

Moving Mountains to Reconnect Communities

THE STORY OF THE RESTORATION AND IMPROVEMENT
OF KAIKŌURA'S TRANSPORT NETWORKS



Tēnā koutou
katoa

E ngā karangatanga e maha he hari anā tēnei mihi atu ki a koutou i runga tonu nei i ngā ahutanga o te tika me to pono o tēnei kaupapa manāki taonga ā whenua ā wai māori ā wai tai.

He kaupapa nui whakaharahara tem ahi ngātahi tēnei iwi me ngā katoa e nohonoho nei ki tō matou takiwā.

Ko Tapuae-o-Uenuku kei runga hei titireia mō te iwi.

Ko Waiau toa kei raro i hono ai ki tōna hoa kit e hauraro ko Waiau Uha.

Ko Te Tai o Marokura te moana i ū mai ai a Tūteurutira kia tau mai ki tō Hineroko whenua i raro i Te Whata Kai o Rokohouia.

Ko tōna utanga he tāngata, arā ko ngā Tātare o Tānemoehau.

A, heke tātai mai ki tēnei ao.

Mā tātou anō ngā awaawa, me ngā hiwi, me ngā toropuke, me ngā maunga, me ngā awanunui kei runga i a Kaikōura whenua e tiaki, e atawhai.

Ko Takahanga te marae.

Ko Maru Kaitātea te whare tipuna.

Ko Ngāti Kuri te hapū.

Ko Ngāi Tahu te iwi.

Tēnā koutou
katoa

To all peoples, it is with pleasure we greet you, with the best of intentions regarding this important issue of caring for our land, our inland and coastal waterways.

It is equally important that our people work with all others that share our tribal territory.

Tapuae-o-Uenuku is above as a chiefly comb for the people.

Waiau Toa is below, also joining with his partner further south Waiau Uha.

Te Tai o Marokura is the ocean crossed by Tūteurutira where he landed upon the shore of the land of Hineroko, beneath the lofty food gathering cliffs of Rokohouia.

His cargo was people, the brave warriors of Tānemoehau.

The descendants have remained to this time.

It is now up to us to protect and care for the rivers, valleys, hillocks, ridges, mountains and broad, braided rivers upon the lands of Kaikōura.

Takahanga is the marae.

Maru Kaitātea is the ancestral house.

Ngāti Kuri is the hapū.

Ngāi Tahu is the iwi.

This book is dedicated to all the women and men who worked for the North Canterbury Transport Infrastructure Recovery (NCTIR) Alliance on Waka Kotahi NZ Transport Agency and KiwiRail's programme of work to recover and improve Kaikōura's transport networks. Ka pai tō mahi.



Introduction	6
The NCTIR Alliance	8
Forewords	10
NCTIR Alliance Project Directors from 2016 to 2021	12
NCTIR Board and Alliance Management Team	13
Timeline	14
Our approach	16
Collective wisdom from the Restoration Liaison Group	18
Powerful partnerships with mana whenua	20
Thanks	22
In the Beginning	24
Response to Rebuild	62
Reconnecting Communities	106
Making Progress	132
Powering Through	164
A Lasting Legacy	186
One Final Innovation	234
A place for reflection	242
Awards	244
Links to project legacy resources	246

Introduction

Just after midnight on 14 November 2016, most of central New Zealand woke following a 7.8 magnitude earthquake which struck about 60km south west of the coastal town of Kaikōura in the South Island.

The earthquake caused widespread damage. Thousands of landslides came down closing State Highway 1 (SH1), the Main North Line railway between Picton and Christchurch, and the Inland Road (Route 70).

The level of earthquake damage to the road and rail networks was unprecedented. Coastal and rural communities were isolated overnight. The instant disruption to tourism, freight and primary industries was felt nationwide.

During four years of construction, nearly 9000 women and men from more than 1350 organisations (from New Zealand and overseas) worked more than 6.5 million hours to restore and improve these critical transport networks.

It was an extraordinary response to a complex, multi-faceted infrastructure project. They moved mountains to reconnect communities and their legacy is a safer, more resilient transport network that will serve generations to come.

7.8

magnitude earthquake ruptured 21 fault lines, generating the strongest ground shaking ever recorded in New Zealand. It moved the South Island 6m closer to the North Island

3300

the number of necessary repairs was enormous, with more than 3300 separate 'things to be fixed', including land and structures

10

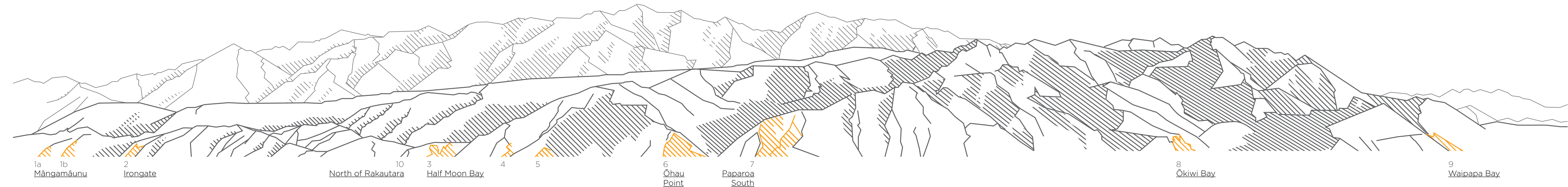
the Main North Line railway reopened to restricted rail services just 10 months after the earthquake

111

one year, one month and one day on from an earthquake which changed the lives of so many people, SH1 north of Kaikōura was reopened, reconnecting communities once again

6.5m

number of hours worked on the project



The NCTIR Alliance

Owners of the road and rail networks Waka Kotahi NZ Transport Agency and KiwiRail came together for the first time in a collaborative model setting up the North Canterbury Transport Infrastructure Recovery (NCTIR) Alliance – with four construction companies – Downer, Fulton Hogan, HEB Construction and Higgins.

This powerful team was established to resolve an extraordinary situation by working collaboratively to successfully restore and improve the road and rail networks.



Waka Kotahi delivers a land transport system connecting people, products and places for a thriving Aotearoa.



KiwiRail owns the national rail network and provides freight and tourist passenger services, as well as the Interislander ferries, and manages a significant property portfolio.



Downer designs, builds and sustains infrastructure that makes a difference to the lives of New Zealanders and are proud to lead the way in delivering social outcomes for communities.



Fulton Hogan is an enduring infrastructure business, creating, connecting with, and caring for communities across Australasia.



HEB Construction designs and builds infrastructure and facilities, enhancing communities and improving daily life and mobility for all.



Higgins provides a comprehensive road and civil infrastructure construction service with teams across New Zealand and in Fiji, working to build better communities for generations to come.

Sub-Alliance partners



Aurecon is an engineering, design, and advisory company who works alongside clients to co-create clever, innovative solutions to some of the world's most complex challenges.



Tonkin + Taylor is an employee-owned environmental and engineering consultancy company that builds solid, enduring relationships.



WSP develops creative, comprehensive, and sustainable engineering solutions for future generations.

Forewords



Waka Kotahi, KiwiRail and our construction partners Downer, Fulton Hogan, HEB Construction and Higgins were a formidable team that has delivered outstanding results.

Through innovation and an amazing collaborative effort we reopened road and rail ahead of expectation – an extraordinary response to a complex infrastructure project.

By forming strong partnerships with our Treaty Partners, Kaikōura District Council, the Restoration Liaison Group and Cultural Advisory Group we were able to achieve so much together and leave a lasting legacy for the community.

A huge thank you to the women and men of NCTIR, you captured the imagination of New Zealanders with your extraordinary efforts. Ka rawe te mahi ngātahi.

Nicole Rosie, Chief Executive, Waka Kotahi NZ Transport Agency



The devastation caused by the Kaikōura earthquake to road and rail networks required a unique and collaborative response.

The NCTIR Alliance brought together a team of remarkable people from around the country and around the world who delivered a simply staggering outcome.

This was always about so much more than reopening road and rail - all those involved in this effort can be proud of the role they played to reconnect families, friends and communities, restore business continuity and keep New Zealand moving, while preserving what was precious.

The team's skills and commitment were deservedly recognised across New Zealand and globally and we thank them for this.

Greg Miller, Group Chief Executive Officer, KiwiRail



The NCTIR Alliance was formed quickly with a vision to 'move mountains and reconnect communities'. This vision helped to energise and engage the team working on this massive rebuild project, and delivering a positive outcome for New Zealanders was at the heart of our response.

A collaborative approach to governance was critical to the successful delivery of the project. Together, we created an environment where everyone could do their best. We have worked to design safe and resilient road and rail networks, balanced with minimising the impact on the environment, cultural landscape, and wildlife along this beautiful coastal route.

I would like to thank all our partners for their wisdom and support which helped us overcome challenges together and enabled us to provide an outcome that will be enjoyed by generations to come.

Steve Mutton, Director Regional Relationships, Waka Kotahi and Chair of the NCTIR Board



The NCTIR team not only delivered world-class engineering solutions safely, but just as importantly, we did it in a manner that considered the unique environment, local community, and mana whenua.

As a disaster rebuild this has been one of the most significant engineering challenges in New Zealand's history. We could not have achieved what we did without the partnership of Te Rūnanga o Kaikōura and the support of the Kaikōura community – it has been the privilege of a lifetime to be part of.

I'm sure I speak on behalf of the 9000 women and men from NCTIR, when I say this was an experience that will stay with us forever.

Tony Gallagher, Project Director, NCTIR

**NCTIR Alliance Project Directors
from 2016 to 2021**



Duncan Gibb
December 2016 to June 2017



David Loe
June 2017 to March 2018



Brian Kirtlan
March 2018 to January 2019



Tony Dickens
January 2019 to May 2019



Tony Gallagher
May 2019 to June 2021



**NCTIR Board and Alliance Management Team
(pictured with some of the site managers)**

NCTIR Alliance Board 2020

Steve Mutton
David Gordon
Henare Clarke

Tony Pike
Jonathon Earl
Mark Evans

Mike Howat
Peter Spies
Simon Robertson

Alliance Management Team 2020

Tony Gallagher
Colin Knaggs
Phil McQueen

Philippa Green
Trudy Guy
Cherie Leckner

Stella Castelow
Robyn Laurenson
Will Doughty

Graeme Tiltman
Kirsty Youldon
Haden Walters
Gary Ikin

2016

2017

2018

2019

2020

2021

Timeline

14 November The 7.8 magnitude earthquake struck about 60km south west of Kaikōura

December Waka Kotahi and KiwiRail formed the NCTIR Alliance with Downer, Fulton Hogan, HEB Construction and Higgins

Mid-December Inland Road (Route 70) reopened to the public with unrestricted, unescorted access

December Access reinstated south of Kaikōura on SH1 on a limited basis

June First work train travelled the Main North Line railway from Christchurch to Kaikōura

July \$231 million funding package announced to improve safety and resilience of SH1

August Final weld to reconnect the Main North Line between Picton and Christchurch

August Construction access platform cut around the hillside at Ōhau Point allowing crews from both sides to work together for the first time

September Night rail freight open

November Kaikōura Harbour reopened

December SH1 reopened to connect north to south during the day

February Ex-cyclone Gita brings down 60 slips along the Kaikōura corridor from the Hundalees to just south of Clarence temporarily closing road and rail again

April SH1 reopened 24/7

October Freight trains operating 24/7

October Both Raramai tunnels on SH1 opened for two-way traffic

October Ōhau Point safe stopping area opened

November Coastal Pacific passenger train service relaunched with a special service

December Both Parititahi tunnels opened for two-way traffic

September Jacob's Ladder temporary rail bridge removed

September SH1 through the Hundalees opened for two-way traffic

October Rail tunnels 11 and 19 rockfall protection concrete extensions complete

October Last seawall block for the whole project placed at Half Moon Bay

October Te Ana Pōuri and Rākautara safe stopping areas opened

December All ex-cyclone Gita repairs in the Hundalees complete

December Ōkiwi Bay and Toka-Ānau safe stopping areas opened

December Raramai safe stopping area opened

January Wandle Bridge, north of Waiau on the Inland Road (Route 70) complete

June Half Moon Bay road realignment complete

July Safe stopping area at Paparua Point opened

July Ōkiwi Bay road realignment complete

October All rail works complete

December Cultural artwork package complete

December Racecourse hill realignment complete and blessing of new Kaikōura town sign

December NCTIR village demobilised

June Permanent rockfall protection canopy installed between Peketā and Parititahi Tunnels



Our approach

A two-phased programme

From the outset, the strategy was to restore the transport network in two distinct phases.

The first was an emergency response, with a goal to reconnect communities as quickly and as safely as possible (completed by December 2017). This included fast-paced works using temporary repairs, to enable a restricted service for freight trains and get SH1 open to the public (with some restrictions in the two most earthquake-damaged sections). The NCTIR Alliance had a strong vision for this phase of 'moving mountains to reconnect communities' which focused and motivated our people to deliver extraordinary outcomes.

The second phase (completed in 2021) focused on delivering strategic long-term durable solutions to improve the safety and resilience of the transport networks. The goal was to build on our strong foundations from the first phase, and leave a lasting legacy for the people of Kaikōura and all New Zealanders.

Preserving what's precious

Kaikōura is internationally renowned for its world-class landscapes, ecosystems and tourism experiences with much of the coastline protected. There are threatened and at-risk species, some unique to Kaikōura. The entire coastline is of great cultural significance to Ngāi Tahu and mana whenua. The team had to preserve what was precious, while rebuilding quickly with great care.

Keeping people safe

The recovery team came from throughout New Zealand and overseas, often spending extended periods of time away from their families. People came from over 1350 different 'home' organisations, each with their own health and safety processes. We created 'one plan to rule them all' to keep everyone safe.

Supporting the community

Initially many residents were dealing with broken homes, loss of jobs and either restricted access to neighbouring communities or long drives to connect with family and friends because of the road closures. There were no visitors, or passing traffic to spend money locally so the team supported the community to thrive by becoming part of it.



**Collective
wisdom from
the Restoration
Liaison Group**

Establishing a Restoration Liaison Group (RLG) was a requirement of the government's Hurunui/ Kaikōura Earthquakes Recovery Act 2016 Order in Council, which helped enable a speedy recovery. It was an unprecedented approach to engaging with Treaty Partners and stakeholders during disaster recovery in New Zealand.

This group was formed to help the NCTIR Alliance address environmental, ecological and cultural concerns alongside the rebuild by using local perspectives, knowledge and expertise to help shape the right solutions.

Members of the RLG:

- Kaikōura District Council
- Marlborough District Council
- Hurunui District Council
- Environment Canterbury
- Kaikōura Marine Guardians
- Te Rūnanga o Ngāi Tahu
- Department of Conservation Pouhere Taonga
- Te Rūnanga o Kaikōura

The group was critical to the successful delivery of the project by working together to design a safe and resilient road and rail line, balanced with minimising the impact on the environment, cultural landscape, and important wildlife along the coastal route.



**Powerful
partnerships
with mana
whenua**

The NCTIR Alliance worked with mana whenua at multiple levels on matters and values they identified as important. In addition to the RLG this involved appointing an iwi advisor to work with NCTIR, undertaking cultural monitoring and identifying ecological and cultural principles for project implementation.

Together with Te Rūnanga o Kaikōura, the NCTIR Alliance established a Cultural Advisory Group (CAG) to structure the ongoing local engagement with Te Rūnanga o Kaikōura. The intent of the CAG was to engage at a local level on all aspects of design and construction across the safety and resilience works within their takiwā (area).



