

HIGHWAY 22 MOTORCYCLE STUDY – WAIKATO DISTRICT COUNCIL

Abstract

Today it is no longer acceptable to New Zealand communities that death or serious injury occurs within the road transport system.

Waikato District Council as a rural road controlling authority has recognised that Highway 22, a low trafficked rural road that is a significant motorcycle route and is the number four recreational ride in New Zealand, offers an opportunity for Waikato District Council to work towards delivering excellence for these users.

National studies of motorcycle safety outcomes in New Zealand have demonstrated that short lengths of road, historically have recorded nearly half the costs of serious injuries and death in New Zealand. This study has focussed on the motorcycle mode by investigating:

1. The road environment and its safety deficiencies
2. Transportation as a service in terms of operational maintenance delivery
3. The responsibility of the motorcyclist user in achieving safety outcomes

The study outcomes provide conceptual programmes of investment for identified motorcycle safety deficiencies within the road environment and the Waikato District Council asset management policy, operational maintenance procedures, and the investment challenge to drive motorcyclist safety responsibility and investment under the motorcycle levy investment programme. This study's outcomes form the basis for an initial predictive motorcycle outcomes asset management tool that through continuous improvement will in the future drive all three outcomes of the study.

Objectives

Highway 22 is the fourth most popular motorcycle recreational route within the top ten New Zealand recreational motorcycle rides. The route offers rider enjoyment and represents, on weekends, a motorcycle dominated usage of this rural topographically challenging and scenic route.

This study vision is to eliminate death and serious injury motorcycle crashes on this popular motorcycle recreational summer weekend ride.

The study objectives are to:

- Create a series of safety improvements to address crash severity on the 80km route.
- Identify and create operational and asset management procedures that create a motorcycle friendly route.
- Enable motorcyclists to actively take responsibility for their own safety.
- Ensure improvements are not detrimental to, and where possible benefit, other road users on the route.

Waikato District Council

The Waikato District Council (WDC) manages a 2,414 km road network, stretched over a wide geographical area with varying topography. In addition, the standards of maintenance and design that have been inherited during district boundary shifts have resulted in a road network with levels of service that are not always consistent, which is an important consideration in the safe system design approach for road safety.

Motorcyclists, as vulnerable users, inherently have a much higher exposure to risk than other vehicle drivers.

WDC has identified road safety as its highest priority in its business case developed for its road investment strategy for road users. The highest risk routes in the district have been identified and are being treated to a consistent standard. The Highway 22 project will bring benefits to all users, and by recognising the route as a specific motorcycle route it brings a targeted approach to improvements that are considered to provide higher benefits at lower costs to ratepayers and road users.

The Problem

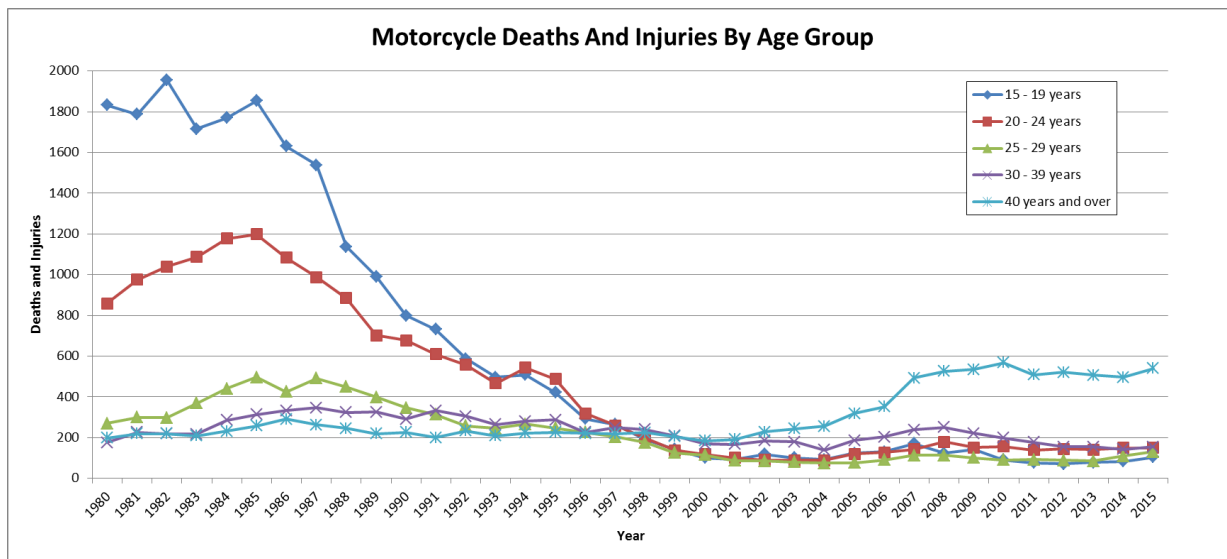
The route is approximately 80km long comprising Highway 22 and Ohautira Road. Seven serious injury and seven minor injury motorcycle crashes have been reported on this route in the last five years. All but three of the crashes occurred at the weekend and all were between October and mid-April.

