

# IPWEA NZ 2019 Abstracts

The following is current as at 7 May 2019

## Risk, Resilience & Recovery

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### **101 Delivering on Reform: Future Infrastructure Perspectives Enhancing community resilience by joined up thinking**

*Author & Presenter: Sam Ketley, Aon*

*Infrastructure forms an essential part of our communities. The threats and exposures to infrastructure are evolving. Consequently, we need to be looking for better, new and innovative solutions.*

Recent events in NZ and globally have highlighted how communities, and the infrastructure supporting them, can be vulnerable to natural disasters and severe weather. This will be exacerbated by climate change, sea level rise and rapid urban growth. This increasing exposure means that traditional solutions are no longer going to be effective. If we are going to enable communities to survive and thrive in this changing environment we need to look for innovative ways to manage risk.

By applying the basic principles of risk management: accept, adapt, mitigate and transfer, this paper considers how we can learn from best practice and partnerships to create practical solutions for future generations.

### **102 Preparing for the unexpected: challenges in infrastructure investment planning and prioritisation**

*Author & Presenter: SR Uma, GNS Science*

*What are the challenges in planning for infrastructure investments to be answerable to the community under an unexpected event?*

Infrastructure services are essential to support community living. During unexpected hazard events, failures of network components could result in disruption to these services, sometimes to an unacceptable level to the community. Pathways to improve resilience of the networks include: (i) identifying vulnerable parts of the network for a credible hazard scenario event; and (ii) undertaking initiatives that help to reduce service outage times. The talk first presents key elements involved in the assessment of impact of multiple infrastructure networks for an earthquake scenario and identifies factors and challenges in estimating service outage times. Next, it will include how decisions can be made for the investment options that can successfully address socio-economic drivers of the region.

### **103 Hiding in plain sight**

*Author & Presenter: Casey Giberson, Tonkin + Taylor*

*How well are we managing our network of stopbanks, what is at stake if they fail, and how can we improve long term management of these critical schemes?*

Over 100 towns and cities across the country have been built on floodplains alongside rivers.

Billions of dollars were spent building stopbanks, pump stations and related assets to protect our citizens and lifeline infrastructure and enable economic stability by preventing regular flooding of our communities and productive land. The world has changed around these assets since they were built. Social, cultural and environmental values are more important. High intensity rainfall is more frequent. Costs to maintain and upgrade these assets are increasing and unaffordable for some. A different approach is needed.

In this paper, we establish what is at stake if the status quo is maintained, assess how well current management practices will serve future citizens, and make recommendations on improving delivery of flood protection services and infrastructure.

## **104 Improving the management of disaster waste in New Zealand**

*Author & Presenter: Chris Purchas, Tonkin + Taylor*

*Effective planning for the management of waste generated in a natural disaster can save time, hassle and money when events occur. New Zealand now has a pragmatic but robust approach to improving preparedness for this important aspect of disaster management.*

A New Zealand Disaster Waste Management Planning template and supporting data analysis tool has been developed to improve planning and implementing waste management during disasters across New Zealand.

The template summarises issues for disaster waste management and includes a series of worksheets to capture information and actions to improve disaster waste management.

The data tool combines a range of existing datasets and develops estimates of waste generated for various disaster scenarios and plan for waste management during an event.

The template has been developed drawing on international experience with funding from Regional Councils and the Ministry for Civil Defence and Emergency Management (MCDEM). This paper will outline the planning process and draw on case studies in the Bay of Plenty and Canterbury where waste specialists and CDEM staff worked together to planning for various disaster waste scenarios.

## **105 Insights into Local Government infrastructure insurance**

*Author & Presenter: Glen McIntosh, Tonkin + Taylor*

*Co-author: Ben Lynch, Aon*

*New Zealand has significant natural hazard exposure. Insurance and physical risk mitigation are key components of a resilience strategy which need to be better linked and understood.*

A string of recent losses, both nationally and internationally, means local councils are now facing higher insurance premiums, more stringent requirements and reduced coverage options from insurers.

Tonkin + Taylor and Aon have together been helping local councils in the purchase of natural disaster insurance through detailed hazard assessments and loss modelling, to determine the best solution for risk transfer and improve infrastructure and community resilience.

This paper provides insight into insuring infrastructure in New Zealand. We will summarise the steps to quantifying exposures, enhancing asset management strategy and ensuring optimal risk transfer. We will discuss the uncertainty that can occur during claims processes and how best to prepare beforehand to minimise this.

## **106 Assessing criticality and resilience of Auckland transport network**

*Author & Presenter: May Oo, Auckland Transport*

*Auckland Transport manages a transport infrastructure network of assets that is essential to connect people and move goods across Auckland, NZ's largest and fastest growing city. The failure or disruption to this network will have significant impacts on financial, environment and social wellbeing of the community at both a local and national level.*

As a leading transport authority, it is important that the criticality of transport infrastructure assets is understood to provide guidance on prioritisation of improvements, and to develop mitigation plans and intervention strategies.

To facilitate this, Auckland Transport is in the process of developing and adopting a criticality and resilience framework for its transport network.

This paper outlines the detailed methodology Auckland Transport uses to assess criticality and resilience of the network, key findings and recommendations for further improvements.

## **107a A resilient approach to coastal revetment protection measures adopted along State Highway 6, West Coast, New Zealand**

*Author & Presenter: Greg Cook, WSP Opus*

*Co-author: Matt Balkham, WSP Opus*

*In February 2018, the West Coast of New Zealand was hit by ex-tropical cyclones Fehi (1<sup>st</sup> February 2018) and Gita (20<sup>th</sup> February 2018), which caused significant damage to SH6 at several locations. Wave overtopping and considerable scour forced the temporary closure of the SH6 whereby large portions of the northbound lane were undermined and washed away.*

WSP Opus provided expert technical advice to support the emergency response and designed and are supervising construction of subsequent urgent repair works of several coastal protection structures to reinstate the highway. Discussions of the repair options required an understanding of the long-term viability of transportation links in their current format, and taking a resilient/reformed approach to ensuring existing and future service levels will be maintained in the long-term to minimise the impact of loss of function on primary industries, local communities and the tourism sector.