Thanks

**TO THE HUNDREDS OF SUBCONTRACTORS
THAT HELPED DELIVER THE RECOVERY
AND IMPROVEMENTS WORK**

A C Earthworks
A L Gill
Abseil Access
Absolute Waterproofing Solutions
Acrow
Action Helicopters Ltd T/A Heli Glenorchy
ADM Earthworks Ltd
Aerial Imagery
AGS Earthmoving Ltd
AJ Drainage
AL Gill
Allan Hahn Contracting Ltd
Alpine Helicopters
Amuri Helicopters
Apes Contracting Ltd
Aquamax Hydroblasting Limited
Arc Projects
Ariki Creative
Art Fe'tiche
Asphalt & Construction Ltd
Asphalt Contractors Ltd
Austin Transport Services Ltd
Australian Portable Camps
Avalon Industrial Services
AWF
B & H Builders
B M Pettit
B&H 2008 Limited
Banks Peninsula Transport Ltd
BBR Contech
BC Design & Fabricate Ltd
BCP
Beta Cut Concrete Cutting
Blakely Construction Limited
Blastcoat
Bluefinn Transport Ltd
BMC Contracting
Bond Earthworks Ltd
Brownlees Contracting Limited
Bruce Ensor Builders Limited
Bryant Earthworks Ltd
Buller Contracting Ltd
Burleigh Engineering Ltd
Buschl Earthmoving

Camelspace (CHC) Ltd
Canterbury Civil & Construction
Canterbury Woodchip Supplies Limited
CB Civil & Drainage
CCL Construction
Ceres New Zealand
Cheviot Lime
Cheviot Transport Limited
Christchurch Helicopters
CityCare Civil
Clayton Drainage and Earthworks
Clifford Road Contracting
Combined Helicopter Services Ltd
Compass Group
Concrete Doctors Ltd
Concrete Dragons Ltd
Concrete Solutions Ltd
Concrete Structures
Concut Concrete Ltd
Construction Techniques Ltd T/a BBR Contech
Crafar Crouch Ltd
Crane & Carry
CRB Transport
CW Drilling & Investigations
Daly Civil Construction
Daniel Smith Industries Ltd
Dave Broadhurst Freight
Daverson Scaffolding Ltd
DC Signals
Deep Stream Contracting 2015 Ltd
Demoworkz
Dormer Construction
Drains and Developments Ltd
Dunlea Products Ltd
Eastbridge Ltd
Eco Drilling
Elevate Crane Truck Services
Elite Trees Ltd
Ellesmere Helicopters Ltd & High Country Helis
Ensor Earthworks Ltd
E-Quip
Euro Corp
Fencing Industries
FFP Canterbury Limited

Findlater Construction Limited
First Guard Security
Fletcher Reinforcing
Fletcher Steel Limited
Ford Bros Ltd
Garden City Helicopters
Gebbie Concrete Repair Specialists Ltd
Gemmell Contracting
Geoff Pacey
Geosolve
Geotech Limited
Geotechnics
Geovert Limited
Glen Alton Ltd
GMS Contracting
Graffiti Solutions
Ground Anchor Systems
Groundfix Ltd
Hadlee & Brunton Ltd
Hanham
Harvest Electronics (NZ) Limited
Helicopters Hawkes Bay
Heron Construction
Hiway Geostabilisation
Hiway Stabilization
Howell Contracting Limited
Hutch Contracting
Hydro Response
Hydrotech
Integrated Consultancy Limited
Intergroup
Isaac Construction Ltd
J & M Livestock
J C Contracting (NZ) Ltd
James Craw Ltd T/A JCI Asphalt
JC Contracting
John Fillmore Contracting (JFC)
John McInnes Building
John Shepherd Contracting Ltd
Johnston Civil Ltd
JPM Contracting
K D McKee Contracting Ltd
K Drainage
Kaikoura Helicopters Limited

Kaikoura Transport Ltd
Kato Transport
KerbCo Limited
Kereikeepa Contracting
Kerry Logistics
Kevin Rush Excavating Ltd
Kwikshift Contractors Ltd
Laing Properties Limited
LB Civil
Legend Landscaping
Letton Kerb and Channel Ltd
Libbet
Lott Construction
M J Sullivan
Mac Developments
Macdonald Gray Ltd
Mackleys
Mainpower
Manly Hydraulics Laboratory
Mass Group Limited
Max People Limited
McCabe Fencing Ltd
McDermott Earthworks Ltd
McEwan Haulage Ltd
McMillan Drilling
Megastructures
Men At Work
Meyer Group Limited
Mike Edridge Contracting
Millenium Electrical
MJ Sullivan
Moddex
Morgan & Pollard Landscapes Ltd
Mt Lyford Contracting Ltd
Murphy Civil
National Personnel
Natural Habitats Ltd
Nelson Protective Coatings Ltd
Nelson Underground Services
Ngaio Downs Contracting
Nicholson Protective Coatings
Nigel Ross Contracting
Nor West Contracting
Not Just Coatings

Off Road Haulage
OJ Contracting
OneStaff Ltd
Ongrade Construction Ltd
Paul Smith Earth Moving
Paul Stemmer & Co Ltd
Personnel Touch Limited
Pidgeon Contracting
Pipeworks
Preco Ltd
ProDrill
ProTranz
Pumprite
Pumprite Concrete Services Ltd
R&B Cartage
Recon Limited
Red Tree Environmental Solutions
Reid's Transport
Reinforcing Kings and Construction Ltd
Renwick Transport
Reo-fab Ltd
Richards Contracting
Richardson Drilling Ltd
Rikirangi Maori Carvings
RJ Civil
Road Metals Ltd
Road Science
Rock Control
Rod Fox Contracting
Rossiter Contracting
RST Environmental Solutions
Rush Earthmoving Ltd
Scaffold Marlborough
Schick Civil Construction
SCIFILMS
Scope Group
Scott Structural Limited
Seaview Homes Ltd
SEE
Seipp Construction
Simcox Construction
Skevington Ltd
Smith Crane and Construction
Something beginning with G

South East Earthworks Ltd
South Pacific Helicopters (2016) Ltd
Southern Geophysical Ltd
Southern Lakes Scaffolds Ltd
Southern Screenworks
Speight Drilling
SprayMarks
SRG/ BBR Contech JV
SS Trucking Ltd
Stonefield Contracting (Paul Ross)
Suck It Up Ltd
T C Nicholls Ltd
T Croft Ltd
T/A Anderson Hay & Baleage Contractors
Taylors Contracting Ltd
Texco Excavating Limited
The Pile Master
Think Steel
Thomas Fencing
Titan Contracting Group Ltd
Titan Cranes Ltd
Toll
Total Harvesting Ltd
Tracey Sinclair's Cleaning Service
Tradestaff
Transport Rangiora
Treescape
Treetech
Tru-line civil
Twoman Structures Ltd
Ultraquip Hire
Underground Brown
Utilities Infrastructure NZ
Vac-U-Digga New Zealand
Viano
W R & P Pacey Ltd
Waiiau Ground Spreading
Wai-Ora Forest Landscapes
Wallace Construction
Waterproofing Concepts Ltd
Westland Contractors Ltd
Ymak Civil Limited

In The

NOVEMBER 2016 – MAY 2017

Beginning

Recovery from a natural disaster presents unique logistical challenges. In the emergency phase, design and construction happen simultaneously – and the amount of necessary repairs in this narrow coastal corridor was enormous. Following the earthquake, Waka Kotahi and KiwiRail immediately began assessments of their respective networks and it was apparent that a unique and collaborative response was required.

The first priority was to get alternative routes operating and ensure critical supplies could get into Kaikōura and people could get in safely to assess the scale of the damage. Only then could critical path works be determined so we could start the journey towards reconnecting communities.

There was also a need to strengthen the resilience of the alternate state highway route between Picton and Christchurch while SH1 was out of action, and establish the Inland Road (Route 70) from Waiau as an alternate route into and out of Kaikōura for all.

The task seemed insurmountable but the team had to think clearly, start quickly and keep moving.



A Māngamāunu (Slips 1a and 1b)

- At 100 to 150 metres high, these two slips buried the road and reached the rail line
- It took five months to clear the over 140,000m³ of slip material
- Road and rail line were realigned away from the slips to protect the transport corridor from falling debris

B Irongate (Slip 2)

- The 60m-high slip created over 10,000m³ of debris
- The road was realigned 35m seawards, supported by a new seawall and new bridge across Irongate Stream
- A rockfall fence and walls help protect the section of rail line exposed between tunnels

C Half Moon Bay and north (Slips 3, 4, 5)

Slip 3:

- 'The slip that just kept giving' at 200m long and 50-100m high it dumped 10,000m³ of debris on rail and road
- A rockfall catch ditch helps protect the transport corridor while the road has been realigned further out on to a newly built seawall

Slip 4:

- While 'just' 50m high the debris still buried the road and violently shoved rail 30m across into the sea
- Two 'benches' formed across the slip divert debris with an attenuator fence helping to catch and slow any falling debris into the 'catch ditch' below

Slip 5:

- While a modest 5,000m³ of debris was dumped, around 45,000m³ was removed to reshape and stabilise the fragile slope
- Ex-cyclones Debbie and Cook battered the slopes over Easter 2017 causing a slip higher up
- A series of earth-fill bunds and channels high on the hill have been constructed to divert debris from the top

D North of Rakautara (Slip 10)

- Originally this slip didn't restrict construction access but it was reactivated by ex-cyclones in 2017
- Known affectionately as 'Slippy McSlip Face' this slip resulted in the rail track being shifted by up to 4m

E Ōhau Point (Slip 6)

- The extreme force of the earthquake violently wrenched up this spot by an extraordinary three metres, creating a hugely complex and daunting monster landslide. A 630m section of road was buried under 200,000m³ of debris
- Located in the middle of the long line of coastal slips meant it was the most difficult to reach until surrounding slips were cleared
- Before any earthworks could begin, convoying helicopters spent months dumping millions of litres of water on the site (known as sluicing) to move debris

F Paparoa South (Slips 7 - a, b, c)

- The over 150m-high slips buried the rail and reached the road, dumping 240,000m³ of debris - the most of all the coastal slips
- Rail and road were both realigned further out onto a new seawall. A 515m by 5m-high gabion rock wall - the largest of its kind in the Southern Hemisphere - now winds along the base of the hill to help catch falling material

G Ōkiwi Bay (Slip 8)

- The enormous 100m-high landslide with a 50m reach buried rail and road, wrenching rail into the sea
- To remove the 40,000m³ debris took hundreds of truckloads from the top and bottom
- The road was realigned away from the slip with earth-filled bund and gabion rock walls, plus rockfall protection fences constructed along the base to protect rail
- Rail was partially realigned onto the existing road corridor

H Waipapa Bay (Slip 9)

- As the Papatea Fault ruptured the bay was lifted by 2.5m and reshaped with a new lagoon created. The force also triggered a massive 115m-high landslide and rockfall which buried the road, creating 11,000m³ of debris
- Road and rail were realigned further out to make them less vulnerable to slope movements. A new 3m x 260m earth 'bund' wall was built along the base of the hill to help trap falling material



A Raramai Twin Tunnels (Slips 31-32)

- Huge landslides on both sides of the Raramai twin tunnels blocked the railway tunnel mouths and the northern road tunnel entry, requiring a massive helicopter sluicing
- Innovative debris avalanche protection fences mean any build-up can be seen without having to cross the live rail line or get up behind the fence. Earthworks machinery can also more easily access the fence to remove debris

B Raramai North (Slip 30)

- The biggest mesh site in the south with around 8300m² of mesh and 600 anchors drilled into the slopes

C Rosy Morn (Slips 29 and 29a)

- Slip 29 was an astounding 110 metres wide and 120 metres high. Well known locally, it first appeared six years before the 2016 earthquake
- A pounding from ex-cyclones Debbie and Cook in Easter 2017 resulted in a new 90m-high slip face (29a). While it buried road and rail (which was later realigned further out), the initial bypass was completed in just 10 days
- Rockfall protection was rebuilt with a debris catch basin and screen along the base of the hill

D Punch Bowl Corner (Slips 22-26)

- This challenging tight corner has road and rail line squeezed between a vertical cliff face and a dramatic drop to the sea below
- And three weeks after the earthquake, a new 200m-high slip dropped from the weakened hillside; the highest slip south of Kaikōura, and one of the highest overall
- Hundreds of metres of mesh is now anchored across several rockfall sites. Based directly under a slip, Rail Tunnel 11 has a new concrete extension with a rockfall attenuator fence above it to help protect both rail line and road from falling debris

E Paritahi Twin Tunnels (Slips 14-20)

- The large complex slips in this narrow corridor buried road and rail, completely blocking the Paritahi twin road tunnel openings
- Debris continued to crash down from the fragile cliffs compounded by wet weather and ex-cyclones Debbie and Cook over Easter 2017
- A massive stabilisation programme saw helicopters dump load after load of water to sluice away unstable materials with abseilers and a high pressure water cannon also dislodging rocks
- A new rockfall 'attenuation' fence against the cliff face north of the tunnels slow tumbling rocks so they slide to the bottom into a catch area behind the road

F 'The Wall' (Slips 8-10)

- Despite only minor failure during the earthquake, the 80-metre high near vertical cliff (known as 'The Wall' to many regular drivers) created ongoing rock falls; at least 70 over the next four years
- It is now the site of a 'self-cleaning' canopy overhanging the road - a first for the Southern Hemisphere

G Peketā (Slips 1-7)

- While the seven slips in this section were comparatively 'modest', a lot of potential slip material was also removed, including 30,000m³ from Slip 6 alone. Hundreds of metres of mesh and anchors have been installed against the cliff faces
- New concrete extensions added to the southern mouth of Rail Tunnels 13 and 14 help catch falling debris to protect rail and road below

**The Inland Road
(Route 70)**

Crews worked tirelessly to make the severely damaged road safe for general use. This included clearing multiple slips, stabilising slopes, repairing damage and building an entirely new diversion road around the highly unstable Whalesback section.

Access was restored within a few days of the earthquake for NZ Defence Force convoys to get through to Kaikōura with emergency supplies. The route remained fragile and hazardous, with restricted, escorted access only until mid-December 2016 when the public was granted access, bringing the first unrestricted road connection back to Kaikōura, one month after the earthquake. The road would be made safer and more resilient over time.

In the Beginning





In the Beginning



State Highway 1 (SH1)

More than 200 areas along SH1 were affected by the earthquake. Close to 1 million cubic metres (about 400 Olympic-size swimming pools) of loose material dislodged by the earthquakes fell onto the road and rail line. More than 30 slips were identified south of Kaikōura and ten major slips north of Kaikōura.

Before the earthquake the average number of vehicles passing through Kaikōura daily was over 2700 but this dropped significantly. Daytime access south of Kaikōura on SH1 was re-established on an open/close schedule before Christmas 2016 but required ongoing work and was subject to short-term closures as efforts to rebuild and improve sections of the highway continued. The road remained closed between Clarence and Māngamāunu in the north until December 2017.





In the Beginning





In the Beginning



The Main North Line

The Main North Line railway between Picton and Christchurch is a critical part of the transport network for moving freight between the North and South islands. Before the earthquake, about one million tonnes of freight travelled over the line each year, as well as the internationally acclaimed Coastal Pacific long-distance passenger train.