Two crashes reported loose material on the road as being a factor, two involved oncoming vehicles when either the oncoming vehicle or the motorcyclist was on the wrong side of the road, and one involved a mechanical fault with a motorcycle. Rider error appears to be a key factor in the other nine reported crashes.

An existing roads safety audit indicated the following features could contribute to crashes occurring or could influence their severity:-

- Inconsistent seal width varying between 5.8 m and 8.0 m.
- Manmade hazards such as concrete drainage drop structures and projecting rail track iron used as retaining wall posts.
- Natural roadside hazards such as drop-offs and trees.
- Non-compliant and poorly maintained safety barriers (Note: even compliant well maintained barriers are not necessarily motorcyclist friendly in New Zealand as very limited design consideration is given to this mode).
- Localised pavement defects which are considered by the maintenance contractor as minor. These could be from poor subgrade conditions, lack of historical maintenance or instability of the underlying ground conditions.
- Inconsistent advisory speed signage.
- Inconsistent road marking and delineation – centreline marked throughout but edge lines used intermittently.
- Occasional debris and detritus on the road e.g. gravel from unsealed driveways, stock faeces.
- Variable, and sometimes deficient, temporary traffic management.

What do we know about motorcycle safety?



Motorcyclist crash rates have been rising since 2000 with the specific poor performing group of riders being the over 40 year old group. This group is commonly known as the ‘born again’ motorcyclists group. These riders are returning to riding on nice weekend summer days on selective routes. KiwiRAP outcomes indicate that a small percentage of the New Zealand transport network is very close to where half the serious and fatal motorcycle crash outcomes in New Zealand occur. Since 2007 approximately 1,200 motorcyclist injuries have occurred annually.

Where do crashes happen?

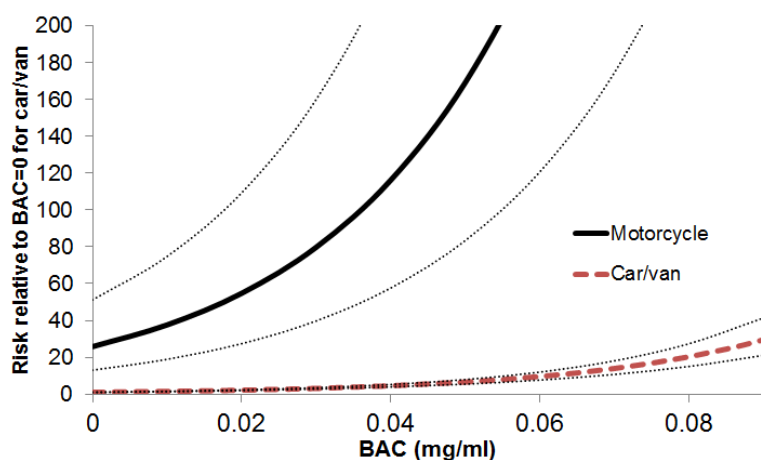
Type of Road	Fatal Crashes	Injury Crashes	Total Crashes
Urban	52	2518	2570
Open Road	160	1985	2145
Total	212	4503	4715