## **108 Ensuring we remain open for business understanding vulnerabilities and prioritising investment**

*Author & Presenter: Liam Foster, WSP Opus*

*We're only as strong as the weakest link in the chain and why we need to start planning to reduce and avoid the impact of potential impacts on our assets, networks and communities that flooding and erosion has on our infrastructure and it's potential to perform its core functions.*

The paper will focus on the critical need to understand and deliver continuity and recovery plans for our infrastructure in light of the current and future flooding and erosion risks. The paper will showcase how we should understand the weakest link and why we need to undertake systems thinking to highlight the real potential to reduce the impact of the failure and shorten the recovery time saving costs along the way. It will position the need to develop 'continuity or recovery plans', using examples from the Oil and Gas, telecommunications, health and education sectors to identify the benefits of being prepared.

## **109 What does level of service mean for transport infrastructure over recovery from disasters?**

*Author & Presenter: Vivienne Ivory, WSP Opus Research*

*Co-author: P Brabharan, WSP Opus*

*Levels of service for transport networks are often defined in terms of access which may be less appropriate in events where damage is extensive, and recovery is prolonged, such as post-earthquake Christchurch.*

We report on findings from the Natural Hazards Research Platform research project, Building to Recovery, examining the relationship between transport disruption and economic performance at neighbourhood levels. We use data from road damage and repair as an indication of neighbourhood levels of service, finding that higher levels of disruption were correlated with lower levels of economic performance. While the overall network retained functionality, our results suggest localised effects of disruption also need to be understood to fully understand impacts. Extended periods of network disruption leading to unpredictability, route changes, and increased travel time across the network are likely to make life more challenging for everyday business operations, and ultimately, community resilience.

## **110 Impacts and implications of the 15 November 2016 rainstorm for the Wellington highway network**

*Author & Presenter: David Stewart, WSP Opus*

*Flooding and landslides resulting from a significant rainstorm event on 15 November 2016 caused widespread disruption to the Wellington Highway Network.*

The rainstorm on 15 November followed a period of persistently wet weather (and the Kaikura Earthquake the day before)! Rainfall at those gauges closest to the landslides show that this was the wettest November on record; with approximately 250% of the 'normal' rainfall. However, while the rainfall totals were high, the intensity of rainfall was not unusual.

This paper discusses the nature, distribution and impact of these landslides on the highway network. An analysis of rainfall shows that the landslides were likely triggered by large accumulations of moisture in the soil reducing cohesion. 'Antecedent precipitation indices' appear to provide a simple method of identifying increasing risk of slope failure.

The emergency geotechnical response, and subsequent risk and remedial works assessments are outlined.

# Asset Management

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## **201 An evidence-based management system for unsealed roads**

*Author & Presenter: Theuns Henning, The University of Auckland*

*Co-authors: Julie Muir & Andy Bartlett, Central Otago District Council and, Kate Robinson & Andrew Thom, The University of Auckland*

*Unsealed roads remain the backbone of New Zealand's economy.*

Despite being regarded as minor, these roads are the starting points for agriculture products, tourism, forestry harvest and mining. Although much cheaper to maintain than sealed roads, the optimal expenditure on gravel roads is difficult to determine, and there is no national programme to guide authorities. Research into unsealed road management systems has revealed that one of the main stumbling blocks of the system is the significant reliance on intensive data collection. This paper suggests a simple, yet practical way of planning maintenance on unsealed roads that is less data-hungry but answers the main questions.

## **202 Northland got serious about data driven road maintenance management**

*Author & Presenter: Simon Gough, GHD*

*Do you know whether your contractor is inspecting your roads in the frequency set out in the contract or when they will be inspecting a specific road in 7 months? Northland does, every day of the week.*

The Northland Transportation Alliance (NTA), made up of the Far North, Kaipara and Whangarei District Councils, commenced new maintenance and renewal contracts on 1 July 2018. With 5 contracts covering the 5,838km of district roads and a contract estimate of \$219M, this was one of the largest road maintenance and renewals procurement undertaken in New Zealand. The procurement and the contract requirements included a strong focus on the generation and use of data to drive and support decision making for maintenance and renewal operations as well as for wider Council and asset management benefits.

After GHD completed supporting the procurement phase, it has turned its attention to supporting the implementation of the contracts with a special focus on innovative setups and use of RAMM to support the new data driven approach. We all know that we should be using data to make better decisions but it is definitely a lot harder in practice to achieve. Listen to this talk explore the journey that GHD has helped the NTA take to get better data and then how to take advantage of it. This has taken advantage of some modern approaches to using automation, advanced data analytics, delivering the right tools and interfaces for different users as well as ensuring that the contract included the right checks and balances that drive the right data behaviors in the maintenance and renewal contracts.

## **203 Powerplan!! The disruptive spreadsheet destroyer for your renewals planning requirements**

*Authors & Presenters: Willem van Blerk & Kim Fraser, Tauranga City Council*

*Real world renewals planning for all Asset Groups. Producing actual budgets and priorities without needing an IT degree to configure*

TCC implemented Powerplan as a one stop renewals modelling software solution for all assets including Parks & Reserves, Property, 3Waters (reticulation and plant) and Solid Waste. Long term renewals forecasts and budgets are developed for all of these asset types. Real world practical planning inputs including condition assessments, CCTV information, AC Pressure Pipe Manual info, SCADA data, Pump run hours, failure data, criticality assessments and even intuitive local knowledge are used to predict renewal events and develop renewal priority lists. Additional benefits of the system are integration with the AMS, financial system, valuation and depreciation outputs, AMP figures and planning, risk modelling, resilience planning etc. etc.

