOT SCALE

Drawn	S THORNTON	Designed	S THORNTON
Drafting Check	D DUNLOP*	Design Check	D DUNLOP*
Approved	A WHALEY*		
Date	OCTOBER 2018		
Scale	N.T.S.	This Drawing must not be used for Construction unless signed as Approved	

Client	NZ TRANSPORT AGENCY
Project	TE AHU A TURANGA; MANAWATŪ TARARUA HIGHWAY
Title	INDICATIVE CONSTRUCTION ACCESS - SHEET 1 OF 1

Original Size **A1** Project Number: **51-38113** Drawing Number: **A-11** Rev: **A**

Plot Date: 29 October 2018 - 10:11 a.m. Cad File No: G:\Transport\NZTA\Proj\5-C3688.00 Manawatu Gorge Transport Assessment\Report - Evidence\Appendices\Drawing\51-38113-A-00 - Standard\51-38113-A-11.dwg

Higho Consultants

MANAWATU GORGE REPLACEMENT PROJECT

CONSTRUCTION TRAFFIC ESTIMATE

August 2018

Revision No.	Revision	Revision Date	Prepared By	Checked By
01	Draft for Internal Review	02/08/18	JS	GH

NOTES/ASSUMPTIONS:

- 1 movement is a single journey to / from site (a return journey is two movements).
- Estimated construction traffic movements occur between 7am and 6pm, Monday to Saturday.
- Construction traffic estimates assume that some plant, equipment, materials etc will not be readily avialable in Woodville (and surrounding areas) and the Contractor will choose to transport these to the Woodville side of the route from Palmerston North. For example it may be more cost effective to mobilise cranage, site facilities, heavy eathrworks plant etc to the eastern side of the route from Palmertson North rather than Hawkes Bay or The Wairarapa.

BRIDGE TO BRIDGE SECTOR & MANAWATU RIVER BRIDGE				
ACTIVITY	**ASSUMED ROUTE**	**ESTIMATED DURATION**	**VEHICLE TYPE**	**FREQUENCY**
Site Establishment including services diversions, forming laydowns, setting up compounds, accesses, fencing, initial erosion & sediment control etc	PN – Site	3-4 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		1-2 weeks	6/8 Wheeler Tipper Truck & Trailers	20 movements per day
		3-4 weeks	Light Vehicles	40 movements per day
Site Clearance, Demolition & Vegetation Removal	PN – Site	2-3 weeks	6/8 Wheeler Tipper Trucks, Logging Trucks	40 movements per day
		2-3 weeks	Light Vehicles	30 movements per day
Strip Topsoil, Bulk Earthworks, Engineered Fill & Drainage (Seasonal)	PN – Site	20-24 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		20-24 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		20-24 weeks	Light Vehicles	60 movements per day
Pavement Construction & Sealing (Seasonal)	PN – Site	12-16 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		12-16 weeks	6/8 Wheeler Tipper Truck & Trailers	30 movements per day
		12-16 weeks	Light Vehicles	80 movements per day
Manawatu River Bridge South Abutment & Superstructure Construction	PN – Site	70-80 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		18-20 weeks	Concrete Trucks	40 movements per day (max)
		70-80 weeks	Light Vehicles	40 movements per day
Installation of signage/barriers/road markings, landscaping, planting etc	PN – Site	8-10 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		2-3 weeks	Concrete Trucks	10 movements per day (max)
		8-10 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		8-10 weeks	Light Vehicles	30 movements per day

WESTERN SLOPE SECTOR & MANAWATU RIVER BRIDGE NORTH ABUTMENT				
ACTIVITY	**ASSUMED ROUTE**	**ESTIMATED DURATION**	**VEHICLE TYPE**	**FREQUENCY**
Site Establishment including forming laydowns, setting up compounds, accesses, fencing, initial erosion & sediment control etc	PN/Ashurst – via 985 Saddle Road - Site	3-4 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		1-2 weeks	6/8 Wheeler Tipper Truck & Trailers	20 movements per day
		3-4 weeks	Light Vehicles	40 movements per day
Establish Temporary Rail Crossing & Access/Haul Routes to Site	PN/Ashurst – via 985 Saddle Road - Site	5-6 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	6 movements per day
		5-6 weeks	6/8 Wheeler Tipper Trucks	20 movements per day
		5-6 weeks	Light Vehicles	20 movements per day
Site Clearance, Demolition & Vegetation Removal	PN/Ashurst – via 985 Saddle Road - Site	3-4 weeks	6/8 Wheeler Tipper Trucks, Logging Trucks	10 movements per day
		3-4 weeks	Light Vehicles	30 movements per day
Form crossing over QEII covenant area (bridge assumed)	PN/Ashurst – via 985 Saddle Road - Site	12-16 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		3-4 weeks	6/8 Wheeler Tipper Trucks / Concrete Trucks	10 movements per day
		12-16 weeks	Light Vehicles	30 movements per day
Manawatu River Bridge North Abutment Construction	PN/Ashurst – via 985 Saddle Road - Site	10-12 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		8-10 weeks	Concrete Trucks	30 movements per day (max)
		10-12 weeks	Light Vehicles	20 movements per day
Build viaduct over existing high value forest area (steel or precast superstructure assumed - scope to be confirmed)	PN/Ashurst – via 985 Saddle Road - Site (including north river bridge abutment)	60-70 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		18-20 weeks	Concrete Trucks	40 movements per day (max)
		60-70 weeks	Light Vehicles	40 movements per day
Strip Topsoil, Bulk Earthworks, Engineered Fill & Drainage (Seasonal)	PN/Ashurst – via 985 Saddle Road - Site (including north river bridge abutment)	20-24 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		20-24 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		20-24 weeks	Light Vehicles	60 movements per day