Along the line, 750 sites sustained damage, including tunnels, bridges and embankments. The line was buried under more than 90 slips and landslides. 60 bridges and 20 rail tunnels were also damaged.

By January 2017, work was already underway on repairs along the 190km of line damaged in the earthquake, as well as some of the damaged tunnels and bridges. Parts of the line were easier to restore due to tunnels protecting them from slips, and through solutions such as temporary bridges.

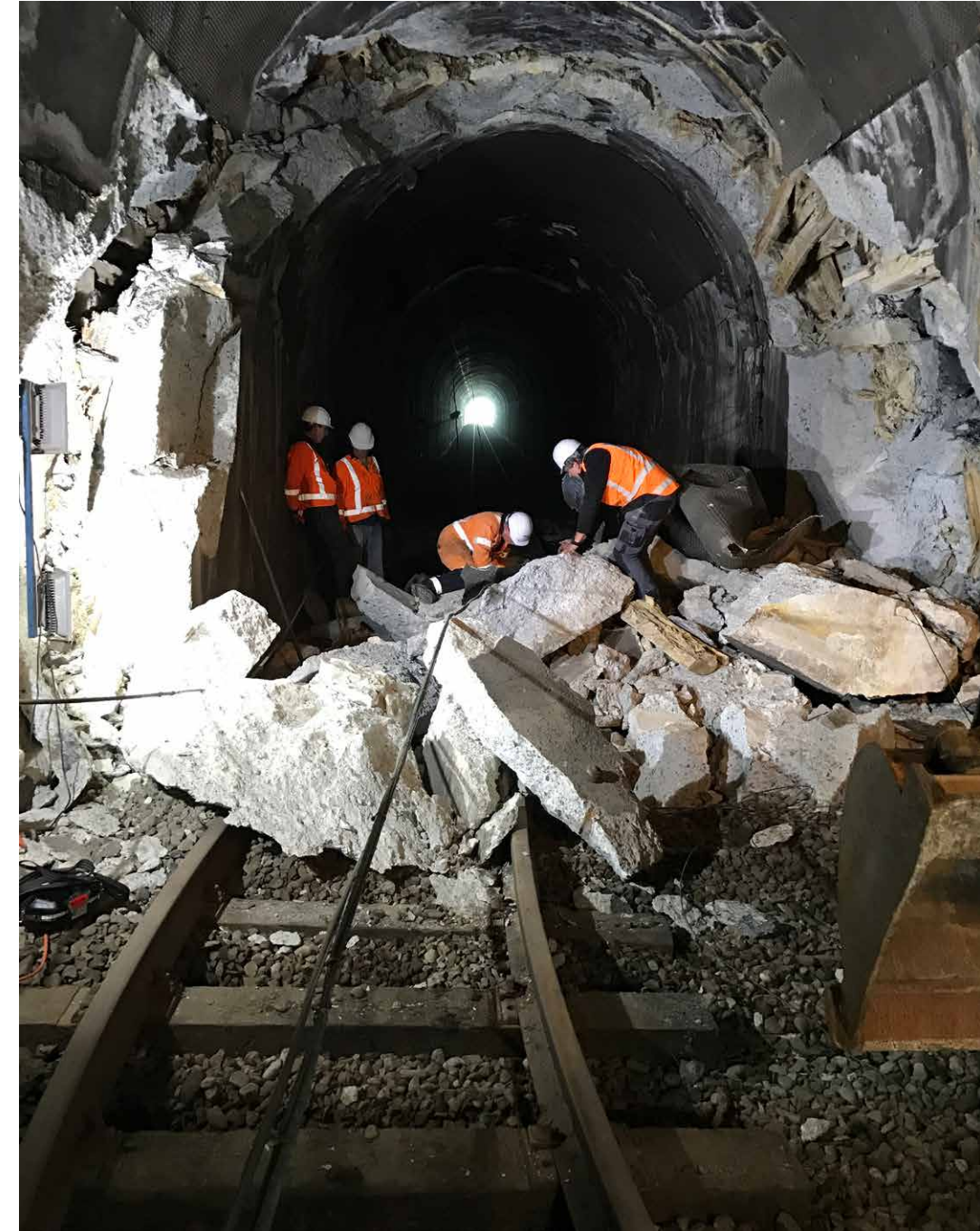
The first post-earthquake train ran from Blenheim to Lake Grassmere in January 2017, the first milestone in reopening the 347-kilometre route between Picton and Christchurch.

In the Beginning





In the Beginning



Kaikōura Harbour

The harbour and marina in South Bay, just south of the Kaikōura township, provide critical infrastructure for the tourism industry which is one of the largest sources of income for the region. It was also used for commercial and recreational fishing and by Coastguard Kaikōura.

The earthquake thrust the seabed up by two metres in places, severely restricting access to the harbour.

Initial work involved deepening the harbour – by dredging the sea floor. A 35-tonne excavator with a two-metre long tooth raked rocks near the bottom of the slipway to break them up before collecting the debris. Further excavators lowered the seabed floor so boats could access the wharf and boat ramps at all times.

About 15,000 cubic metres of material was removed from the main marina channel which was used to construct a 'cofferdam' across the marina basin. This was a watertight enclosure pumped dry to enable construction work to get underway and deepen the marina basin below the waterline within the harbour. The next step included reinstatement of the marina, piles and wharf.

In the Beginning



Moving mountains

Repairs on rail and road could only start once the slips were removed and the hillsides were made safe, so clearing the landslides was a priority – but not easy; the fractured cliff faces were often unstable. In April 2017 ex-cyclones Debbie and Cook created a new 90-metre slip and brought down more material from existing slips. Work was halted for some days as the already damaged slopes continued to release more material.

Helicopters dropped over 220 million litres of sea water over the slopes for several months to dislodge loose rocks and dirt. This is known as sluicing. Abseilers also worked on numerous slips, helping remove any remaining loose material and to clear trees and vegetation. This helped to stabilise the hill faces to enable workers and machinery to begin work down below to remove the slip material.

In the Beginning





In the Beginning



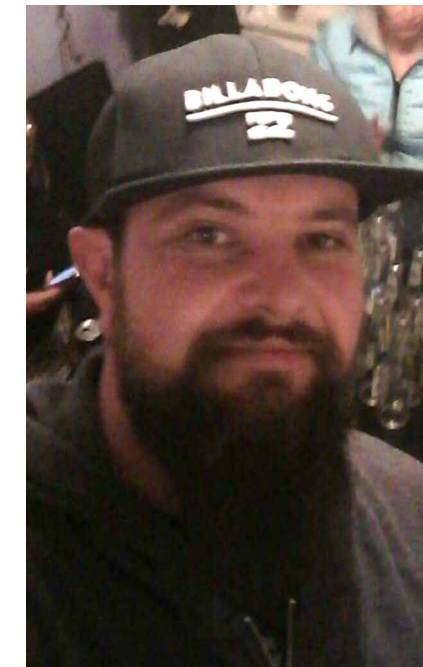
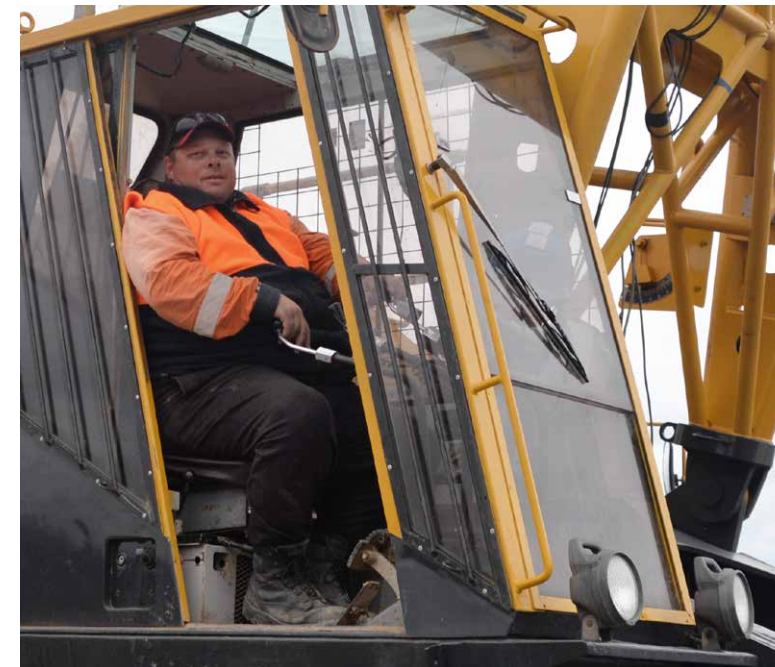


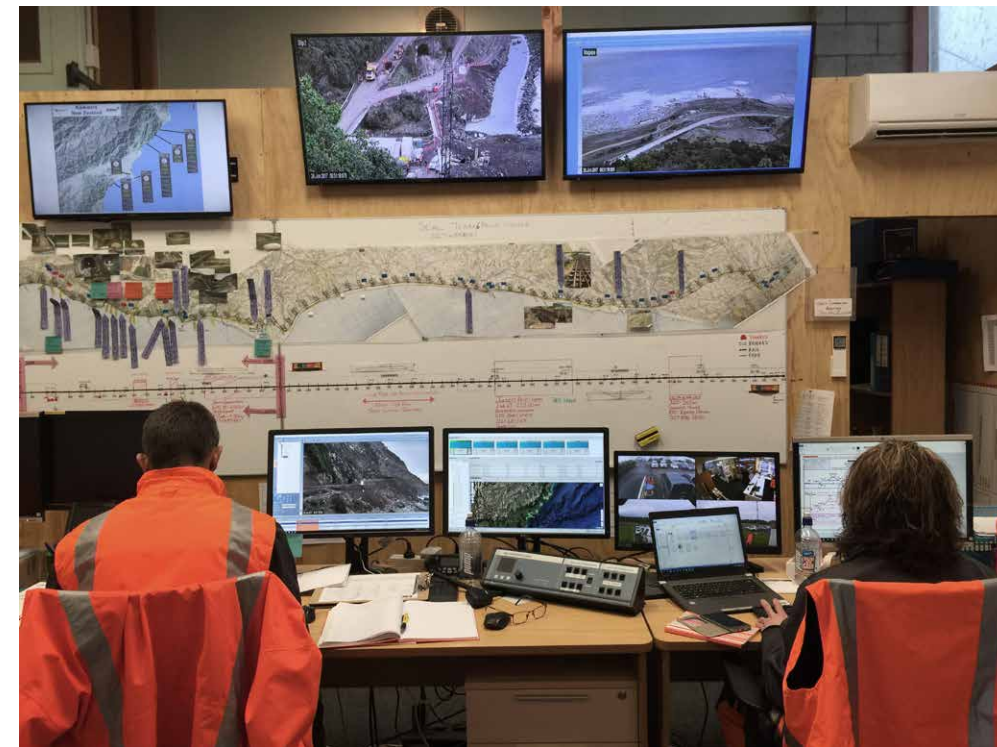


In the Beginning



**LEGENDS
of NCTIR**
November 2016
- May 2017





A valued team of locals

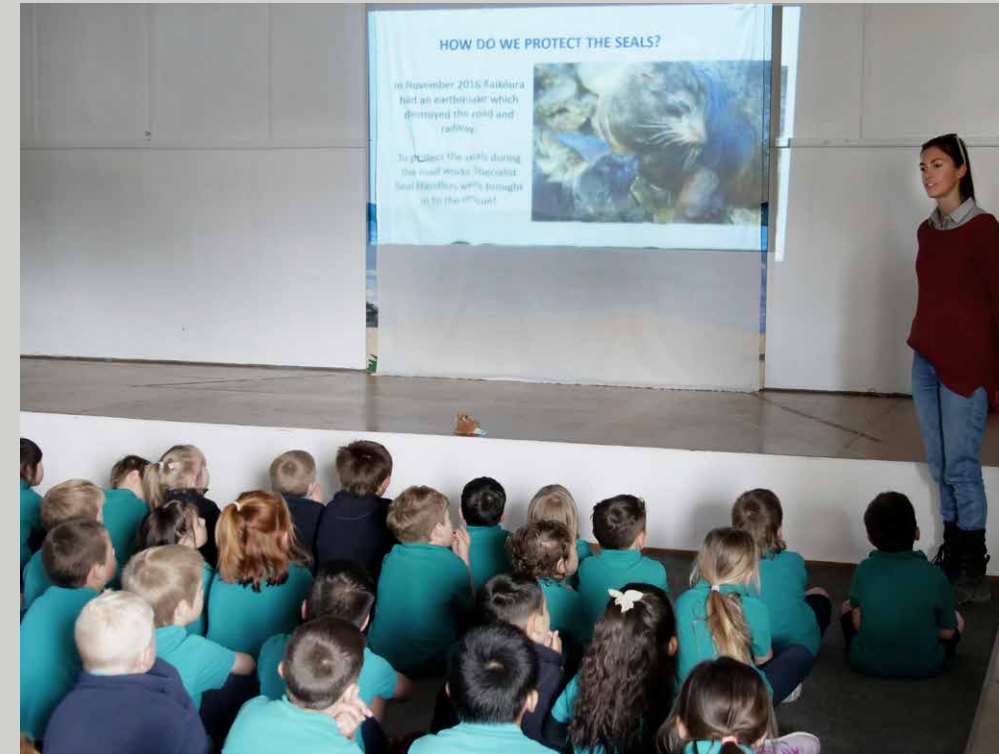
Locals were involved in the project since day one. With over 180 directly joining the NCTIR Alliance, they brought a wealth of local knowledge to the recovery work and did some stellar mahi. The influx of NCTIR crew saw the population of Kaikōura swell by 30%. The locals provided a warm welcome to their new neighbours working and living so far away from their whānau.



Think community

With much of the work hidden behind roadblocks, the team was keenly aware of keeping the community informed of progress. It was an anxious time as locals rebuilt their own lives, trusting the delivery of what many saw as an insurmountable challenge.

There were regular opportunities for conversations about what was happening where, when, why and how. From door knocking to community meetings to newsletter updates, the team listened and responded.



Response

JUNE 2017 - NOVEMBER 2017

To Rebuild

After six months of intense work, the team was making good progress towards rebuilding the road and rail networks but there was still a long way to go.

2017 was a particularly wet year with a number of storm events, and many slips had to be cleared repeatedly, testing the patience of all involved.

By July 2017, five of the nine large landslides north of Kaikōura had been cleared.

An 'ugly but fast' approach was being taken in places for rail so that urgent temporary and safe repairs could be achieved quickly, with work planned in the future to upgrade and make the work permanent.

The rebuild became a national effort, with supplies travelling the length of the country. Bridge beams and seawall blocks were manufactured on both islands and brought to site by road and rail. It wasn't until early Spring 2017 that supplies could be moved between sites north and south of Ōhau Point, where the largest landslide had fallen and was finally cleared.