## **204a Let's aim higher better together**

*Authors & Presenters: Ian Ho, Harrison Grierson & Shane Turk, e-SPartial*

*Asset Information Model (AIM) is at the heart of delivering digital asset management, which connects information requirements from the organisational/corporate level to project/operational levels. Water NZ's National Performance Review 2016-17 identified significant variability among Councils in how water asset data is being collected and managed. This adds unnecessary complexity and difficulty to compare conditions and services levels from different councils.*

This paper discusses the approach taken by four rural councils on their journey on improving their AIM, and reviews of key lessons learnt. Comparison is made with case studies from other industries about their development of an improved AIM, eventually leading to constructing a digital twin of the physical infrastructure.

The authors appreciate the water asset managers being supportive and share their view and experience in this paper.

## **204b NZ Metadata standards update**

*Author & Presenter: Philip McFarlane, WSP Opus*

*Co-author: Greg Preston, Quake Centre*

*This presentation is an update on the current status of the NZ Asset Metadata Standards.*

It will cover:

- The status of the standards in relation to 3 Waters, Transport and Vertical Infrastructure
- The Governance structure and the role of the National Technical Standards Committee
- Implementation plans and current activity.

## **301 Sustainable outcomes – bringing the concept to life**

*Author & Presenter: Tom Mansell, Auckland Council*

*Is imbedding a sustainable outcome approach the key to a city's long-term liveability? Auckland Council Healthy Waters (AC HW) have tested an approach....and it works.*

Unemployment levels, environmental degradation and the affordability of living are just a few of the key challenges our large cities are facing. The good news? Auckland Council Healthy Waters (AC HW) have begun addressing these issues through their 'Sustainable Outcomes' social procurement model.

AC HW recently applied a simple 'Toolkit' approach to drive positive sustainable change on a major stream restoration project (circa \$20M) in central Auckland. The process involved looking beyond lowest price and instead prompted suppliers to consider long-term value-adding community outcomes through the works. The results spoke for themselves – employment opportunities for local youth; empowerment of local community groups; Mana Whenua and school involvement; environmental protection and restoration and reuse of materials onsite. AC HW are now looking to:

- Implement this 'Sustainable Outcomes Toolkit' approach into all projects going forward; and
- Include the approach as part of their long-term operation and maintenance contracts.

This presentation will demonstrate how incorporating a broad values-based approach into the business case planning, procurement and contract process, organisations can contribute to tackling societal challenges and achieve sustainable community outcomes. Sustainable procurement is the answer. The time, is now. Together, let's deliver.

## **302 Who wants to be a billionaire? What would you do with \$2b?**

*Author & Presenter: Ash Deshpande, Harrison Grierson*

*Co-author: E J Wentzel, Hauraki District Council*

*A recent study commissioned by Department of Internal Affairs (DIA) estimated that approximately \$2B will be required to upgrade all waste water treatment plants in New Zealand that discharge to fresh water to meet the current/future requirements of NPS-FM. These plants service 13% of the total population and is approximately 20% of the total wastewater generated in the country.*

This paper will question if there are alternative pathways of investing this money that will have a more beneficial environmental impact and provide a greater "bang for buck". Our approach needs to be catchment focussed rather than achieving an "end of pipe" standard. The feasibility of potential alternatives like offset mitigation, nutrient controls in farms, and grants/investment incentives to farmers may realise better benefits. The paper will also investigate and compare initiatives and practices implemented overseas.

## **303 Bold new approach to partnering for long term wastewater services provision**

*Authors & Presenters: Ewen Skinner, Morrison Low & Stavros Michael, Rotorua Lakes Council*

*Rotorua Lakes Council (RLC) innovative procurement approach to providing world class management and long term cost certainty for wastewater service delivery over 25 years.*

RLC currently operates an extensive wastewater reticulation network and WWTP in Rotorua. Key challenges for RLC were the significant upgrade of the existing WWTP, a pipe network with limited condition information approaching a peak in design life expiration, and a new low pressure network and WWTP coming online in 2019.

RLC undertook an innovative approach to packaging up all wastewater services into a Design Build Finance Operate and Maintain contract for a 25-year period. Worth in the order of \$500M, it included unique collaboration with Iwi throughout planning, design and delivery of the works.

A rigorous procurement process was undertaken involving Early Contractor Involvement where the risk allocation, levels of service, asset management and cost were negotiated to provide an optimum outcome for Council.

### **304a What makes up a consultant's fee**

*Author & Presenter: Ralph Fouché, Stantec*

*You want how much? Professional services always seem so costly. Often the fee structure and mark ups of the consulting engineering companies are questioned.*

You need a consultant to help with tricky project issues but there's a limited project budget available. This presentation will help you comprehend the value/fee arrangement when using consultants.

A common mis-conception is that the professional services firms are making plenty of money with little risk. This presentation will look at what makes up a professional services fee, how fees are structured within a large firm and then more importantly what buyers of professional services can do to get better value from these fees.

### **304b Smarter together – realising excellence across the transport sector**

*Author & Presenter: Andrew McKillop, NZ Transport Agency*

The focus of the REG programme has been enabling a step change in the transport sectors leadership and capability. This ensures the sector is delivering maturing asset management in transportation, improving decision making and building public confidence and value in these essential services.

