



The Bulletin Kaikōura earthquake update

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Welcome back for 2019

Welcome to the first issue of the NCTIR Bulletin for 2019. If you're a local, you'll have already noticed our people back at work after the Christmas break. It was great to see the roads running efficiently and being well-used during the holidays, as well as the rail corridor, with the Coastal Pacific passenger trains and rail freight trains. Coming back to Kaikōura myself it's been fantastic to see how busy and vibrant the town is over summer with so many tourists and holiday makers coming through.



NCTIR has a full workload planned through to December 2019, with an estimated spend on par with 2018. So NCTIR orange will still be a feature of Kaikōura, and you'll continue to see our friendly stop-go workers managing traffic. Much of this work was already on the cards in 2018: finishing off the Ōhau Point safe stopping area with extra planting and design elements, and completing a further six formal safe stopping areas, as well as 13 informal stopping areas. These will enhance the experience for locals and visitors - and make the roads much safer for everyone. In addition to the previously planned work, we've also had approval on some extra work for the Inland Road, which includes seven bridge repairs and the repair of two slips.

If you're local, and want to know more about what we've got planned this year, we have community information evenings coming up in early February. I really would encourage you to come along if you can, they're your chance to come and ask questions and talk to our people. You can find the full details on these further on in the Bulletin.

It's going to be a busy year for us at NCTIR, and our ultimate aim is to leave the area in a safer, more resilient state for all users. We're geared up to make the journey in 2019 a great one.

Brian Kirtlan, Project Director

Light at the tunnels' end



The December 2018 re-opening of both Parititahi Tunnels for the first time since the November 2016 earthquake was cause for celebration. The inland tunnel was completely buried by a landslide and both tunnels required repairs. Along with those repairs, the twin tunnels required widening to accommodate larger freight vehicles which will help to make State Highway 1 a more efficient freight route.

While repairing the tunnels the crew were able to mill out and provide extra height and side clearance for larger vehicles.

The new 4.6m height allows freight vehicles under the Vehicle Dimensions and Mass rules of 4.3m to travel the road. The original lane widths have not changed and remain as 3.6m.

The iconic tunnels were opened with a blessing and karakia from the acting chair of Te Rūnanga o Kaikōura, Rawiri Manawatu, followed by a huge thanks from the NCTIR management team to all of the crews involved in restoring and improving the tunnels.



The Parititahi Tunnels

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Staying on track

While the NCTIR project moves ahead full-steam in 2019, the integral regular maintenance work continues along the corridor. 'Renewing ballast is part of our regular track maintenance and it's the foundation of the railway,' says Greg Hackett, safety specialist for KiwiRail. 'Ballast holds the railway track and sleepers in place so it's important that there is plenty of it. Since the November 2016 earthquake, the ballast has been disturbed by necessary work that's been going on in the project, and renewing it is an important part of keeping everything on track.'



Rail Protection Officer, Paul Jones at Hapuku



Getting the weight right

The NZ Transport Agency's Weigh Right programme is about keeping a check on heavy vehicle weight compliance as one important measure to help keep roads safe and ensure a level playing field for the freight industry.



New heavy vehicle screening technology is being installed at 12 commercial vehicle safety centres (formerly weigh stations) around New Zealand as part of the new compliance activity. This includes one at Glasnevin, North Canterbury on State Highway 1.

How vehicle screening works

Vehicle screening involves weigh-in-motion or in-road scales and automatic number plate recognition cameras that link to a screening system to detect if a vehicle is potentially overweight.

If it is, the system will send a message to a roadside electronic sign to alert the driver to 'pull in now' to the commercial vehicle safety centre to be checked on the weigh bridge.

Cars, and other heavy vehicles within their weight, can continue their journey uninterrupted.

You can find more information at: www.nzta.govt.nz/weigh-right-programme



NCTIR project information evenings

Please join us for a project update and to find out more about our work in 2019. This will be a great opportunity to talk to our team, have a look at our latest designs and share your thoughts.

Drop in anytime between **6pm and 8pm** at one of our venues below:

Monday 11 February - Hapuku School

Tuesday 12 February - Memorial Hall, Kaikōura

Wednesday 13 February - Matariki Woolshed, Clarence

Thursday 14 February - Goose Bay Campground

Safety and resilience work

The safety and resilience work designed to provide better and safer travel and access to the coastal environment will continue through 2019.

The work between Clarence and Oaro includes:

- Seal widening of the road carriageway
- Installation of guard rails
- Developing seven formal safe stopping areas, two with toilets
- Reinstating 13 informal safe stopping areas
- Realignments of small sections of the road.

As a result of this work there will be ongoing traffic management and 'Stop/Go' around the construction sites throughout 2019. We are aware that this may slow your trip around the coast and appreciate your continued patience.

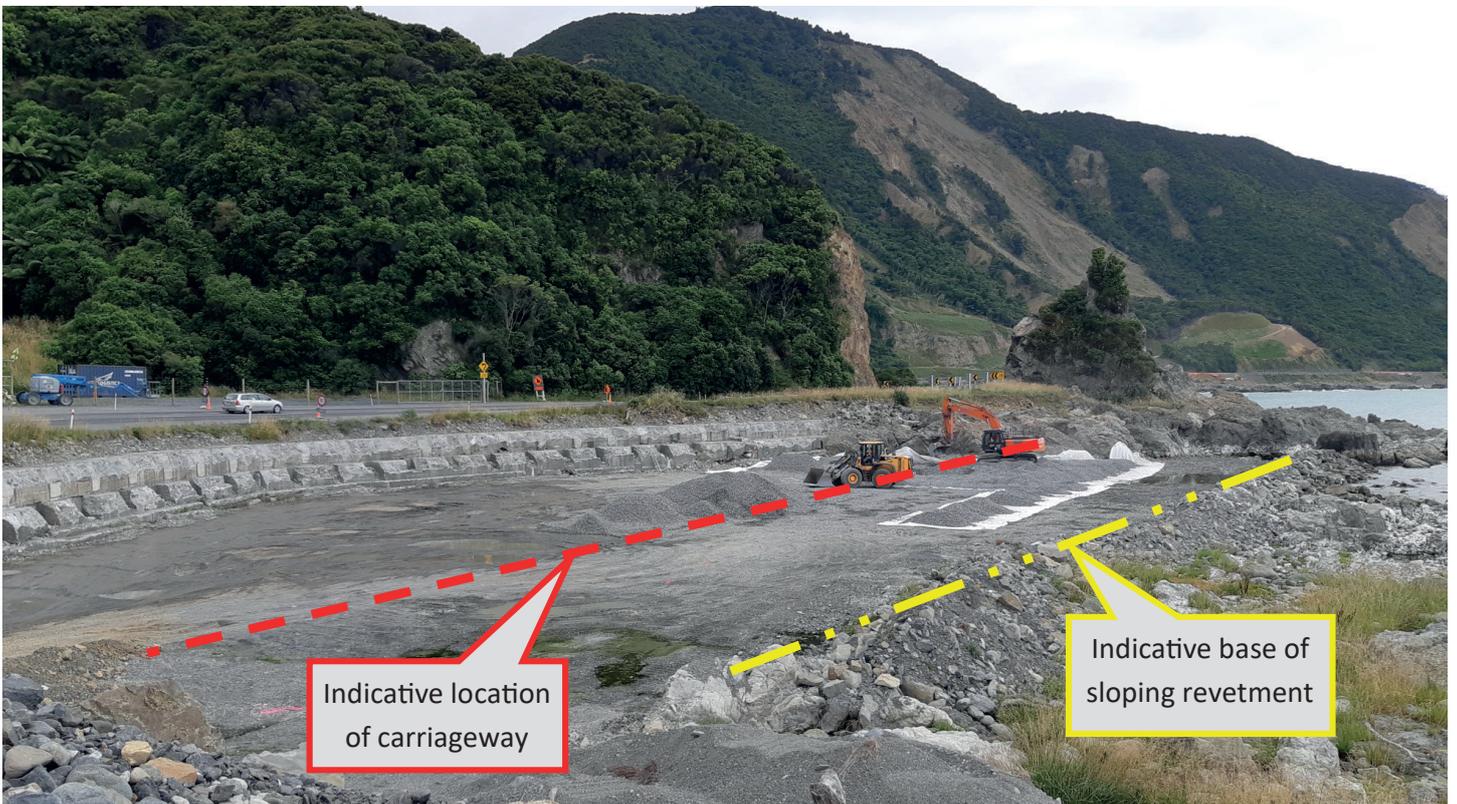
The formal safe stopping areas will be constructed with parking bays, cycle stands, most with beach access, landscaping and in some cases picnic areas and a lookout area.

With safe stopping areas and informal areas in development along the coast the design team at NCTIR along with the Transport Agency and iwi advisors are developing a number of design elements to enhance the

journey along State Highway 1 and to tell the region's story. Illustrative and story-telling panels will be installed in safe stopping areas along the route and there's also an opportunity for art to feature on surfaces, such as retaining walls, tunnels, furniture, fences and the installation of artworks at key points. NCTIR's engineers and landscape architects are also involved in the project to help integrate the safe stopping areas into the coastal environment.

Work has already started at both Half Moon Bay and Rakautara where the road is being realigned, smoothing out the bends to make them safer for cars and trucks. The bends will be slightly straightened moving the carriageway towards the coastline and filling in the area between the existing road and the new alignment.

In preparation, the environmental team has carried out pāua investigations and temporarily relocated bird nesting material which will be placed back into the area post works to recreate the nesting habitats. An assessment of plants and lizards in each of these areas has also been carried out as well as daily checks for birds and fur seals prior to commencement of works. Ramps have been formed to enable machinery access into the bays to construct the seawall and the new road. On the sea edge the final product will have locally-sourced rocks placed in two layers forming a sloping revetment. A revetment is typically a sloping structure placed on banks or cliffs in such a way as to absorb the energy of incoming water.





Take a break!

'Operation Fatigue' is a NZ Police, Transport Agency and Marlborough District Council initiative that focuses on educating drivers about taking a break so they don't endanger themselves or others,' says police sergeant Michael Porter, after directing a vehicle into the designated stopping area. 'We are encouraging people to break up their journey and presenting them with info packs, first aid kits, water, and vouchers for a coffee at The Store in Kekerengu.' The crew is also encouraging everyone to participate in a Transport Agency survey to increase awareness and safety on the roads.



Sergeant Michael Porter directing vehicles into the designated 'fatigue stop' on 19 January 2019



PLAN YOUR JOURNEY SH1 - PICTON TO CHRISTCHURCH

PLAN YOUR JOURNEY - PICTON TO CHRISTCHURCH

Whichever route you take this summer plan ahead and allow enough time for your journey.

Things can change at short notice so please check real-time travel information: call **0800 4 HIGHWAYS** (0800 44 44 49) or visit www.nzta.govt.nz/p2c

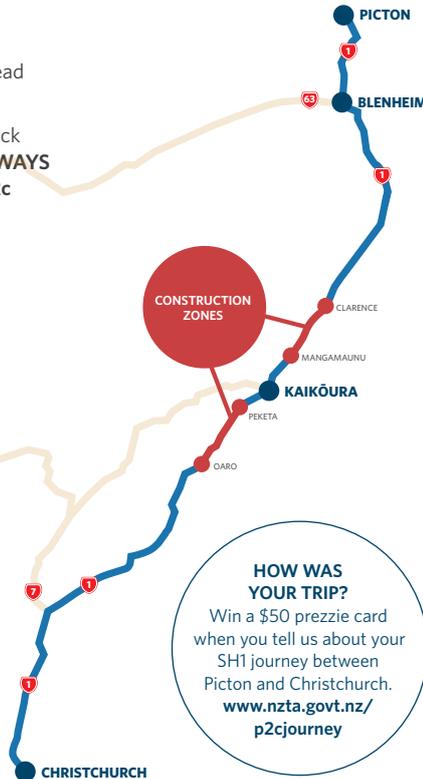
WHAT TO EXPECT ON SH1

Crews are now back working so please be aware that parts of the road will still be under construction, so there will be some unsealed sections, lane closures with stop/go controls, and speed restrictions in place.

Estimated travel time on SH1 between Picton and Christchurch is 5½ hours, but allow plenty of time in case of delays.

Speed limits north and south of Kaikōura have changed - please pay attention to signage.

Please drive safely, follow signage and stay safe on our roads this summer.



DRIVE SAFELY THROUGH ROADWORKS

SLOW DOWN - TAKE IT EASY

journeys.nzta.govt.nz



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Keeping a close eye on journey times

After SH1 reopened in December 2017, NCTIR promised that traffic travelling between Picton and Christchurch wouldn't be delayed by an average of more than 45 minutes.



Angus Bargh

That promise is now the responsibility of our Transport Planning Manager, Angus Bargh, who works with our Programme Managers to minimise the impact of road works on traffic.

To calculate potential delays, Angus looks at the scheduled works and seasonal traffic volumes. When roads are busier, there are longer queues at each site and more traffic to manage through each stop/go, meaning a longer wait for vehicles coming from the opposite direction.

'In some cases, we can end up with over 120 vehicles in a queue,' says Angus. 'A short 400m single lane section adds a two-minute delay for traffic but a lengthy 2km section adds, on average, 12 minutes to journey time.'

Where works are likely to have a significant time impact, he talks to the team about changing their methodology or shifting work to a quieter time.

'If it absolutely must go ahead, predicting the delay ahead of time allows us to let people know their journey might take longer than normal.'

As a result, traffic delays average 20-25 minutes, peaking at 35-40 minutes between September and November 2018.

You'll probably never see him out on the road but rest assured that Angus and the team are there in the background, calculators in hand, helping customers enjoy a faster, safer journey.

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Designing safer journeys at Rākautara and Half Moon Bay

North Canterbury road users can expect safer and smoother journeys around the coastline north of Kaikōura, with two road safer alignments underway at Rākautara and Half Moon Bay. With the realignments next to one another, the same project team of about 30 people will be working on both - widening shoulders, realigning the road and installing additional safety barriers to reduce the impact and severity of crashes. While both sites require safer road alignment to increase safety on the notoriously harsh corners, each has its own unique challenges and opportunities.

The existing seawall at Half Moon Bay has the Hope Fault running directly through it, and as a result experienced major damage in the 2016 earthquake. This meant special thought had to be given to the new design. 'This new seawall design incorporates construction joints every 20 metres along the seawall, allowing 20 metre sections to move without impacting the entire seawall,' says NCTIR Project Manager David McGoey.

The crew have already created access to the beach and begun preparation for the seawall foundation. Once the foundation work is complete, they will be installing the new seawall blocks. Along with improved safety features, the Rākautara realignment will feature landscaping, and a safe stopping area along the coast.

This project will be completed in late 2019. Until then, keep an eye out for our friendly Stop-Go workers managing traffic around the sites.





Progress in the north

Bunds, gabions, terra mesh... north of Ōhau Point, a collection of odd words is being used to describe one of the Southern Hemisphere's largest retaining wall projects.

Since September teams have been using terra mesh (a type of modular retaining wall) to create a bund, or embankment, which will protect both road and rail from frequent rock-falls.

The 500-metre-long wonder-bund is being constructed in two parts, with both sections due to be completed by mid-March.

The project is extremely labour intensive, requiring rock to be placed by hand, but project manager Mike Reilly says the crews have done an incredible job in challenging conditions.

At Ōkiwi Bay, he says his teams have just completed drainage work.

'Now the team is underway building a 50 metre terra mesh bund wall, as well as a gabion wall (a retaining wall using rock-filled cages) and installing seawall blocks for rail and road protection on site,' he says.

Work got underway in October with the installation of a 15-metre-long rock fence, and has now progressed to full construction, with the project due to be completed by late March.

At Waipapa Bay, a 200-metre-long terra mesh bund wall is due for completion by the end of February. Although the road is back to two lane traffic, road users can expect occasional traffic management along this stretch of road, due to ongoing works.

And, on the seaward side of the rail, rock revetment work continues, with approximately three months of work remaining.





Completion after completion in the south

This awesome photo was taken from one of our helicopters at the end of last year, and shows abseilers hard at work drilling the final anchors just south of the Parititahi Tunnels. It was a one of the last steps needed for traffic to flow through both tunnels for the first time since the November 2016 earthquake.



Since joining NCTIR as part of a Downer internship, Canterbury University engineering student, Rory Geare, has made a big impression with the team.

‘It’s been awesome having Rory on board for a season,’ says Site Engineer Liam Mulvihill.

‘He’s learned a lot, and explaining the ins and outs of such a huge project to him is a good reminder of all the work that goes into something like this.’

As Rory’s internship comes to a finish, and he returns to university for his last year of study, he will be doing so with some practical knowledge, and the odd once-in-a-lifetime experience under his belt.



South of Kaikōura, an abseiler installs a bracket for a rope to support the SL150 barrier fence.



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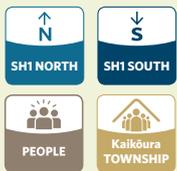


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NCTIR project information evenings



Rākautara resident, Bill Campbell was the happy winner of a jelly bean gabion basket from NCTIR's public information evenings. Bill's guess came closest to the 1,167 jelly beans that were inside the basket.



Your questions answered

During our recent NCTIR project information evenings, you asked us some great questions. We're answering them here so everyone can read our responses.

We'll continue to answer your questions in future issues of the editions of the Bulletin. If you have anything you want to know, please email info@nctir.com. We appreciate your comments and feedback.

Why are there so many guardrails? Wouldn't 'slow down' signs be cheaper and safer?

Guardrails are being installed at various spots along SH1 to help improve safety for road users. They are a safety tool used when the consequences of a vehicle hitting them is less than the hazard which they are protecting. So, for example, they could be installed near an unexpected curve to stop someone going down a slope if they lose control.

'Slow down' signs are a useful road safety tool, but they're not an active road safety measure and don't achieve the same outcome as barriers. We know people make mistakes, and those mistakes shouldn't result in death or serious injury.

The 2018 Government Policy Statement, which sets out the Government's priorities for transport funding, encourages investment in treatments that reduce the risk of head-on and run-off road crashes, such as installing median and side barriers.

People have been seen climbing over the guardrails to get to the beach, is this safe?

The guardrails we're installing are only 790mm high, so people can easily step over them to access the beach. But drivers will need to make sure they're parked in a safe and appropriate place before leaving their vehicle.