A community within the community

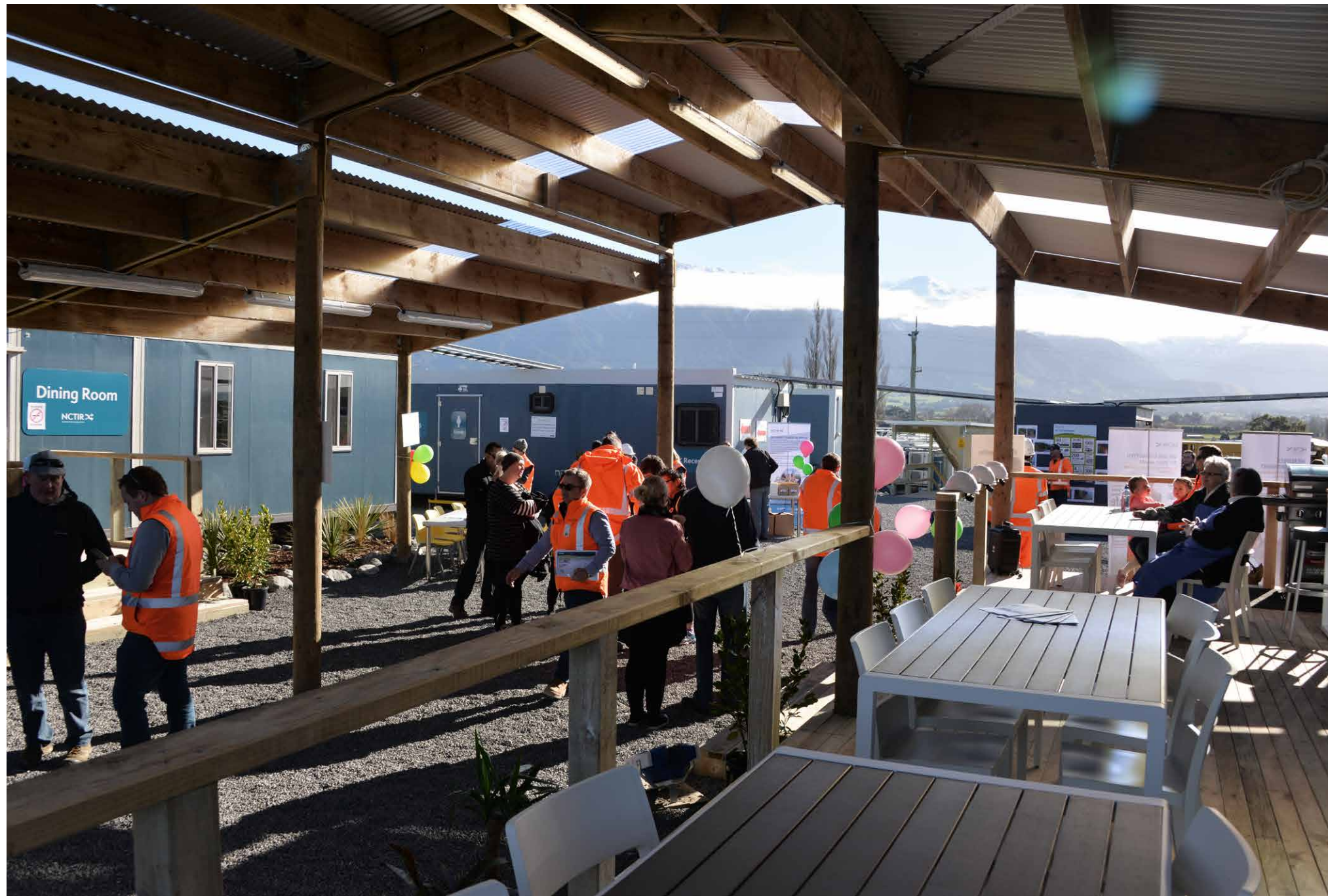
With 1700 workers from New Zealand and overseas in Kaikōura at the peak of the project, there would not have been enough beds.

So in June 2017 the 300-bed NCTIR Village was opened to house some of the team with two smaller villages operating in the north.

The hardest thing for many was being away from family, so the NCTIR Village became their home away from home.

Local organisations helped to create a neighbourly atmosphere where the team could make the most of what Kaikōura had to offer, including joining local sports teams. And local businesses were supported by providing meals for the crew, with over 270,000 served during the project.





Response to Rebuild





A coordinated approach

The cliffs south of Kaikōura proved to be more fragile than anticipated, with additional slips occurring during bad weather that hampered progress.

Night works under lights started (when safe to do so) to ease daytime congestion in the busy, narrow construction zone. At one point 75 truck and trailer units were on a continuous 24-hour cycle shifting the slip material.

Innovative approaches saw road and rail lines temporarily realigned to reopen the transport corridor as quickly as possible.





Response to Rebuild



Building back stronger

In July 2017, the government announced a \$231 million funding package to improve the 60km section of SH1 between Clarence and Oaro. The improvements package would increase the safety and resilience of SH1 and ultimately improve the experience of using the road for locals and visitors.







Response to Rebuild



Railing against time

More than 40 percent of the work to reopen the Main North Line was completed by May 2017.

In early June 2017, the first work train since the earthquake travelled the Main North Line from Christchurch to Kaikōura.

This was innovatively guided through the tunnels (some of which were yet to be repaired) by a push/pull combination of locomotives - so that no people needed to pass through the tunnels. It was all about keeping everyone safe. The train was over a kilometre long, carrying rail sleepers, ballast wagons and tampers that would be used to replace buried and damaged track north of Kaikōura.

Getting the work trains to Kaikōura meant resources could be stored there, enabling the pace of reconstruction to ramp up and help not only KiwiRail with its rebuild work, but also assist with the reinstatement of SH1 by bringing materials to worksites along the route and moving material north of Ōhau Point for the road reconstruction. This partnership approach with a common goal was vital for success.

Response to Rebuild





Response to Rebuild



Credit: Craig Reyland



The final weld

On 8 August 2017 the Main North Line between Picton and Christchurch was reconnected (through a welding of the final section), nine months after the earthquake. It was a powerful milestone in what had become one of New Zealand's largest rebuilds of rail since WWII.

Final ballasting, tamping and other track work then took place, as well as the retraining of locomotive engineers for the altered route requirements, to get the track ready to reopen for freight in September.







Freight again

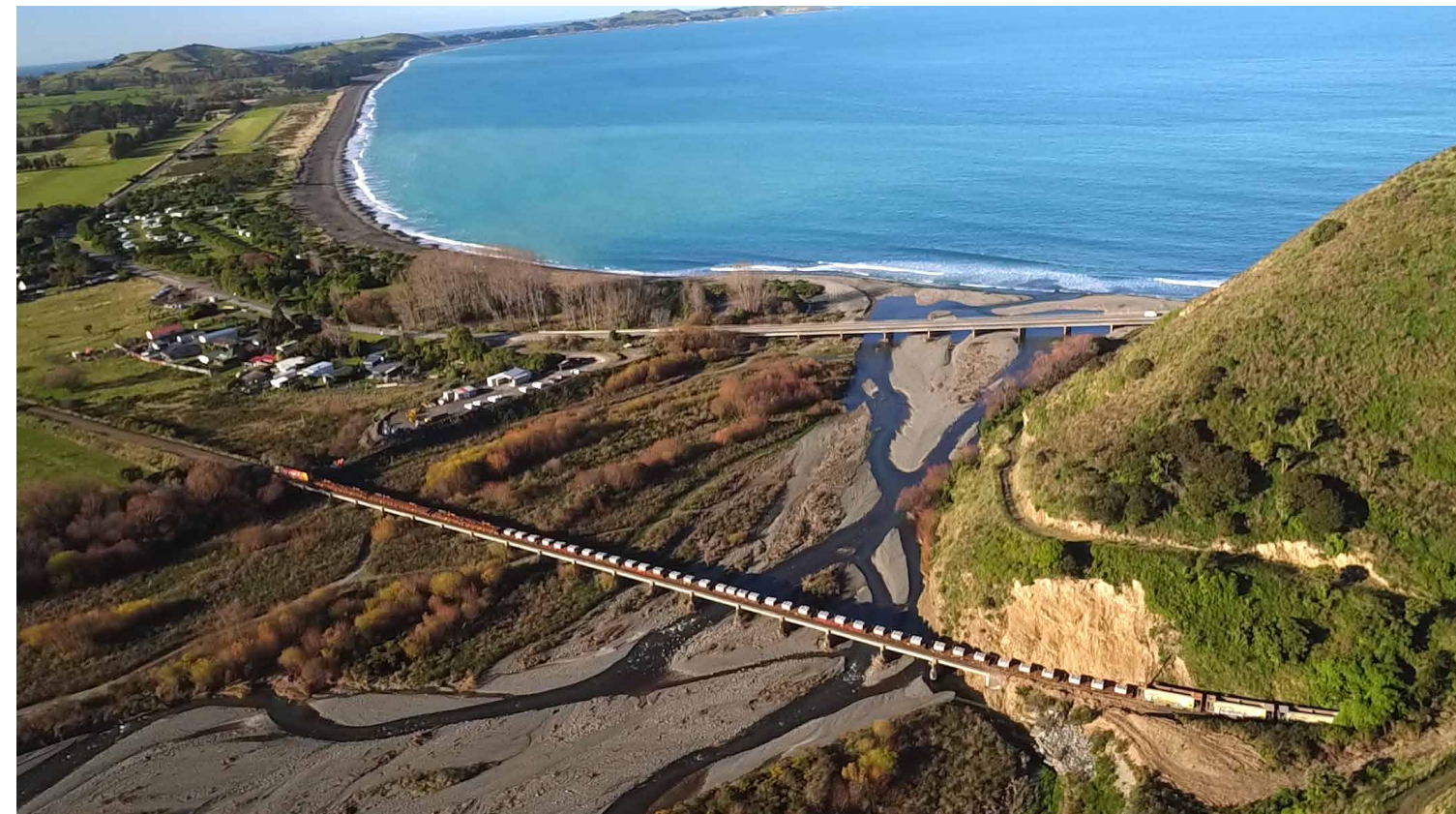
On 15 September 2017, 10 months after the earthquake, freight rail services resumed in a limited capacity on the Main North Line.

Low-speed, low-frequency services ran at night, with work on the rail and road networks continuing during the day.

Reopening the Main North Line months earlier than expected was a huge achievement, which benefited communities cut off by the earthquake and increased efficiency in the South Island supply chain. Prior to the earthquake, KiwiRail moved about 1 million tonnes of freight on this line each year (about 70,000 truck journeys). With their freight services once again operating, it also helped take pressure off the road network.

About 50,000 cubic metres of ballast (or 90,000 tonnes – enough to fill 20 Olympic-size swimming pools) was used to restore the track.





The battle of Ōhau Point

As the earthquake violently wrenched this spot up by an extraordinary three metres, the extreme force also created one of the most complex and daunting landslides. The road was completely buried under 200,000 cubic metres of slip material.

The sheer enormity of the task seemed impossible to overcome. Over six long months convoys of helicopters sluiced from above followed by hundreds of crew working doggedly day and night towards each other from north and south until they finally broke through in August 2017. For the first time since the earthquake, crews from both sides of the landmark could now work together as one team.

For the exhausted crew it was a physical and emotional triumph. For NCTIR and the community, it marked a critical milestone to finally have an access track right along the coast again.



**Kaikōura Harbour
handed back
to the town**

The seabed at the harbour rose almost two metres during the earthquake making it unusable.

On 14 November 2017, exactly one year on from the earthquake, 30,000 person hours and 880 truckloads of material later, a new and improved Kaikōura Harbour was handed back to the community.

The harbour is a place that is unique, special and at the heart of Kaikōura. Getting it fully functional again so quickly meant a lot to the community, their businesses and their visitors. It was also a huge boost to the town's tourism and fishing industries.

Te Rūnanga o Kaikōura created a memorial at the harbour from sperm whale ribs that had emerged at a local beach during the earthquake. Evoking Papatūānuku, Tangaroa and Ruamoko (the earth, land and earthquake), a rib each represents Jo-Anne Mackinnon, Louis Edgar (who both sadly lost their lives in the earthquake) and the people of Kaikōura.

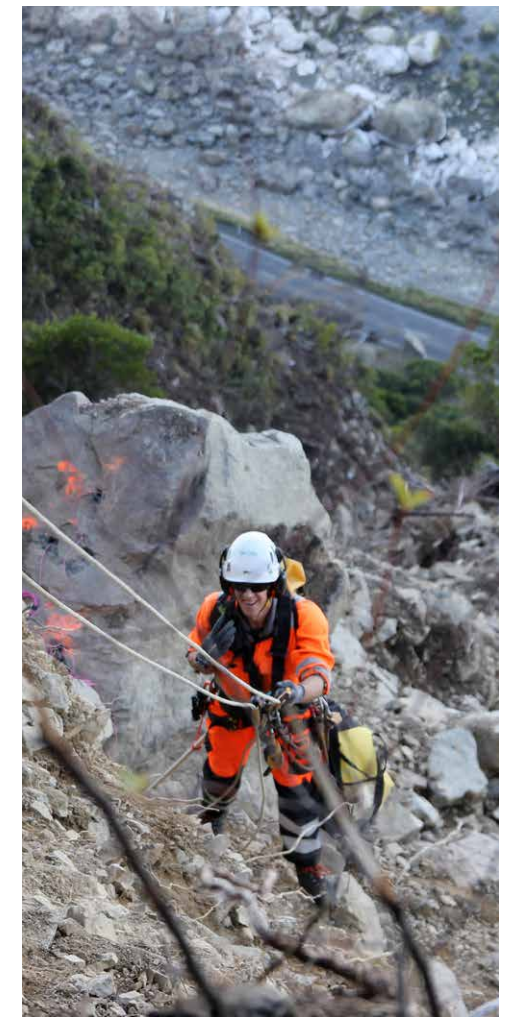




Response to Rebuild



**LEGENDS
of NCTIR**
June 2017 –
November 2017





Safety first

The safety of NCTIR people, the community and the travelling public was the top priority. The team developed a single, cohesive approach to health and safety with a strong focus on mental wellbeing.

The range of specialist skills required for the rebuild meant that health and safety processes had to look after people working in a variety of places, sometimes in isolation. Rail and road construction workers worked in parallel with designers, engineers, ecologists, geo-specialists, abseilers, logistics specialists, helicopter pilots, seal wranglers, tunnellers and traffic management teams on numerous work sites, spread out along 200km of coastline between Picton and Christchurch.

It was hard work in a challenging environment and most NCTIR people had to adapt to a life based away from their homes and whānau.



Response to Rebuild



Reconnecting DECEMBER 2017 – APRIL 2018 Communities

Everyone was waiting for the road to reopen and the country's eyes were on Kaikōura.

The project team had set a stretch target of reopening the road by Christmas 2017, just in time for the busy summer season, which would be vital for the region's recovery. Then focus would shift to making those routes safer and more resilient, including making temporary works permanent.

Shared resources and a combined workforce with one overall goal, allowed for flexibility. Often work programmes would be scaled down in one area in order to scale up in another where there was an immediate priority.

Over 1700 crew were working on the project night and day to get the road ready for a safe opening.

**One year,
one month
and one day**

On 15 December 2017 – one year, one month and one day after the earthquake – SH1 was reopened. Families and friends in isolated communities were reconnected, businesses welcomed tourists back, freight could move easily to and across the South Island, and residents regained a more direct route to the world.

But it was a hard won achievement. Torrential rain towards the end of November had pushed the road rebuild team to the wire. Hours before the gates swung open to let lines of excited drivers through, the down draft from helicopters was being used to dry the surface so the final chipseal could be laid to meet the deadline.

It was a testament to the hard work of the crew on the ground, and those toiling just as hard in the office, for an impressive ‘one team’ achievement across every part of the Alliance.