The presentation shares the programme highlights, in particular the launch of the REG Business Excellence, and Asset Management Competency Frameworks

### **305 SPOTLIGHT Supply Chain Leadership as a Strategic Response to a Workforce Capability & Capacity Development**

*Author & Presenter: David Langford, New Plymouth District Council*

*When construction skills are already in short supply and industry predictions foreshadow a bleak future as an aging workforce begins to retire over the next 10 years, we explore the role of Supply Chain Leaders and the use of strategic procurement to drive workforce development*

High skilled talent is in short supply and already struggling to meet the construction sector's workload demands. A recent report by Austroads paints a bleak picture of the future as it forecasts the NZ roading sector workforce will shrink by 25-30% over the next 10 years as people retire faster than new talent is trained. This presentation will explore the role client organisations, particularly central and local government agencies, have in creating a sustainable future for the construction sector. This will be supported by examples of how the New Plymouth District Council is taking a strategic approach to procurement and creating a culture of Supply Chain Leadership in order to respond to the issues of sustainable procurement, workforce capability & capacity and future talent pipeline management.

### **306 Public infrastructure and projects the options and issues**

*Authors & Presenters: Michael Garbett & Rachel Brooking, Anderson Lloyd*

*Michael Garbett and Rachel Brooking are lawyers that advise a range of Councils in relation to resource management issues and the overlap with provision of infrastructure. This presentation will cover how a successful project can effectively integrate with the provision of public infrastructure.*

It will cover:

- The consenting pathways and how infrastructure can be required, for example conditions of consent, designation or plan provisions.
- The imposition of development contributions, their usefulness and potential problems.
- Development contribution agreements between developers and Local Authorities. How they work and what they can be used for. Tips and tricks on when to use them, and how.
- Working with public infrastructure providers and getting the right infrastructure provided at the right time, including discussing the murky world of Long-Term Plans, Annual Plans, infrastructure strategies, Council operating budgets, and the relationship with private investment.

### **307 So, you're short on cash?**

*Authors & Presenters: Warren Ladbrook, Harrison Grierson & Ulrich Glasner, Queenstown Lakes District Council*

*Proven success with funding applications to NZ Central Government - Creating certainty in the uncertain world of the Housing Infrastructure Fund, the experience developed in Queenstown.*

There is usually more need for funding, than there are funds available - a common experience highlighted during the three yearly LTP process. This cash shortfall results in deferred projects which sometimes are never implemented. However, occasionally there is a pot of funding available from Central Government, but which is challenging to obtain for the projects you have in mind.

Based on the Housing Infrastructure Fund, this paper outlines the challenges which were faced in Queenstown, and which have commonality throughout New Zealand, but also describes the methodologies that resulted in a successful outcome - access to Central Government funding.

## **401 The journey of rebranding public infrastructure for the 21st century**

*Author & Presenter: Deborah Lind, Harrison Grierson, Myles Lind, NZTA*

*Co-authors: Myles Lind, IPWEA NZ*

*A call to arms to positively rebrand and raise awareness of public infrastructure services to better engage our stakeholders and encourage our next generation of infrastructure professionals.*

One of the greatest challenges that we can experience as public infrastructure professionals is when our stakeholders just don't get it. They don't get why the investment we are recommending is important, they can't see what's wrong or why we want to make things better.

Their experience is that public infrastructure just works - out of sight, out of mind, and it's definitely not exciting. If we want our communities and key stakeholders to understand and support infrastructure outcomes, moreover encourage the next generation of professionals to join our sector to drive those outcomes, we need to do some things differently.

## **402 3r needed to take MaaS to masses**

*Author & Presenter: Rekha Kharbanda, GHD*

*Public transport authorities are increasingly looking to embrace innovative technologies to meet user expectations and enable travelers to personalize their journeys.*

MaaS is an innovative new approach to transport of providing a personalized transport choice to customers in real time across multi model options. It gives travelers unrestrained flexibility to choose the most suitable mode of transport for their journey, all on one intuitive platform.

To accelerate MaaS we need to pull both the levers, behavioral change and technology change to make MaaS more acceptable and widespread.

The three factors that have been identified across to really accelerate MaaS and help them;

- Regulation or Reform
- Reward / Incentives
- Real time – Multi modal choices

## **403 Urban intensification challenges**

*Author & Presenter: Nigel Tse, Harrison Grierson*

*Are we wanting to lead the pack or are we happy to be in the peloton*

We have all heard about the sorry state of Auckland's housing issues, the need for over 50,000 new houses just in Auckland alone to deal with the demand in NZ's largest city.

The traditional green field development project in Auckland is now all about maximising yields and squeezing every square metre of development capacity out of every block of land. This level of intensification is not just occurring in Auckland, it is also occurring in Tauranga, Hamilton plus the areas in between which are also experiencing unprecedented growth. Queenstown and its surrounding areas such as Wanaka, Cardrona, Cromwell are also experiencing significant growth in the South Island.

It is understandable that asset owners across the country are struggling to keep up with the issues and demand to support the growth in these areas. This paper will look at some of the issues and innovative solutions that are possible with technology available today to address the issue of wastewater servicing with aging, under sized infrastructure and innovative/smart ways to maximise efficiencies and value within their networks.

#### **404a Lifting the lid on underground assets**

*Author & Presenter: Simon Bottomley, EJ*

*The world has changed. We demand information at our fingertips and we have a thirst for data. Today, we lift the lid on gathering remote data from your underground assets via manhole systems.*

Baby-boomers and Gen X; we have a nagging desire to know how it all works. The new generation of engineers and local government officers have grown up in the age of the internet and social media. They appreciate smart solutions and just expect them to work.

Manhole systems are strategic assets and allow access to water, stormwater, sewer, electrical, gas and communications. In local government engineering there is a need to know how these systems are functioning or an alarm to be sent as soon as something goes astray.

The traditional method of knowing what was happening was to send a field crew to open the manhole cover and visually check. However, with the availability of Low Power Wide Area Network (LPWAN) and battery powered sensors; we now have the ability to remotely monitor and measure our manhole systems from our computers and smart devices.

EJ has developed the iCover manhole cover system which works to allow the signals from sensors to pass through the manhole cover and be transported on the LPWAN.

My paper will talk about the costs of traditional methods and risks compared to the costs of the remote monitoring systems. I will also discuss the types of sensors currently available, their features and benefits and how these may be applied to asset monitoring.

