Department of Conservation
Te Papa Atawhai

OIAD-2965

2 June 2023

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Radio New Zealand

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Tēnā koe Phil

Thank you for your Official Information Act request to the Department of Conservation, received 01 May 2023 in which you asked for:

> *RNZ requests release in full and in fully searchable and copyable format, regards an accident on or about 30 May 2020 at Collier Gorge swingbridge:*
>
> - *A copy of any investigation report/s or similar into this, along with any attachments and appendices*
> - *A copy of any review/s or similar, of the above report*
> - *Details of any further inquiries made following that investigation or the accident*
> - *Details of any actions or similar arising from that investigation or the accident*
> - *Details of any other govt or private entity with which DOC engaged regards the accident or the investigation of it*
> - *And dates of any engagement/s*
> - *Purpose of any engagement/s*
>
> *If any of the above has previously been publicly released, pls provide links to that forthwith. If any of the above has previously been released under the OIA, pls release it now to RNZ as per the OIA regs and SOP. Please redact names of junior staff but include those of senior ones.*

Your questions and our responses are listed below:

1. *A copy of any investigation report/s or similar into this, along with any attachments and appendices.*

There are two internal investigation reports related to this incident – further details are provided in the following table. The additional documents referenced in Item 2 include two accounts of the incident, and photographs of a private individual. These are withheld in full under section 18(a) of the Official Information Act, by virtue of section 9(2)(a). Please note that the information in these documents is also substantively found in Items 1 and 2.

Item	Date	Document description	Decision
1	*7th June 2020*	*Collier Gorge Swingbridge Visitor Fall Accident, June 2020* *(Engineers Report)*	Released in full
2	9th July 2020	Learning Teams at DOC Collier Swingbridge (Learning Team Process)	Released in part, redactions under section 9(2)(a)

2. *A copy of any review/s or similar, of the above report*

   There are no copies of 'reviews' as such for either of the documents outside the documents released in response to question 1. Note that the Learning Teams document is essentially a write up of a facilitated discussion with the district team responsible for managing the asset; the discussion focusses on the incident, incident follow up, site management (including any gaps), and what management improvements (if any) can be made at local through to organisational level. The document is 'reviewed' and signed off at the District Operational Manager level.

   The Engineer's Report was authored by DOC's Engineering Manager in response to the incident. The report was then issued to the Operations Planning Director with a series of recommendations at a functional and systems level.

3. *Details of any further inquiries made following that investigation or the accident*

   No further external inquiries were made following this incident. However, further internal inquiries were made regarding the management of swingbridges on Public Conservation Land. This is detailed in the Engineer's Report, s7 Commentary and Recommendations, and largely concerns the use of polyethylene netting for barrier infill, and the prevalence of in-fill netting in general on DOC swingbridges.

4. *Details of any actions or similar arising from that investigation or the accident*

   Initial actions are detailed within the Learning Teams document, which are repeated here:

   - Report received on Tuesday 2nd June 2020, inspection was organized to be carried out next day, 10am Wednesday team were flown to bridge. Bridge was repaired within 48 hours of bridge incident being notified.
   - DOC staff, with appropriate skills required to investigate incident and make repairs were gathered fast and materials flown into site to repair bridge and fixtures.
   - The Engineering Manager made all DOC Operations Managers, Senior & Supervising Rangers, Asset Inspectors, and engineers aware of the incident so they could take immediate local action if required (e.g., complete outstanding barrier mesh work orders on NZFS swingbridges) and requested feedback as to the prevalence of this issue.

The subsequent Engineer's Report and associated recommendations then prompted a country wide priority task, directed at the Operations Unit, to:

- Ensure any currently live issues related to barrier in-fill netting on NZFS bridges are resolved with urgency
- Gather more information on DOC's 147 NZFS bridges to allow triaging and prioritisation of chain-link barrier in-fill installation
- Agree timeframes and funding for a prioritised list of work
- Issue work orders to install chain-link in-fill as per a prioritised list.

Each region then built a plan around prioritising netting replacement and installation on its NZFS bridges. This work is largely complete. The few bridges that still have remaining tasks relevant to the work programme have had the risk temporarily mitigated, or are programmed for further combined capital upgrade work, and are those that have been assessed as a low risk through discussions with DOC engineers.

In response to the recommendation to consider establishing a system to record visitor incidents, DOC now records visitors incidents in its Risk Management System, and has also established an online visitor incident reporting form.

5. *Details of any other govt or private entity with which DOC engaged regards the accident or the investigation of it*
6. *And dates of any engagement/s*
7. *Purpose of any engagement/s*

DOC has not, to my knowledge, engaged with another government or private entity regarding the accident or the investigation.

Please note that this letter (with your personal details removed) and enclosed documents may be published on the Department's website.