When the road reopened many sites were still under construction with some unsealed surfaces, lane closures, speed restrictions and stop/go traffic controls. Ōhau Point had a new seawall and road realignment, Irongate had a new overbridge and road realignment, and between Goose Bay and Peketā there was ongoing cliff face resilience and road rebuilding work.

The two most damaged areas on SH1 remained closed overnight as a safety precaution until 20 April 2018 when the road reopened for 24/7 travel once again.











Reconnecting Communities









Reconnecting Communities



Credit: Daniel Murray

**LEGENDS
of NCTIR**
December 2017
- April 2018



Gita batters the coast

The weather continued to be against us when in February 2018 ex-cyclone Gita blasted the fragile unstable coastline, creating 60 new slips, including a powerful surge of more than 100,000 cubic metres of mud, boulders and vegetation dumped onto the recently reopened transport corridor, shoving the rail line several metres out.

On what could have been a massive setback, the undeterred crew worked tirelessly to regain road access in just 10 days, and rail access in 15 days.

In February 2020 work was wrapped up on the ex-cyclone Gita-affected sites, just over two years on from the extreme weather event. The team focused on resilient, low-maintenance design solutions.





Irongate Bridge

The new 144-metre seven-span Irongate Bridge enabled this section of road to be built further out from under the fragile slope faces.

Crew worked from sunrise to sunset, while also racing against the clock to get materials in as fast as they could build, with the bridge completed in 14 weeks!

Design work was done in stages so construction could begin on the foundation piles while the bridge deck was still being finalised. The 91 bridge beams needed on-site were prefabricated at four different locations across New Zealand to reduce construction time to meet the road opening deadline.

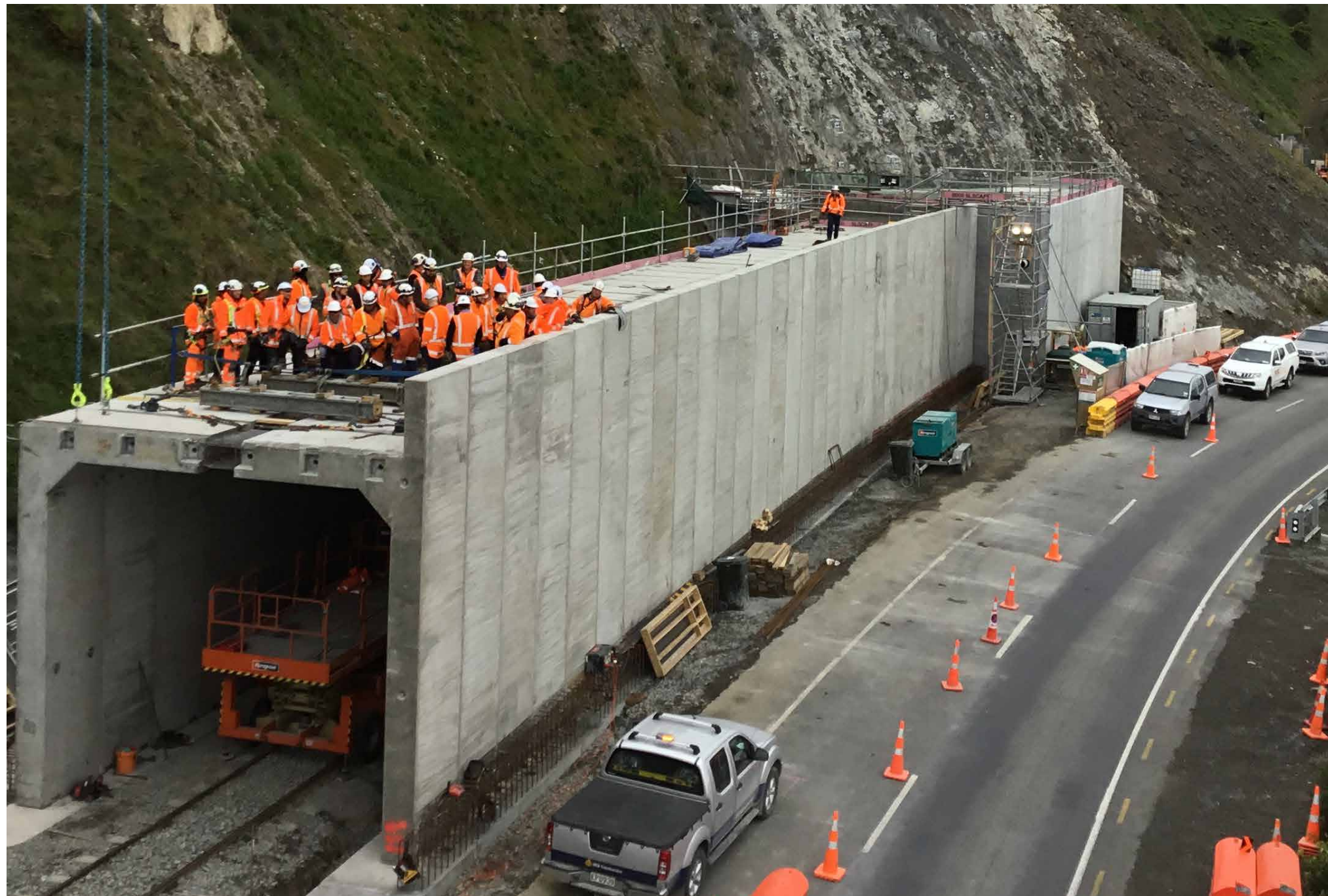


Making MAY 2018 - DECEMBER 2018 Progress

The initial emergency response and recovery phase required fast-paced works, including temporary repairs, to enable the reopening of SH1 and a restricted service for freight trains.

With phase one complete, the work programme changed to focus on making temporary works permanent and providing strategic long-term durable solutions that would improve the safety and resilience of the transport networks. It was about carving enduring connections.

This saw hundreds of people working on tunnels, bridges, seawalls, and slip face remediation to make rail and road travel safer for all, as well as improving the Main North Line so that it could support faster and more frequent rail services.



Making Progress



Freight at full steam

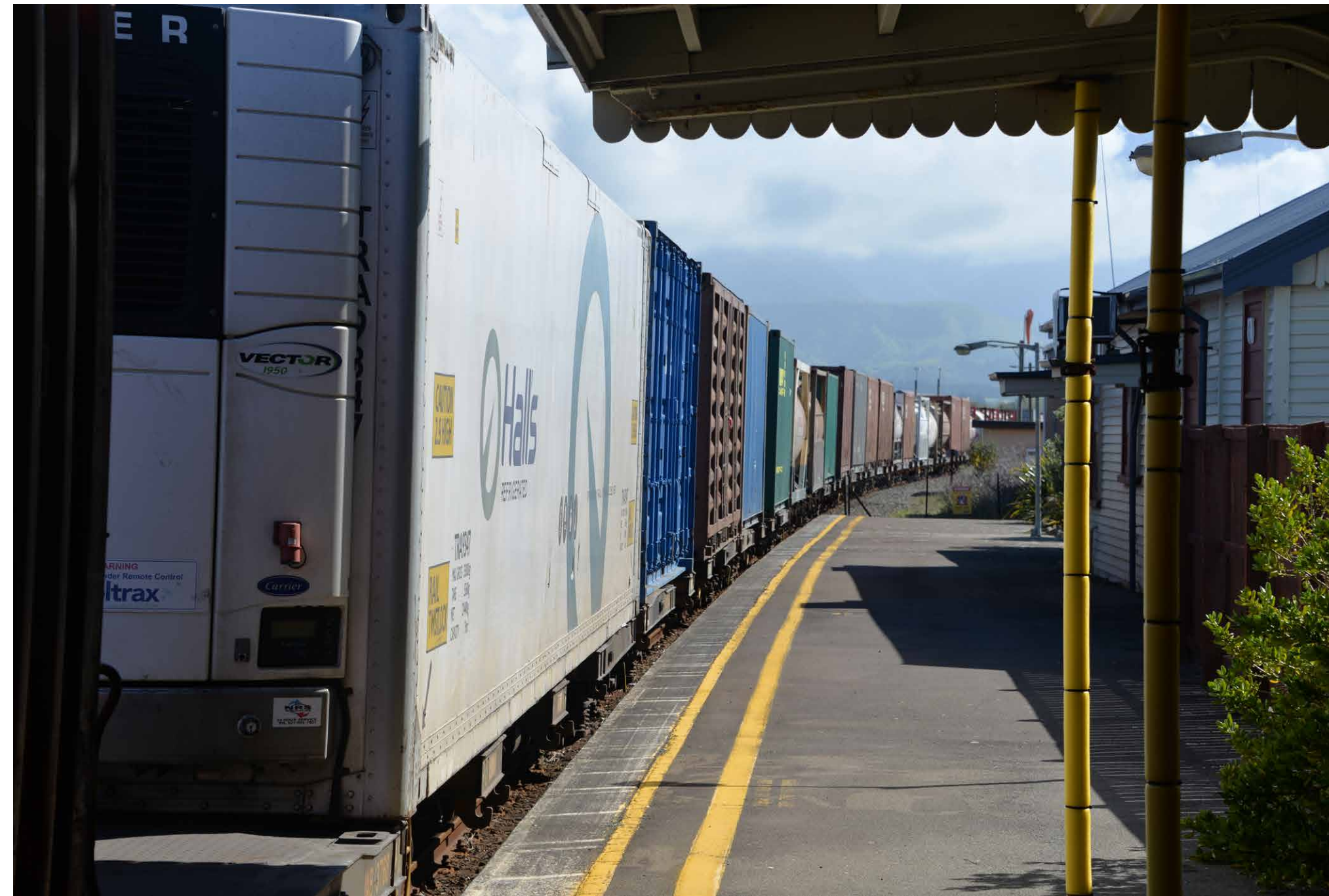
On 9 October 2018, the first daytime freight train (375m long and 796 tonnes) in almost two years ran again between Blenheim and Christchurch.

The return to 24/7 operations followed completion of critical works along the line. Efforts to get to this point were extensive with slope work, tunnel repairs and ongoing bridge work improving rail operations and seismic resilience. This milestone brought rail services another step closer to the much anticipated return of the Coastal Pacific passenger service in December.





Making Progress



Oh how wonderful

On 18 October 2018, the new Ōhau Point safe stopping area opened ahead of Labour Weekend.

Ōhau Point was the first in a series of seven new safe stopping areas to be completed along SH1 as part of the government's \$231 million package of works designed to improve safety and resilience between Clarence and Oaro.

Ōhau Point was one of the areas most damaged by the earthquake. The land was pushed up by three metres. The road and rail line was rebuilt further out towards the sea on new terrain protected by a 1.7km seawall - using thousands of concrete blocks - each one weighing five tonnes. It was an incredible feat of engineering to get to this stage less than two years after the earthquake.

The Ōhau Point safe stopping area provides the local community and visitors with a safe place to stop and take a break while viewing the outstanding coastline and the famous home of Ōhau's protected fur seals.





Making Progress





**Coastal Pacific
back on track**

On 23 November 2018, passengers travelled on the Main North Line railway between Picton and Christchurch for the first time since the earthquake.

KiwiRail's beloved Coastal Pacific service was put on hold for two years while rail repairs were made to the Main North Line. Its return was significant for the Kaikōura region and its recovering tourism industry. With over 40,000 passengers a year spending almost \$35 million supporting 300 local jobs, it was another important milestone to celebrate.

Prime Minister Jacinda Ardern, tourism chiefs, NCTIR Alliance crew, iwi and Kaikōura locals were among those on-board the special commemorative service.







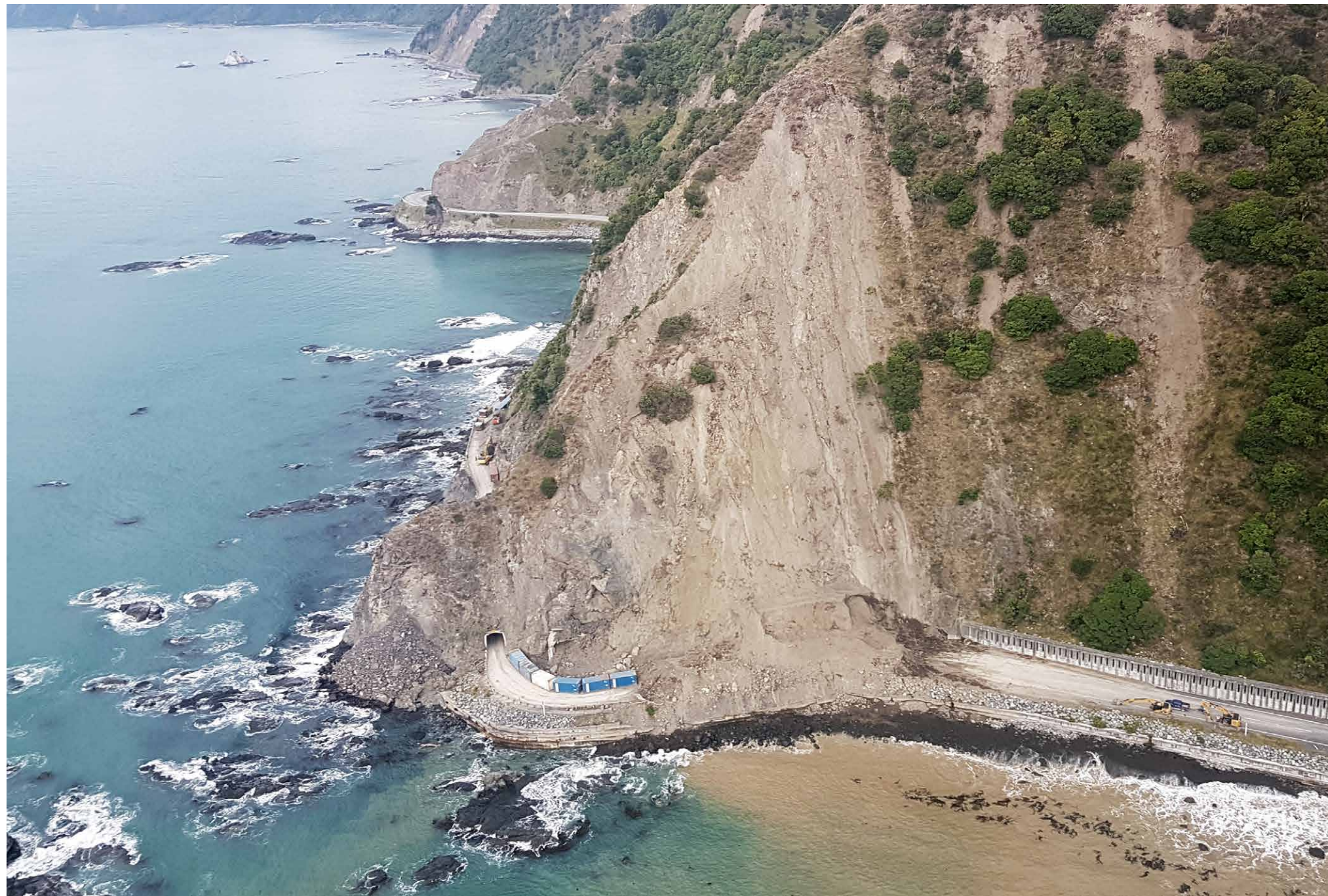
Twin tunnels reopened

The 21 December 2018 reopening of both Parititahi Tunnels in time for Christmas holiday traffic 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 and heightening to accommodate larger freight vehicles. While seemingly minor, it was much heralded by the freight industry to help make SH1 a more efficient freight route for them and their customers.

