

Connecting communities following the Lemons Hill slip

You drive 15 km out of Paihia on State Highway 11 towards Kawakawa to get to Lemons Hill. The road narrows through the bush-clad hills and climbs to a crest before plunging down to a left-hand bend and on towards the Kawakawa River. Above that bend is Lemons Hill. Or it was.

Much of Lemons Hill is gone. Where once there was a steep tree-clad hillside, there's now a lot of clear air. The terrain has been stripped bare, with five benches 5 m high carved out of the burnt orange greywacke. With native plantings and hydro-seeding, the greywacke will soon disappear again under a rich carpet of grass and bush.

Lemons Hill changed forever on the morning of 13 February 2018. Above-average rainfall in Northland through winter and spring was topped off by a deluge from ex-tropical Cyclone Fehi. The hillside gave way and an overslip crashed on to the road just after daybreak.

"We haven't done a slip of this size or complexity in Northland before. The Kaikoura earthquake produced extreme examples of overslips, but this was big for the north and our team responded to the challenge," says the NZ Transport Agency's Northland system manager, Jacqui Hori-Hoult.

NO ORDINARY SLIP

The slip measured about 100 m along the road, 50 m high and 80 m wide. A geotechnical assessment and drone survey led to a first estimate of 4-6 weeks to reopen the road. But this was no ordinary slip.

As well as the overslip, the top of the hillside had slipped, and there was about 8500 cu m of loose material sitting as a layer halfway down the hillside and hanging over the road. "The risk at any time after 13 February was that this layer would come down," says Ms Hori-Hoult.

It took 5 months and the removal of more than 50 pine trees and an estimated 50,000 cu m of loose material to tame Lemons Hill. A lot of the removed soil was carted to Kawakawa for use in the foundations of the new Hundertwasser Park Centre, or Te Hononga. In all, repairs, 24/7 traffic management and security cost about \$2 million.

STANDING ON THE EDGE OF A CLIFF

Initial access to the site was via a steep one-way track to the top of the hill, and a top-down excavation began.

Drone footage of the slip on 16 February shows the slippage and destruction of pine trees



The new-look Lemons Hill in Northland – although currently stripped bare, the rock will soon disappear again under a rich carpet of grass and bush



Two months into the work – a steep one-way track to the top of the hill enabled access for machinery, and excavation was carried out from the top down

"When you climbed up the access track, there was a spectacular panoramic view from the top of the hill, but it was like standing on the edge of a cliff, with the road out of sight about 50 m below. From below you couldn't appreciate the complexity of the slip – in fact you really couldn't see anything," says Ms Hori-Hoult.

At first there were just two excavators and three heavy-duty tractor-and-trailer units carrying out one load at a time. It was slow-going, with further heavy rainfall from ex-tropical Cyclone Gita and Cyclone Hola disrupting work for days at a time.

"The weather was always going to play a part. For safety reasons we could only work during daytime hours, with spotters keeping watch, and when it rained we had to stop and wait for it to dry out," adds Ms Hori-Hoult.

About 20 people, including stop/go traffic managers and security working shifts 24/7, specialist engineers, machine operators, spotters and cultural advisors worked on the slip. As well as the excavators and tractor units, they used a six-wheel truck, a truck and trailer, a truck-mounted drilling rig, a 100 tonne crane, a D6 bulldozer, a grader, a road

sweeper, a high-pressure water pump, and abseiling and hydro-seeding equipment. They also brought in a specialised tree grabber from Rotorua for removing trees.

COMMUNITY CONCERNS

While crews worked on the slip, the NZTA worked with local communities and businesses. SH11 is the main route off SH1 for visitors and tourists heading to the Bay of Islands. SH11 connects Kawakawa, Russell and Paihia, so schools, jobs and services were also disrupted. There was an alternative route via SH1, SH10 and SH11, but it added 30 minutes to the journey and unwelcome extra cost.

"We went out to talk to the affected communities and listened to their concerns. From our professional communicators to our stop/go traffic managers, it was a team effort to assure residents, iwi and local authorities that we were there for them and were doing all we could to restore the road. We handed out flyers about the detour route on the roadside and at information centres to reassure tourists and visitors that the Bay of Islands was still open for business," says Ms Hori-Hoult.



The road was able to be opened to one-way traffic 24/7 in late May



NZ Transport Agency Northland system manager, Jacqui Hori-Hoult: "We haven't done a slip of this size or complexity in Northland before"

"We resolved from day one to provide as much information as possible, as quickly as possible, and to open the road as soon as possible. Towards the end of April, we started one-way convoys between 7.30-8.30am and 4.30-6pm. We said it would depend on daily safety inspections and we could close the road at short notice. But hundreds still came and queued."

The NZTA tried to be innovative in its approach to the slip, constantly challenging contractors Fulton Hogan to rethink how they worked so they could open the road, even for limited times. "While we pushed, we also reminded everyone that safety was the priority. That meant no work at night and no work in the rain – and it rained a lot!" says Ms Hori-Hoult.

Another innovative approach brought a plan to dynamically the layer of loose material to speed up the slope clearance. In the end, blasting wasn't needed as the top-down work by excavators reached the level where the layer could be safely broken up and removed. But getting to that point brought a new plan. In April it became possible to push the loose material down the slope and collect it from the road. Suddenly the crews were clearing up to 2000 cu m of material a day whereas before 200-500 cu m was considered a good day.

CUSTOMER-FOCUSED COMMUNICATIONS

The road was opened to one-way traffic 24/7 in late May and to two-way traffic 24/7 in late June. There was a one-lane closure mid-July to install the final kerb, channelling and safety barriers.

Throughout the closures the NZTA used a messaging tool first used after the Kaikoura earthquake, called Campaign Manager. "Anyone could sign up and we sent out email updates sometimes three or four times a week to 380 addresses. It meant people were informed and could plan their lives. Once we established that email contact, we had people writing back, asking questions and sharing information," says Ms Hori-Hoult.

"It meant we understood the need to plan special openings – such as for the International Rally of Whangarei so cars could transit between stages, or so people could get to Paihia for the Mothers' Day fun run. We did our best to balance fixing the road and keeping it open as much as possible. We could see from email responses that our customers got that," she adds.

"We took drone footage of the site and put that on Facebook and Twitter, included photos in media releases, and took media to the site – all so people could see what we were dealing with and the progress we were making.

"We learnt from the whole experience and were able to apply those lessons almost immediately in March when heavy rain washed out State Highway 1 at Pukenui," says Ms Hori-Hoult. "In that event, there was no detour route, Far North communities were cut off, and our quick response, coordination with partners and customer-focused communications were vital to managing the disruption to our network. But that's another story!"



The view from the top was like standing on the edge of a cliff, with the road 50 m below



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EXPOL: Auckland – Tauranga – Wellington – Blenheim – Christchurch (Belfast, Rolleston) – Cromwell

Contact EXPOL
P: +64 9 634 3449
F: +64 9 634 0756

T: 0800 86 33 73
E: sales@expol.co.nz

Technical Advice / Quotes
E: tech@expol.co.nz

Website
www.expol.co.nz