Research in New Zealand to date points to motorcycle death being strongly speed related. However, what this really means is ‘speed differential’ deaths. The records show 34 percent as travelling too fast for conditions and 47 percent as travelling too fast, resulting in death. This does not enable understanding of the impacts within the roading system or of other vehicle users. However, if the motorcyclist does not make contact with an object or vehicle, the speed related crash probability of a fatal outcome is significantly reduced. In terms of motorcyclist friendly design, under a safe system approach eliminating the hazard of the speed differential is the key to success.

Understanding Risk

Motorcycling is returning in popularity today as a commuter and recreational transport mode. Current motorcycle designs are not crash worthy and rely heavily on the rider skills and their capability to address crash risk.

Fitted curves



The above New Zealand research from CAS data by ACC demonstrates impairment risk. In reality, the data is based on alcohol and drugs impairment. However, it also demonstrates that motorcyclists need to have far greater training, experience, fitness for task and observation skills as part of their transport capabilities to that of a car driver or other users.

It is considered that this research finding indicates motorcycle riders cannot be impaired (alcohol, drugs, bad mood, or just being mentally not alert or being fatigued) during any trip, if a rider is to safely and efficiently use the transport system.

As the research demonstrates, riders' risk is so high that an incident will happen; it is just a matter of where and when. This appears to be especially applicable to the so called 'born again' motorcyclists who are now dealing with modern motorcycles and may not have the appropriate training, fitness and skills to safely negotiate the limitations within the existing roading system. Manufacturers have and are improving motorcycles, with some manufacturers having a vision of producing a motorcycle design that is crash worthy and in the future. For example, Honda's rider assist, and BMW's digital crash worthy motorcycle vision.

Awareness

Waikato District Council are fully aware that despite motorcycling being the first form of motorised transport worldwide, limited infrastructure exists that is specifically designed to eliminate death and serious injury outcome for these vulnerable users.

Waikato District Council is also aware of the excellent research and solutions that have been developed in New Zealand and worldwide. As the asset owner and operator, the motorcycle key issue is to identify what the problems are ahead of developing solutions. Waikato District Council saw an opportunity to assess if this route could maintain its functionality as a safer motorcycle route. In addition to this, Waikato District Council would like to enable other future studies to utilise the techniques used to identify safety problems and predict crash potential as an innovative way to improve safety over time, while also collecting and continuously improving the study tool for the Highway 22 motorcycle route.

. The study team also wanted to use and challenge the current motorcycle problem identification knowledge available today in New Zealand and worldwide.

This paper seeks to forge ahead with identifying safety issues and through this innovative

approach to address issues based on evidence while also recognising the constraints of an RCAs within the New Zealand political system and financial regional economy.

Methodology - logical and transparent project approach

Improving motorcycle safety in New Zealand is one of the top five highest priorities within the National Safer Journeys programme.

Waikato District Council proposes that success for this project requires 'outcomes led thinking,' in the development of a motorcycle route safety tool that aligns with the New Zealand Safer Journeys strategy.

This safe system approach enables high levels of team collaboration and a focus on 'the problems' that motorcyclists face within the transport system. The solutions to the transportation failure issues have already been identified in such works as:

- Making Roads Motorcycle Friendly - Motorcycle Safety Advisor Council
- The New Zealand Motorcyclist Perceptions and Experiences of Riding and Risk and their Advice for Safety study
- The Motorcyclist Motivations and Attitudes to Safety - TRL
- The Effective Targeting of Motorcycle Safety Countermeasures in New Zealand – Monash
- The various South Coromandel Motorcycle Safety Demonstration reports.

What these references do not identify is - 'What is the problem' or how do we predict future problems to enable proactive investment into motorcycle safety.