The iconic tunnels were opened with a blessing and karakia from then acting chair of Te Rūnanga o Kaikōura, Rāwiri Manawatu.





Making Progress



**LEGENDS
of NCTIR**
May 2018 -
December 2018







Legacy of care

The entire coastline is of great cultural significance to Ngāi Tahu. Much of the coastline forms part of the New Zealand conservation estate, and a significant proportion of both the marine and terrestrial environments (and their inhabitants) are protected under New Zealand environmental legislation. The recovery team had to protect what was precious.

Through work with the Restoration Liaison Group, environmental, ecological and cultural concerns and opportunities were addressed alongside the rebuild.

The environmental team included planners, archaeologists, ecologists, landscape architects, seal handlers, cultural advisors and construction environmental advisors. They moved seals, protected birds and lizards, designed around Totara, rehomed thousands of fish and helped rejuvenate the rare Ōhau Rock Daisy, allowing it to thrive once again.



Powering Through

JANUARY 2019 - DECEMBER 2019

Safety and resilience work, designed to provide safer travel, continued at pace in 2019.

This included sealing and widening the road in places, developing seven formal safe stopping areas and reinstating 13 informal safe stopping areas.

Work was also underway on road realignments at Half Moon Bay and Rākautara to create a safer and smoother journey around the coastline north of Kaikōura.

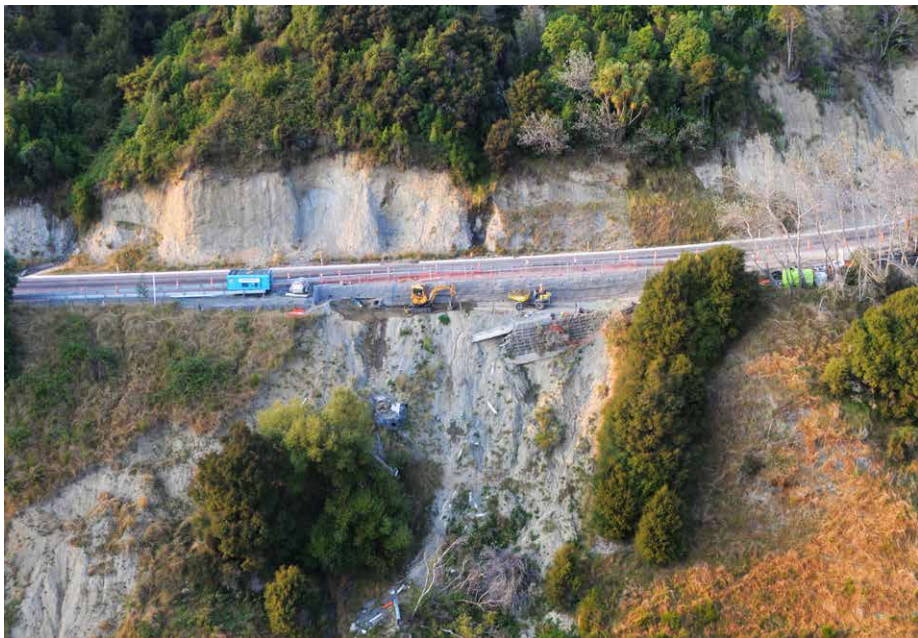
The team also took on additional work to repair the Inland Road (Route 70) which included permanent repairs for bridges, culverts and retaining walls, and a road realignment at Lulus 'hairpin' bend.

In December, for the first time since the earthquake, SH1 was open with two lanes all the way through to help with the holiday flow of traffic. This gave road users a small taste of what they could expect when all the safety and resilience work was complete.

Two-way traffic through the Hundalees

In September 2019 this ex-cyclone Gita damaged section of road was put back to two lanes, meaning a quicker trip through the Hundalee Hills after 18 months of travel via one lane.

Repairing this section was a major piece of work as the edge of the road had fallen down the hillside. To rebuild it, a working platform was created on the side of the hill, six metres down, and then the land was slowly built up to eventually reinstate the second lane.



Powering Through

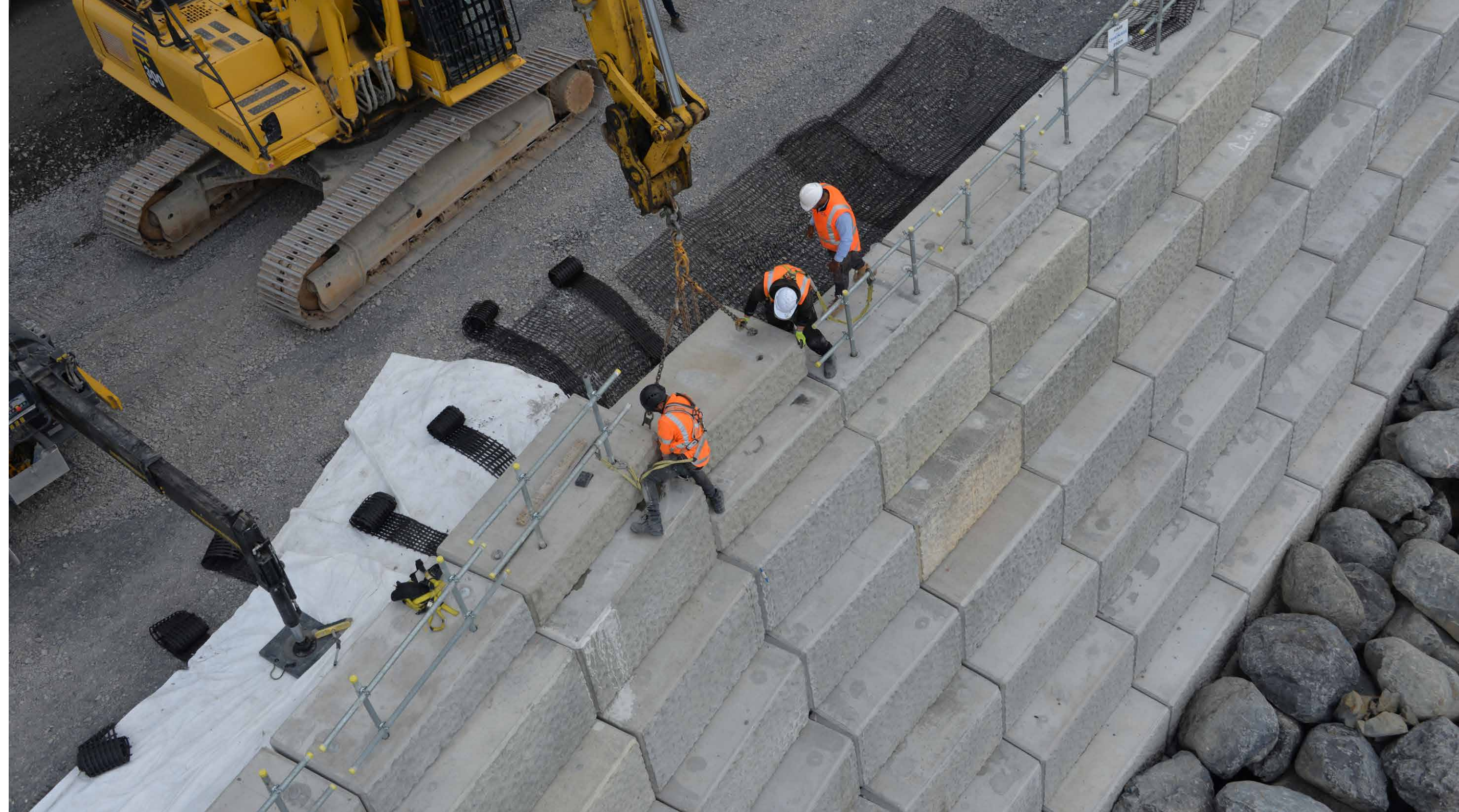


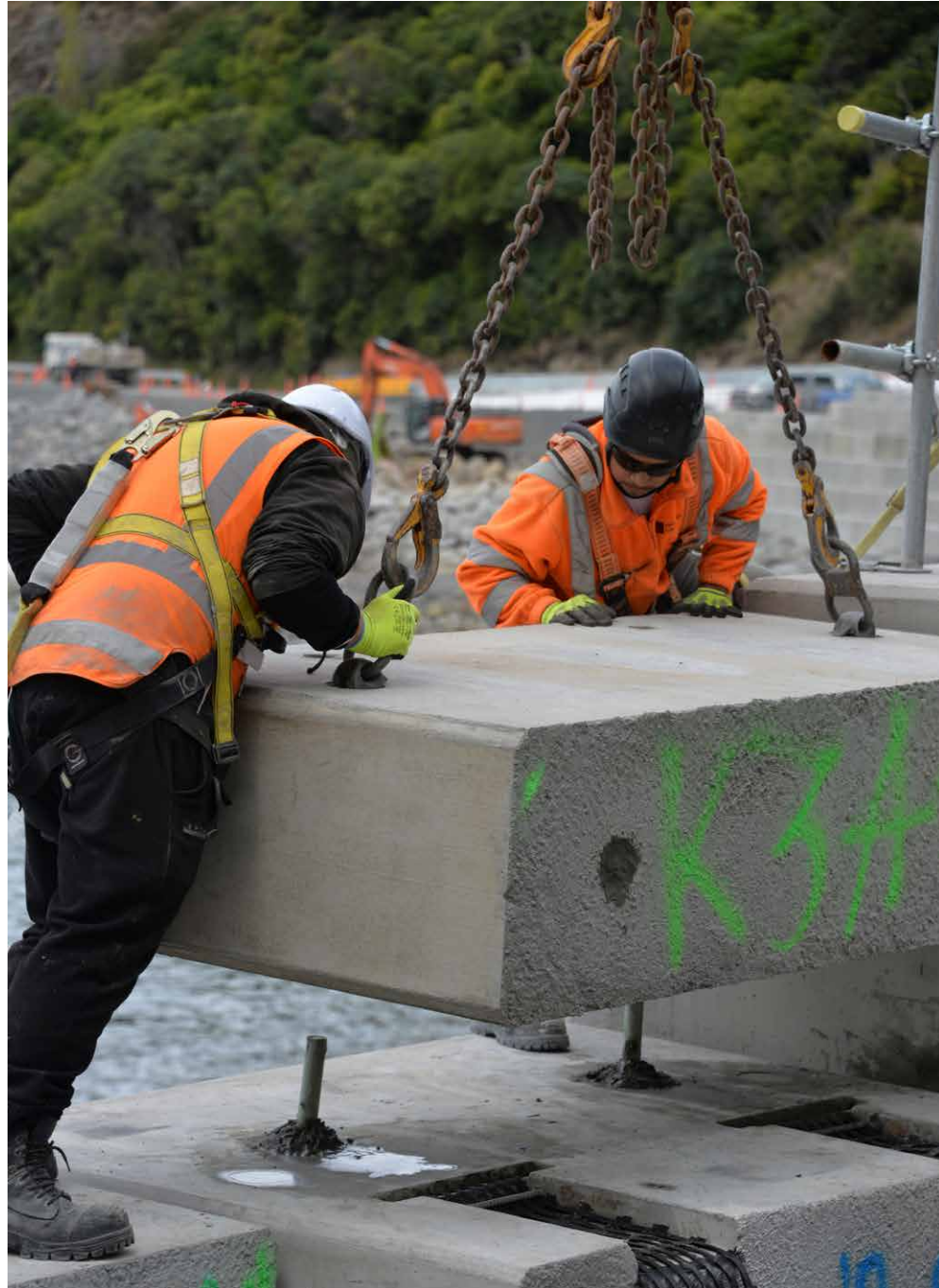
Laying the final block

On 9 October 2019, the team working at Half Moon Bay laid the final seawall capping block on the final seawall.

Work started on the seawalls in March 2017 when crews had to work around the tide to construct the foundations. Overall approximately 2.5km of seawall has been built, using over 7500 blocks.

Seawalls help protect the transport corridor from the unforgiving eroding forces of the sea, fit in narrow spaces, and can be 'retrofitted' if needed for rising sea levels. They use the natural curvature of the coastline to support a safe, enjoyable trip along this world-class scenic route.





Powering Through



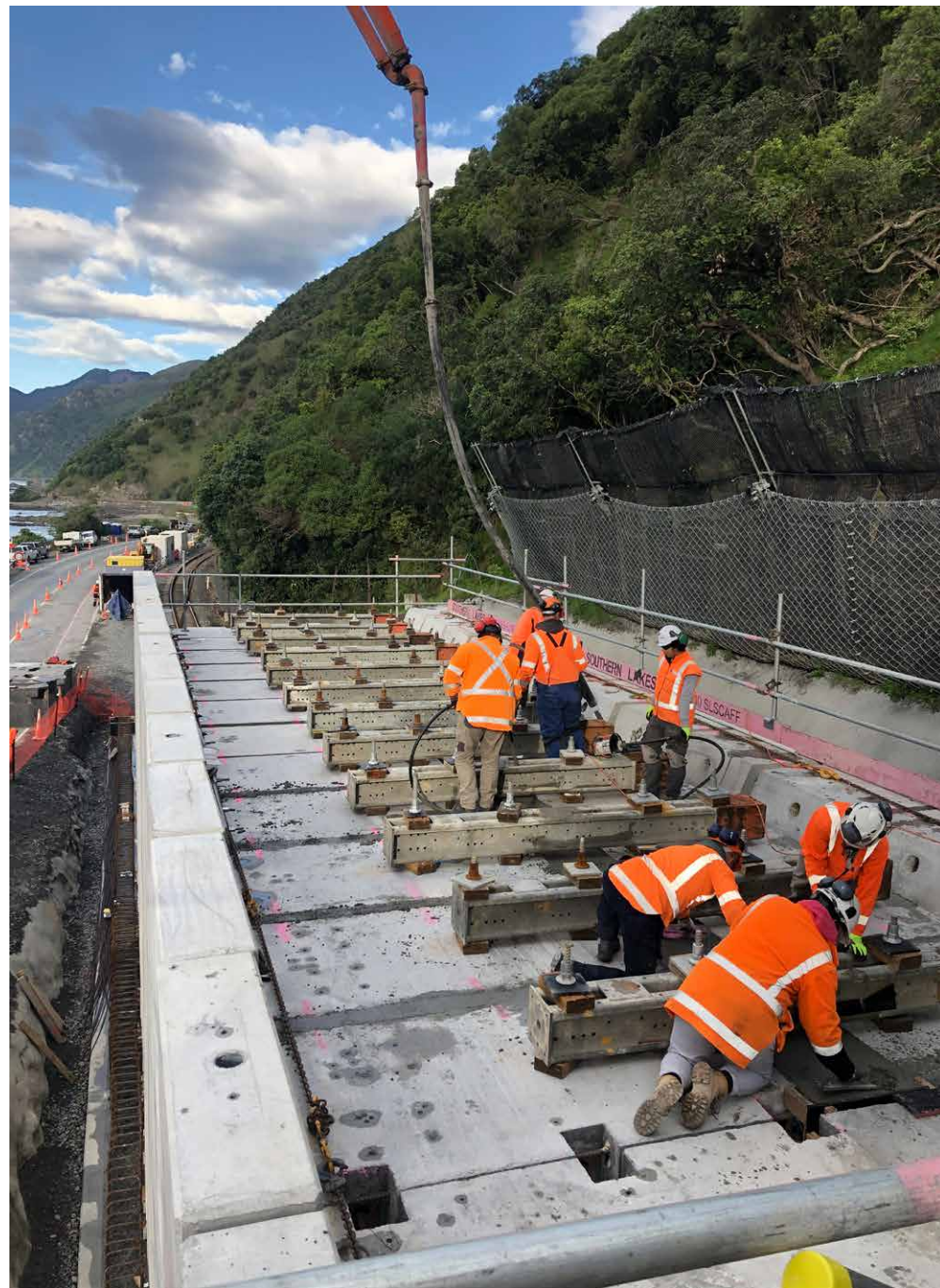
Extensions complete

In October 2019 crews at Rail Tunnel 19 south of Ōhau Point finished sliding a number of concrete sections against the tunnel mouth to form an extension. This will act as a permanent rockfall protection measure to catch falling debris protecting rail underneath and the adjacent road.

