



## Abstract overview

### Wednesday 10 August

#### **A proactive approach to addressing crash risk on DOC roads. Jay Baththana, Abley Limited**

The Department of Conservation (DOC) is a road controlling authority (RCA) responsible for almost 1,100 kms of public road. These roads are predominantly unsealed, low volume roads, connecting other RCA roads to key tourist and recreational destinations on public conservation land all over New Zealand.

The crash record over a ten-year period shows run-off road and head-on crashes are the most common crash types on DOC roads; however, many crashes on these remote roads are not reported. The limited crash record, combined with low traffic volumes, makes it difficult to assess risk across DOC's road network using crash data alone.

Therefore, a proactive risk assessment framework was developed to identify high risk DOC roads. A set of actions were then developed to quantify improvements to the network.

High-risk roads were identified by using the three basic components of crash risk: exposure, likelihood, and severity. Forty-five roads that satisfied the pre-set criteria within the framework were classified as high-risk roads.

Consequently, DOC is carrying out safety inspections to validate the risk and identify appropriate low-cost interventions, ranging from driver information through to on-road infrastructure changes, that will address the crash risks on those roads. The project is ongoing.

Bio - Jay is a Transportation Engineer who specialises in Road Safety and Transport Planning. He has ten years' experience working on various road safety projects in New Zealand and overseas. He has Road Safety audit qualifications and applies his skills to promote the safe system approach and work towards vision zero.

## Thursday 11 August

### **Seeing is believing – providing performance**

#### **Logan Taylor, Fulton Hogan**

The Stratford District Council General Road Maintenance contract was secured by Fulton Hogan in April 2019. A key requirement of this contract is “The Contractor is expected to develop, execute and monitor maintenance strategies which will ensure the proper and long-term performance of the principal’s assets”.

This presentation covers how we are tracking over the past 2 years, the challenges we have faced and just how we have tracked and improved performance across the Stratford district.

Bio – Logan is a department manager running the Stratford District Council roading maintenance contract. Logan has spent 6 years in the infrastructure industry and 12 years in Road transport. He understands the importance of fostering good relationships and serving the public. Logan believes our people are our greatest asset and has the ability to work collaboratively from “Suits to boots” clearly communicating ideas and delivering solutions.

### **Under 35 presentations**

**Presentation order confirmed closer to the time.**

#### **Design and testing protocol for Local Authority Networks. Jamie Clark, Fulton Hogan**

The introduction of the NZ Guide to Pavement Evaluation and Treatment Design (Rehab Guide) in 2017 significantly expanded the investigation and design process for pavement rehabilitations. Due to the lack of other guiding documents, many Councils followed Waka Kotahi’s lead and required that the Rehab Guide be adhered to in their maintenance contracts. Although the guide is based on best practice, its approach to pavement investigation is more suited to sites with higher traffic volumes and risk. However, many council roads have traffic volumes that are significantly lower than the State Highway network and do not require such a robust level of investigation in order to gain the information required for a design to be undertaken.

Fulton Hogan have developed a client-focussed Design and Testing Protocol for Local Authority Networks based on our extensive design and construction experience throughout New Zealand with the aim of offering a more targeted practical approach to designing rehabilitations. The Protocol allows a more cost-effective solution, while still satisfying the Client’s performance expectations. This in turn enables our Clients to ensure their maintenance program delivers more value for money, with less focus on digging test pits and more focus on maintaining roads.

Bio - Jaime is a Pavements Engineer in Fulton Hogan’s Engineering Solutions team. His past roles have included Site Engineering and Project Management of various civil infrastructure projects. Jaime’s interests include design and construction of Low Volume Roads and the creative solutions that can be implemented on these projects.

#### **Bridge Barrier safety screening. Michael Woodward, WSP**

The risk of a serious or fatal crash is significantly greater at or near a bridge or major culvert than on a typical road section. However to date, there has not been a standardised process to quantify the crash risk at structures on New Zealand roads. To achieve the safe system goal of a road system free of serious injuries and death, we must fully understand the factors that influence crash likelihood and severity. Through crash data analysis, reviews of past studies and discussions with industry experts, WSP and Waka Kotahi have developed assessment criteria and a methodology for screening bridge networks. Factors such as narrow width, high vehicle speeds, low-standard barriers, protruding kerbs and surrounding hazards amplify the crash risk. Grading each category provides an overall score to identify and rank dangerous structures. Using this standardised methodology, local authorities can prioritise improvement works and help to secure funding for upgrades on low volume roads. Implementation of the methodology has identified hazardous bridges and large

culverts on State Highway and local authority networks, which can now be prioritised for safety improvements. The research enables targeted spending to save lives and transform existing structure management approaches.