Waikato District Council has focus on a project level tool that will systemically address the what, when, how and why of safety for motorcycle users of Highway 22, and be a tool that will be able to be applied proactively, responsibly and sustainably by Waikato District Council as well as its safety partners and agents.

As a project team, the focus was to drive alignment to motorcyclist outcomes and their needs within the study area by establishing:

- What is happening?
- Why outcomes are happening?
- When to apply improvements?
- How practically and sustainably identified issues can be addressed and predicted?
- As well as what is the best way to transfer this knowledge and drive practical continuous improvement towards the goal of eliminating death and serious injury on this route?

The study was conducted through the following phases.

Phase 1: The investigation phase

This study began with an inception meeting. The meeting was important to get to know each other and establish the various networks and contacts, as well as to confirm the study route extents of Highway 22 study and to source and exchange all available information from Waikato District Council as well as safety partners.

Once the information and data was provided to the study team it was collated, and provided the basis to inform participants at the study workshops.

The study team then undertook a short Gap Analysis which was discussed with Waikato District Council at a second meeting to highlight areas and risks where important evidence to inform the study route may need to be sourced or be specifically undertaken.

The key motorcycle safety risk concerns identified were the:

- Existing road environment safety deficiencies.
- Lack of operational maintenance.
- Rider risk taking.

The study focussed on what is needed to develop identifiers for the motorcyclist route safety issues.

To achieve this, the study team undertook:

- An 'Existing Road Safety Audit' specifically for motorcyclists of the entire route in both directions.
- A video survey carried out at two locations over three days at labour weekend.
- Assessed safety programs using the 'safe system framework analysis'.
- Created spatially located maps that can be linked to RAMM and Waikato District Council video data.
- Issues were risk assessed in workshops with concerns ranked within the matrix from the Road Safety Audit Procedures for Projects – Guidelines (interim release May 2013) as this is well-accepted in determining safety risk throughout New Zealand.
- Analysis of the CAS data was undertaken to identify reported motorcycle and motorcycle involved crashes, and this become one of the parameters in the motorcycle safety prediction tool developed.
- Waikato District Council's traffic volumes, motorcyclist user interview data, maintenance specific issues and records data have also been part of the study assessment.

This formed the audit and analysis investigation phase of the study and the basis of the Route Specific Motorcycle Safety Assessment report. This investigation completed the what, when, how and why of the study to inform the workshop participants.

The workshop phase focused on the best way to transfer the knowledge obtained into practical long term programs, asset operational management and road user engagement recommendations that the prediction tool can, over time, drive practical motorcycle safety delivery towards the goal of eliminating death and serious injury can be established.

Phase 2: Challenging and engagement phase

With Phase 1 of the investigation completed the study team began by undertaking a workshop where the study findings through engagements with participants were challenged, debated and tested through engagement with the participants that own and operate the transport system every day as those who are responsible for motorcycle safety.

These sessions also enabled the recommendations and tool to be tested as to whether the Motorcycle Assessment Framework criteria met the route requirements as well as its application onto other potential transport futures on this route.

The workshops include participants and focus groups such as:

- Waikato District Council asset management and maintenance contactor workshop and its safety partners as a study area workshop.
- Waikato District Council, safety partners and motorcyclist as a study area workshop.
- A systemic delivery training session for the key network operations, asset management and maintenance contractors to focus on motorcycle safety.

These workshops were structured evaluations for interactive, knowledge sharing and for open discussions that enabled evaluation and focus onto the motorcycle site assessment criteria, usability and motorcycle user's safety delivery on this specific route.

The workshops enabled participants to:

- Confirm the outcomes sought
- Establishing the existing trends and outcomes
- Forecasted future trends and outcomes
- Identified the probable future motorcycle and vehicle mix issues
- Debated the understanding of the environment and its effects on motorcyclists
- Identified user limitations and behaviours
- Enabled participants to engage and discuss potential criteria for a motorcycle tool to predict safety changes from investments, operational maintenance and rider responsibility
- Enabled asset and operational maintenance procedures to be understood and challenged
- Maximised value for money and practical application within appropriate budget constraints
- Undertook structured findings sessions with participants to provided evidence based support for motorcycle safety champions to disseminate.