#### **404b Smart infrastructure: An innovative approach for vacuum sewer monitoring**

*Authors & Presenters: Utsuk Shah, Beca and Michele McDonald, Christchurch City Council*

*Co-author: Mo Chalabi, Beca*

*Showcasing the wide-scale implementation of a novel vacuum sewer monitoring system utilising cutting-edge sensor technology to provide smart infrastructure for the resilient city of Christchurch.*

After the 2010 Canterbury Earthquake, Christchurch City Council (CCC) installed three vacuum sewer systems which collectively consist of 1,483 geographically dispersed vacuum chambers. CCC recognised a need to monitor the performance of the vacuum system in order to improve their operational response. The lack of power at sites made this an ideal opportunity to consider emerging Internet of Things (IoT) technology as a solution. In this case study, we describe the drivers behind the solution and the process of installing smart infrastructure whilst managing the associated risks.

#### **408 Drone technology - no more excuses to delay survey**

*Author & Presenter: Lee Paterson, Stantec*

*When the first person on site is trained to operate a drone, site appraisals and initial design no longer need to be a thumb-sucking estimate of the site geography.*

Using drones to survey your site at the earliest opportunity gives basic accurate information for rapid development of design solutions that you can build upon.

Software modelling of aerial photographs can provide a rich 3D, colour, 1:1 scale topographical model, accurate to 5-10cm, to survey datum (when using ground control), as well as a high-resolution flat aerial image.

A single 20-minute flight can model ten hectares, and a site this size would be processed in just a few hours. Then you can take accurate measurements, cut cross sections, calculate volumes and start doing some real design with confidence.

Let me show you an example from start to finish.

## **409 Smart sewer networks - Lessons from overseas and their application to New Zealand**

*Author & Presenter: Philip McFarlane, WSP Opus*

*Changing our approach to sewers, using technology driven approaches to provide smarter sewers that provide improved customer service and environmental outcomes.*

Wastewater systems have traditionally been fit-and-forget. However, this is changing. Aging assets, population growth and increased environmental standards are driving the need for a new approach that integrates monitoring and modelling to actively manage wastewater systems.

Smart sewer systems monitor flows in the wastewater network and forecast changes in weather and other operating conditions to predict flows. They then actively control flows, utilising storage in the system to improve energy efficiency and reduce overflows, delivering improved performance at less cost.

This paper sets out a vision for how wastewater systems can be actively monitored, modelled and managed. It draws on research undertaken by WSP for the UK Water Industry Research (UKWIR) and discusses the applicability of this research to wastewater networks in New Zealand.

The paper identifies that active management of sewers does not need to be complex nor expensive. Rather it is a tool that can be implemented to support management from very simple situations through to highly complex ones.

## **410a The minimalist concept for future urban transportation**

*Authors & Presenters: Ronald Tay & Andrew Collings, Beca*

*Are autonomous vehicles, as seen in Hollywood movies, possible in reality? Will it save us infrastructure space? Research shows we are close to a breakthrough! Flying taxis will debut in trials in Singapore and Dallas-Fort Worth come 2019 and 2020, respectively.*

With the exciting development, there will be a need to re-assess infrastructure and policy requirements that allow for future modes of travel. These technologies were fanciful a decade ago; but with trials in the next six years proposed for New Zealand, decision-makers will have to consider future urban transportation requirements, today.

This paper introduces the minimalist concept - where technology will assist the transport industry in reducing labour (e.g. drivers) and infrastructure needs (e.g. tracks, roads etc.), and also details the necessary policy and infrastructure changes that are required to take us on this journey. Let us look forward to welcoming the range of possibilities in space- and cost-savings!

## **410b Your internet of simple things**

*Author & Presenter: Hugh Blake-Manson, CityCare Ltd*

*The Internet of Simple Things IosT is here - is the slippery slope to a "Terminator" AI type world - reform gone too far?*

An innovative agile design, development and deployment team has demonstrated that this disruptive approach is fact, not fiction. Wide scale deployment of fit-for-purpose IosT devices, communicating small targeted data packets over a low cost wide area network has been achieved within weeks to meet asset owner's needs - this has never been possible before.

Case studies of this technology demonstrate asset owners can step past traditional high end and high cost SCADA systems that have long lead and roll-out timeframes to now provide targeted real-time data. This then allows them to realise new operational efficiencies and improve tactical approaches. The quality and accuracy of these low-cost devices, such as the Made In NZ wastewater manhole LevelSense device provides robust information for updates of water network models.

# Planning for Change

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## **501 The challenge of creating a three waters planning framework that can respond to change**

*Author & Presenter: Daniel Johnson, WSP Opus*

*With reform and regulation imminent, how planning your future planning can provide some certainty in an industry full of uncertainty.*

The future is one of uncertainty with changes on the way in the water industry, along with the constant challenges of providing three water services to manage; growth, climate change, aging assets and affordability.

Waipa District Council recognised the need to develop a planning framework to ensure it could meet these challenges for its communities but be adaptable to change. The framework combined a collaborative approach to understand current constraints and needs, with Community and Strategic goals to deliver the three Water Asset Management Plans.

## **502 What does global warming mean for my sewage works?**

*Author & Presenter: Andrew Springer, WSP Opus*

*The Victorian Water Industry is now mandated to achieve NET ZERO emissions before 2050.*

As NZ is also committed to reduction, it is only a question of When will the NZ industry have to comply with reduced GHG emissions. The key to effective management and reduction is to understand the nature, the source and some of the mitigations. This paper presents the challenge, the nature of emissions and their relative impact, the main sources in our Network and treatment plants, and some of the ways we can offset and reduce to protect NZ for the future.