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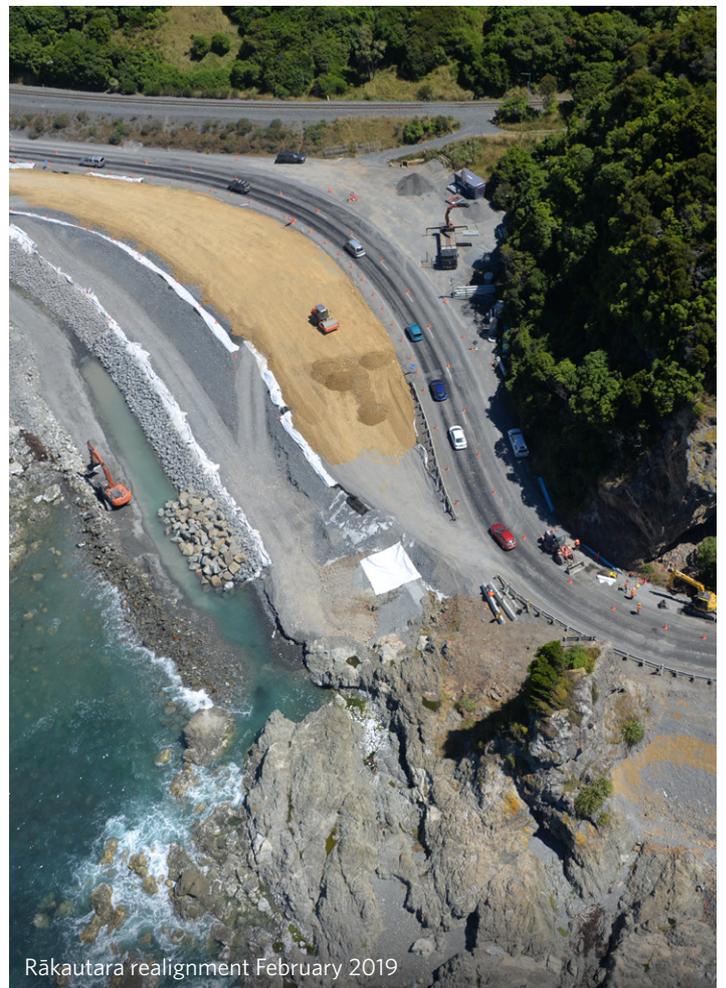
Will smoothing out curves in the road (as part of the safety improvements package) encourage higher speeds?

Losing control on a curve is one of the most common causes of crashes on rural state highways. Unexpected curves, like some of the ones around Kaikōura, can be problematic for drivers because they require special concentration as it's difficult to maintain a consistent speed on them. Smoothing out the unexpected curves on a road makes it more consistent, which helps reduce the risk of a driver losing control.

Why have speeds been lowered between Clarence and Kaikōura on a road that is new and improved?

Too many people have been killed or seriously injured on this stretch of road. So the Transport Agency reviewed the speeds people were driving, as well as the road itself. The review indicated 80km/h was the safe and appropriate speed to balance safety and the efficient movement of people who live, travel and work along the road, except for part of the road over the Hundalee Hills where 55–59km/h was the typical travel speed, resulting in a new speed limit there of 60km/h.

Even when speed doesn't cause a crash, it is most likely to determine whether anyone is killed, injured, or walks away unharmed. The new speed limits may take some time to adjust to, but they will help keep our community and visitors safer.



Rākautara realignment February 2019



Half Moon Bay realignment February 2019



Ongoing improvements to Hundalee Road

Work is underway at one of three ex-cyclone Gita major washouts on the Hundalees, roughly 4.5km north of the Conway Bridge. 'The road, with its existing crib wall, was washed out by the storm, leading to a steep, deep drop out into the Limestone Creek,' says project engineer Anil Balgumar.

'The washout took away almost half of one of the lanes and left the road in a fragile state, with minor cracking continuing even after Gita,' he says. 'We are monitoring and measuring the cracking to ensure safety for current single-lane traffic and now we are able to start repairs.'

Temporary stabilisation works are underway to ensure traffic and crews will be safe. This includes drilling 6 metre long, 20 millimetre in diameter GRP bars (commonly referred to as soil nails) 5.5 metres into the ground, injecting grouting, and finishing with shotcrete (strong flowable concrete delivered through a high-pressure hose).

Permanent work includes the construction of four layers of gabion walls with 32 mm GRP bars anchored 9 metres deep, grouted, and shotcreted for stabilisation. 'We are building future resilience into the road, which should prevent washouts like this from happening in this location in the future,' says Anil.

Works are due to be completed by the end of June and then the road will re-open to two-lane traffic. In the meantime, expect delays of up to 10 minutes as crews work hard repairing the road and making it more resilient. As always, your patience and safe driving is greatly appreciated.



Load testing each GRP bar for safety and resilience

Expect delays south of Kaikōura to Oaro

With the summer road maintenance season in full swing and construction work continuing, multiple work sites are in place along the State Highway 1 coastal route between Picton and Christchurch.

In particular, south of Kaikōura to Oaro, the number of work sites has increased with several stop/go traffic management sites in place.

Allow up to three hours to travel between Christchurch and Kaikōura and five-and-a-half hours between Christchurch and Picton.

Upcoming night work in the Hundalees - asphalt sealing at two places

Around five full night closures are planned for mid to late March in the Hundalees at Okarahia. The highway will be fully closed from 9pm to 7am with a detour for through traffic north of Peketa and at Waipara to Route 70 via Waiau. Residential and emergency access either side of the work sites will be available. More details will be provided by the highway maintenance team closer to the date.

For real-time travel information and details on SH1 go to www.nzta.govt.nz/p2c or call 0800 4 HIGHWAYS (0800 44 44 49).

Work programme update

The NCTIR programme has delivered \$900m to date and we have around \$300m to go within the existing work programme. Additional work is currently being scoped out - this is expected to be finalised in April. With this extra work in the NCTIR programme, the end date of physical works will extend into 2020. We expect to know the new NCTIR programme completion date soon and will let you know.



Peer support training at NCTIR

In preparation for life after NCTIR, and in recognition of their massive contribution, Kaikōura locals involved in the recovery effort got the opportunity to take part in important peer support training. The initiative, a collaborative partnership between the Ministry of Social Development, Kaikōura District Council, Te Hā o Mātauranga, and NCTIR, grew out of a conversation about how to prepare locals to transition back into the community when their time with NCTIR comes to an end. With \$300 million worth of work remaining on the project, the initiative is focused on proactive preparation.

Award-winning leadership coach and author Kathryn Jackson led the peer support training session on 13 February, and offered practical advice on how to transition well, what recruiters are looking for, and what kind of future opportunities might be the right fit.

'I've found it surprisingly helpful,' says construction phase administrator Haylee Tehuia-Claxton, who has worked with NCTIR for almost two years.

'I'm looking forward to working on my CV, and I feel like it's helpful moving forward to have these new skills. I feel better equipped to look for jobs and apply for them with confidence.'

The training also encouraged participants to pass their new skills on to others, creating a network of locals supporting locals. 'It's all about preparing more people at NCTIR to support others,' says people and culture advisor Robyn Laurenson. 'It's equipping people with good tools, and I think it's fantastic.'



NCTIR Village update

In October 2018 we announced we'd started the long tender process of putting the NCTIR Village up for sale, in advance of our programme of work coming to an end. The tender process closed on 22 February 2019. While we received some tenders, the Transport Agency, KiwiRail and NCTIR will retain the village for now, given the extension of the works programme. We will revisit what happens next with the village towards the end of 2019.



The NCTIR team were thrilled to win the best trade site at the Kaikōura A&P Show, awarded by the Kaikōura Youth Council.



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Engineering solutions north of Kaikōura

While safety road realignments are underway at Rākautara and Half Moon Bay to make the roads safer for traffic, permanent rockfall protection solutions have been completed south of Ōhau Point to protect the rail and road from falling debris.

At the southern entrance of rail tunnel 19, which runs through Ōhau Point, a special triple-layer rockfall protection wall, designed and tested in Christchurch, has been completed.

The three-metre-high section, closest to the hillside, is a gabion rock basket layer designed to reduce the impact of slips. The centre layer is comprised of sand and texcel-filled gabion baskets. These baskets absorb the initial impact, with the softer sand dispersing the force and allowing the final rock wall layer, closest to the rail, to be pushed out slightly without being damaged.

Each part of the 40-metre-long wall is connected with wire, steel rings and eye bolts to keep the structure together. Project engineer Tomislav Diklan says the wall works in a similar way to a concrete barrier for traffic, only much more flexible and compact.

A drainage system built into the bottom block-wall layer directs water into a swale, and then out to debris flow bridge 115C, to be carried underneath the rail and road and back out to the ocean.



Aerial view showing all three layers of the modular rockfall protection wall

Just south of this, a 126-metre-long and 4-metre-high landslide barrier has been completed to protect the rail from the 100-metre-long slip face behind it. This has a series of posts anchored deep into the ground, and upslope into the rock face, with three wire retaining ropes stretched from post to post at the top, middle and bottom. Strong spider net is applied over these wire ropes, along with a secondary mesh to capture smaller sediment.

We have run the wire ropes through energy dissipating rings at the top, middle and bottom of the border posts. If debris hits the fence, the rings absorb much of the force and protect the wires. Hinges at the base of each post add further protection by allowing for back and forth movement while the middle wire rope, called a transmission rope, is anchored every 50 metres so it can bulge when filled with material, preventing it from reaching the rail. All of these solutions will protect the Main North Line and keep trains on schedule.



A crew at work on the shallow landslide barrier

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How many crashes have there been around Māngamāunu?

Over the last 10 years between Māngamāunu Te Pō o Te Manu (the Fisherman's parking area) and the 80/100 km/h zone (including Kiwa Rd) there have been 2 fatalities, 2 serious and 7 minor injury crashes recorded. This doesn't include the crashes that don't get recorded for various reasons.

Rather than just fixing blackspots, the Transport Agency aims to reduce deaths and injuries on our roads by identifying and addressing risks before they result in crashes. There are lots of tools to help identify where crashes may happen, as a result of multiple factors - including speed, types of traffic, out of context curves, road surface quality, road width, and roadside features such as ditches, power poles and trees.

Along the Kaikōura coast the Transport Agency is carrying out a route safety project that will widen the carriageway, install a wider centre line and protect vehicles that may hit an object or go down a slope by installing barriers.

The informal 'surfers' carpark location at Māngamāunu is an unexpected place for cars to be entering and exiting the highway (parking) and for people to be walking across

the state highway. This is a surprise to many drivers that are not familiar with the area, which contributes to its inherent risk. KiwiRail also have safety concerns with people crossing the live rail corridor in this area. Relocated parking will provide safer access across the rail corridor.

Will you be closing the informal carpark at Māngamāunu in March?

No, we won't be closing the informal carpark until alternative parking options are available. We will be developing options in discussion with the local surfing community, iwi, and residents for feedback.

The present informal parking area creates a safety risk for pedestrians crossing SH1 and then crossing and standing on a live railway line.

What are the plans for Te Pō o Te Manu (the Fisherman's car park)? It's not close enough for the surfers and there won't be enough parking.

At present there are no plans for this area. It will be discussed as part of the wider engagement for this part of the coastline. This will be required to go through the Resource Management Act consenting process.

Continued on page 3



When will the shared use path between Okiwi Bay and Māngamāunu be completed?

The shared use path is currently on hold and for internal planning purposes has been ringfenced from the current construction programme while we continue engagement with our Treaty partners and the local community. It can be added back in to the construction programme at any time.

This is so our construction teams can better plan for people resourcing and procurement of materials for the remaining safety and resilience works. Allowances for the shared use path to be constructed in the future have been made in the design and construction of the new seawall structures, safe stopping areas and bridges between Irongate and Ōhau.

When will the cycleway between Picton and Christchurch be finished?

The NZ Transport Agency funded shared use path (walking and cycling) announced in July 2017 is planned to be constructed between Okiwi and Māngamāunu only. Any areas beyond that are not part of our remit.

The organisation working to develop a cycle trail between Picton and Christchurch is the Marlborough Kaikōura Trail Trust and there are no timeframes around that delivery. It is expected that our section would connect to the wider cycleway.



The Hutton's Shearwaters need your help



Why?

During March-April, young Hutton's Shearwater, fly from their mountain burrows out to sea.

They fly at night and can become disorientated by artificial lights and crash land on dry ground.

The birds cannot take off by themselves once grounded.

What to do if you find a bird?

Pick it up and place it in a non-airtight container/cardboard box.

Keep the bird's wings contained: a towel/t-shirt put over the bird can help to pick it up.

If you're in the Kaikōura township drop the bird off at the 'Huttons Hub' on Ludstone Rd, next to the DOC office.

If you're out of Kaikōura, release the bird onto the water at a sheltered undisturbed location. Do not throw the bird.

Can't drop off/release straight away?

Keep the bird in a cool and dark location; do not water, feed or further handle the bird.

Help us learn more

Report rescues or sightings by emailing information of the date, number of birds and location to admin@huttonsshearwater.org.nz

For more information about Hutton Shearwaters visit www.huttonsshearwater.org.nz



Kia Kaha Christchurch

The NZ Transport Agency, KiwiRail and NCTIR would like to acknowledge those affected by the 15 March attacks in Christchurch. We are sending our support to the Muslim community and all those impacted by the horrendous events that took place. Many of our people are based in Christchurch and we are supporting them at this difficult time.

An investment in foresight

Around 30 members of the Hong Kong Institute of Engineers (HKIE) recently visited New Zealand to gain insight into a number of engineering projects around the country. One of the projects that they visited was the Kaikōura earthquake recovery where they met with the NCTIR team. 'One of the purposes of our visit is to learn something innovative and new - technological advancement - and its application in New Zealand,' said tour leader, Tony Ho Ying-Kit.

The group met up with several members of our design team at Clarence to travel down to Kaikōura by bus, before staying overnight and attending a workshop at the NCTIR Village to explore some of the works programme in greater detail. Louise Kendal-Riches, one of NCTIR's Geotechnical Engineers who met with the group, said it was a whirlwind tour, trying to show so much in such a short space of time, but that it was a really valuable learning experience for all. 'Different people in the group were interested in different aspects of the project, and it was great for us, too, to compare what we're doing with how they do things in Hong Kong. They particularly commented on the difference in scale: we have 4.5 million people needing infrastructure across the whole country, compared to more than seven million in the small area of Hong Kong.'

At the workshop, Tony Ho Ying-Kit went on to say 'noting that the scale of earthquake recovery work was so extensive, the efficiency of the New Zealand Government to come up with a big team of multidisciplinary professionals was amazing. In a crisis such as this, it's important to get the lessons learned and drill deeper to understand how to avoid or minimise damage and risk in future events for the public at large. In this regard, innovative technologies do help and are worth investing - it's a path driving to the future!'



Flaxbourne A&P Show

Weld Park, SH1, Ward,
Marlborough
Sunday 24 March,
8.15am to 9pm

Come along and check it out! There'll be a handy dog competition, a terrier race, sheep shearing, an Iron Man competition, and plenty more to enjoy.

The NCTIR Communications team will be there with a stand to talk to the community and showcase some of our updated designs for the safe stopping areas. We'll have giveaways for the kids, and a free jellybean counting competition to enter. If you're at the Show, please stop by and say 'hi' to the team.

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The Bulletin Kaikōura earthquake update

Improving safety and resilience between Peketa and Oaro

NCTIR is completing its recovery work and is set to start on the safety and improvements programme on SH1 between Peketa and Oaro, south of Kaikōura.

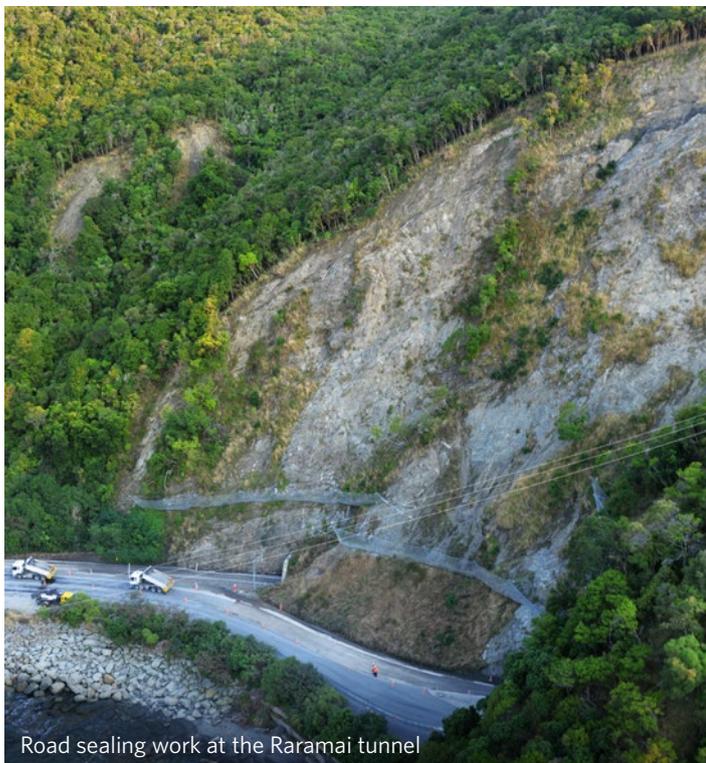
The improvements, funded by the NZ Transport Agency, will improve the safety and resilience of the road for all road users and help improve journey time reliability. The activity includes:

- Increasing the road width. This involves milling the existing carriageway and extending it by up to two metres to provide more room. Kerb and channel is also being laid in places
- Installing guardrails to protect against large drop offs and obstacles, which could result in injury in the event of a crash

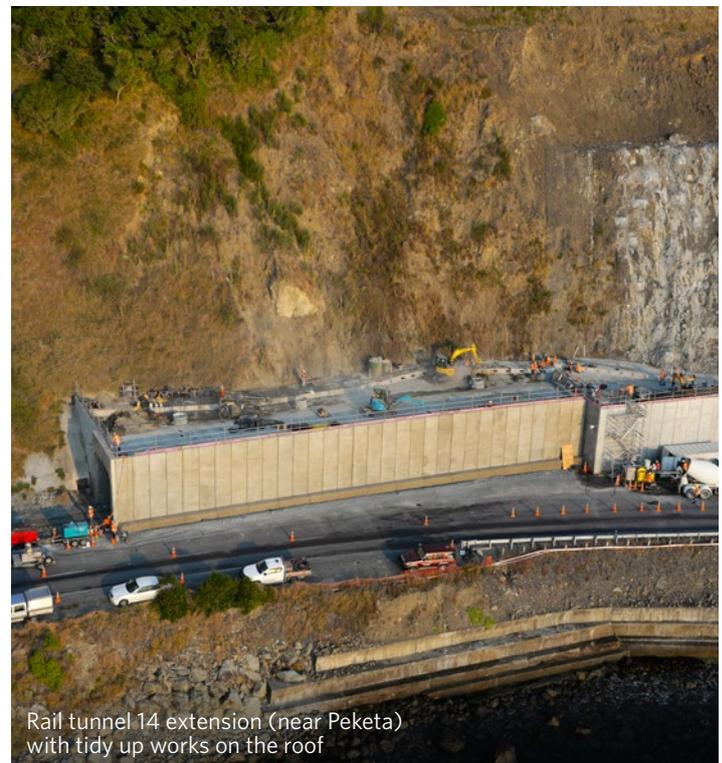
- Guardrails being installed which vary from the low metal 'W' barrier to solid concrete barriers
- Adding a double median line, when the final seal is complete, to help separate traffic
- Drainage work, to be completed by the end of April, which will include catchment drainage along the inner edge of the road and a small number of culverts across the road.