The outcomes of this interactive 'brainstorming,' of the investigation findings and issues sessions has been used to enable the development of programs and the draft tool through the engaging and challenging workshops.

The outcomes enabled the team to refine and develop the basis for the:

1. Study routes motorcycle safety deficiency assessments
2. Spatial concept solutions report for further design on the route
3. Targeted asset maintenance opportunities for motorcycle safety

4. Basis for a Motorcycle Assessment Framework Tool.

The report and the tool could then be further tested in the third and final 'output phase.' The output phase was undertaken to ensure the report and tool meet the valuable investigation and engagement outcomes of the study and that they align to the objectives of the project.

Phase 3: Output phase

In this final phase the Study Team began by undertaking an interactive meeting with Waikato District Council to confirm the aspects of the four deliverables that by now Waikato District Council were fully familiar with, having been fully engaged during Phase 1 and 2 and having contributed through the structured review and alignment to goals and objectives for the study.

Following these interactive sessions the Study Team completed the:

- Highway 22 route safety assessment report as a draft.
- Highway 22 route concept level solutions with spatial maps.
- Motorcycle Route Assessment Framework Tool and continuous improvement process as a draft.

At the time of this paper Phase 2 is completed and Phase 3 is underway.

Conclusions

At the time of this paper submission the study has not been completed, but indications to date have identified the following:

- The need for a multi-year asset management improvements programme to develop a safe system motorcycle friendly Highway 22 route.
- The importance of operational maintenance in the delivery of a motorcycle friendly safe route.
- The need to enhance motorcyclist personal skills, resilience, concentration and capabilities, so that riders take responsibility and are using a well maintained motorcycle for their personal safety and the collective safety and travel experience of other road users.
- The importance of facilities and education to inform riders and enable positive outcomes, such as rider 'rest areas' along this 80 km route.
- The RCA requirement to critically predict motorcycle outcomes on this route in the prevention of death and serious injury motorcycle crashes on low volume rural roads proactively. This can be achieved through undertaking structured continuous improvement assessments that enables the new prediction tool to be improved against quantitative and qualitative data.

The study has utilised the newly developed safe system analysis framework tool to innovatively assess operational maintenance as an asset management tool that aligns with Waikato District Council policy. It has touched on the need to understand riders to develop new motorcycle safety responsibility initiatives.

The study outcomes and tool enable this innovative safe system approach method to be applied by Waikato District Council for other routes and across other RCA jurisdictions to create motorcycle friendly routes for users. This approach will proactively address the high risk of death and serious injury outcomes for motorcyclist on Highway 22.

The Highway 22 study found no evidence that indicated that any motorcycle friendly and safety

provisions did not also benefit all other road users in their travel and land use interactions. The study concept initiatives are designed to provide motorcyclists, other users, rate payers and government agencies with appropriate efficiency, cost effectiveness as well as flexibility and adaptability for change as community demands and motorised vehicles change along with the regional economy and land use interactions within this transport network.

Acknowledgments

The study team wish to thank the following for their respective valuable contributions to the Highway 22 Motorcycle safety study:

Wayne Furlong – Waikato District Council – Roads Asset Management Team Leader

Nathan Hancock - Waikato District Council – Road Safety Engineer

Rob Bullick – Waikato Principal Investment Advisor - NZ Transport Agency

Marceli Davison – Waikato Regional Road Safety Advisor - NZ Transport Agency

Monique Haines – Waikato Regional Road Safety Co-ordinator

Chris Smith – Passmasters Rider Training

RoadSafe Risk – Motorcycle Routes <https://roadsafetyrisk.co.nz/>

MSAC – Motorcycle Safety Advisory Council

Waikato District Council Road Safety Coordinator – Megan Jolly

NZ Police – Andrew Heath and Neil Mansell