This is similar to works completed at Rail Tunnels 6, 11, 13, and 14 south of Kaikōura, where the new concrete structures have also become canvases for stunning local cultural artworks.

Tunnel 19





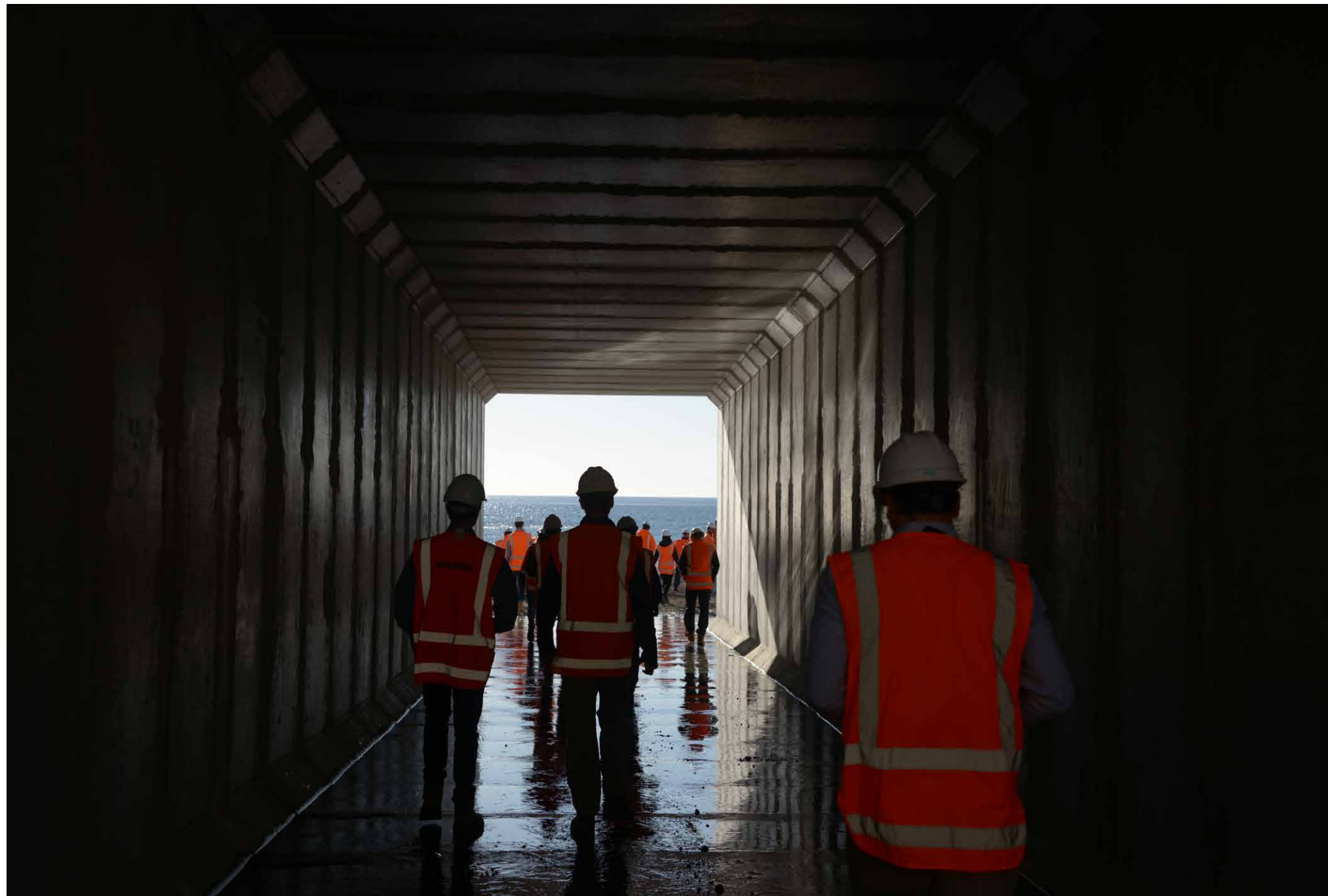
**LEGENDS
of NCTIR**

January 2019 -
December 2019









Powering Through



Ground-breaking archaeology

The archaeology work undertaken by the NCTIR Alliance was the first regional scale heritage-oriented project in New Zealand.

245 archaeological sites were identified by the archaeology team who focused on protection, conservation and the management of impacts since the start.

The team screened 1169 project works as a way of managing construction effects on historic and cultural heritage. 445 were high-risk projects that had potential impacts on archaeology and cultural heritage.

From the initial formal blessing process of a new site, to the final whakanoa (the removal of tapu), the archaeology management process at NCTIR was enshrined by tikanga Māori.



A Lasting

JANUARY 2020 – DECEMBER 2020

Legacy

The year started well and the team had a full schedule planned, with many milestones to meet so that all work could finish by the end of the year. But then the COVID-19 pandemic hit.

The national lockdown in March and April halted work. Then under Alert Level 3, the team followed the New Zealand COVID-19 construction protocols under strict new health and safety measures, which initially included restricted site access, maintaining physical distance, and additional protective clothing. Keen to get on with the job, crews formed small work 'bubbles' that stayed together during that time, sharing accommodation and travel.

Once alert levels were lifted and work could continue with no restrictions, the programme got back into full swing. One by one the remaining projects were completed and teams wrapped up their work and left Kaikōura. The last of the NCTIR Alliance team farewelled the township on 15 December after a series of events to mark the momentous occasion.

A small team would return to the Peketā site office in 2021 to complete one final job – that had been delayed due to COVID-19 and bad weather – a rockfall protection canopy south of Kaikōura.

**Inland Road
over and out**

The Inland Road (Route 70) was hit with multiple slips and seven damaged bridges following the 2016 Kaikōura earthquake and subsequent weather events.

The repair works consisted of 20 separate projects, including repairs to bridges, culverts and retaining walls, as well as a road realignment at Lulus bend, and a complete bridge replacement at Wandle River.

The completion of work on the Waiau Bridge in September 2020, marked the end of all major earthquake repairs on this important route which had provided critical access in and out of the township when SH1 was closed.





A Lasting Legacy





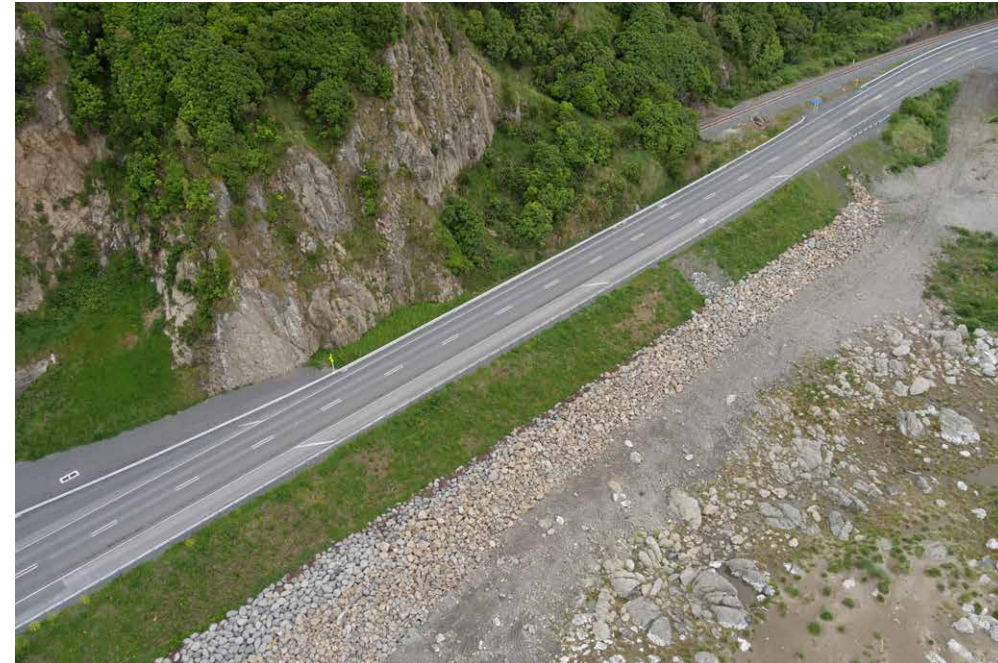
Realigning the road

After a string of weather setbacks, the team at Ōkiwi Bay was pleased to put down the final layer of seal on their road realignment in late June 2020, completing the project to realign the road and rail in 13 months.

The new road alignment reduced the number of curves from three to two, removed a dip in the road, and widened the centreline. This helps to improve safety for people travelling.

Part of the road was built on slip material to reduce construction time and cost, and to decrease the amount of excavation and imported river gravel required, providing a more sustainable solution.





Race to the finish

In December 2020, work to reconstruct and realign a section of SH1 above the Kaikōura Racecourse was completed, where an earthquake-damaged retaining wall had previously slumped.

The old road embankment was cut away, and the team built a wider embankment to support the new road alignment. This saw the road moved over by the width of one lane in some sections.

Safety improvements include a new left turning bay into South Bay Parade and a shared path for people walking and cycling on the southbound side of the highway.

The racecourse road, and shared path, were officially opened on 13 December 2020 with members of the local cycling club the first to ride down the new section of shared path, which connects and completes the club's 48km bike loop trail around the Kaikōura township.







A Lasting Legacy



Celebrating the completion of the racecourse project and the official opening of the shared path for walking and cycling.

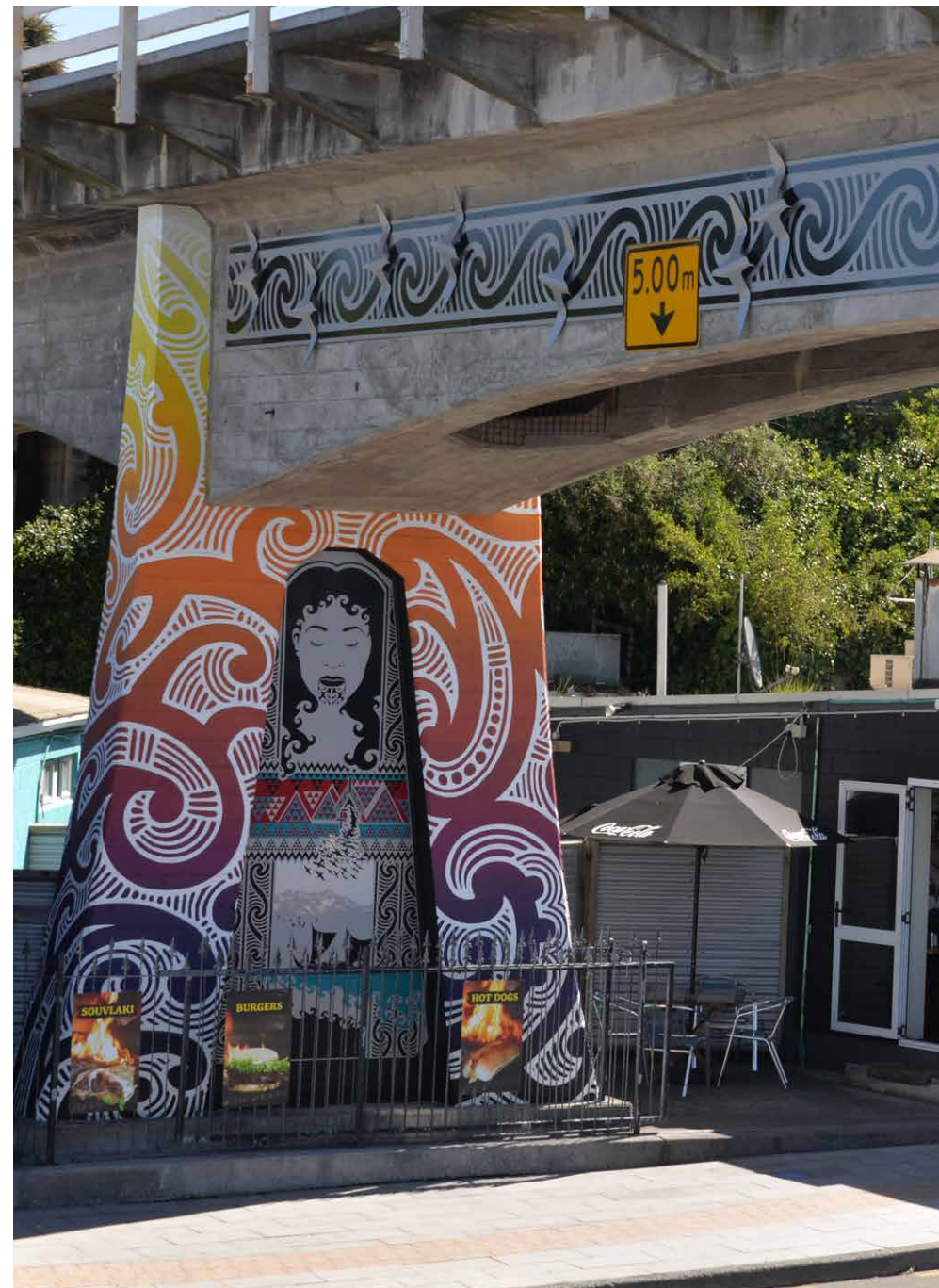
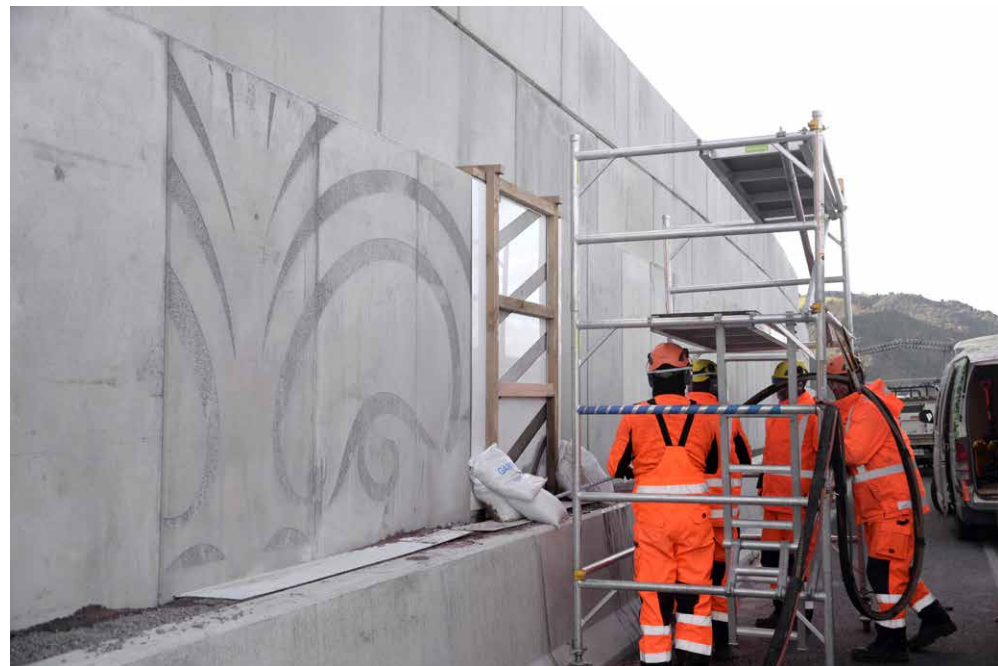
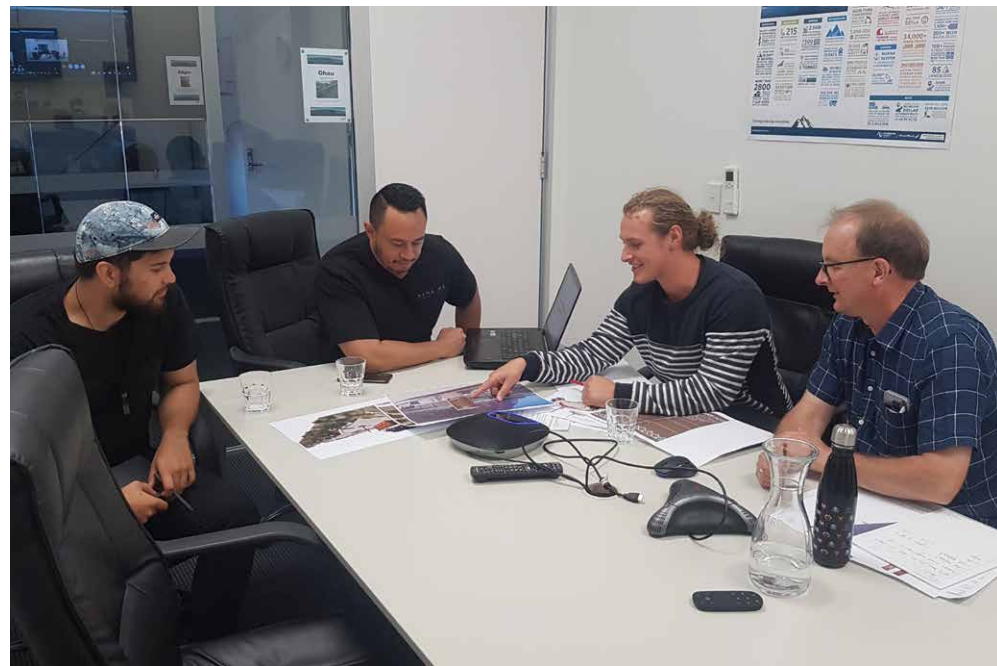
**Stories of
whakapapa
and connection**