There are still several slip sites where work is being completed.

Because sealing work is weather dependent it is ideally done in warmer months. You will notice many small areas being sealed during April, while other areas will then be sealed in November when conditions are optimal again.



Road sealing work at the Raramai tunnel



Rail tunnel 14 extension (near Peketa) with tidy up works on the roof

This Bulletin provides the latest information about the rebuild of road and rail networks damaged by the Kaikōura earthquake in November 2016. The Bulletin is produced by the North Canterbury Transport Infrastructure Recovery (NCTIR) – an alliance representing the NZ Transport Agency and KiwiRail, on behalf of Government.



Your questions answered

You're planning formal safe stopping areas but what about the informal areas we regularly use?

There are seven formal safe stopping areas planned which will include parking and landscaped areas as well as various levels of amenity such as seating, viewing areas, and toilets. They are at Ōkiwi Bay, Papanoa, Ōhau, Te Ana Pōuri (Rākautara north), Rākautara, Raramai and Toka-ānau (Hikurangi marine reserve).

There are also 13 informal safe stopping areas where NCTIR has been working that will be tidied up with some planting to help them blend back into the environment. Some planting will not be available until the 2020 planting season.

There will also be numerous casual places along the coastline where there will remain room to park and access the coast as before the earthquake. Only the areas where parking is considered unsafe will be closed off.

I like the boulders at Ōhau. Will the other safe stopping areas look natural?

Yes. The safe stopping areas will be softened by using landscaping, local materials and planting so that they blend into the natural environment. This blending will increase over time as the materials weather and plants mature.

The planting season for these areas is June and July and we will use eco-sourced seeds that are native to the area.

Please explain how the new names for safe stopping areas, such as Te Ana Pōuri, came about

The names for the formal safe stopping areas have been agreed through our local Cultural Advisory Group. They originate from the Ngāi Tahu maps of the local area and are from nearby landmarks.

Will there be wheelchair access to the coast? There is currently no access from the pathway that has been constructed to date

Providing continued access for all community members is a priority. Easy access for the coast will be available at Toka-ānau (Hikurangi marine reserve), Raramai, Rākautara and Ōkiwi Bay. The other areas being developed have rocky foreshores or drop offs where ramped access is not practical.

Train spotting

This KiwiRail freight train was spotted crossing the Clarence River Rail Bridge shortly after sunrise. Watch out for trains and send your (safely-taken) train picture to info@nctir.com for a chance to be featured in the next NCTIR bulletin!



Thank you for your patience and for driving to the speed limit

Thank you for your patience

The work undertaken by Transport Agency contractor, Downer, during the recent night closure of SH1 in the Hundalees, was completed within the five nights planned for. With the public well-informed, traffic was detoured between 9pm and 7am during the closure. Work is now continuing on this section of road while the west lane is being rebuilt.

We are aware that the number of work sites can be frustrating for drivers, and we know that small delays can add up, but by maintaining oversight across the network we try to make sure collective delays aren't too long. Please allow plenty of time for travel between Christchurch and Kaikōura.

COASTAL PACIFIC SPECIAL LOCALS DISCOUNT

Travel Period: 1-27 April 2019

Don't miss out, book your seat today at participating locations*

20% off best available fare*

*Only bookable in person at Interislander Picton Terminal and Blenheim, Hurunui and Kaikōura i-Sites. Valid for NCTIR staff and residents of Christchurch City, Hurunui District Council, Waimakariri, Kaikōura & Marlborough Regions - proof of staff or residency will be required. Further terms and conditions apply - see in store.


COASTAL PACIFIC
A Great Journey of New Zealand

Repairs south of Oaro

NCTIR is preparing one of the three sites damaged by Cyclone Gita, 4km north of the Conway Bridge.

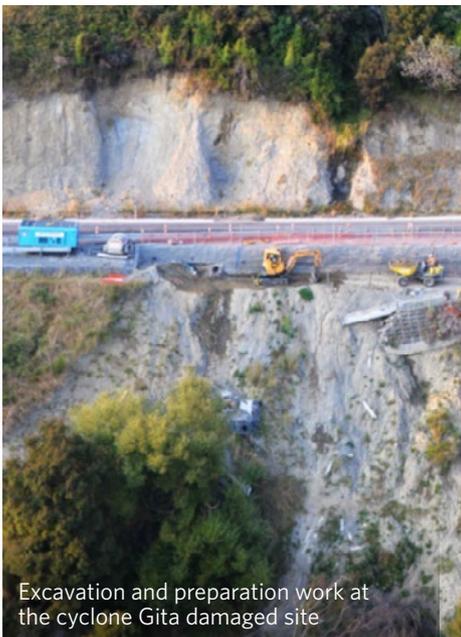
We are excavating and making it a safe work site before starting reconstruction of the washed-out road. The original crib retaining wall has collapsed and will be replaced with a new resilient retaining wall.

The steps to construct the new road are:

- Installing soil nails that are grouted and load tested
- Constructing gabion baskets, to be held in place by more soil nails
- Constructing a new road base and completing with seal, line marking and a guard rail

This work is expected to take four to five months to complete.

The other two Gita-damaged sites, both 1km south of Oaro overbridge, will start later in the year. The retaining walls at these sites will be built using a metal and cement stabilisation mix in MSE flexy bags. These are placed on top of each other to build the wall and are tied into the road for resilience.



Excavation and preparation work at the cyclone Gita damaged site

Safe stopping areas

Work will start on the two safe stopping areas, Raramai and Toka-ānau, in May and will take about six months to complete. To see concept designs of these areas, go to www.nzta.govt.nz/projects/Kaikoura-earthquake-response/safety/

Additionally, four informal stopping areas along this section of the coast will also be completed during the winter months. These popular pull-off places will be tidied and landscaped.



Winner!

The winner of our jelly bean count competition at the Flaxbourne A&P Show is Seddon local, Craig. Craig's workmate Gregg (pictured) accepted the prize on Craig's behalf, as the guess had been a 'team decision' by the crew at TRS. They have promised to make sure Craig gets at least one jelly bean upon his return to work - probably an orange one. Thanks to all who entered!



Thank you for your feedback

Thank you to everyone who took part in our NCTIR Bulletin subscriber survey recently. Your thoughtful responses will help shape future issues of the Bulletin, and you can expect to see many more of your questions answered.

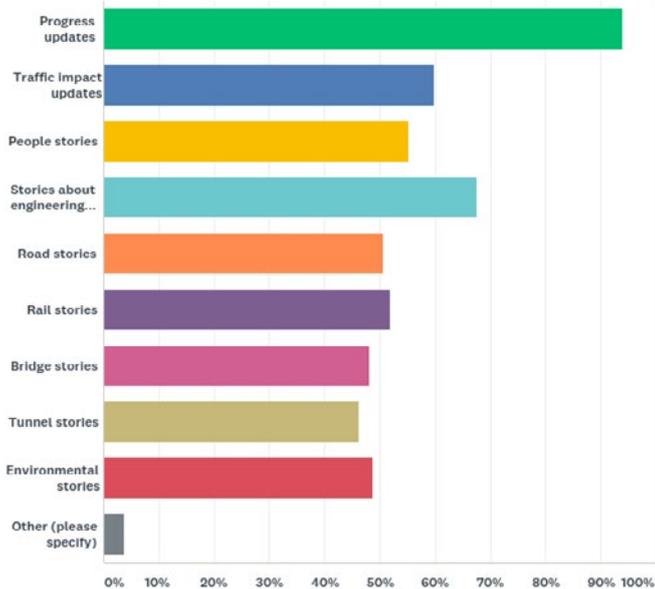
When asked to rate the Bulletin on a scale from 1 (not informative) to 5 (very informative), 87% of you rated it a 4 or 5. When asked if there was anything you would like to see less of in the Bulletin, 84% of you responded that you like the mixture of material.

The demographic information gave us some insight into who our readers are. Over 50% of our readers are 61 or older, with just one person under the age of 20 taking the survey. The majority of our readers are male (60%). Only 30% of our readers come from Kaikōura or the surrounding area where NCTIR is working, showing that news of the recovery and improvements work interests people much further afield.

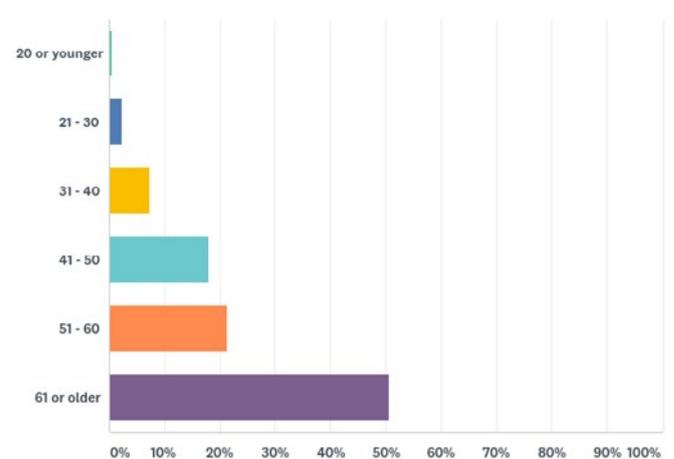
Where our readers are from



What do our readers enjoy about the bulletin



Our readers ages



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The Bulletin Kaikōura earthquake update

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Coastal Pacific – that's a wrap

KiwiRail's Coastal Pacific service wrapped up for the season on Sunday 28 April after a busy summer, following a two-year hiatus. The much-loved service will return on 27 September, offering the experience of enjoying the beautiful Kaikōura coastline from the comfort of the train.

'Kiwis and overseas visitors alike have been thrilled to once again be able to travel along the stunning Kaikōura coastline by train, as well as get an up-close view of the amazing post-quake rebuild effort,' says KiwiRail Head of Tourism Ahleen Rayner.

'Our Great Journeys help drive regional growth and that includes in Kaikōura and Marlborough, where Coastal Pacific passengers are estimated to spend \$34m across the two regions, supporting about 300 local jobs.'

Waiting patiently in the sun at the Kaikōura platform to enjoy the last train were Waikato locals, Abigail and Robert Walker. After a beautiful day whale watching and looking around Kaikōura they were ready for the twilight trip to experience the rest of the coastline from Kaikōura to Christchurch.

'We couldn't believe the amount of work that's been done and how impressive it all looks compared to what you see on the TV,' Abigail says.

This year Abigail and Robert are on a 'train trilogy' journey. Along with the Coastal Pacific, they have recently been on the Northern Explorer, and, after a couple of days in Christchurch, were off to experience the TranzAlpine.

'Last year we did cruises, this year is trains, and who knows what we will get up to next year!'



Abigail and Robert Walker



Final Coastal Pacific of the season departing Kaikōura

FUN FACTS

During the Coastal Pacific season, passengers consumed:

- Nearly 22,000 cups of tea and coffee
- Nearly 5000 bottles of wine (with Delectat Sauvignon Blanc the top choice)
- 4568 bottles of beer (with Monteith's Golden Lager the most popular option)
- 5788 sandwiches (with ham, cheese and egg the most popular filling)
- 1774 pies
- 1077 cheese platters
- Nearly 6000 ice creams (the best-seller was raspberry and white chocolate)
- More than 700 roast chicken meals

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Coastal Pacific passengers consumed nearly **22,000** cups of tea and coffee, **5,788** sandwiches were eaten, with ham, cheese & egg the most popular filling

27,380 passengers on the Coastal Pacific between December 2018 and March 2019, compared to **25,158** for the same period in 2016

98km of Pacific Coastline along the Coastal Pacific route

The Coastal Pacific returns on 27 September **2019**

29 December was the **busiest day of the season**, with passengers in total **258** travelling on the Coastal Pacific that day

6 hours' journey from Christchurch to Picton on the Coastal Pacific

21 tunnels on the Coastal Pacific route - **20** tunnels were repaired

183 bridges on the Coastal Pacific route - **60** bridges damaged, **3** new bridges built, **3** bridges replaced

Post-earthquake rail repairs is the **largest rail** construction effort in the South Island since WWII

60,000 fewer truck movements on upper South Island roads since rail reopened to freight trains on 8 August 2017

Main North Line buried under more than **100** slips and landslides in the **7.8** earthquake

More than **800,000** tonnes of freight moved since 8 August 2017

SEAL ALERT



Safety alert: seal pups

'The seal population in Kaikōura is booming,' says environmental advisor and trained seal handler Elisa Chillingworth. 'Since the earthquake they've spread out along the coast and found new habitats. This is good news considering the change in sea level from the earthquake and the disruptions from all the work along SH1.'

While the growth in seal population is positive, it also means sightings on the road are increasing. Seal pups are typically born between November and January, becoming more active and independent around April - and love to lie on the warm road.

'NCTIR has completed most of the work that would affect seal habitats, at this point our priority is protecting and monitoring the population,' says Elisa.

Fences are being installed in areas where there is a high risk of seals accessing the road. Road users should drive carefully and obey the speed limits. If you see a seal, slow down, be aware of traffic behind you and keep to your side of the road. Put your hazards on and drive carefully around the seal. First and foremost think about your own safety and the safety of other drivers. If you have a passenger they can notify DOC by calling 0800 362 468. Please contact info@nctir.com if you have any concerns.

Waimā Bridge completion

Physical repairs on the Waimā bridge, north of the Clarence River, have recently been completed. The seven-piered bridge was a 'cool little job' in comparison to some of the project's bigger jobs, according to project engineer Adrian Blok - but it also presented its share of challenges. Damage from the 2016 earthquake meant a total repair job was necessary. Ecologists had to go 'electric fishing' on-site during the river diversion process in order to protect any native fish, while a crew of nine people pumped the remaining water away from each individual pile to complete the work.

Works involved re-sleeving and re-casting existing columns/piers below the ground. A sleeve is a cylindrical steel housing for concrete to be poured into, which creates a casing. All seven piers required such repairs. 'It was a good learning experience in a really challenging environment,' says site engineer Olga Joensuu.

What's next for this team? Repairs at Jacob's Ladder and the Clarence road bridge will keep the crews busy well into winter.



Behind the scenes at Blue Duck corner



Temporary traffic lights have been installed between Irongate Bridge and Blue Duck Valley Road to allow for stabilisation work on the seaward edge of the corner. There is a great deal of work being done to improve ground conditions and stabilise the road. Large reinforced concrete piles have been constructed on the cliff edge into the ground. Rock anchors are being installed, and these will be tied into a capping beam constructed at the top of the piles. When this work is completed the road will be constructed to finished level and the road barriers installed.

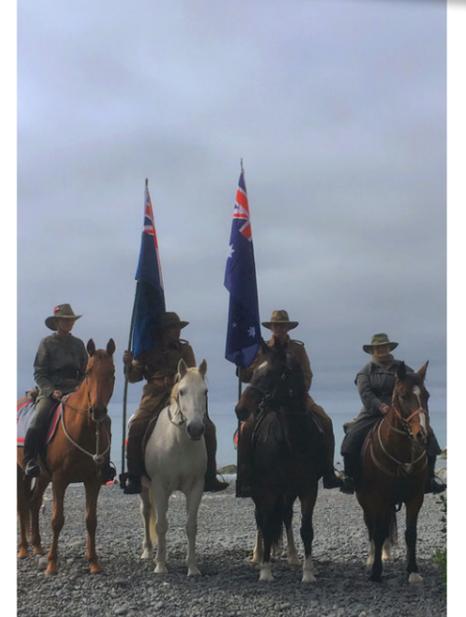
Traffic has been reduced to one lane as the worksite is on a very narrow corner, and the crew have limited space to use machinery. The stabilisation process involves inserting rock anchors that are 17.5 metres long at a 15 degree angle into the sea edge, under the road, and up to 8 metres into the rock bank. The rock anchors consist of a

steel rod inside a plastic tube. Grout is inserted inside to secure the rod. Due to the length of these rods and tubes (17.5 metres), the engineers have developed a unique grouting system. A 'ski ramp' has been built at a 15 degree angle (the same angle they are inserted into the ground), and the tubes are laid down the ramp while the grout is being injected.

Next these 17.5-metre lengths are moved to the worksite and inserted into predrilled holes in the ground. Grout is used to secure these plastic tubes into the predrilled holes. Once the 49 rock anchors are installed, the road barrier and capping beam to be completed, and the road rebuilt. Work is expected to complete by the end of July 2019. Road sealing will be done in September or October when weather conditions are suitable.

Anzac Day

NCTIR wellbeing officer Rob Roche was honoured to participate in this year's Anzac Day parade, laying a wreath on behalf of the team during a ceremony at the Garden of Memories.



SH1 safety improvements

Along the Kaikōura coast the NZ Transport Agency is carrying out a series of improvement works, as part of the rebuild, that will improve the inherent safety for road users. The KiwiRAP tool - www.kiwirap.org.nz - is used to rate the overall safety of the road. The pre-earthquake KiwiRAP star rating for the coastal sections of the road was between 2 and 3 out of 5. The Transport Agency has tasked NCTIR with improving this rating to be in excess of 3, so how will this be done?

- Double centre line markings put an extra ½ metre between traffic lanes, so motorists are less likely to enter the opposite lane if they cross the white line by mistake. This allows for extra reaction time if a motorist has a lapse in concentration or judgement.
- Narrowing lanes from 3.5 metres to 3.25 metres (with double white lines between) moves cars further away from a head-on collision. Narrowing lanes has also been shown to reduce traffic speeds.
- Road widening will allow a 750mm shoulder between the white line and roadside barrier, allowing for increased reaction time. It also reduces the risk of drivers dropping a tyre off the side of the seal, which could result in the car losing control. The additional widening also provides some additional space to allow for confident cyclists to ride along the road.
- Guardrails are being placed to reduce the chances of vehicles running off the road and landing upside-down on the foreshore or hitting solid objects (such as trees) on the roadside. Barriers absorb the energy when a vehicle hits them, reducing the severity of the crash for the occupants.
- Road realignment in Half Moon Bay and Rākautara will make the road safer and more consistent to drive by straightening out curves, reducing the chances of a driver losing control on the corners.
- Safe stopping areas and informal pull-in areas will be provided in as many places as possible along the coast, and dangerous parks in unsafe areas have been reduced.
- Speed reduction has occurred in parts of the Hundalees (60km/h) and along the coast (80km/h) due to the inherent safety risk of the road. Kaikōura's narrow transport corridor cannot accommodate the 20-metre width required to build a road safe enough to travel at 100km/h.