## **503 Projecting Growth for infrastructure planning**

*Author & Presenter: Mark Baker, QLDC*

*The Queenstown Lakes District continues to grow at an unprecedented rate year on year, with significant new greenfield and infill development coming online to service the burgeoning demand.*

However, a historical reliance on using Statistics New Zealand growth projections as a basis for projecting the quantity and location of growth has proven to be vastly inaccurate when compared to the potential housing supply projected by QLDCs recent assessment for the National Policy Statement on Urban Development Capacity. The development of a new methodology for the population projections has not only given QLDC improved population projections at a census area unit level but has allowed the development of a land parcel level projection to vastly improve infrastructure planning.

## **504 2018 Global Cities Index: learnings & insights for New Zealand**

*Author & Presenter: David Kidd, WSP Opus*

*Insights for New Zealand from the 2018 Global Cities Index, identifying the challenges and opportunities for creating resilient future ready communities.*

A Tale of Our Cities 2018: Global Cities Index assessed 24 cities across the globe including Auckland - comparing how well prepared they are to meet the challenges, demands and opportunities they'll face over the coming two decades, and beyond.

The WSP Cities Index provides insights about how cities are preparing for a future shaped by the major urban transitions of our day: urban density and growth; digital disruption; smart mobility; evolving utility provision and a changing climate.

This presentation outlines WSP's research methodology across four themes: being Places, Mobility, Technology and Urban Systems. Key learnings and insights are identified from leading global cities that are applicable to New Zealand communities, whether they be large metro or regional cities.

Leveraging these insights and best practice initiatives will contribute to developing more connected, resilient and future ready communities where people can live, work and thrive.

### **508 The impact of sea level rise on Local Government owned infrastructure**

*Authors & Presenters: James Hughes, Tonkin + Taylor & Tom Simonson, LGNZ*

*LGNZ has recently completed an ambitious study that quantifies the value of Council-owned infrastructure exposed to sea level rise in 56 of 60 coastal councils.*

In 2018 Local Government New Zealand commissioned a study into the quantity and value of Council-owned roading, 3 waters infrastructure, and buildings/facilities exposed to increments of sea level rise (namely 0.5, 1.0, 1.5 and 3.0m above mean high water springs). The data gathered from 56 coastal Councils paints a detailed and troubling picture of where and how sea level rise and coastal inundation may unfold around NZ.

This paper presents the findings at the regional level and presents recommendations for Councils to begin addressing inevitable impacts from a planning, governance and funding perspective - to enable adaptation decisions to occur.

### **509 On the understanding of groundwater level fluctuations and its effect on infrastructure**

*Author & Presenter: Mark Pennington, Tonkin + Taylor*

*Out of sight, out of mind? The hidden effects that a fluctuating groundwater table can have on infrastructure, natural hazards and the wellbeing of people are gradually being revealed in an ongoing project in Tauranga, with learnings gained from Christchurch cases.*

Continuous monitoring over a wide network of locations has revealed the direct influences of tidal fluctuations and rainfall on instantaneous groundwater levels. Investigation of the interaction and influence of near-surface groundwater level on buried and above-ground infrastructure has been enabled by the availability of such data. Valuable insights have been gained which, when combined with potential groundwater level rise in synch with predicted sea level rise, lead to a need for consideration of changes to ongoing operation and maintenance, to the way redevelopment occurs and potentially to additional constraints in greenfield development. Whereas in the past an assumption of a semi-static groundwater level was taken into account in infrastructure development, the relatively new understanding of the dynamic effects is leading to an enhanced understanding which can now include duration over which groundwater level is elevated above a given threshold.

### **510 Impacts of climate change on groundwater and related infrastructure**

*Author & Presenter: Neil Thomas, Pattle Delamore Partners Ltd*

*Co-author: Katy Grant, Pattle Delamore Partners Ltd*

*Understanding climate change impacts on groundwater will be crucial in developing resilient infrastructure and adaptable strategies for future management.*

The impacts of climate change on surface water, for example changing flooding effects and increased irrigation demand, are widely publicised and provide a visible reminder of the potential effect of an increase in global temperatures. However, there are a wide range of potential effects on groundwater that will affect infrastructure. Those effects include sea level rise affecting coastal groundwater supplies, including those used for drinking water; higher coastal groundwater levels affecting underground infrastructure and stormwater/wastewater infiltration; changes in river flow patterns affecting seepage to groundwater and groundwater chemistry; and changes to patterns of groundwater recharge and discharge, affecting groundwater levels with follow on effects on groundwater availability. Details on each of these effects are presented, as well as potential adaption strategies

# Public Health & Safety

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## **605 Revisions to drinking-water standards for New Zealand**

*Authors & Presenters: Sarah Burgess and Kathryn Jessamine, Ministry of Health*

*An update on the proposed changes to the Drinking-Water Standards for New Zealand developed by the Drinking Water Advisory Committee for the Ministry of Health.*

The Drinking Water Advisory Committee was formed by the Director-General of Health in November 2017, to provide scientific and technical advice on current and emerging health issues relating to drinking-water quality in New Zealand. The Committee oversees five expert working-groups who are undertaking a comprehensive review of the Drinking-Water Standards for New Zealand.

The Committee is working against the backdrop of the 51 recommendations from the Havelock North Drinking Water Inquiry's Stage 2 Report. Some of these, which were classified as urgent and early, are to be implemented by the Director General using the existing powers under the Health Act. The other recommendations are being considered by the Committee and its working-groups.

By the time of the conference, the changes are expected to be in a presentable state. Their presentation will be part of the roll-out of the revisions and help disseminate the changes to the wider industry.

## **606 Public safety at catchpits - lessons from tragedy**

*Author & Presenter: James Reddish, WSP Opus*

*Co-authors: Dukessa Blackburn-Huettner & Craig Mountjoy Auckland Council*

*Following the tragic death of a young girl in a catchpit in South Auckland, Auckland Council, with the support of Auckland Transport, led a review and risk assessment on catchpit health and safety best practice.*

The outcome from this review is relevant to all catchpit asset owners. The South Auckland drowning is the second recent, recorded drowning in New Zealand associated with a catchpit. Both incidents were linked to members of the public seeking to retrieve personal items. This risk cannot be ignored, or dismissed, particularly as Auckland Council have no appetite for health and safety risks to staff, customers or the community.