Pavement Construction & Sealing (Seasonal)	PN/Ashurst – via 985 Saddle Road - Site (including north river bridge abutment)	12-16 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		12-16 weeks	6/8 Wheeler Tipper Truck & Trailers	30 movements per day
		12-16 weeks	Light Vehicles	80 movements per day
Installation of signage/barriers/road markings, landscaping, planting etc	PN/Ashurst – Saddle Road - Site (including north river bridge abutment)	8-10 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		2-3 weeks	Concrete Trucks	10 movements per day (max)
		8-10 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		8-10 weeks	Light Vehicles	30 movements per day

TE APITI WIND FARM & RIDGE SECTOR				
ACTIVITY	**ASSUMED ROUTE**	**ESTIMATED DURATION**	**VEHICLE TYPE**	**FREQUENCY**
Upgrade/Extend/Divert Existing Wind Farm Access Roads & Fencing etc	PN/Ashurst – via Saddle Road & Wind Farm - Site (50%) Woodville - via Saddle Road & Wind Farm – Site (50%)	2-3 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	6 movements per day
		6-8 weeks	6/8 Wheeler Tipper Trucks	20 movements per day
		6-8 weeks	Light Vehicles	20 movements per day
Site Establishment including forming laydowns, setting up compounds, accesses, fencing, initial erosion & sediment control etc	PN/Ashurst – via Saddle Road & Wind Farm - Site (60%) Woodville - via Saddle Road & Wind Farm – Site (40%)	3-4 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		1-2 weeks	6/8 Wheeler Tipper Truck & Trailers	20 movements per day
		3-4 weeks	Light Vehicles	40 movements per day
Existing Wind Turbine Decommissioining & HV Cable Diversions	PN/Ashurst – via Saddle Road & Wind Farm - Site (80%) Woodville - via Saddle Road & Wind Farm – Site (20%)	3-4 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	6 movements per day
		3-4 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		3-4 weeks	Light Vehicles	20 movements per day
Site Clearance, Demolition & Vegetation Removal	PN/Ashurst – via Saddle Road & Wind Farm - Site (30%) Woodville - via Saddle Road & Wind Farm – Site (70%)	3-4 weeks	6/8 Wheeler Tipper Trucks, Logging Trucks etc	10 movements per day
		3-4 weeks	Light Vehicles	30 movements per day
Construct Box Culvert Underpass	PN/Ashurst – via Saddle Road & Wind Farm - Site (60%) Woodville - via Saddle Road & Wind Farm – Site (40%)	6-8 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		1-2 weeks	6/8 Wheeler Tipper Trucks	10 movements per day
		6-8 weeks	Light Vehicles	20 movements per day
		60-70 weeks	Light Vehicles	40 movements per day
Strip Topsoil, Bulk Earthworks, Engineered Fill & Drainage (Seasonal)	PN/Ashurst – via Saddle Road & Wind Farm - Site (50%) Woodville - via Saddle Road & Wind Farm – Site (50%)	28-30 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		28-30 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		28-30 weeks	Light Vehicles	60 movements per day

Pavement Construction & Sealing (Seasonal)	PN/Ashurst – via Saddle Road & Wind Farm - Site (50%) Woodville - via Saddle Road & Wind Farm – Site (50%)	38-40 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		38-40 weeks	6/8 Wheeler Tipper Truck & Trailers	70 movements per day
		38-40 weeks	Light Vehicles	80 movements per day
Installation of signage/barriers/road markings, landscaping, planting etc	PN/Ashurst – via Saddle Road & Wind Farm - Site (70%) Woodville - via Saddle Road & Wind Farm – Site (30%)	12-14 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		3-4 weeks	Concrete Trucks	10 movements per day (max)
		12-14 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		12-14 weeks	Light Vehicles	30 movements per day