The engineering behind these improvements will provide a safer state highway for locals and visitors for years to come. Over a five year period, these safety improvements are forecast to result in eight fewer deaths and serious injuries, representing a 35% reduction.



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The Bulletin Kaikōura earthquake update

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New NCTIR Project Director

Recently we bid farewell to Acting Project Director Tony Dickens, and welcomed aboard new Project Director, Tony Gallagher.

Tony Gallagher comes to the project from his role as a General Manager at Fulton Hogan, complete with more than two decades of experience working across infrastructure services and civil construction.

'This project is a true privilege,' says Tony G. 'People will be talking about the NCTIR project in Kaikōura for the next 100 years. It's such a significant event and project, making a hugely positive difference in people's lives. How often do you come across an opportunity to be a part of something like that?'

Tony is a Christchurch local, but will be spending his time in Kaikōura where he can be more effectively involved with the team. His family will largely stay in Christchurch but, he says, 'they're keen to get up here for the weekends!'

We acknowledge the great job Tony Dickens has done during his stewardship of NCTIR and wish him all the best for the future. 'I appreciated the wonderful way I was welcomed into the team,' says Tony D. 'Stepping in as a stranger, the cooperation and goodwill of everyone here really smoothed the way for me.'



Tony Dickens hands over the reins to Tony Gallagher

In June NCTIR will be starting a large programme of work on the Inland Road (Route 70) between Waiau and Kaikōura.

This work will make the temporary emergency repairs, which allowed us to reopen the route soon after the November 2016 earthquake, permanent. It will take about 12 months to complete.

Work will include:

- Construction of a new bridge over the Wandle River to replace the temporary Bailey bridge
- Major structural repairs on six other bridges
- Minor repairs made to many culverts and other bridges
- Retaining walls at six slip locations
- A road realignment at Lulus Hairpin bend

PUBLIC INFORMATION EVENING

Please come and join us to find out more at one of our public information meetings:

- **Monday 17 June**, 7pm, Waiau Community Hall
- **Tuesday 18 June**, 7pm Lynton Downs School

Or you can email info@nctir.com or call **0800 628 4737** and we will provide more information.



Ground breaking archaeology

The archaeology work being done by NCTIR is the first regional scale heritage-oriented project New Zealand has ever had. Prior to NCTIR works beginning, 195 archaeological sites were identified by NCTIR's archaeology team. 'The archaeology team has focused on protection, conservation and management of NCTIR related impacts since the start,' says archaeological director Jeremy Habberfield-Short, 'leading to the discovery of 20 additional sites during NCTIR works across the programme.'

Archaeologists and other field specialists are rare commodities, so collaboration with up to five organisations has been necessary to create the team. Fifteen members of the archaeology team have been working together for the duration of the project, ranging from archaeologists, to forensic anthropologists, with 10 other crew members joining them at different stages.

So far the archaeology team has screened 1,004 NCTIR projects as a way of managing construction effects on historic and cultural heritage and identified 398 high-risk projects that require archaeological management.

Archaeologist Dan Witter says, 'There's never been anything quite this size, or quite this large in area, with such a lot of excavations, recovering such an enormous amount of material. This is a first for the country.'

Heritage New Zealand Pouhere Taonga is proud to have been a part in supporting the reconstruction of the Kaikōura transport corridor from its beginning steps.

NCTIR has run a very collaborative and collegial process which is a testament to the alliance but also to KiwiRail and NZ Transport Agency. The relationships with all parties have been a critical factor in the success of the project to date. We expect that the work that has been done will stand as an enduring legacy for everyone involved and is providing a much enhanced critical transport corridor.



Definitions

Tikanga correct procedures, custom

Whanaungatanga relationship, kinship

Tipuna ancestors

Kaitiaki guardian

Tapu sacred

Manaakitanga kindness, showing respect

Whakanoa a formal blessing process to remove tapu

Kōiwi human remains

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Whanaungatanga

Before beginning archaeological work on a new area, everyone working in a culturally sensitive area participates in a formal blessing process. 'You can't just start digging,' says cultural monitor Darran Kerei-Keepa. 'There are processes, and it is essential that we follow tikanga protocols all the way through. This is our Health and Safety from a Māori perspective.'

One of NCTIR's lead field archaeologists is Deb Foster. Deb's 12 years of work as an archaeologist with Te Rūnanga o Kaikōura affirms the necessity of a trusted relationship between rūnanga and those excavating in order to adhere to the manaakitanga of a specific area. 'I joined this project because I was familiar with the people and places and could not pass up the opportunity to learn more,' says Deb. 'It has been a real privilege to work collaboratively with the rūnanga, the archaeology team and NCTIR contractors to achieve the best possible outcome for the cultural remains affected by the earthquake.'



Mapping out history

'I've found a lot of interesting things, but graphs are the most riveting part of my work,' says archaeologist Dan Witter. Dan brought more than 40 years of archaeology experience when he joined the NCTIR archaeology team this year as a technical stone tool specialist. 'Once items are recorded, we can start to make graphs which deal with human processes. The individual items are so interesting in relation to their larger picture, and the graphs help us to see this.'

A thorough recording process is a huge part of the team's work - everything that gets excavated gets recorded. 'We are bound by law to record features such as a hāngi, house structure, or tool making deposits, to industry standards,' says archaeological director Jeremy Habberfield-Short. 'And because heritage is subject to multiple values, managing it requires awareness and delicacy.'

One standard is the use of the single context recording system. This allows the archaeological team to document their finds consistently across the project, and all the information is fed back into a report that will be shared with Te Rūnanga o Kaikōura, Heritage New Zealand, the NZ Transport Agency and KiwiRail as a means of celebrating and understanding New Zealand's history.

'We are also recovering kōiwi and mitigating impacts on places by recovering as much information about those places and what happened there,' says Jeremy. 'It's vital that this information is disseminated to the appropriate parties, so that the knowledge can be retained and respected. Our approach is based on tikanga principles, and we operate within these protocols, especially when it comes to kōiwi as a way of honouring the tipuna and respecting iwi values.'



Jean Spinks, Teri Trickey, Victoria Ross and Dan Witter at work identifying bird bones, fish bones, and stone tools

Returning from the past

Just south of the Clarence Bridge, the archaeology team has just completed two years' worth of work at Waipapa Bay. As each project is completed, a formal process of whakanoa must take place, and it was no different with Waipapa Bay. 'It's important that everyone who was involved is part of the reinterment and whakanoa. Otherwise they remain in a heightened state of tapu,' says cultural monitor Darran Kerei-Keepa. 'It is important for those participants involved to have closure through this process. Waipapa has been a huge undertaking. We have been there for over two years, and it is important to close it off correctly, and return from the past into the land of the living.'

But what happens if a crew member leaves the project prior to its completion? During the past two years at Waipapa Bay, three people left, and were each given a formal farewell and gift to honour their mahi at the Takahanga Marae. They were also brought back for the whakanoa and reinterment.

From the initial blessing, to the final whakanoa, the archaeology management process at NCTIR is enshrouded by tikanga Māori. 'It's about meeting and adhering to the kaitiaki principles,' says Jeremy. 'Everything we do is couched within a cultural framework. This is really exciting because it adds a whole new layer of context, significance, and meaning to the traditional role of an archaeologist. It's also an apt reminder that the places, objects and remains are from a time not too distant from the Ngāti Kurī and Ngāti Māmoe descendants living in Kaikōura today.'

Layers of discovery

One discovery stands out as an example of continued occupation in certain areas along the coast. A rectangular stone-lined hearth was found, and when it was finally removed there was another hearth underneath it - and yet another occupation layer underneath that. Posthole patterns indicate it was inside a structure, possibly

a whare. The sequence has yet to be dated, but it is likely to span several periods of dwelling and abandonment, which reflects people moving across the landscape seasonally.



The hearth was uplifted and recreated for eventual display at Takahanga Marae

Fibre optic repair underway

Did you know that one of the fibre optic cables between the North Island and Christchurch was damaged during the earthquake? This cable is critical for communications between the North and South Islands. While a temporary repair was done at the time to restore supply to affected locals, there are still exposed parts of the cable in a number of locations.

A consortium made up of the Transport Agency, Chorus, Spark and Vodafone was formed to provide a single solution to permanently repair the cable. The agreed solution is for a single shared 75km duct to be installed between Parikawa, north of Clarence, through to Oaro. This is designed to have regular access points for repairs and maintenance. A new fibre optic cable will then be installed in the duct.

A consortium contractor, Connect 8, will install the new fibre optic cable into the existing AquaLink duct network between Kaikōura and Oaro. NCTIR is designing and installing 27km of the new duct north of Kaikōura. Connect 8 will then install the fibre optic cable inside the duct to complete this project.

NCTIR has already started installing the duct while completing other work on stretches of SH1, and will be installing the remainder as work progresses. NCTIR will be using two different construction methods depending on the location and conditions. These are:

- Excavating a narrow 300mm trench, installing the duct and backfilling with layers of different materials, and completing the work by reinstating the road surface and road markings.
- Directional drilling where a 250mm pipeline is bored using specialised equipment. This method does not involve excavation or reinstatement and is not weather dependent.

The road will be reduced to one lane with 'Stop/Go' traffic management where this work is happening. This project is a great example of organisations making the most of our resources to complete extra work that benefits the country.



Seal safety alert amendment

In our previous Bulletin we advised motorists to call DOC if a seal is seen on the road, but we would like to amend this to Downer's 24/7 line - 027 478 3458. This number is specific to the Kaikōura coastline between Clarence and Oaro - in all other locations, please contact DOC.

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The Bulletin Kaikōura earthquake update

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From the beginning



Holly Reitveld and Brandon Te-Rewiti Timms have been working on the earthquake recovery project since the beginning. Each of them starting work during the emergency response phase, when NCTIR was still in its formative stages.

While Holly has worked as a traffic controller since January 2017, Brandon was initially hired by a recruitment agency to deal with road closures through the Inland Road, and to assist the NZ Army with bringing in supplies. Brandon recalls that back then workers had to go to site in pairs and work back-to-back as a safety precaution, so they could watch the hills for rockfall. Some workers, including Brandon, had to be flown by helicopter to access their sites. This led to a few late nights waiting for a clear weather pocket to be flown out again.

Before joining NCTIR Brandon was an anthropology student in Auckland, but put study on hold to come home to Kaikōura. 'This is a historic moment for New Zealand, and I really wanted to be part of it. And I think [Holly and I] have an extra sense of pride and loyalty because it's our home town.' As a descendent of Ngāti Māmoē, Brandon says he's enjoyed watching progress at Irongate the most, as this land has been in his family for hundreds of years. He even sat his abseilers licence so that he could work alongside local iwi on some of the sites.

He said it was 'otherworldly' to be working at Irongate while learning about its history from NCTIR's cultural monitors. 'That was the highlight. That, and meeting all the people.'

Brandon and Holly agree that it is the people on the project who make up for the long hours and exposure to the elements. For Brandon the mixture of different cultures and humour on site has been a highlight. 'You end up building really strong relationships with people because of the amount of time you spend with them.'

Holly agrees humour has been a key element. 'I've never had so many laughs in my life' she says, recounting a day when she and another traffic controller were chased by a seal. Holly says her grandfather enjoys hearing her work stories when she visits him at the Kaikōura hospital. 'He's always asking me what's going on!'

Both traffic controllers admit that they can't stop themselves from waving at motorists, even after their shift has ended. 'I like waving,' says Holly. 'Everyone gives you a different wave. It's interesting seeing how people react.' Brandon observes that motorists are more content to wait if they have been greeted by traffic control with a big wave and a smile.

Holly says she will get a real sense of accomplishment to look back on the project and think 'we actually worked on it from start to finish.'

NCTIR inbox 9 June 2019

Dear Sir/Madam,

My husband and I have just completed a road trip around the South Island [...] I have to say that the crews from NCTIR on SH1 around the Kaikōura rebuild are outstandingly polite [...].

I know that it's impossible to feed this back to each and every one of them but I wish that you could because they are doing a damn fine job in pretty trying conditions.

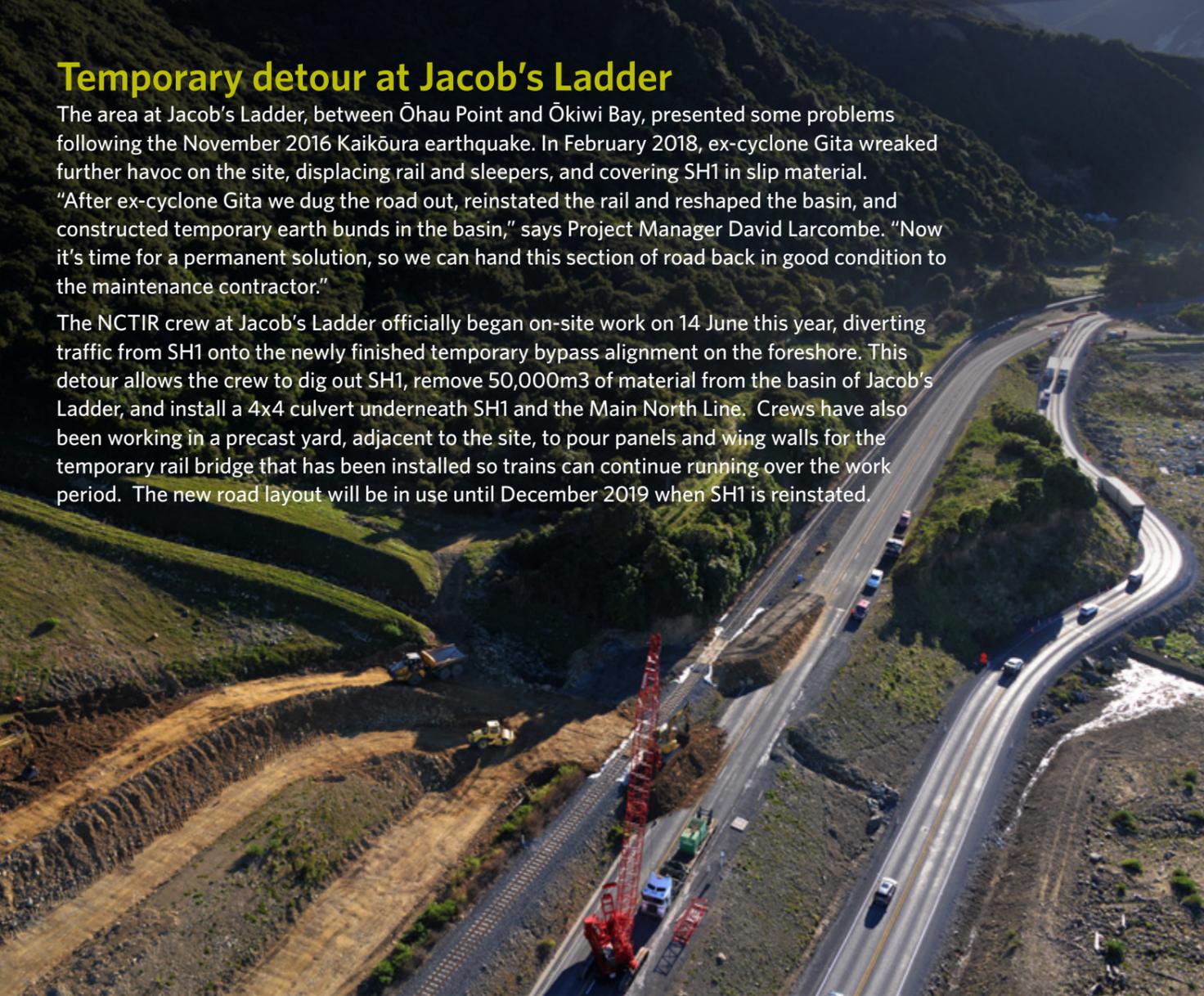
We just wanted to say thanks very much and acknowledge their efforts.

Kind regards
Megann & Mark

Temporary detour at Jacob's Ladder

The area at Jacob's Ladder, between Ōhau Point and Ōkiwi Bay, presented some problems following the November 2016 Kaikōura earthquake. In February 2018, ex-cyclone Gita wreaked further havoc on the site, displacing rail and sleepers, and covering SH1 in slip material. "After ex-cyclone Gita we dug the road out, reinstated the rail and reshaped the basin, and constructed temporary earth bunds in the basin," says Project Manager David Larcombe. "Now it's time for a permanent solution, so we can hand this section of road back in good condition to the maintenance contractor."

The NCTIR crew at Jacob's Ladder officially began on-site work on 14 June this year, diverting traffic from SH1 onto the newly finished temporary bypass alignment on the foreshore. This detour allows the crew to dig out SH1, remove 50,000m³ of material from the basin of Jacob's Ladder, and install a 4x4 culvert underneath SH1 and the Main North Line. Crews have also been working in a precast yard, adjacent to the site, to pour panels and wing walls for the temporary rail bridge that has been installed so trains can continue running over the work period. The new road layout will be in use until December 2019 when SH1 is reinstated.



Students leaving their mark at safe stopping areas

NCTIR is engaging some amazing local artists to design and hand-paint tiles that will be permanently displayed in the toilet blocks at three future Safe Stopping Areas - Raramai, Rākautara and Ōkiwi Bay. For the first phase of the tile project, the young artists from Kaikōura's four local primary schools left their classrooms to learn from Te Rūnanga o Kaikōura representative, Rawiri Manawatu, who shared knowledge of the cultural history of each site. Following Rawiri's korero, the students sketched ideas for their tile design to reflect the unique imagery of the area where their work will be displayed. Kaikōura Primary School visited Ōkiwi Bay, Suburban and Hapuku visited Rākautara, and St Joseph's visited Raramai. The young artists will paint their final tile designs with Auckland based mural artist Nicola Francis-Gibb in late July.



A view from the Punchbowl: 1925 and now



1925



2019

Permanent works on Inland Road (Route 70)

After the November 2016 earthquake, emergency repairs enabled the Inland Road to be re-opened quickly and access restored to Kaikōura. Now NCTIR is undertaking 20 permanent repairs on the Inland Road. This work will take about 12 months.

Three separate crews are working on the 20 projects, which include bridges, culverts and retaining walls. A new reinforced concrete bridge over the Wandle River will replace the temporary Bailey bridge. Six other bridges require major structural work that will take between three and ten months to complete on each bridge. Many other culverts and bridges have minor damage, mainly cracking in concrete structures. These repairs will take between one and four months to complete.

The road at Lulus 'hairpin' bend will be realigned. This involves raising the road above the river level, up to 1.8 metres in some sections. Five culverts will be installed and along the side of this section of the Mason River, a rock armour protection will be installed. Between the Conway River and the Upper Mason Bridge there are six slip locations where we will be building retaining walls using gabion baskets. Each of these will take two to four months.