Bio - Michael is a structures asset management engineer working for WSP. Michael is focused on improving and coordinating the management of infrastructure throughout its life cycle. He has worked with Waka Kotahi and local authorities to assess and treat risks facing road and bridge networks

#### **Road to nature. Lia van den Kerkhof, WSP**

It has been more than 3 years since the construction of the “Road to Nature” field trial led by Tūhoe. There were two trial sites in Te Urewera which were constructed using tall oil pitch (TOP) as the stabilising material. While the Rosie Bay site had to be abandoned due to accidental grading and thus damage to the stabilised pavement during the first year of the project, the Mangapae site has performed well with minimal maintenance treatments over the past 3 years. The site has exceeded all expectations in terms of its dust suppression and resistance to failures (such as potholes and corrugations) that are common for unsealed gravel road surfaces. This treatment method has shown merits as an alternative option for unsealed road networks. Investigation into samples extracted from the site indicate the TOP binder has been retained as first constructed. In this presentation, we will examine the surface friction of the site, quantify the effect of ageing of the binder over its service life and investigate whether the material can be recycled and re-used to improve whole-of-life cost of this treatment selection.

Bio - Lia is a research scientist in the pavements team at WSP. She works across a wide portfolio of projects focusing on the rheological characterisation of bitumen, epoxy bitumen, development, and investigation of more sustainable alternatives to bitumen, re-use of waste materials and the development of performance-based specifications.

#### **Network performance using Fault data. Gurpreet Singh, Downer New Zealand**

The assessment of Low Volume Roads condition (roughness, rutting, texture) is often infrequent, so what can we do if we are not collecting this condition data regularly for these roads? Networks that Downer support collect faults across all severity classes from routine inspections which we call “All Faults”.

This presentation will show how we use this data for managing low volume roads through;

1. Development of a deterioration model which can utilise the All faults as a proxy for condition to calculate pavement & surfacing Defect Score.
2. The identification of ‘high cost’ sections using Fuse reporting. This allows enquiry from various perspectives such as renewal planning, maintenance activity management, asset performance and financial management.
3. Tracking network condition over time utilising “All faults” and assigning a ‘severity index’ to this data to get a network condition score.

Bio - Gurpreet has a Master of Engineering at Auckland University. After working on collection of data from Long Term Pavement Performance sites all over New Zealand he then worked as an Asset Engineer for Waitomo DC. Gurpreet is now with Downer, an Asset Engineer, working on east coast north island council networks.

### **A Road into The Future – Using AI to Identify Unsealed Road Defects. Danielle Turner, Lonrix**

This presentation, will discuss how AI is reshaping the way in which we can manage our roads, generate meaningful data, identify problem areas, and oversee all from your home or office. Lonrix has, for the past 2.5 years, been developing various deep learning model applications under our AI product, JunoIntelligence. Using computer vision and convolutional neural networks, Lonrix has demonstrated success in their approach to AI development and real-world application, passionately looking to the future of road maintenance. Here, we will discuss JunoIntelligence most recent trial on unsealed roads distress detection using go Pro videos, challenges that are unique to Low Volume roads, and the future possibilities in overcoming these.

Bio - Danielle is the project coordinator for the JunoIntelligence product developed by Lonrix and moderates the progress and performance of these developments. A graduate of Computer Science (2017) she has been with Lonrix since August of 2017 working intensively with the JunoViewer software as a tester and technical support specialist. She later moved into a hands on role coordinating the Artificial Intelligence projects and JunoViewer integration of which she brings her experience of academic research in AI and almost 5 years of working with JunoViewer, asset management software designed for civil engineers.