EASTERN SLOPE SECTOR				
ACTIVITY	**ASSUMED ROUTE**	**ESTIMATED DURATION**	**VEHICLE TYPE**	**FREQUENCY**
Site Establishment including forming laydowns, setting up compounds, accesses, fencing, initial erosion & sediment control etc	PN/Ashurst – via Saddle Road - Site (40%) Woodville - via Saddle Road - Site (10%) Woodville – Eastern End of Site (50%)	3-4 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		1-2 weeks	6/8 Wheeler Tipper Truck & Trailers	20 movements per day
		3-4 weeks	Light Vehicles	40 movements per day
Establish Access/Haul Routes Along Route	PN/Ashurst – via Saddle Road - Site (20%) Woodville - via Saddle Road - Site (30%) Woodville – Eastern End of Site (50%)	3-4 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		3-4 weeks	6/8 Wheeler Tipper Trucks	30 movements per day
		3-4 weeks	Light Vehicles	30 movements per day
Site Clearance, Demolition & Vegetation Removal	PN/Ashurst – via Saddle Road - Site (20%) Woodville - via Saddle Road - Site (30%) Woodville – Eastern End of Site (50%)	4-5 weeks	6/8 Wheeler Tipper Trucks, Logging Trucks etc	20 movements per day
		4-5 weeks	Light Vehicles	30 movements per day
Construct Bridge at CH 13000	Woodville – Eastern End of Site (100%)	12-16 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		3-4 weeks	6/8 Wheeler Tipper Trucks / Concrete Trucks	10 movements per day
		12-16 weeks	Light Vehicles	30 movements per day
Strip Topsoil, Bulk Earthworks, Engineered Fill & Drainage (Seasonal)	PN/Ashurst – via Saddle Road - Site (10%) Woodville - via Saddle Road - Site (40%) Woodville – Eastern End of Site (50%)	28-30 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		28-30 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		28-30 weeks	Light Vehicles	60 movements per day
Pavement Construction & Sealing (Seasonal)	PN/Ashurst – via Saddle Road - Site (10%) Woodville - via Saddle Road - Site (40%) Woodville – Eastern End of Site (50%)	38-40 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		38-40 weeks	6/8 Wheeler Tipper Truck & Trailers	70 movements per day
		38-40 weeks	Light Vehicles	80 movements per day

Installation of signage/barriers/road markings, landscaping, planting etc	PN/Ashurst – via Saddle Road - Site (30%) Woodville - via Saddle Road - Site (20%) Woodville – Eastern End of Site (50%) ite (50%)	12-14 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		3-4 weeks	Concrete Trucks	10 movements per day (max)
		12-14 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		12-14 weeks	Light Vehicles	30 movements per day

WOODVILLE GATEWAY SECTOR				
ACTIVITY	**ASSUMED ROUTE**	**ESTIMATED DURATION**	**VEHICLE TYPE**	**FREQUENCY**
Site Establishment including services diversions, forming laydowns, setting up compounds, accesses, fencing, initial erosion & sediment control etc	PN – via Saddle Rd - Site (20%) Woodville – Site (80)%	3-4 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		1-2 weeks	6/8 Wheeler Tipper Truck & Trailers	20 movements per day
		3-4 weeks	Light Vehicles	40 movements per day
Site Clearance, Demolition & Vegetation Removal	Woodville – Site	2-3 weeks	6/8 Wheeler Tipper Trucks	10 movements per day
		2-3 weeks	Light Vehicles	30 movements per day
Strip Topsoil, Bulk Earthworks, Engineered Fill & Drainage (Seasonal)	PN – via Saddle Rd - Site (5%) Woodville – Site (95)%	10-12 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		10-12 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		10-12 weeks	Light Vehicles	40 movements per day
Pavement Construction & Sealing (Seasonal)	PN – via Saddle Rd - Site (10%) Woodville – Site (90)%	8-10 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	10 movements per day
		8-10 weeks	6/8 Wheeler Tipper Truck & Trailers	30 movements per day
		8-10 weeks	Light Vehicles	40 movements per day
Installation of signage/barriers/road markings, landscaping, planting etc	PN – via Saddle Rd - Site (30%) Woodville – Site (70)%	4-5 weeks	Transporters, Low Loaders, Flat Decks, Hiabs etc	20 movements per day
		1-2 weeks	Concrete Trucks	10 movements per day (max)
		4-5 weeks	6/8 Wheeler Tipper Truck & Trailers	10 movements per day
		4-5 weeks	Light Vehicles	30 movements per day