How this work may affect you:

- We will keep the road open. At each worksite, the road will be one-way with 'Stop/Go' or traffic lights.
- There will be one or two short 'Stop/Stops' (road closure) for up to 2 hours at Cribb Creek when lifting the bridge.
- Work will generally take place between 7am and 5pm Monday to Friday with some occasional weekend work.

Expect delays and allow extra travel time.



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NCTIR 2019/20 programme of work

The NZ Transport Agency and KiwiRail have agreed on the final work package for NCTIR to deliver. This includes 33 new projects along SH1 north and south of Kaikōura, as well as the inland route to Waiau. 'Work on these projects is ramping up. We'll be continuing at pace, through to approximately June 2020, before winding down to lights off in December 2020,' says NCTIR Project Director Tony Gallagher.

Teams are currently hard at work constructing six formal safe stopping areas, after the completion of the first at Ōhau Point last year. They're also making safety improvements such as road realignments, installing safety barriers, and adding double centre lines to move traffic further apart. Work is also underway at a number of sites to further improve the resilience of the Main North Line.

'We all want a finished product we can be proud of - a safe and enjoyable journey for future generations,' says Tony.

Some of the milestones for the next phase:

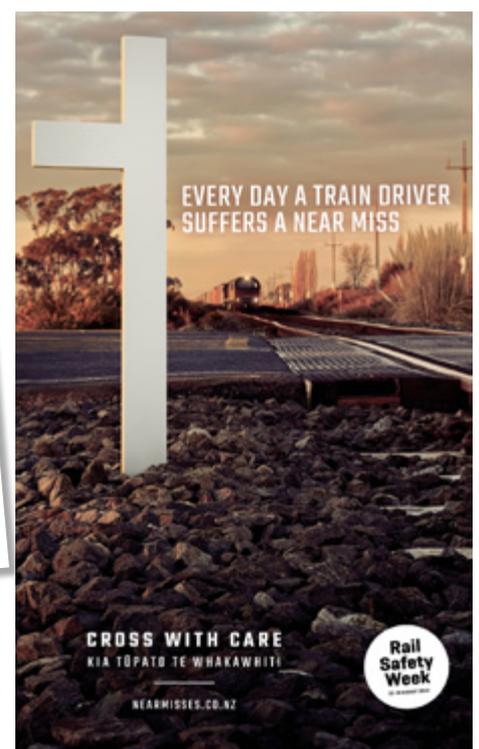
- Inland Road (Route 70) works complete - August 2020
- Rail works complete - September 2020
- SH1 improvement works complete - October 2020
- Recovery/resilience works complete - October 2020

If you would like to find out more about NCTIR's new programme of work for 2019/20 please follow this link to see the map nzta.govt.nz/projects/kaikoura-earthquake-response/safety/



Rail Safety Week campaign

As part of Rail Safety Week last week (12-18 August) KiwiRail and TrackSAFE NZ set up 224 'near miss memorials' in 33 locations around the country to raise awareness around the importance of safe behaviour at railway tracks and level crossings. Each of the memorials included a QR code that, when scanned, linked to a video clip showing footage of a real near miss. Over 400 near misses were recorded last year, and while most of these went unreported in the news, every single one left an impact on the train driver, rail staff, witnesses and pedestrians involved. For more information please visit the campaign website: www.nearmisses.co.nz



Guardrails – some of your questions answered

Why are guardrails being installed along the Kaikōura coast?

In July 2017, the Government announced a \$231 million investment to increase safety and resilience on State Highway 1 between Clarence and Oaro. Guardrails are being installed in certain areas along the Kaikōura coast as part of this investment, to help improve safety for road users. This route safety project also includes the following improvements:

- Double centre lines, which put an extra half metre between traffic lanes, also narrow the lanes from 3.5 metres to 3.25 metres, which has an effect on traffic speeds.
- Road widening to leave a 750mm shoulder between the white line and roadside barrier, allowing for increased reaction time.
- Road realignment, to make the road safer and more consistent to drive by straightening out curves.
- Seven safe stopping areas and more informal pull-in areas, providing safe parking in as many places as possible along the coast.

The Government has recently announced a \$1.4 billion investment to make New Zealand's highest risk roads safer but due to the earthquake we are already working on making SH1 around Kaikōura safer.

Can you install other safety systems and reduce the number of guardrails?

A range of interventions are considered when looking to improve road safety across the transport network. Guardrails are a safety tool used when the consequences of a vehicle hitting them is less than the hazard which they are protecting. For example, they may be installed near an out-of-context curve to stop someone going down a slope if they lose control. They are useful in narrow corridors where there is limited reaction time and if the vehicle left the road it would have a high chance of rollover or end up in an unrecoverable location.

Some other hazards they will help protect drivers from are:

- rail line and trains that are at road level or up to 1 metre above the road
- drop offs into culverts and rocky shoreline
- power poles
- large trees and rocks
- ground that is unstable for heavy vehicles
- rockfall from slips.

Guardrails are also being installed along the road by the camping grounds to provide protection for campers in tents and caravans.

Can I walk or cycle along the road by the guardrails?

SH1 is narrow between Clarence and Oaro. Where possible there will be some road widening to achieve a 750mm shoulder between the guardrail and the edge of the road. This is mainly designed to allow for increased reaction time for drivers before they hit the gravel shoulder, but can also accommodate cyclists. Pedestrians are not advised to walk along the road.

If a vehicle crashes into the new guardrails, would it bounce off into the opposing traffic?

The guardrails are designed to capture and retain vehicles on impact. They absorb the energy of the vehicle by allowing the posts to break off but the solid line of the barrier stays intact. This in turn reduces the speed and severity of the crash for the occupants.

There have been no deaths on this section of SH1 so why do we need guardrails?

Between 2012 and 2016, four people were killed and 15 people were seriously injured in SH1 crashes north of Kaikōura, up to Waipapa Bay, and south of Kaikōura to Conway Flat.

Of all crashes between Kaikōura and Clarence, 55% were loss of control or head-on crashes on a bend, and 25% had speed as a factor. South of Kaikōura, 79% of crashes were from loss of control or head-on crashes on a bend, and 38% had speed as a factor.

In 2018, the Transport Agency introduced reduced speed limits in parts of the Hundalees (60km/h) and along the coast (80km/h), following consultation with the community. Even when speed doesn't cause a crash, it is most likely to determine whether anyone is killed, injured, or walks away unharmed.

International research has found that even if road users complied with the road rules 100% of the time, there would only be a 50% reduction in deaths and a 30% reduction in injuries. Guardrails protect people in a loss of control or speed crash.

Will guardrails stop injuries?

Guardrails are designed to 'capture and retain', which means they will soften and/or deflect the impact but will not stop crashes from happening in the first place. When a vehicle hits a guardrail it is slowed down, reducing any resulting injuries.

Why is there so much guardrail between the road and railway line?

The railway line is a hazard where there is the potential of a vehicle moving onto it and colliding with a train or a vehicle being struck by a train because it's on the track or parked too close to the track. KiwiRail has a requirement that allows controlled access only within 4 metres of the centre line of the track. Guardrail is being installed where the road is adjacent to the track and has a height difference of one metre or less.

Why can I not stop on the side of the Kaikōura coast where I used to?

We have been assessing places where it is safe to park and open a car door along state Highway 1 between Clarence and Oaro. In general, when there are vehicles travelling at speed adjacent to the park, three metres is the distance required for safe parking.

All possible locations along the coast have been made available for parking, where we have found there is enough space and no other hazards.

How have you informed the public about the guardrails?

We inform the community about the NCTIR work programme in a number of ways including:

- the Bulletin, a monthly newsletter with hardcopies delivered to numerous Kaikōura businesses and distributed to over 2000 email recipients
- advertisements in the Kaikōura Star
- public information meetings
- work notices to people and parties directly affected.

We also work regularly with two advisory groups, a Restoration Liaison Group made up of representatives from a number of organisations, and the Cultural Advisory Group.

We also welcome public enquiries. You can contact us on **0800 NCTIREQ** (0800 628 4737), by emailing **info@nctir.com** or dropping into our office on Beach Road.



Around the clock at Jacob's Ladder

Once the distant lights of the Kaikōura Peninsula had flickered out, and the last train of the night had passed, the crew at Jacob's Ladder kicked into high gear over a weekend in July. A pre-approved block of line (BOL) by KiwiRail meant no trains would pass the site, just south of Ōkiwi Bay, for 48 hours, allowing the crew to safely remove a section of rail and install a temporary rail bridge.

The temporary rail bridge was familiar, the same infamous 'ugly bridge' installed at Bridge 131 near Wharenui to get the KiwiRail trains moving again after the November 2016 earthquake. This time the rail bridge is enabling vital work to continue under the road and rail alignment at Jacob's Ladder while trains continue running on time.

Leading up to the BOL, crews were hard at work prepping the area and, in the precast yard adjacent to site, boxing and pouring wing walls for the permanent rail bridge that will be installed later this year. Project Manager David Larcombe explains that teamwork has been key to moving forward at Jacob's Ladder. Project Engineer Adrian Blok agrees, pointing out the strong communication between Earthworks Superintendent Warren Arnold, and Structures Superintendent Hemi Foster. The task of installing the temporary rail bridge began just after midnight, and required all hands on deck. The hard work paid off, and the temporary rail bridge was opened and ready for the next scheduled train.

Site Engineer Rana Hassnain says the temporary rail bridge will be removed and the tracks reinstated in time for the Coastal Pacific train to start on the last Friday of September. "We'll put the normal track lines back, and they will sit on the newly installed 4x4m³ culvert." As for the ugly bridge? It will return to KiwiRail until it is needed by another site.



Oaro Gita repairs

Work is underway to repair culverts and build retaining walls at two sites past Oaro, where there is existing damage from Cyclone Gita (see map below for location). Works are expected to continue for four months, with one-way traffic in place around the worksite. Work will generally take place between 7am and 5pm Monday to Friday, with some occasional weekend work. Expect delays and allow extra travel time.



Half Moon Bay debris bridge work

Work is underway at a debris rail bridge near Half Moon Bay to further improve the resilience of the Main North Line. By installing a new, wider bridge the capacity of the channel will be increased. This work



will be completed in time for the Coastal Pacific passenger train to return at the end of September. Two 63 tonne precast beams, which form the sides of the bridge deck, were driven up from Christchurch and installed during two hour-long road closures. Now that these have been fitted, work can begin in 24-hour shifts to prepare the bridge deck for a concrete pour. After the concrete has cured, the main 'deck swap' will occur within a 54-hour window (old bridge will be lifted out, the new bridge desk slid into place), and the road and rail will be closed for a short period during this time in late September.

What will NCTIR do with its assets once work wraps up?

A number of locals have expressed interest in the shipping containers, traffic shelters and other various materials that have been used by NCTIR over the course of our work.

Many of these assets seen at our worksites are not owned by NCTIR - they are either hired, on loan, or belong to subcontractors working with us on the recovery.

When NCTIR-owned equipment or material is no longer required, the NZ Transport Agency and KiwiRail, as funders of the project, will decide whether they will keep, donate or dispose of the equipment/material.

If the Transport Agency or KiwiRail do not require the equipment, it will be offered at fair market value to the NCTIR alliance contractors (HEB, Higgins, Fulton Hogan and Downer).

Anything they do not purchase will be put up for auction using client-approved auction companies.

Some NCTIR assets will have no market value, either through age or condition, and will be sold for residual scrap value where possible, or will be disposed of appropriately. Any revenue will be returned to KiwiRail and the Transport Agency.



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A 'win-win' for NCTIR and KiwiRail

Over 1000 tonnes of slip rock cleared from behind NCTIR bunds has been transported by KiwiRail for repurposing on another of their projects south of Kaikōura. 'It's a win-win for everyone,' says NCTIR Foreman Butch McGinnis, who has been working alongside KiwiRail Civil Project Manager Nolan Chaston to load the rock onto rail wagons at Ōhau Point, where the material was sourced.

'We are currently using the slip rock to stabilise the access road and track formation embankment at Claverley,' explains Nolan. This project includes three rock revetment sections spanning just under 200m, and will require close to 7000 tonnes of rock to build. Nolan estimates that approximately 1500 tonnes of this rock will come from NCTIR sites, with three loads of rock taken so far, and two left to go. 'We are saving NCTIR from having to shift and dispose of the rock, and in turn we are receiving free material, and using one slip to stabilise another,' says Nolan. 'It's a win-win'.



Building a new safer road at Half Moon Bay

Since March this year, there has been a great deal of activity at Half Moon Bay building a new alignment of the road. The realignments at Rākautara and Half Moon Bay work together, removing the dangerous curves in this section of road, which this year has experienced an average traffic movement of 3,000 vehicles per day. Since 1985 there have been 39 crashes, including one fatality, on this small section of SH1.

The Half Moon Bay realignment has an added technical challenge for designers, as the Hope Fault cuts through this section of road. As a result, they needed to ensure that the designed structure is sufficiently flexible to allow for movement.

To build the new road, a seawall up to 9.5m high is being constructed on the seaward side. On completion the wall will be nine blocks high, with a total of 634 concrete blocks, with each weighing 8.5 tonnes. On the seaward side of the wall a rock revetment is also being constructed, which is designed to absorb the wave energy and protect the seawall from coastal erosion.

44,000m³ of aggregate will then be placed in layers to fill the space between the new seawall and the old road. Finally the road carriageway will be formed, sealed and guardrails will be installed.

Completion of the seawall is expected in early October, and the road realignment in January 2020.

Also included in this work:

- Installing a new Telco cable
- Drainage works
- Providing access to the northern end of rail tunnel 18
- Landscaping the existing road returning it to bush.

Constructing this complex piece of work involves a large amount of resources:

- Engineers, surveyor, supervisor and foremen
- A block laying crew
- A backfilling crew
- Three 30 tonne excavators with rock grabs
- One excavator
- Sixteen trucks for backfill.



Hāpuku Bridge upcoming night closures

Hāpuku Bridge, just north of Kaikōura, needs some structural repairs to the bearings, and to do this safely we need to close the bridge for up to two hours at a time while we lift and lower the bridge decks. To minimise any disruption to road users, this will be done at night when traffic volumes are low.

To reduce the impact of traffic loading on the bridge it is currently one-way with a speed limit of 30km. This will remain in place until the completion of the bridge repairs.

The repair works will require jacking up the bridge decks by 10mm so that we can work on the bearings underneath. The bridge has three decks each supported by four piers.

Work will not be visible from the road as we are working under the bridge. Provision will be made for emergency services. The work is not weather dependent.

When: Starting in the early hours of Tuesday 24 September and then every Tuesday for 13 weeks (last closure 17 December).

Time: Between midnight and 2am, each Tuesday.

Travelling to the Kaikōura Hop?

Prepare for extra traffic on the road over the Kaikōura Hop weekend 18 - 22 September 2019.

For those of you travelling, please expect delays and allow plenty of time. Traffic will still be down to one lane at some sites, with stop/go or traffic lights in place.

Between Clarence and Kaikōura there will be approximately three of these short stops. Between Oaro and Kaikōura there will be three.

On the afternoon of Sunday 22 September we have one five minute stop at a rail bridge site that is just south of Ōhau Point, north of Kaikōura. We are expecting this small piece of work to be efficiently done and only a short stop required.

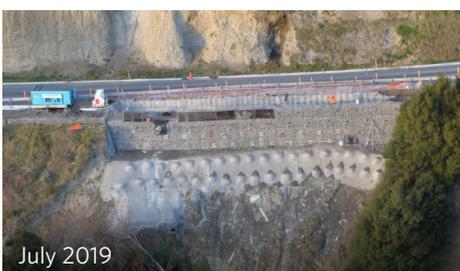
The travel time between Christchurch and Picton is still expected to be 5 ½ hours. Things can change at short notice so please check real-time travel information: call **0800 4 HIGHWAYS** (0800 44 44 49) or visit www.nzta.govt.nz/p2c.



Road through the Hundalees is back to two-way

In February 2018, Cyclone Gita damaged the road through the Hundalees resulting in a section of the road being one-way only for 18 months.

Repairing this section has been a major piece of work as the edge of the road had fallen off. To rebuild it, the NCTIR crew had to create a working platform on the side of the hill, six metres down, and then slowly build up the land to eventually reinstate the second lane. To do this the bank was stabilised by drilling in 37 six-metre-long soil nails. A retaining wall of 63 gabion baskets, four rows high, was built and this was secured with nine-metre-long rock anchors. All this work has been done out of sight of the travelling public down the side of the hillside.



This section of road is now back to two lanes, meaning a quicker trip through the Hundalees.

Blue Duck: progress in pictures

During the 2016 earthquake, the corner between Blue Duck Valley Road and Irongate Bridge developed a large tension crack that required serious ground stabilisation work. Before the road reopened in 2017, concrete piles were installed to reinforce the corner. The rock anchors and capping beam currently underway will complete the work required to stabilise the new road. 'The work in this location is unique,' explains Project Engineer Wendy Heynen. 'The team came up with innovative solutions to make this happen.'



Pre-drilling 18-metre rock anchor holes under the road, and into the rock bank, at angles of 15 and 30 degrees. A fine mist is sprayed to reduce dust.



Supervisor Lukis Fuller adding a length of casing to the rock drill.



Rock anchors consist of a steel rod grouted inside a plastic tube. This ramp allows grout to be poured into the tubes at the correct 15 degree angle, to secure the rods at the same angle they will go into bank.



Before work started, a platform was built to hold the machinery, and a crane sourced that would fit the narrow corridor, but is large enough to manoeuvre a rock anchor around into the hillside.



Pre-grouted rock anchors are swung into position by crane, then inserted into the pre-drilled holes.



48 reinforced concrete piles were constructed to a depth of 13-22 metres. The concrete at the top of each pier is removed to expose the steel reinforcing rods. These rods, as well as the rock anchor ends, are then tied securely into a complex steel reinforcing cage that will form the skeleton inside the capping beam.



The concrete is poured in multiple sections, with a gap between each segment to allow for earth movement. Once complete, the road can be built up to finished level, and guardrails installed. Road sealing should take place in October, once weather conditions are suitable.





Revetments rock!

We asked our NCTIR engineers Gurdeep Singh and Tim Martin to answer some questions about the revetment work underway along the coast.

What is a revetment?

Gurdeep: 'A rock revetment is basically a sloping structure that is placed on a bank in such a way that it absorbs the energy of incoming water. The revetment also works as a supporting structure for the road embankment or seawall.'

How is the revetment built?

Gurdeep & Tim: 'Our revetments are built in two layers. The big rock on top that everyone sees is called 'rock armour' (400mm - 1400mm diameter), and that's what protects the road from the waves - but we also have an underlayer of smaller rocks (150mm - 400mm diameter), which provides the integration between the big rocks and the soil beneath. We have to overlap the rocks in a certain pattern so that we don't have clean joins, because the waves would pull them apart.'

Where is the rock sourced?

