

SMART SOLUTIONS Coastal management



Billions of dollars of local government infrastructure and assets are at risk from sea level rise, according to recent research by LGNZ and Tonkin + Taylor. The impacts will be most significant for water infrastructure and roads. Thousands of properties and businesses are also under threat. **Patricia Moore** talks with specialists from four consultancies helping to manage our crumbling coastlines.

WSP OPUS

Following two ex-tropical cyclones in February 2018, WSP Opus has been designing and implementing repairs to coastal infrastructure along SH6 for NZTA. The work has included consultation with Buller District Council and West Coast Regional Council.

As Matthew Balkham, work group manager – water resources, explains, the projects are not without their challenges.

“At Punakaiki [currently under construction] it was important to get a quick handle on the risk and offer advice on safety and road closures. We also needed to define an acceptable level of service to balance investment in infrastructure against risk, and the needs of the road users.”

Smart solutions require good data to support decision-making, says Matt. “By using unmanned aerial vehicles [UAVs], we’ve collected information that typically includes aerial photos, video and digital terrain model point cloud data.”

He says this has ensured solutions that are robust, and that residual performance risks are understood and managed.

“We’re able to articulate the likelihood of damage and



Seawall under repair by WSP Opus, just north of Pancake Rocks, Punakaiki.

risk of overtopping and inundation through subsequent storms, on replacement or new coastal infrastructure. This enables smarter whole-of-life asset management decisions.”

A plus for councils, is that design information can be used to develop maintenance plans and budgets and take operational decisions – such as road closures – that protect road users.

Matt says the demand to deliver broader outcomes from infrastructure investment is an ongoing challenge.

“Coastal infrastructure is no different. But with a little effort at the design stage we can consider and integrate a wider range of benefits – such as improved recreational opportunities and beach access or improved coastal habitat and ecology – into the provision of coastal erosion and flood risk management infrastructure.”

BOFFA MISKELL

The review of the New Zealand Coastal Policy Statement (NZCPS, 2010) found that while some local authorities are making good progress, others still have work to do. Rhys Girvan is Boffa Miskell’s landscape planner and senior principal, Christchurch.

“Some of the problems for councils are defining the extent

of the coastal environment and differentiating between requirements to preserve natural character and protect natural features and natural landscapes,” he says.

This year, Boffa Miskell has been working with Porirua District Council and the Greater Wellington Regional Council to identify and assess ‘natural character’ within their coastal environment, to help inform the Porirua City Council’s current district plan review.

Rhys says this helps clarify the operation of NZCPS Policy 13 which requires avoiding adverse effects on areas of outstanding natural character and avoiding significant adverse effects on all other areas.

Emma McRae, a senior landscape architect in Boffa Miskell’s Wellington office, says the project team relied on landscape architects working alongside natural science experts to evaluate relevant and accessible data.

“This included our own specialist terrestrial and freshwater ecologists and marine science experts from NIWA.”

The process also involved fieldwork, including aerial reconnaissance, and a series of workshops to collectively evaluate and describe the attributes which contribute to natural character at defined scales.

Rhys adds, “Essentially, natural character can be examined through considering the extent to which biophysical landscape factors have undergone human modification, including the sensory human experience of such modification.

“By comparison, a broader suite of attributes which includes other sensory and associative aspects are assessed when describing, characterising and evaluating a landscape.”

GHD

GHD is developing data-driven insights into the dynamics of the natural, built and social spheres of our country’s shoreline, bringing smart solutions to bear for global and local coastal management challenges.

Anthony Kirk from GHD New Zealand’s Data and Analytics group is working with GHD coastal management consultant Greg Munford to mobilise new digital tools and techniques in the delivery of smart monitoring studies, strategic assessments, evidence-based decision-making and adaptive coastal management plans.

GHD has a number of projects in the planning, piloting and implementation phase.

These typically include installation of telemetered monitoring equipment into stormwater and coastal infrastructure, such as bridges, manholes and groundwater wells – alongside rain gauges, cameras and other remote sensing technology – to monitor real-time flooding, tidal conditions, storm surges, asset conditions and other relevant information.

“It’s about achieving better value for money for investments in coastal and stormwater management initiatives and infrastructure,” says Greg. “Last-minute, reactive and ‘data blind’ responses to long-term and / or event-based coastal hazards can be costly and clumsy.



Top image: Overtopping at Haumoana. From left: Matt Balkham, WSP Opus; Rhys Girvan, Boffa Miskell; Emma McRae, Boffa Miskell; Anthony Kirk, GHD; Greg Munford, GHD; Jonathan Clarke, Tonkin + Taylor.

“Sometimes these only address problems on a localised, temporary or partial basis – for want of a more complete information and knowledge base.”

GHD’s smart monitoring methodologies are geared for councils, communities and companies that are susceptible to coastal inundation and erosion. The methodologies aim to identify, understand and act on the risks and uncertainties projected to accompany climate change, such as sea level rise and extreme weather events.

Anthony believes that benefits from an internet-of-things approach are burgeoning.

“[This is] enabling our clients to automate monitoring, leverage the power of integrated data analysis and make informed decisions on cost-effective asset management strategies to support reliable and efficient infrastructure operation, and to target maintenance when and where it’s needed.”

TONKIN + TAYLOR

The release of the latest Ministry for the Environment guidelines on coastal hazard and climate change has provided a new approach to addressing coastal adaptation. Tonkin + Taylor’s senior coastal engineer Jonathan Clarke says it has also added new impetus within local government to engage communities and find long-term solutions.

As lead technical consultants on the Clifton to Tangoio Hawke’s Bay coastal strategy, (now complete after four years and moving on to the implementation phase) Tonkin + Taylor worked with the council, community panels and elected members to produce the first wide-scale coastal adaptation strategy based on the new guidelines.

The group’s role was to produce coastal hazard and risk assessments for future climate change scenarios covering at least the next 100 years and include economic, environmental, cultural and socio-economic impacts.

“Options are fully developed and costed, then subject to a multi-criteria analysis scored by the community,” says Jonathan.

He notes that the pathway carries widespread support as the options are developed with the community, stakeholders and councils.

Jonathan says lessons learned from the process are now being applied to other areas around the country. Typically, these require a bespoke approach for each location, taking into account the nature and scale of the hazard.

“These range from Wellington’s Makara Beach, to a wide-scale application along Auckland’s 3000-plus kilometres of coastline.

“Councils are facing growing pressure to address issues around coastal hazard and the threat of rising sea levels and erosion, as well as manage council assets within those areas.

“So, it’s important to have a comprehensive understanding of the hazards, how they are likely to change in the future and the options available to mitigate them.

“Without that it’s difficult to produce a long-term strategy to deal with them.” **LG**

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