Although this study has been driven by a specific incident, a holistic approach has been utilised in an effort to ensure that all risks are considered and that any other risk is not unacceptably increased. Although the likelihood of a person becoming stuck in a catchpit leading to death is rare, this tragedy has identified both activities and design improvements to further reduce the risk to the public.

## **607 Improving drinking-water quality with data**

*Author & Presenter: Michael Howden, Beca*

*Data and technology can support better regulation and insights into the state of our infrastructure to inform better decision-making.*

Through the collection, analysis and publication of data on drinking-water quality and water supply performance, the Ministry of Health is providing increased transparency into the state of drinking-water in New Zealand. The Drinking Water Online solution allows water suppliers and regulators to better work together to improve the quality of drinking-water. This is enabling the automatic integration with water supplier's IT systems to reduce the cost of data collection and reporting. Improved publication and communication of drinking-water quality information will better inform the public regarding the quality of their drinking water. This paper will use the Drinking Water Online project to demonstrate how to leverage data and technology in the management of our infrastructure.

## **608 Temuka water event (asbestos)**

*Author & Presenter: Ashley Harper, Timaru District Council*

*At 4.45 pm on the 5th of December 2017 advice was received that the Temuka Water Supply contained 'enormous amounts of asbestos fibres'.*

Urgent medical advice confirmed that when ingested asbestos fibres are not a health hazard but when inhaled they could cause significant health issues.

A comprehensive media plan was put in place while a strategy was urgently developed to address the immediate problem and implement a long-term solution.

A filtration plant was assembled and immediately commissioned and by the 26th of March 2018 a 450mm HDPE replacement pipeline had been installed at a budgeted cost of \$3.3m.

The presentation describes the timelines, communication techniques, procurement methods, construction details and the outcome of this urgent work.

## **609 Appropriately sized drinking water source protection zones are important to reduce the risk of supply contamination.**

*Author and Presenter: Katy Grant, Pattle Delamore Partners*

*Whilst water treatment and well-maintained infrastructure are important barriers to the contamination of surface water and groundwater drinking water supplies, source protection zones should form the first line of defence, minimising the risk of contaminants reaching the take inlet via control and management of activities within the zone.*

The traditional method of defining zones solely for intake protection and the potential travel time of microbial pathogens, whilst important, does not consider the risks associated with more persistent contaminants, such as nitrate, or other factors. A more comprehensive approach is to initially consider the entire aquifer or catchment before refining source protection zones for different contaminant groups using all the available data, with a conservative allowance for parameter variability and uncertainty. This paper presents specific examples to illustrate this approach.

## **610 Christchurch water supply improvement programme**

*Authors & Presenters: Mike Thorley, Beca, & Bridget O'Brien, Christchurch City Council*

*Following the Havelock North Drinking Water Inquiry and the loss of secure bore water status, Christchurch is undertaking an extensive bore head security improvement programme.*

In late 2017, inspections of wellheads in Christchurch found that they were not secure and did not comply with the drinking water standards. There was a risk that contaminants could enter the water supply. Consequently, the Drinking Water Assessor revoked provisionally secure status. Christchurch City Council (CCC) decided to temporarily chlorinate the city's water supply while the wellheads were remediated.

In light of recommendations from the Havelock North Drinking Water Inquiry, CCC chose to raise over 100 below-ground wellheads above-ground to meet best practice. An extensive \$35 million programme of work is underway.

This paper shows real-world examples of wellheads, discussing the practical realities of remediating wellheads to meet the requirements that are likely to emerge from the Havelock North Drinking Water Inquiry.

# Working Together

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## **705 RATA - Working together 5 years on.**

*Presenters: Jarrod Bates, Fulton Hogan and Dawn Inglis, RATA*

*The Waikato Road Asset Technical Accord (RATA) is on the way to its goal of "Achieving best practice road asset management within the Waikato by improving capability, capacity and outcomes through effective collaboration". RATA brings together the common needs of the participating Waikato councils to improve the management of their roading assets in a cost-effective and consistent manner.*

Since 2014 RATA has facilitated forward works program tours covering each of the 9 Waikato Councils based loosely on NZTA annual plan RAPT tours, with a key focus being on sharing knowledge and experience, and exploring decision making processes currently being applied for programme development to provide a basis for future guidance in this area.

This paper explores the learnings and developments of these tours over the past 5 years

Key learnings:

- The tours have representatives from NZTA, neighbouring councils, industry and RATA. The improvements gained have been a direct result of the collaboration and dedication of the entire group.
- Data analysis can be confusing and mystifying to many, simplifying how the data is displayed and its validity has proven invaluable in improving it.
- Depending on size and complexity of a road network, many challenges may seem the same but are being addressed differently with success.

## **706 Collaborative partnering more than a mission statement**

*Authors & Presenters: Alice Grace & Helen Ramsey, Morrison Low*

*If you want to go fast go alone, if you want to go far go together*

The issues we face in public works engineering are vast and dynamic and the outcomes unknown. Despite this we're expected to drive the best outcomes possible for our communities today and simultaneously prepare for an uncertain future.

Resilience will be achieved by those who are courageous in the partnerships they form. We're talking more than mission statements that are framed and hung on the wall. How can we transform the very frameworks in which we operate to achieve mutually beneficial, sustainable business for all parties?

The future might be unknown but the need for collaboration is certain. How far will you go on the status quo?