Tim: 'We found it really hard to source the five size ranges that we need to meet our design specifications - because it's no good to have lots of one size of rock - we need an even balance. We sourced the majority of this in Kaikōura, but we're looking all over the country for the big rocks (1100mm - 1400mm) - Lake Tekapo, Blenheim and the West Coast.'

Helping hand for Hutton's shearwaters/Titī

The breeding season for Hutton's shearwaters/Titī has begun and adult birds are returning to their nesting sites around Kaikōura. The Hutton's Shearwater Charitable Trust says the birds are vulnerable to disorientation from artificial lights at night and can crash land on local roads.

This usually occurs from September to November and in past years high numbers of birds have been hit and killed by night-time or early-morning traffic.

The birds are at high risk as a grounded shearwater is unable to take off and is clumsy on land, leaving it unable to avoid oncoming traffic. Also, adult shearwaters are black on top and grey/white underneath making it difficult to spot them when on the road.

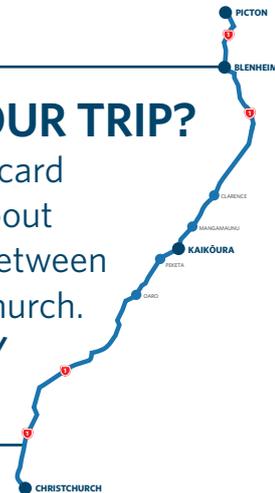
The Trust is asking road users to slow down at night and approach any dark shapes on the road with care.

If you spot a Hutton's shearwater/Titī on the ground place it in dark, quiet and contained place and take it to Encounter Kaikōura for release at sea. If it is clearly injured call the Department of Conservation hotline on 0800 362 468.

HOW WAS YOUR TRIP?

Win a \$50 prezzie card when you tell us about your SH1 journey between Picton and Christchurch.

www.nzta.govt.nz/p2cjourney



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The Bulletin Kaikōura earthquake update

Coastal Pacific returns for the season

The Coastal Pacific has returned for its 2019-2020 season, and passenger Anne Coulston and her brother Peter spent a lovely sunny day in Kaikōura, getting off the train in the morning and leaving late afternoon. Anne says everyone was friendly, and they enjoyed chatting with locals and visiting the shops. “We had fish and chips for lunch, and Poppy’s famous ice cream. It was a lovely relaxing time – no rushing, as we had the whole day.”



Coastal Pacific passengers Anne and Peter



Debris Flow Bridge 115b



Jacob's Ladder

On track at Half Moon Bay and Jacob's Ladder

Two rail projects north of Kaikōura have passed important milestones, with a new tunnel/culvert installed at Jacob's Ladder and a permanent rail bridge at Debris Flow Bridge 115b finished in time for the Coastal Pacific passenger train to restart its 2019-2020 season.

Crews at Jacob's Ladder are now working to remove 50,000m³ of material to form a debris flow catchment basin behind SH1. Around 10,000m³ of this material is being filtered and recycled into a permanent earth bund to direct the flow of debris into the catchment basin

during any future weather events. A new 4x4x30m tunnel/culvert has been installed under the road and rail to allow easy access for the dump trucks that are removing material. The traffic diversion around Jacob's Ladder is expected to remain until November, when SH1 is reinstated there.

Approximately three months' work remains at 115b, with retaining walls to be constructed, and a concrete-lined debris flow channel formed beneath the road and rail.

NCTIR BY THE NUMBERS

Mid-2019



GEOTECHNICAL

HEAVILY LOADED RETAINING WALLS, UP TO 5M ABOVE THE ROAD, ARE MADE UP OF **200+** PILES WHICH ARE DRILLED 10M BELOW THE ROAD

NEARLY **50,000M²** OF ROCKFALL PROTECTION MESH HAS BEEN WRAPPED AROUND 21 SLIP SITES PROTECTING THE ROAD AND RAIL BELOW

MORE THAN **2800** ROCK ANCHORS HAVE BEEN INSTALLED ACROSS 7 SLIP SITES SOUTH OF KAIKŌURA

29 ROCKFALL CATCH FENCES INSTALLED, TOTALLING 2.5KM IN LENGTH

ENVIRONMENT

216 ARCHAEOLOGICAL SITES IDENTIFIED

60 CONSENT APPROVALS

PROFESSIONAL SEAL HANDLERS HAVE PERSONALLY MOVED **14,117+** SEALS (ADULTS AND PUPS) SINCE FEBRUARY 2017

DURING CONSTRUCTION, **4373** FISH FROM 18 SPECIES HAVE BEEN MOVED INTO A DIFFERENT SECTION OF THE SAME STREAM

30 ARCHAEOLOGISTS HAVE WORKED ON THE PROJECT

SEAWALLS

2.5KM OF SEAWALL BEING CONSTRUCTED

7500+ BLOCKS PLACED TO BUILD SEAWALLS NORTH OF KAIKŌURA

EACH SEAWALL BLOCK MAKING UP THE BASE OF THE STRUCTURE WEIGHS **5 TONNES**

THE TALLEST SEAWALL TOWERS TO **10M** ABOVE SEA LEVEL

EX-CYCLONE GITA

THE ROAD REOPENED EIGHT DAYS AFTER IT SHUT

FREIGHT STARTED MOVING JUST **13 DAYS** AFTER EX-CYCLONE GITA BURIED RAIL TRACKS

300 MLS OF WATER FELL OVER 24 HOURS AT RARAMAI CAUSING MATERIAL TO BURY A HOUSE AND SECTIONS OF RAIL & ROAD

MORE THAN **300,000M³** OF MATERIAL CLEARED FROM 60 SITES BOTH NORTH AND SOUTH OF KAIKŌURA

PEOPLE

480 PEOPLE PEOPLE NOW WORKING FOR NCTIR

MORE THAN **1350** ORGANISATIONS HAVE WORKED WITH NCTIR INCLUDING CONSULTANTS, SUBCONTRACTORS AND SUPPLIERS

MORE THAN **7,934 PEOPLE** HAVE BEEN INDUCTED INTO THE PROGRAMME

MORE THAN **5,000,000** WORKER HOURS ON THE PROJECT

16,550 POSITIVE SAFETY CONVERSATIONS

130+ PEOPLE LIVING IN THE TEMPORARY ACCOMMODATION VILLAGE IN KAIKŌURA

KAIKŌURA CAFES AND RESTAURANTS HAVE SUPPLIED MORE THAN **240,000** LUNCHES & DINNERS FOR THE WORKERS AT THE VILLAGE

THE EARTHQUAKE

7.8 MAGNITUDE KAIKŌURA EARTHQUAKE

THE SOUTH ISLAND MOVED **6M CLOSER** TO THE NORTH ISLAND

RUPTURES OCCURRED ON **21 FAULT LINES**, ACROSS **170KM** IN A COMPLEX SEQUENCE THAT LASTED FOR ABOUT 2 MINUTES

THE EARTHQUAKE GENERATED A **TSUNAMI** OF NEARLY 7 METRES IN PLACES

HARBOUR

MARINA REOPEN TO THE PUBLIC ON 14 NOVEMBER 2017

22,000M³ OF MATERIAL DREDGED FROM KAIKŌURA HARBOUR

ROAD

SH1 NORTH AND SOUTH OF KAIKŌURA REOPENED **15 DEC 2017** DURING DAYLIGHT HOURS TO SUPPORT THE TRAVELLING PUBLIC

SH1 NORTH AND SOUTH OF KAIKŌURA REOPENED **24/7** 30 APRIL, 2018 17 MONTHS AND 16 DAYS AFTER THE EARTHQUAKE

BETWEEN CHEVIOT AND CLARENCE THERE WERE **1,500+** DAMAGED SITES **200+** WITH MAJOR ISSUES

100+ ORIGINALLY DAMAGED STRUCTURES OF THOSE NEEDING REPAIRS WE ARE **70%** OF THE WAY THROUGH

85 LANDSLIDES

184KM OF ROAD AFFECTED BETWEEN WAIPARA AND PICTON

NCTIR

THE TOTAL ESTIMATED COST TO REPAIR THE DAMAGE TO THE SOUTH ISLAND TRANSPORT NETWORKS CORRIDOR REMAINS AT **\$1.2 BILLION**

AS OF JUNE 2019 **\$985 MILLION** HAS BEEN SPENT ON RECOVERY AND RESILIENCE, SH1 IMPROVEMENTS, THE INLAND ROUTE, AND GITA REPAIRS

RAIL

RAIL REOPENED TO RESTRICTED RAIL SERVICES **10 MONTHS** AFTER THE EARTHQUAKE

MNL OPEN **98%** (EXCLUDING GITA) SINCE REOPENING

70,000+ FEWER TRUCKS ON UPPER SOUTH ISLAND ROADS BECAUSE OF THE FREIGHT MOVED BY RAIL

DAYTIME FREIGHT OPERATIONS RESUMED OCTOBER 2018 COASTAL PACIFIC RESUMED IN DECEMBER 2018

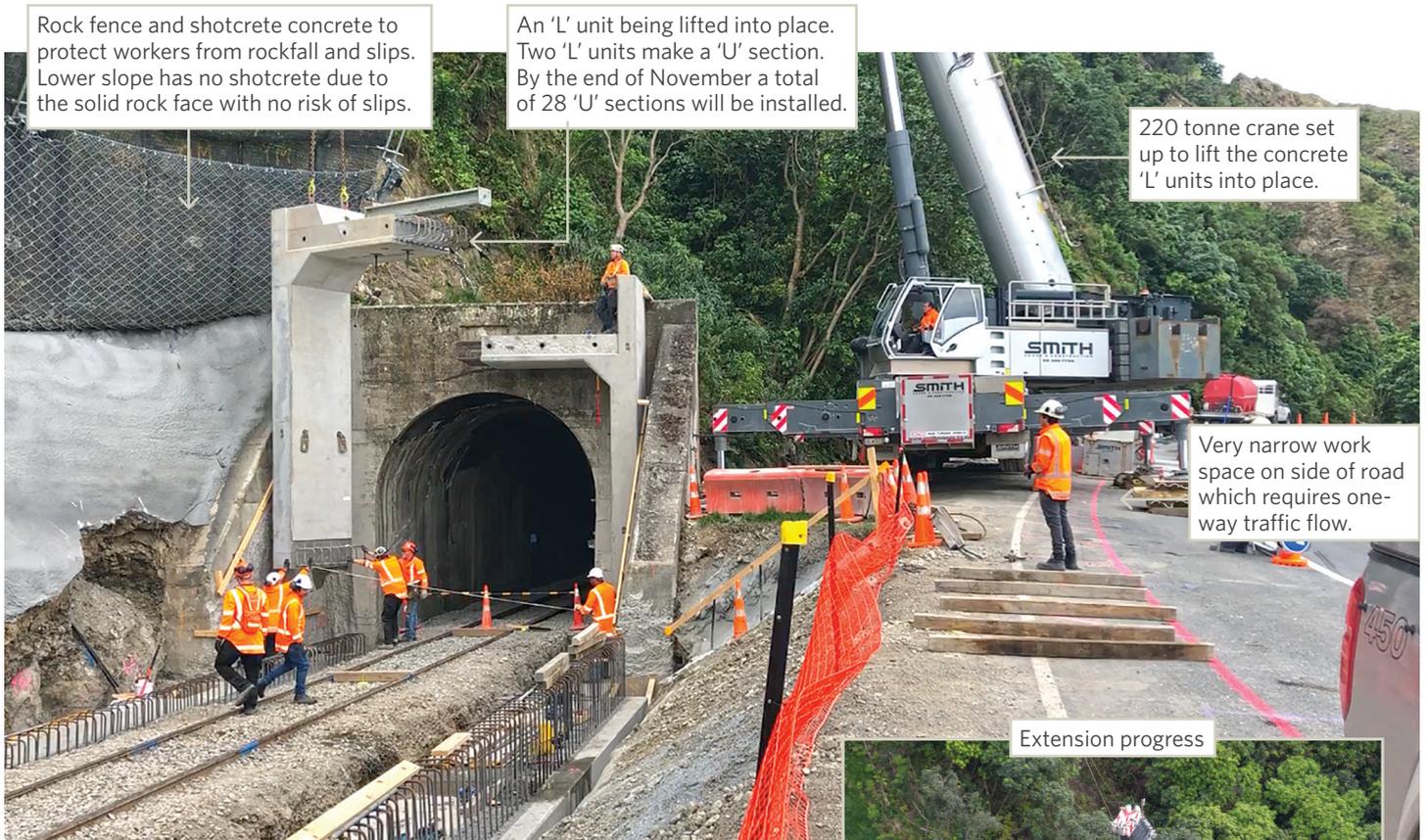
20 TUNNELS AND **60** BRIDGES DAMAGED

22 WORK SITES ALONG **190KM** OF TRACK

Strong foundations, lasting legacy

North and South rail tunnel extensions

Work is ramping up at Tunnel 19 (south of Ōhau Point) and Tunnel 11 (between Paratitahi & Raramai Tunnel) while crews extend both rail tunnels as a rockfall protection measure. See below for an example of the work at Tunnel 11.

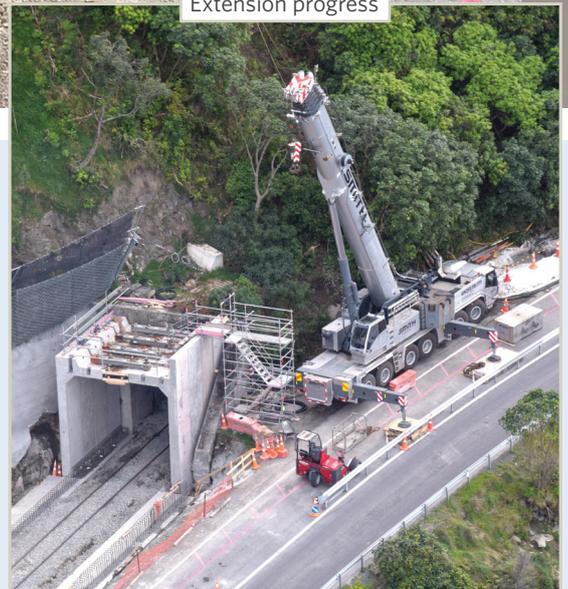


Traffic impact of Tunnel 11 work

A one-way traffic lane is currently in place around the Tunnel 11 site (between the Paratitahi and Raramai tunnels), and will remain until April 2020. This allows for a 220 tonne crane to extend the southern end of the rail tunnel.

While each of the tunnel sections are delivered and installed, there will be a number of 5 - 10 minute traffic holds. There will be no stops between 9:30am and midday while the train runs. This work is expected to complete in early November. Some less frequent traffic holds will continue into April 2020 while crews finish installing rock anchors, drilling and backfilling work.

We apologise for the inconvenience and thank everyone for their ongoing patience.



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The Bulletin Kaikōura earthquake update

Thank you from NCTIR



The 14th of November marked three years since the 2016 earthquake, which shook many from their beds and the NCTIR project into being.

The Kaikoura District Council's Community Celebration was a great opportunity to mark the anniversary alongside the local community, who have been so welcoming and hospitable to our NCTIR team.

As the project approaches its final year we would like to acknowledge the amazing patience and support we have received from the community. We know it has been a long process, but the end is in sight!

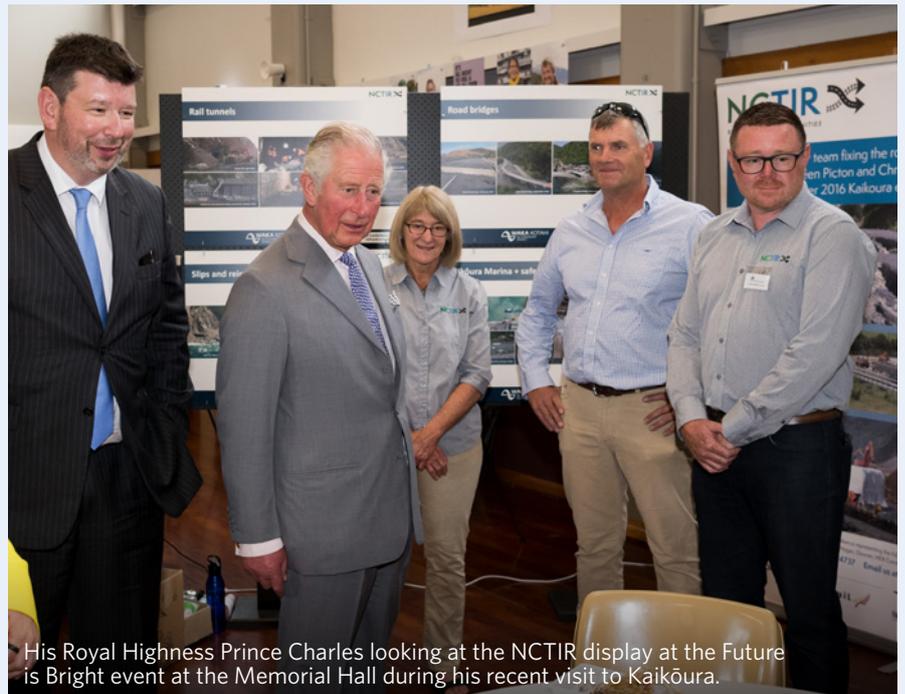
Long after the project is done and NCTIR is gone, we hope that the community will enjoy journeying along a resilient coastline and be proud of their part in supporting the rebuild effort.

Ngā mihi nui,

Tony Gallagher
NCTIR Project Director



Royal welcome



His Royal Highness Prince Charles looking at the NCTIR display at the Future is Bright event at the Memorial Hall during his recent visit to Kaikōura.



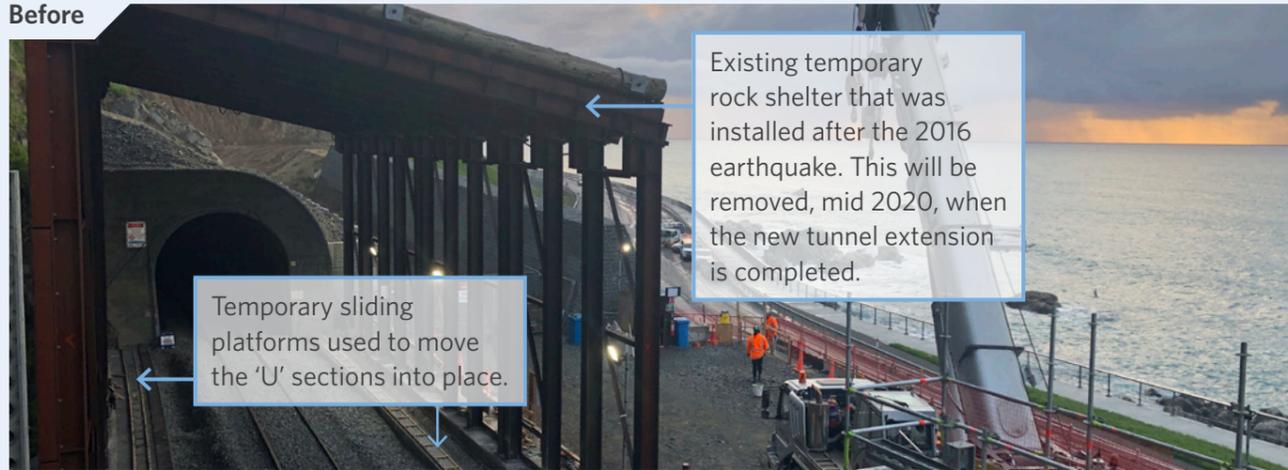
Meeting the NCTIR welcoming party at the Takahanga Domain.