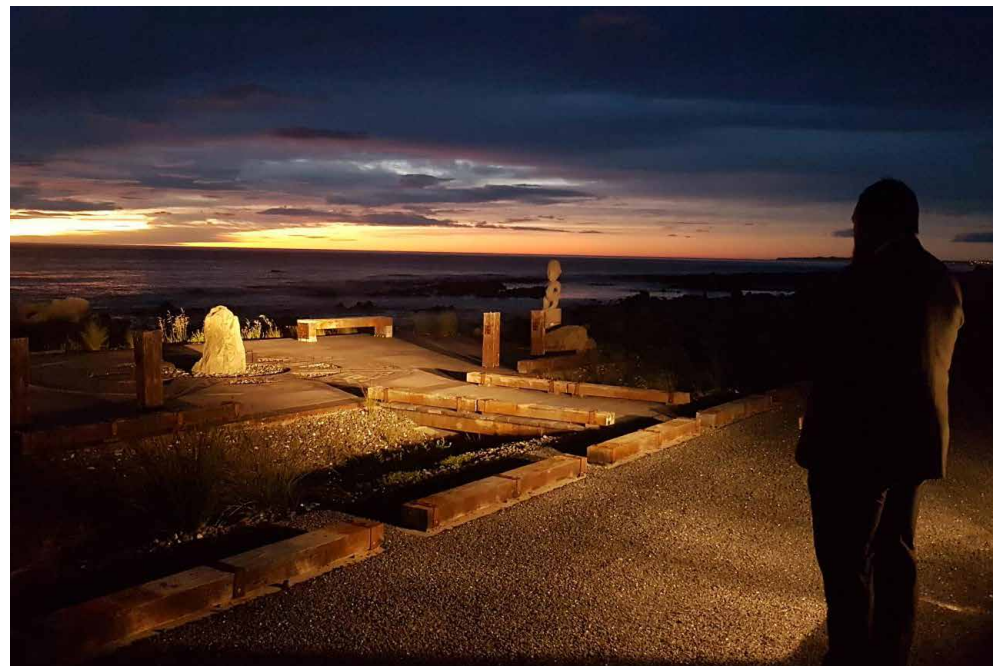
In December 2020, the final pieces of the Cultural Artwork Package were installed along the Kaikōura coast, adding pouwhenua and tekoteko (carved pillars), laser cut corten steel murals, a painted rail bridge and palisade fence to the existing artwork displayed on rail tunnel shelters, and at seven new safe stopping areas along a 60km stretch of coastline.

The artwork package emerged from the relationships formed by Waka Kotahi, KiwiRail, and NCTIR with Te Rūnanga o Kaikōura during the road and rail rebuild to tell the story of mana whenua and to leave a legacy beyond safe and resilient road and rail connections.

Maurice Manawatu, of Te Rūnanga o Kaikōura, led this kaupapa and hopes the artwork will inspire curiosity and encourage more people to investigate the history and culture of Kaikōura. "To have our stories laid over our environment and to share them with all people has been something special."









A Lasting Legacy





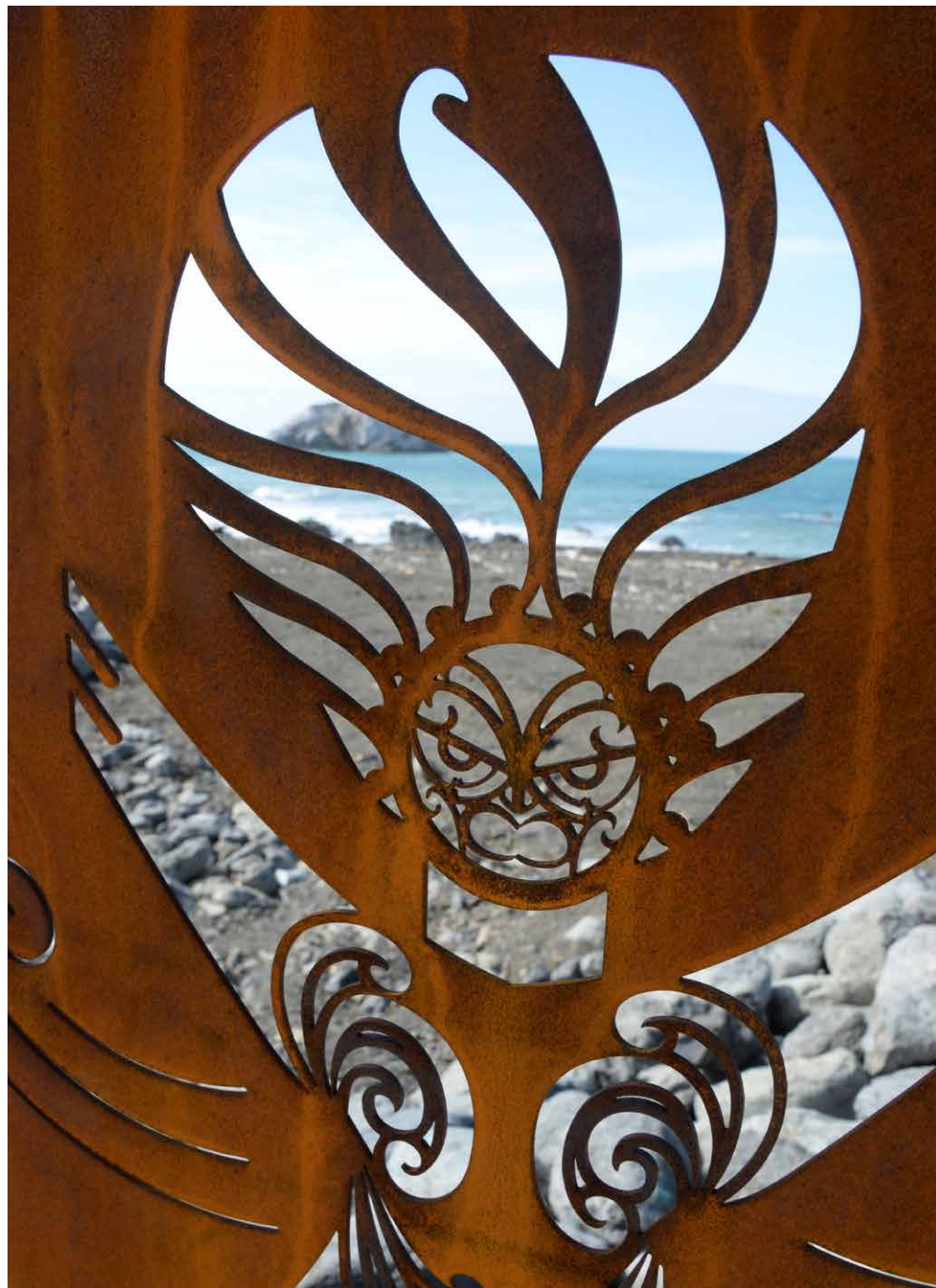
A Lasting Legacy





A Lasting Legacy





A Lasting Legacy



Treasures returned

In December 2020, the archaeology team undertook repatriation of taonga tūturu (objects that relate to Māori culture, history or society and are over 500 years old) recovered during the NCTIR project to Takahanga Marae.

This was an historic event in the context of kaitiakitanga, for both Kaikōura and New Zealand, as such an endeavour has never been undertaken.

The whānui at Takahanga welcomed the team with warmth and friendship, and the tupuna were laid to rest in the arms of the whareniui in preparation for their permanent accession to a whare taonga (treasure house) being established at the marae.

It was a reflection of the growth and development of the relationship between Te Rūnanga o Kaikōura, Waka Kotahi and KiwiRail and honouring of Te Tiriti o Waitangi principles. It is hoped this sets a precedent for other major projects.







A Lasting Legacy



Thank you and goodbye (for now)

December 2020 saw a series of events allowing the NCTIR team to farewell Kaikōura after an emotional four years.

On 13 December 2020, NCTIR hosted a community day to thank the people of Kaikōura for their patience and support, and on 15 December a beautiful poroporoaki was held by Te Rūnanga o Kaikōura at Takahanga Marae to say goodbye to the team.

On 15 December, a special ceremony was held at the South Bay corner to unveil a new Kaikōura town entry sign and to bless the two tekoteko (carved pillars) flanking the sign. The event officially marked the departure of NCTIR from Kaikōura exactly three years after State Highway 1 reopened in 2017.

Many staff past and present attended the ceremony to mark this momentous occasion. Speakers included the Minister of Transport Michael Wood, Waka Kotahi Chief Executive Nicole Rosie, KiwiRail Chief Operating Officer Dave Gordon, Chair of Te Rūnanga o Kaikōura Hariata Kahu and Kaikōura Mayor Craig Mackle.

As Tony Gallagher, NCTIR Project Director, said on the day, the disaster rebuild project has been one of the most significant engineering challenges in New Zealand's history. "It's been a privilege and humbling to be so warmly welcomed by the community and mana whenua over the last four years. We could not have achieved what we did without that partnership. This is an experience that will stay with us forever."







A Lasting Legacy





A Lasting Legacy





A Lasting Legacy



Local school children singing 'A million dreams'

One Final Innovation

JANUARY 2021 – JUNE 2021

The last project was one of the most challenging. It needed some legendary NCTIR innovation and a dedicated team to nail it.

The first of its kind in the Southern Hemisphere, the canopy project delivered essential safety improvements at a rockfall-prone corner south of Kaikōura. The solution is in-keeping with the beautiful natural environment, all constructed whilst SH1 remained opened in the day, and despite many COVID-19 related supply issues.

The overall work here involved installing three separate rockfall solutions: a draped mesh fence, a one-metre high catch barrier and the six-metre high canopy to help redirect rockfall away from the road.

The team completed the barrier and mesh fence in March and the canopy in June.

The canopy is a stunning feat of engineering and another example of the NCTIR crew's precision work that has left safe and resilient infrastructure as part of a lasting legacy.







One Final Innovation



Credit: Rock Control

A place for reflection

This seat was installed at the Paparoa Point safe stopping area for the NCTIR whānau. The seat was designed as a special place to pause and reflect as you sit overlooking the sea towards Kaikōura.

This area can't be seen from the car park so visitors will need to make a special effort to find it. A path to the right of the pouwhenua leads down to the sunken seat which faces southward looking back to Kaikōura. Trees have been planted around the seat area.

All those who worked for the NCTIR Alliance are encouraged to visit when passing through and reflect on the vital part they played in the extraordinary efforts to restore and improve Kaikōura's transport networks. Ka pai tō mahi.



Awards



2020 Public Service Commission Spirit of Service Awards
Prime Minister's Award
Leadership in Governance Award



2021 International Association of Business Communicators
Gold Quill for Excellence (audio/visual)



2019 Safeguard Workplace Health & Safety Awards
IMPAC Best Collaboration between PCBUs



2019 Engineering NZ ENVI Awards
(Joint winner) Impact Category



2019 ACENZ Innovative Awards
Silver Award of Excellence



2019 American Railway Engineering and Maintenance-of-Way Association (AREMA)
W.W. Hay Award for Excellence



2019 Engineering NZ ENVI Awards
Supreme Award



2018 Railway Technical Society of Australasia
Railway Project Award



2018 Resource Management Law Association
Project Award



2018 Institute of Civil Engineers
People's Choice Award



2018 Australian Rail Industry Awards
Freight Rail Excellence



2018 Emergency Media and Public Affairs
Excellence in Response and Recovery

**Links to project
legacy resources**

- Project overview including 100+ Bulletin newsletters (publications) and a selection of photos (gallery) www.nzta.govt.nz/kaikoura-earthquake-response
- Project videos in a Kaikōura YouTube playlist including 2020's 'Our Kaikōura Story' and 'Achieving positive heritage outcomes in Kaikōura' <http://bit.ly/NCTIRVideos>
- After the Earth Stopped Shaking - an interactive website bringing stories of the rebuild to life <http://bit.ly/NCTIRStoryMaps>

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Karakia
whakamutunga

Kia tau te wairua
Kia tau te tinana
Kia tau te hinengaro
Kia tau ai te mauri

Tuturu, owhiti whakamaua kia tina

TINA

Haumi e, hui e

TAIKI E

Karakia
whakamutunga

Let the spirit, body and mind be calm and settled so there is serenity of everything.

We all agree and are united as one.

(This karakia in this context refers to the closing of a saga. It acknowledges the people, the places and the mahi and now that the saga has come to an end, everything is calm and settled.)



New Zealand Government