## **707a The Rewarewa Creek culvert story - delivering resilience through rapid response**

*Author & Presenter: Craig Mountjoy, Auckland Council*

*It takes vision, the right team and the backing of high-level decision makers to enable implementation of future infrastructure resilience through the recovery of an emergency situation.*

In March 2017 the Tasman tempest swept across the country leaving a trail of destruction. Particularly hard hit was the suburb of New Lynn, Auckland. The deluge, exceeding the capacity of the culvert, led to catastrophic failure of stormwater infrastructure, the wash-out of a major arterial roadway and major disruption to the local and business community. While some saw chaos, others saw an opportunity to bring together various council departments, Auckland Transport, the Local Board and the community to achieve a multitude of outcomes spanning a number of local infrastructure and social objectives. These included, providing 100 ARI stormwater conveyance, building resilience, enhancing water quality, future proofing the arterial route and unlocking the development potential of the upstream catchment, enabling the connectivity in the community developed precinct plans and breathing life back into the local and business community.

## **707b A planner, an engineer and a communications manager walk into a bar**

*Author & Presenter: Gez Johns, GHD*

*A planner, an engineer and a communications manager walk into a bar (except the communications manager doesn't, because he's set his that much higher!)*

Infrastructure developments and change projects today attract such intense stakeholder scrutiny that the importance of effective public relations has never been greater. And yet, while the private sector readily embraces an outside-in philosophy that ties success to a clearer understanding of trends and public sentiment, this approach can still struggle for legitimacy within the linear world of public sector works delivery.

Using contemporary examples, communications expert Gez Johns will explain why gaining social licence has gumped statutory approval, not only as the barometer of project success, but a vital risk mitigation strategy in today's blurred media and social media landscape.

## **707c Injecting client focus into professional service bids – tips for engineers**

*Author and presenter: Donna Smithies, Plan A*

*Risk and opportunity – the two most likely considered factors when putting together a professional engineering services bid. But hang on, what about the client??*

Many professional services providers pack their tender responses and proposals full of technical terms ... after all, if the client is outsourcing professional services, that's what they want, right? By taking a wider view, this presentation considers how professional services proposals can benefit from increased client focus. It will look at both writing styles and document structure and provide tips on how to review and check for client focus in a highly competitive services-focused environment. Aimed at both younger engineers and those with a lifetime of experience, the presentation will provide practical examples and case studies of how to 'sell the benefits' at both a personal and company-wide level.

## **708 Collaboration -we don't know what we don't know**

*Author & Presenter: Chris Olsen, Chris Olsen Consulting*

*This paper identifies what international best practice looks like for successful collaboration, both horizontally across different organisations and also down the supply chain. It provides some overseas and New Zealand examples to demonstrate this.*

It found that while a number of organisations are starting to introduce elements of international best practice for collaborative working, only one organisation in NZ is implementing collaborative working to the international level, and that many working in collaborative/alliance arrangements are not aware of many of the critical requirements for successful collaboration.

Collaborative working within the international construction industry became established in the UK during the 1990s following the Sir John Latham Report and the Sir John Egan Report. The construction industry in the UK had consistently performed in a way that was thought to be wasteful compared to other industries. The above reports drove the business process reengineering of the UK construction sector to work collaboratively so everyone could be winners.

The Institute of Collaborative Working UK was also established in the 1990s and has had a profound impact in setting international best practice for Collaborative Working by capturing the learnings over the past 30 years. These learnings are now documented in ISO 44001 as a structured approach to collaborative working to minimise the risk of failure and to maximise the opportunities.

## **709 The best street in New Zealand – conflict to commitment**

*Author & Presenter: Jeffery Robinson, Tasman District Council*

*This paper covers the design, construction, crisis management, lessons learnt and award satisfaction during the complete demolition and rebuild of a main street.*

It is a rare opportunity to be asked to completely demolish an existing street and replace it with a design that includes almost every asset that local government manages. Whilst doing this we had to ensure that the street remained open

for business. It is important to get it right – to future proof it – to create the desired look and feel that connects the whole town whilst responding to multiple, demanding street users. This paper is about how the project was initiated and completed with an emphasis on how we responded to a major project crisis and overcame it to end up winning the Keep New Zealand ‘Best Street in New Zealand’ award in 2018. Importantly we share some of the many lessons learnt and suggestions on how we could have improved on the delivery of this very public project.

## **710a Changing the way, we engage to drive improvement in our community**

*Author & Presenter: Mike Jeffery, Associate RCP*

*This paper focuses on overcoming challenges faced by the Wellington City Council in the delivery of their URM programme of works, with 113 buildings posing a risk to public safety.*

Reform of Building Act by Central Government was undertaken following the Hurunui Kaikoura Earthquake of November 2016. This required owners of Unreinforced Masonry (URM) Buildings to strengthen and restrain street facing parapets and facades to reduce the risk of falling masonry in future earthquake events. Exploring key processes implemented by Project Management firm, RCP, in conjunction with Council, ultimately led to the successful completion of the programme of works and provided proven recommendations around engagement, funding and procurement models and programme milestones that will be of benefit to others embarking on similar works programmes.

## **710b New glue for forming (and reforming) virtual teams**

*Author & Presenter: Caroline Boot, Clever Buying and Plan A*

*5 surprising ways to strengthen your company whanau.*

In an increasingly virtual work environment, it's harder and harder to get onto the same wavelength as our workmates. Here are five simple suggestions to help.

As our professional world smashes geographical boundaries, it's more and more likely that you seldom or never are in the same room as your work colleagues. Yet, collaboration, teamwork, alignment of values and practices has never been more important.

How can consulting companies create high-performing teams when they have had to cut back on providing fancy offices, business travel and hotel accommodation for their people to congregate in? What practical mechanisms can effectively build shared values, collegial respect, and a single modus operandi - when opportunities to press the flesh are rare?

This short presentation introduces five simple but valuable ways to build your mostly virtual work team into a cohesive, high-functioning, united and companionable crew.