Tunnel 19 extension slides complete



Crews at Tunnel 19 south of Ōhau point have recently finished sliding a number of concrete sections against the tunnel mouth to form an extension. This will act as a permanent rockfall protection measure. This is similar to works underway at Tunnel 11, south of Kaikōura, except here crews need to work around the existing rockfall shelter. See below for an example of the process.

Before



Existing temporary rock shelter that was installed after the 2016 earthquake. This will be removed, mid 2020, when the new tunnel extension is completed.

Temporary sliding platforms used to move the 'U' sections into place.

During



Scaffold set up on either side of the railway line. Each concrete 'U' section is made up of two sides and a 13 tonne top beam, which is lifted alongside the scaffold and then connected together. These sections were then slid, three at a time, into position under the temporary rock shelter.

DoubleE exciting news



The inaugural Engineering New Zealand ENVI Awards were held earlier this month. These awards look for organisations that have been involved in outstanding engineering projects that demonstrated excellence in engineering in ways that benefit society and the environment.

NCTIR, the NZ Transport Agency, and KiwiRail were proud to be finalists in three categories for our work in Kaikōura: Partnership, Impact, and Innovation. With 120 applications received across the eight award categories, Project Director Tony

Gallagher says, 'These awards are recognition of the wider Kaikōura community's involvement in NCTIR and their support of the rebuild efforts.'

On the night, we were delighted to win the Impact Award, jointly with Auckland Council, Fulton Hogan, Boffa Miskell and AECOM for the Te Auaunga project.

The icing on the cake? Receiving the Supreme Award. 'This was a great honour for us to receive, and recognises the huge effort that went into re-opening the road and rail networks. The NCTIR team is diverse

and exceptionally talented. I'd like to thank all of our crew members, past and present, for their hard work - we couldn't have achieved what we have without them. To date, over 8,000 people have worked to restore the road and rail networks and make them safe and resilient for the future.'



Hidden work under Hāpuku Bridge



It's not immediately obvious from the road, but there is a hive of activity taking place under the Hāpuku Bridge. Site Engineer Florent Giffon describes it as a challenging project, but says that work is well underway.

The main work involves jacking the bridge at each of the ten piers to remove and replace the bearing pads. The 30km speed restriction and one-way traffic lanes currently in place help to reduce the impact of the traffic loading on the bridge.

Minimising inconvenience to the public was paramount - so every Monday night the team close SH1 for ten minutes while they lower the bridge onto the previous weeks' repaired pier, then for another two hours from midnight while they raise the bridge and complete work on the next pier.

'We use four jacks at the same time - and the purpose is to jack the bridge evenly to prevent any damage. It's an old bridge that has been partially damaged by the earthquake so we need to take care of the weight,' says Florent.

'We are allowed to jack a maximum of 10mm of displacement, but most of the time we are only jacking the bridge to 6mm, which is enough to remove the bearing pad.'

The team raise the bridge slowly using a number of small lifts across each 100 tonne jack to ensure each is raising evenly in increments of about 5MPa (MPa stands for Megapascal, a unit of pressure) and no more than 2mm of displacement at a time.



Project Manager Fred Witton and Site Engineer Florent Giffon have both been involved in the weekly midnight lifts to repair the Hāpuku Bridge.

'We do ten pumps using a hand pump connected to the jack, before stopping to measure the displacement and record the pressure.'

'From the beginning to maximum displacement the process takes about 40 minutes, we then take a bit of time to place the secondary catching system, and also we have to lower the bridge to minimise the weight we have to match the existing level of the bridge with the new level.'

The next day the team break the hard mortar pad beneath the pier and reinstate a new mortar pad with a strength of 30MPa.

A total of 88 mortar pads from ten piers and two abutments will be replaced. The work is expected to be complete by late December.

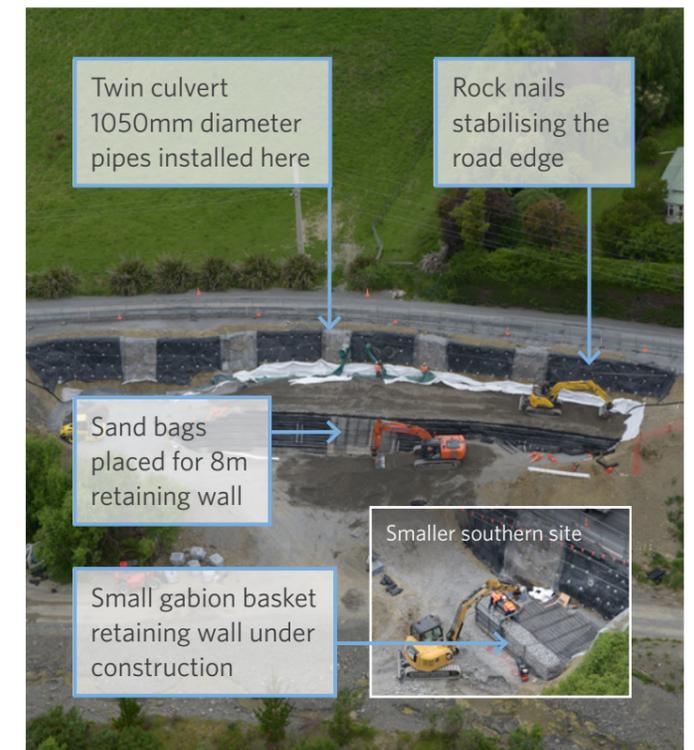
Cyclone Gita repairs at Oaro to be completed by Christmas



The work at the twin culverts site on SH1 at Oaro is on target to be completed. The road will be sealed and back to two lanes before the Christmas holidays.

On the larger northern site the retaining wall is being constructed by hand. Instead of using gabion baskets the wall is being constructed of sandbags, containing 95% sand and 5% cement. Placing each sandbag by hand takes slightly longer, but makes for a more resilient structure, as hand placed sandbags have a 100-year guarantee, instead of the standard 50.

When the 8m high retaining wall is complete, and the twin 1050mm diameter culverts installed, the western side of the road will be backfilled to match the road height. Traffic will then switch onto this newly constructed lane while the culverts are installed on the eastern side. The road will then be stabilised and sealed ready for Christmas.



Twin culvert 1050mm diameter pipes installed here

Rock nails stabilising the road edge

Sand bags placed for 8m retaining wall

Small gabion basket retaining wall under construction

Smaller southern site

Clarence River Bridge final pier pour



Crew at Clarence River Bridge recently hit a milestone, strengthening the last of the bridge's piers by pouring a 92m³ concrete 'jacket' around the existing Pier B structure. The pour lasted around six hours, with two 6m³ capacity concrete trucks taking turns to pour and then refill at an on-site concrete plant. Crews will now begin removing the river diversion, with work expected to wrap up before Christmas.



Blue Duck Corner – signed, sealed, delivered



Following months of road stabilisation work, crews at Blue Duck corner have sealed and line marked the road and returned traffic to two lanes. 'This seal is literally the icing on the cake,' says Project Engineer Wendy Heynen. 'It's the finished layer of the whole project.'

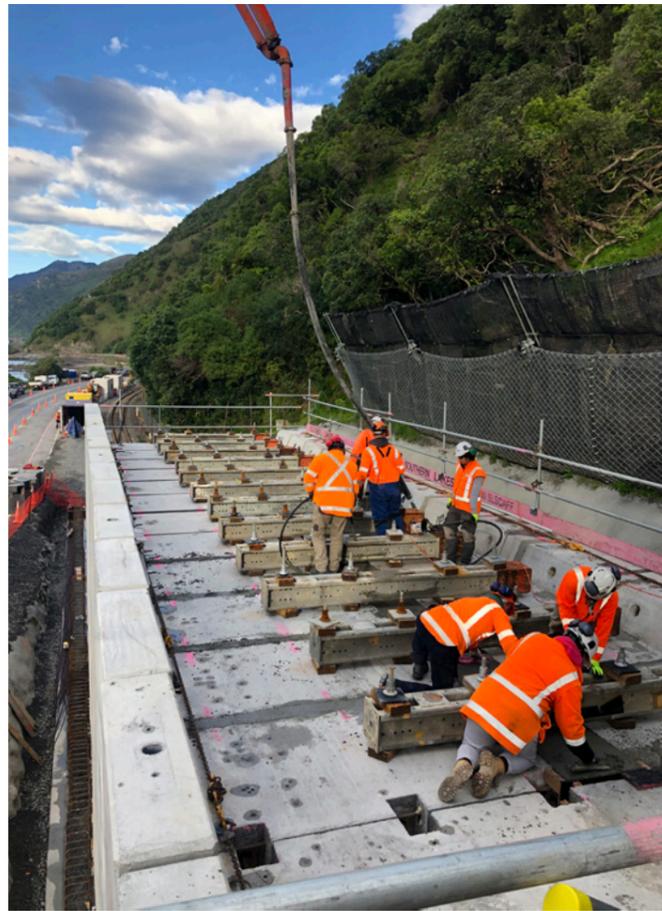


Tunnel 11 rail tunnel extension



The 28th and final concrete 'U' section has recently been placed on the Tunnel 11 rail tunnel extension between the

Raramai and Paratitahi tunnels south of Kaikōura. Crews are now focussed on backfilling work, and will begin installing rock anchors above the tunnel in the new year, with work expected to wrap up in April 2020. Traffic will return to two lanes over the Christmas break.



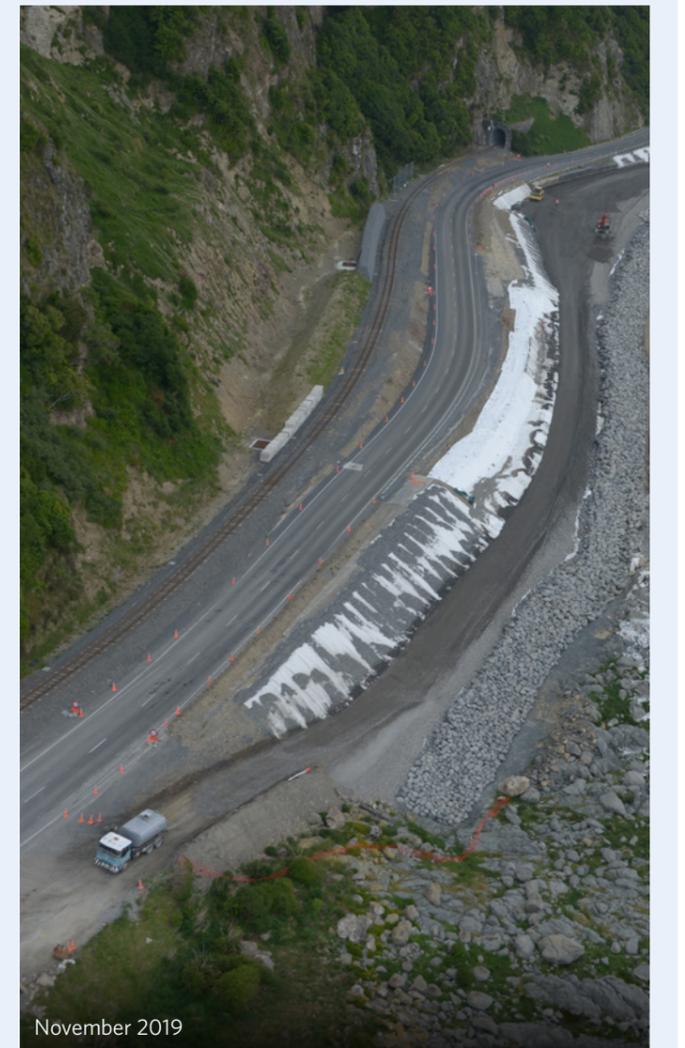
Realigning Ōkiwi Bay



Work is progressing on the southern end of Ōkiwi Bay where the road is being realigned to smooth out the curves, and to move the flow of traffic further from the rock face. Approximately 98% of the material to form the embankment has been placed, with 85% of the rock revetment completed. This project is scheduled to wrap up in late May 2020.



July 2019



November 2019

Your questions answered

What is being done at Māngamāunu with regard to the shared use path?

There has been some discussion around this topic in recent days. We want to be clear, we have no intention of building the shared path south of Blue Duck at Māngamāunu. This decision was made following judicial review, in December 2018 after discussions with the local Te Rūnanga o Kaikōura and the Surfbreak Protection Society. We have formally withdrawn the consent for the 800m around the Māngamāunu Bay area. Through ongoing discussions with iwi, we have also removed further sections of the shared use path from Māngamāunu Bay to Blue Duck.

What is happening with the rest of the shared use path?

As a result of our continued kōrero with Te Rūnanga o Kaikōura, NCTIR/Waka Kotahi NZ Transport Agency is working to find a resolution that will link up the sections of shared use path already built. The Transport Agency has proposed an alternative design to the current shared use path.

The intention of the alternative design is to ensure access to and views of this rugged coastline are maximised, and to ensure that the shared use path does not impinge archaeological and culturally sensitive areas.

What is happening with the guardrails?

Feedback and concerns over the introduction of safety guardrails from Te Rūnanga o Kaikōura, advisory groups and some members of the community encouraged the Transport Agency to review the locations of the guardrails in relation to the level of risk. As a result, there will be reductions in the initial proposed scope of the guardrail both north and south of Kaikōura.

- South of Kaikōura (between Peketa and Oaro) some guardrail that has already been installed will be removed (includes both rail and sea side). Some will also be repositioned to allow more parking areas. There will still be guardrail installed in the high-risk priority locations to improve safety outcomes.
- North of Kaikōura there will be reductions from the original scope but this still in progress, as it is tied to decision-making around the shared use path.

What engagement has been undertaken with iwi?

Since December 2016 we have worked with the Restoration Liaison Group, which includes an iwi advisor representing Te Rūnanga o Kaikōura and a representative from Te Rūnanga o Ngāi Tahu.

In addition, as of August 2018 we formed a specific Cultural Advisory Group, with representatives from both Te Rūnanga o Kaikōura and Te Rūnanga o Ngāi Tahu.

We have had cultural monitors and an archaeological team of up to 30 people working on the project since December 2016.

What are the handrails for?

There are handrails installed at the Ōhau safe stopping area and where we have constructed new infrastructure like seawalls. We need to comply with safety regulations like the Building Code so there have to be handrails to protect the public from the significant drop-offs.



New home for native skinks



New Zealand renowned herpetologist and wildlife ecologist Marieke Lettink has been working with NCTIR to rehome native skinks from upcoming work sites. Initial surveys found a population of South Marlborough grass skinks at the Waiiau Bridge that needed to be removed before construction to repair the bridge could begin. 'They'll have to strip all the vegetation off the slopes here, and obviously the lizards will be affected by that. So the easiest thing to do is to go in and move them,' Marieke said.

'First the site engineer has to wait for us to clear the lizards. Once we're done they get the go ahead that the lizards are all gone, and they're able to maintain this as a construction site.'

Marieke said there are over 110 species of native lizards and all are absolutely protected by the Wildlife Act – so mechanisms for their protection are a legal requirement.

Marieke uses tinned pear to bait the skinks into the traps before she catches and bags them for removal. 'They will be released at a site in Lottery Bush that has been prepared with a network of predator traps, which will protect the skinks from predation by things like mice and rats.'

'It's about making sure the animals are protected and that they get released in the best possible place.'



Megan Brown and Marieke Lettink trapping lizards at the Waiiau Bridge.



A female South Marlborough grass skink.

Seal of approval from Kaikōura Primary School



NCTIR Environmental Advisor Elisa

Chillingworth has been visiting schools in the district to tell pupils all about Kaikōura's seals and the steps being taken to protect them at NCTIR work sites. Her talk covers seal biology, behaviour, and the variety of different seals that call New Zealand home.

Elisa is part of the environmental team and is one of the

environmental specialist seal handlers who relocate seals from unsafe areas in the rebuild.

The preferred rocky habitat of New Zealand fur seals puts them at risk of construction works along the coastal route, and the specialised team has moved over 14,000 seals from harm's way since work began.

Here are some of the thoughtful questions asked by Kaikōura Primary School children at one of Elisa's talks:

Q: Can seals see underwater?

A: Yes, their eyes have an adapted round lens (similar to a fish) that lets them see clearly underwater.

Q: How long can seals stay underwater?

A: Their average dive time is 11 minutes to around 100-200 metres deep.

Q: How long do seals live?

A: NZ fur seals live to around 16 years old.



Elisa showing off her seal handling gloves.



The Kaikōura Primary School pupils had plenty of questions about the seals

NCTIR teams visit the Marae



Te Rūnanga o Kaikōura invited the NCTIR whanau to be welcomed on to the Takahanga Marae with a pōwhiri and to learn about the history of the whare. An added highlight for the NCTIR team was getting an overview of the Cultural Artworks Package and understanding the stories behind the design work.

The Cultural Artworks Package came from a November 2018 hui between NCTIR and the Cultural Advisory Group about the stories that should be told along the coastal corridor at seven formal safe stopping areas.

Te Rūnanga o Kaikōura executive member Maurice Manawatu gave an insightful presentation on the unique symbolism used at each site - on buildings, furniture, concrete pathways, and carved pouwhenua. For example, Rākautara, north of Kaikōura, has long been known for its kai moana.