### **Unsealed Roads Inspections. Mark Chamberlain, Ashburton DC**

Following on from the 2019 workshop and the presentation by Lee and Ros from HEB Construction Ltd on setting up our unsealed inspections, I will present on the results of the five completed inspections (six monthly), issues found, the response from elected Council and future use of the information.

Bio - Mark is the Roding Manager at Ashburton District Council. This follows 38 years at Selwyn District Council (and Ellesmere County Council prior to amalgamation in 1989) predominantly on roading maintenance and construction.

### **Good roads cost less – Do we have the balance right? – finding the proof for unsealed roads. Scott Mackenzie, Mackenzie District Council and Grant Holland, Waugh Infrastructure Management**

In the days of performance management data and evidence-based decision making, is there still room for gut feel, working from first principals, seat of the pants decisions, out of the box thinking and innovation? What approach drives efficiencies and the asset management outcomes sought? In one of New Zealand's most challenging, diverse & changing environments Mackenzie District is on a path of change and transition. Balancing today's demands and levels of service with a sustainable management for the long term is a constant juggle and balance of risk. There needs to be room for trial and error, testing, learning, constant improvement and innovating along the way (Nothing ventured, nothing gained). The Roding Manager having full oversight of the transportation operation-has shown experience & working with the contractor and the community can deliver good results. Decisions made today have a long-lasting impact.

Presentation considerations.

- The traditional approach of the past
- The challenges
- The balance maintaining fit for purpose network would look like in the future?
- Our sustainability goals?
- Our vision?
- Are we on the right track?

Bios - Scott, Roding Manager, Mackenzie District Council. As Roding Manager for the past five years Scott has a hands-on knowledge of the Mackenzie District and the issues faced. Scott is keen to innovate and see the network serve the community effectively.

Grant, Waugh Infrastructure Management. Grant is an asset management specialist contributing to local, national, and international transport practice. He is a regular presenter at IPWEA events.

**End to End unsealed network management. Andy Brown, Northland Alliance, and Tim Ward, Broadspectrum**

This is the story of the Northland Transportation Alliance and the Northland Maintenance Contractors and how we began changing the unsealed road network in Northland into a more sustainable, more customer focused network that provided levels of service embedded into the maintenance contracts and used ONF/ONRC to do it.

Asset Management and planning - The first steps were for us to understand and develop a plan. This involved data, data and more data. We collected loads of data, geometry, traffic, freight and in particular forestry and then built a model (in parallel to IDS and dTIMS) that predicted re-graveling of pavements and re-graveling of wearing coarse across the whole network.

Performance Aggregate - Paige – Green was key. Having sources that we knew would do the right job in the right place meant we could deliver the specific outcomes from our model reliably. Knowing that we could expect a certain return on investment by having invested time into developing material supplies that delivered real world solutions to the unsealed networks was a significant breakthrough.

Delivery - This was our biggest hurdle, getting a change across the whole region to a uniform delivery required a lot of time and investment in staff. Teaching grader drivers' new tricks and getting our engineers to write the specs into our maintenance contracts so it became our BAU treatment was a slow journey but 3 years on we are now seeing real world improvements network wide.

Bios – Andy, Northland Transportation Alliance Asset Manager - I've been involved in the industry for over 20 years, my early career was developing and refining the data collection for LTPP dTIMS calibration sites. I've had time on the shop floor with FH, first as a maintenance manager on the wellington NOC then as an asset manager and now I currently live and work in the winterless north as part of the Northland Transportation Alliance Asset management team.

Tim Ward – Ventia Maintenance Contract Manager - has been in the industry since 2008 working on a variety of projects and contracts across the Northland region, and has spent the last 6 and a half years with the Kaipara District Council Road Maintenance and Renewals contract based out of Dargaville, Kaipara. With the large majority of the network being unsealed, development and implementation of strategic unsealed maintenance practices has been key to the contract's success. After delivering a joint presentation about unsealed renewals practices in 2017, Tim is happy to return to provide an update on the status of the continued improvement, and collaborative approach employed over the last 5 years.

**Gisborne District Council Polycom Unsealed Roads Trial. Amal (Jimmy) Prasad, Downer New Zealand**

The Gisborne District Council like many local authorities in Aotearoa, is challenged with high demands from forestry loadings, poor local material quality, and climate change impacts. These challenges make providing an appropriate level of service on unsealed roads difficult for the limited funding available.