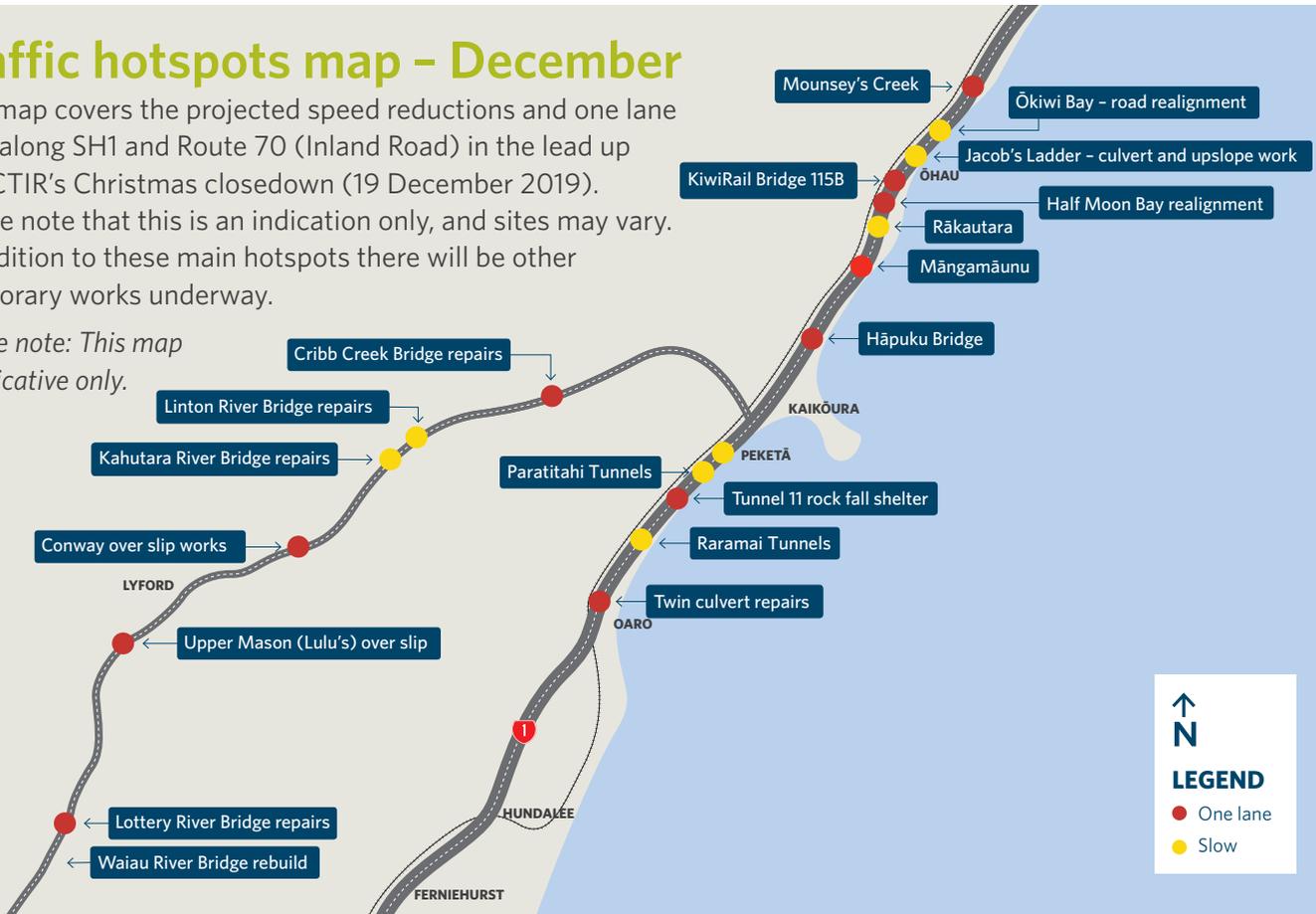
NCTIR Project Director Tony Gallagher says the visit to the Marae was very special. 'Such beautiful people who made us all feel so welcome, shared their own stories, built the story behind the Cultural Artworks Package which we will have the privilege of building. I was so proud to be part of the team and deeply appreciated the way we participated and came prepared to learn.'



Traffic hotspots map - December

This map covers the projected speed reductions and one lane sites along SH1 and Route 70 (Inland Road) in the lead up to NCTIR's Christmas shutdown (19 December 2019). Please note that this is an indication only, and sites may vary. In addition to these main hotspots there will be other temporary works underway.

Please note: This map is indicative only.



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The Bulletin Kaikōura earthquake update

Enjoy your Christmas travel



December the 15th marked the two-year anniversary of our biggest milestone to date – the re-opening of State Highway 1 north of Kaikōura, resulting in the reconnection of the coastal corridor to neighbouring communities that had been separated since the November 2016 earthquake.

This Christmas, it looks like we're on track to open two lanes all the way through, with reduced road cones and speed restrictions to help with the holiday flow of traffic. We hope you'll enjoy driving this beautiful piece of coastline and stopping at some of the newly opened safe stopping areas. Public parking is now available at Rākautara, Te Ana Pōuri, Ōkiwi Bay, Raramai and Toka-ānau. Paparoa Point is still under construction and will open in early 2020, along with the amenity block at Raramai.

Take some time to have a look at the pieces of cultural artwork, designed in collaboration with Te Rūnanga o Kaikōura, that are being installed at the stops. This includes information panels that explain the cultural and historical significance of the symbols used at each location. The safe stops will be formally 'opened' in 2020 when they are all complete, with artwork installed.

Most of the NCTIR crew will be taking a well-deserved break over Christmas, and will be off the roads by midday Thursday 19 December, returning on Monday 6 January 2020. From all of us here at NCTIR we hope you have a safe and happy Christmas!

A motorist's Christmas message to NCTIR



Hi there all you wonderful guys and gals,

Just been down and back to Kaikōura from Blenheim. So totally impressed by the work you have done, the care you have taken to protect and preserve wildlife, and your amazing interface with travellers. It was a pleasure to drive through, even though there were holdups. You are all so cheerful, friendly and responsive to travellers, even though we are probably a bit of a pain. It was a fantastic experience and I just wanted you to know that your efforts are truly appreciated and greatly admired.

Thank you all so much. You are stars.

I wish all of you a very Merry Christmas, and a Happy New Year.

Warmest greetings

Jackie Roberts



Artwork by Julia Lewis (Archaeology)

Three years on for NCTIR

December 2016 - 2019

It's been three years since the earthquake changed the landscape in Kaikōura and our work to repair the road and rail networks began. 2020 will be our final year on the project as we build safety and resilience into everything we do. Here is a look at how far we've come.



Jacob's Ladder temporary rail bridge removed

2016	
DECEMBER	The NZ Transport Agency and KiwiRail formed the NCTIR Alliance with four construction partners to restore the road and rail networks
2017	
JUNE	Access reinstated south of Kaikōura on SH1 First work train travelled the Main North Line from Christchurch to Kaikōura
JULY	\$231 million funding package announced to improve safety and resilience of SH1
AUGUST	
SEPTEMBER	Night rail freight open
NOVEMBER	
DECEMBER	SH1 reopened to connect north to south during the day
2018	
APRIL	SH1 opened 24/7
OCTOBER	Freight trains operating 24/7 Both Raramai tunnels opened for two-way traffic
NOVEMBER	
DECEMBER	Both Paritahi tunnels opened for two-way traffic
2019	
SEPTEMBER	SH1 through the Hundalees opened for two-way traffic
OCTOBER	Tunnel 11 and 19 rockfall protection extension slides complete Blue Duck road sealing and stabilisation complete
DECEMBER	All ex-cyclone Gita repairs in the Hundalees complete



AUGUST At Ōhau Point a construction access platform was cut around the hillside allowing crews from both sides to work together for the first time



NOVEMBER Kaikōura harbour reopened



OCTOBER Ōhau Point safe stopping area opened



NOVEMBER Coastal Pacific relaunched with a special service



OCTOBER Last sea wall block for the whole project placed at Half Moon Bay



OCTOBER Te Ana Pōuri and Rākauara safe stopping areas opened

ASK AN ENGINEER:

Why wasn't the seawall at Ōhau Point built higher, so the waves don't come over?



A number of options were considered for the reinstatement of the road around Ōhau Point including bridges and a viaduct. When assessing

the options the key considerations were:

- how quickly it could be constructed
- how much it would cost
- how it would perform in a future earthquake (reducing damage and making repair easy), and
- how likely is it to overtop (when waves come over the top)

The seawall option was selected as it was the quickest to construct, could provide access prior to being completed, was cheaper, and can be reinstated faster in the event of another earthquake. It also met the required overtopping frequency based on the survey and modelling which had been done at the time.

For the majority of the 3.2km, the wall has matched the modelling - but there is a 50m section at Ōhau Point which has proven to be affected by strong 3D wave effects, generating the few 'overtopping' events that we have seen.

The seawall has been constructed close to the maximum height possible, as to go higher meant that the wall would have needed to go further out into the sea. While there is a long term provision to increase the current wall by 1m, going any higher in the current location would make the wall too tall and skinny and it would not survive well in an earthquake.

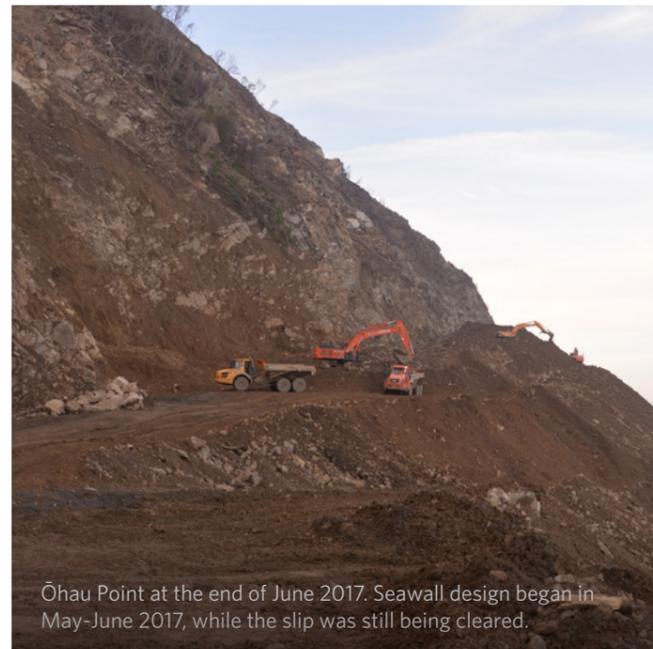


July 2017

To mitigate the effects of waves coming over the road along that short section of seawall a number of measures are being taken. These include:

- Installing and testing a temporary steel wall with a wave return in place of the hand railing, which will be monitored to measure performance - this is reliant on further wave events, so may take some time for results to come through. This will be used to develop a permanent wall.
- Installing a monitoring buoy and camera and correlating the observations with weather patterns to develop a Trigger Action Response Plan (TARP - see page 5) with warning thresholds - this information gets fed back to Waka Kotahi NZ Transport Agency allowing them to make the call to manage traffic or close the road for a short period of time, until the event passes.
- Undertaking physical model testing at a hydraulics laboratory in Sydney to supplement the onsite observations and provide further certainty over the events which cause overtopping. The model testing will also assess whether a rock revetment or armour unit type solution at the base of the wall could be effective for consideration into the future.

The end result, when our testing is complete, will be a permanent, low-cost mitigation improving the situation for that short section of wall that can be manufactured locally.



Ōhau Point at the end of June 2017. Seawall design began in May-June 2017, while the slip was still being cleared.



Early stages of seawall construction, September 2017.

What is a Trigger Action Response Plan (TARP)?

A TARP is a process that allows people to assess changes in situations and identify if they need to change what they're doing in order to remain safe. Our workers use them on sites for a variety of situations. For example when ex-Cyclone Gita came through, the TARP indicated that rainfall was reaching unsafe levels, based on the observed effects of previous weather events, which meant the team knew to stop work, pack up safely, and leave site.



November 2019

Your questions answered

Why are debris flow bridges needed?

Along the Kaikōura coast, north of Rākautara, there are three debris flow bridge sites within a 1km area, as well as one at Jacob's Ladder just south of Ōkiwi Bay. They have been built at these locations because of the large quantities of natural debris material remaining on the hillsides, which will continue to wash down in heavy rain events.

The bridges prevent debris material from blocking the road and rail, causing a hazard and disruption. An advantage of this design is that it requires less regular maintenance than other options.

How do debris flow bridges work?

The debris flow bridges are built to an appropriate size to pass rock and other material under the road and rail corridors and allow that material to continue on its natural course. To direct flow from the hillside

under the bridges there is a need to construct and maintain channels, bunds and walls.

Was there additional debris to be managed after ex-cyclone Gita?

When ex-cyclone Gita hit in February 2018 it exposed an additional erosion path north of Rākautara which increased the quantity of debris material coming down. This material remains on the seaward side of the road and rail corridor.

A significant volume of material remains on the hillside that will likely pass through the debris flow bridges at some stage. To manage this greater quantity of material a larger inlet on one of the bridges has been constructed and is due to be completed this month.

What happens when the inlet construction work is finished?

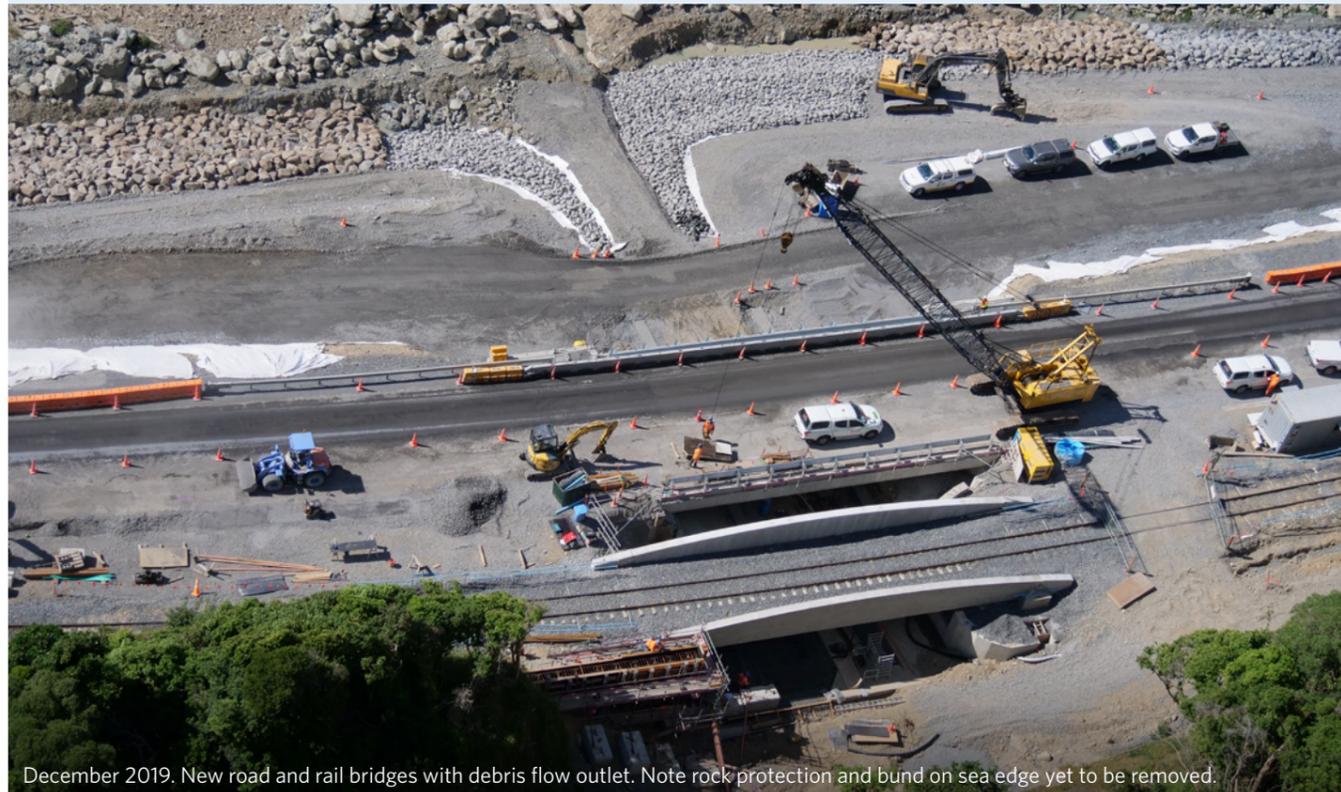
During construction of the debris flow bridges, rock protection

in the form of a large bund was constructed at the outlets to retain the naturally eroded ex-cyclone Gita material and minimise sediment discharge into the sea. To ensure the debris flow bridge at this site performs as designed, the rocks, bund and temporary works will be removed when the inlet is completed.

This will then expose the natural ex-cyclone Gita material to the sea and allow nature to take its course. There will likely be some initial sediment discharge, and during rain events and high seas it is likely some of this material will be slowly eroded away.

Is this work consented?

Yes. NCTIR works closely with Environment Canterbury and the Department of Conservation to ensure all aspects of the relevant consents are adhered to. Our environmental team monitor all work and particularly have an oversight of the sediment discharge to ensure it complies with the consents.



December 2019. New road and rail bridges with debris flow outlet. Note rock protection and bund on sea edge yet to be removed.

Engaging youth in the rebuild



Over the last three years, primary and high school students from across the district have had opportunities to get involved in the NCTIR rebuild with site visits and activities.

Recently, teenagers from the Kaikōura Youth Council were given an overview of construction works and engineering design around Ōhau Point. Geotech Engineer Sam Glue met the group at the safe stopping area and gave them an insight into the project.

Children from Kaikōura's primary schools have also been visiting sites to see the tile artwork they created earlier this year on display at three safe stopping area amenity blocks along the State Highway 1 coastal corridor.

Auckland artist Nicola Francis-Gibb and Rawiri Manawatu from Te Rūnanga o Kaikōura worked with the children to develop their designs, which followed a different theme for each safe stopping area.

Kaikōura Suburban School pupil Zara Smith said the whole process was special. 'It's pretty nice to have something like this, we don't get to do it very often and to have some art around our town. I really recommend people to come and see them, I think they'd really enjoy them.'

NZ Transport Agency Owner Interface Manager Colin Knaggs says involving the community is a key part of the NCTIR programme. 'We hope that by including projects for local children at the safe stopping areas we can help them to feel a part of the recovery efforts along the coastal corridor and give them a sense of ownership of these sites.'

Another school initiative, to mark the third anniversary of the November earthquake, was the delivery of a gabion basket and lots of rocks to each of the local primary schools. The students have decorated the rocks with their names and messages for the future and placed them in the baskets which will be displayed at each school.

Kaikōura Youth Council visit to Ōhau Point



Hāpuku School's completed gabion basket



Suburban and Hāpuku Schools visit their tiles at the new amenity block in Rākautara.

Culvert opening



Crews at Jacob's Ladder A celebrated the

early completion of their project, just south of Ōkiwi Bay, which wrapped up a month ahead of schedule. The temporary detour around this site has now been closed, with traffic returned to two lanes over the completed culvert on State Highway 1.



FOR A SAFE JOURNEY, DRIVE WITH CARE THIS SUMMER

STAY SAFE.
PLAN AHEAD.

This summer, take your time by driving to the conditions, keep a safe following distance, and be patient in traffic. For a safe enjoyable trip, use our journey planner to check real-time traffic information before you head away.

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This Bulletin provides the latest information about the rebuild of road and rail networks damaged by the Kaikōura earthquake in November 2016. The Bulletin is produced by the North Canterbury Transport Infrastructure Recovery (NCTIR) - an alliance representing the NZ Transport Agency and KiwiRail, on behalf of Government.