The Gisborne District Council (GDC) and Downer identified that traditional methods of unsealed road maintenance may no longer be sustainable given these local challenges and so decided to trial an alternative method. The team agreed to trial the Polycom stabilising agent because of the benefits being identified from its use in the forestry sector and Jimmy's past experience with the product in Fiji for similar challenges.

The team identified Ngakoroa road as the ideal candidate to test the effectiveness of the Polycom product. The site in question had significant longitudinal and horizontal grade changes making it a challenging site to trial the product. This presentation will focus on;

1. Why we felt it necessary to depart from traditional maintenance methodologies and why this site was chosen for a trial.
2. Why we chose Polycom as a product to use for the trial and how it was constructed
3. How the site is performing and the benefits it presents from level of service and economic contexts.

Bio - Amal (Jimmy) is a Roving Asset Engineer with over 20 years of Asset management, Roving and Transportation experience in both Fiji and New Zealand. Currently working for Downer as an Asset Manager for Gisborne State Highway and Local Road Contract. He possesses broad engineering experience encompassing most aspects of roving maintenance and construction works.

### **Utilizing New Zealand's Geothermal resource for dust control. Che Kranenburg, Geo 40**

Innovation – Geothermal aquifers are found all over the world and are high precious future minerals. However, geothermal power generation is inherently restricted by silica scaling in reinjection pipes. It is a significant cost and production problem for geothermal power plant operators. Geo40 has created a process to recover silica and other future minerals from the hot water prior to reinjection, which dramatically reduces the issue of silica scaling.

Naturally sourced - The Geo40 process for making colloidal silica mimics what nature has been doing throughout history, e.g., once known as the seventh wonder of the world: The Pink Terraces. Steam is separated from hot geothermal water and used to generate renewable power (seen naturally as a geyser venting into the air). The Geo40 process utilizes the dissolved silica to grow colloidal silica nanoparticles. In nature, silica over time forms a solid and builds beautiful natural silica sculptures around geysers and geothermal pools. In this process, the colloidal silica nanoparticles are filtered out of the water, washed of trace minerals, and then grown using geothermal heat into final customisable solution-based products relevant in multiple traditional and emerging markets.

Uses for dust & sediment control – Colloidal silica can be applied to erosion prone areas to create a protective barrier against sediment pollution. It can also be added with applications of magnesium chloride to increase performance life. When added with magnesium chloride applications Geo40's colloidal silica reacts with the magnesium chloride to form a hydrogel effectively trapping the natural soils. This hydrogel reduces the release of magnesium ions therefore reducing dust creation and sediment run off. Geo40 has an experienced team with test rigs available throughout NZ.

Bio - Che is an experienced Environmental Advisor with a demonstrated history of working within both the New Zealand and Australian markets. Qualified with a Master of Science (M.Sc.) focused in Sustainability Studies from University of Southern Queensland and a Bachelor of Environmental Science from the University of Waikato. A Soils & ESC Specialist and Engineering Geologist by trade, Che is passionate about sustainably lowering the impact of construction with Geo40's emerging nanotechnologies.

## Friday 12 August

### **National Land Transport Programme funding Jacqui Hori-Hault, Waka Kotahi NZ Transport Agency**

Jacqui is going to share the Regional Model as part of the Transport Services Operating Model.

Bio – Jacqui is the Regional Manager Maintenance & Operations for Tamaki Makaurau me te Tai Tokerau since May 2021. Jacqui returned home from the UK with her family 16 years ago. Jacqui has predominantly worked in Maintenance and Operations roles. She took a break and then worked as a Consultant for 4 years developing the Northland RLTP, on various projects as Project Manager, Engineers Representative and MSQA for what was known as Minor Works. She started with NZTA in 2018 doing what she is passionate about working in Maintenance and Operations area. Her first role was as the Service Delivery Manager for Northland. When the implementation of the new Maintenance & Operations model started, she held first the Journey Manager role, followed by the acting Maintenance Contract Manager and Senior Network Manager so understands the interchanging of the roles and the importance and value they bring.

### **Inspecting and maintaining structures on Low Volume Roads in Taranaki. Nicholas Zglobis, WSP**

WSP provides a quasi-real time overview of the condition and asset management of structures on LVR within the Taranaki Network

This presentation gives a brief overview of some of the unique structures, under, over and on the roads and a selection of the monitoring and reporting tools used.

WSP assists with inspection and maintenance of structures on low volume roads within the Taranaki region. This includes structure types, materials, ages, specific topography and road users.

The subsequent analysis brings in other data sources and focusses on life cycle management, condition reporting, asset performance and risk profile.

Inspection and data analysis on 10 years of structural and routine maintenance has enabled:

- **Robust** funding forecasts for 3, 10 and 30 year horizons.
- Risk (and **opportunity**) identification within the network
- **Proactive** recommendations for actions through the long term collaborative contracts in place between client, contractor and consultants.

The presentation will also include a summary of recent developments utilised, such as UAV, ROV and 3D scanning to enhance current knowledge of specific assets and inform future maintenance.

Bio - Nicholas is a WSP Senior Engineer, CMEngNZ & CEng (UK) with 11 years' work history across a broad range of assets, environments, and industries.

His New Zealand experience covers the inspection and maintenance supervision of structures on 5 State highways networks and 9 local authority roading networks.

### **Bitumen Emulsion Stabilisation. Nikhil Vishwanath, Road Science**

Bitumen stabilisation is the term South African's use in their TG2 guide to encompass both a road stabilised with foam bitumen or bitumen emulsion as these are just different mechanisms of mixing bitumen into the aggregate base. Laboratory tests by Road Science show a bitumen emulsion stabilised aggregate with 1% cement has similar properties as a foam stabilised mix with 1% cement except less residual bitumen is needed with the bitumen emulsion which is also supported by the TG2 guide.

Although, a low-cost application explored by Road Science is simply applying 1.5% residual bitumen emulsion without the addition of lime or cement when stabilising the base aggregate to a depth of 100mm. This is a way of improving the flexibility of the pavement whilst also increasing the waterproofness of the base course aggregate. Testing and trialling done by Road Science has proven

that adding bitumen emulsion to base course vastly improves the wet properties of the base course making it comparable to dry, unbound base course performance. This waterproofness prevents potholes and rutting seen in wet weather especially under first coat seals and can extend the sealing season. This application of bitumen emulsion is another tool in the tool kit for pavement designers to use to reduce the risk of a granular pavements failing early while not incurring the significant extra cost of a structural asphalt pavement.

This presentation will discuss the problem that emulsion stabilisation is solving, lab testing and field trial results that have been completed and the types of applications that would benefit from bitumen emulsion stabilisation.

Bio - Nik is the Technology Implementation Manager for Road Science. "What does this mean?" most people ask. Basically, it entails working with people much smarter than him and taking the clever developments these people make in the lab and scaling it up to commercial sized quantities. Nik's role manages the implementation of new technology in the materials and IoT (Internet of Things) space. Nik tries to ensure this transition is as smooth as possible to ensure new products reach the market in a fast but controlled manner.

### **Delivering safe systems outcomes for Low Volume Roads**

**Anna Bray-Sharpin**

New Zealand's Road to Zero Strategy and the Safe System Approach to Road Safety - Considerations for Rural Roads

Anna is Principal Advisor - Speed, Infrastructure and Urban Mobility

Anna joined Waka Kotahi in late 2020. Most of her experience comes from the international sustainable mobility sector, where she previously held roles with the Centre for Sustainable Cities at the World Resources Institute (Washington DC) and the Institute for Transportation and Development Policy (Sao Paulo and Mexico City). In these roles Anna developed guiding publications, contributed to policy and legislation revision, and advised cities on how to adopt the safe system approach, with a particular focus on speed management. This included facilitating workshops and exchanges between cities as part of the Bloomberg Initiative for Global Road Safety.

Anna has a BSc in Environmental Studies and Human Geography from Victoria University of Wellington and a MSc in City Design and Social Science from the London School of Economics.

In her role at Waka Kotahi, Anna is the lead writer on Waka Kotahi's updated Speed Management Guide, a contributing author to the World Bank Global Road Safety Facility's international Speed Management Guide and a member of the Innovating Streets for People (tactical urbanism) Program.