Nāku noa, nā

Catherine Wilson
Director, Heritage and Visitors
Department of Conservation
Te Papa Atawhai

Item 1

Collier Gorge Swingbridge Visitor Fall Accident, June 2020

Issued To: Darryl Lew, Director Operations Planning

Author: Jonathan Calder
DOC Engineering Manager

File: DOC-6336042

Date: 7 June 2020

Department of Conservation
Te Papa Atawhai

New Zealand Government

Contents

1 Executive Summary

On Saturday 30th May 2020, a tramper fell through the barrier of the Collier Gorge Swingbridge, a New Zealand Forest Service (NZFS) type swingbridge in the Hokitika District. They survived the sixteen-meter fall into the Whitcombe River, receiving only minor injuries.

The accident progressed from what should have been a minor slip to a serious fall, because the bridges polyethylene barrier-infill netting had detached, leaving a 450mm high opening between the lower barrier-infill cable and the deck. The netting had deteriorated between structure inspections and so was not picked up in the normal course of the Department of Conservation's (DOC) asset inspection regime.

Polyethylene netting has been widely used as barrier-infill netting, but problems with it wearing and detaching are common across DOC's bridging network.

Fig. 1 Detached barrier-infill netting where the fall occurred

To reduce the risk of a similar accident happening again, steel chain-link barrier-infill netting should be used in preference to polyethylene netting on all NZFS Swingbridges, and where possible, on other bridge types.

Recommendations 1 to 7 from Section 7 of this report are summarised below:

1. *Replace polyethylene barrier-infill netting on Collier Gorge Swingbridge with stainless steel chain-link netting.*
2. *All NZFS Swingbridges should have barrier-infill netting. Install stainless steel chain-link netting on 31 NZFS Swingbridges that currently have no barrier-infill netting.*
3. *Replace polyethylene barrier-infill netting with stainless steel chain-link netting on NZFS Swingbridges, when problems recur or when deterioration is widespread.*
4. *Replace polyethylene barrier-infill netting with zinc-aluminium coated steel chain-link netting (where compatible with barrier construction details) on other bridge types, when problems recur or when deterioration is widespread.*
5. *When repairing or installing new barrier-infill netting, use 1.6mm x 150mm stainless steel wire loop tie fixings.*
6. *Improve the slip resistance of tread plates on steep NZFS Swingbridge access ramps.*
7. *DOC should consider establishing a system to record visitor accidents.*

2 Introduction

This report documents the engineering investigation into the accident and recommends seven follow-up actions, detailed in Section 7.

3 Background

3.1 New Zealand Forest Service (NZFS) Swingbridges

The NZFS Swingbridge was a standard design developed by Forest Service engineers in the 1960's. There are 147 NZFS Swingbridges still in service on Public Conservation Land (PCL).

NZFS Swingbridges have a 300mm wide flexible walking surface of chain link netting, with aluminium tread plates at approximately 350mm centres, supported by four 10mm diameter cables.

Two 10mm diameter cables form the barrier top rails.

There are two 5mm diameter barrier-infill cables on each side. These are often supplemented with either polyethylene or galvanised steel chain-link barrier-infill netting between the deck and the top barrier-infill cable.

Fig. 2 Colliers Gorge NZFS Swingbridge, 2020

3.2 NZFS Swingbridge Related Incident History

DOC does not have a system to record visitor accidents and near-misses but there are, to the authors knowledge, no other cases of a person falling through the barrier of a NZFS swingbridge in the 33-year history of DOC.

There is one anecdotal account of a fatality, pre-DOC, following a fall from a NZFS Swingbridge. This apparently happened on the St James Walkway in the 1970's. The accident prompted the NZFS to install barrier-infill netting on some, but not all, NZFS Swingbridges.

There is one documented account, from a DOC staff member, of a particularly alarming crossing of Collier Gorge Swingbridge in 2014. A strong North West wind was funnelling up Collier Gorge blowing the bridge around. There was no barrier-infill netting on the bridge at the time. The main cables were tightened and barrier-infill netting was installed in response to this incident.

3.3 Barrier-Infill Netting

Traditionally, barrier-infill netting has been installed on most NZFS Swingbridges, 116 of DOC's 147 NZFS Swingbridges have barrier-infill netting, but there is no specific policy mandating its installation.

NZFS Swingbridges without barrier-infill netting have been assumed to meet the barrier geometry requirements of *Standards New Zealand Handbook 8630 Outdoor Visitor tracks and Structures*, as long as their barrier-infill cables are tight enough to maintain a gap between cables no greater than 500mm (SNZ HB8630 Table 22 - Back Country Adventurer Site, Fall Height > 3.0m, Type C Barrier required, maximum opening 500mm measured vertically between rails).

The two most common types of barrier-infill netting used are galvanised steel chain-link and Polyethylene netting. The netting is typically fixed to the top barrier-infill cable and deck of the bridge with one of the following options; lacing wire or nylon cord, wire loop ties, ring staples or plastic cable ties.

On the day of the accident, Collier Gorge Swingbridge had polyethylene barrier-infill netting fixed with ring staples (Fig. 2), but the bridge has had intermittent periods in its history with no barrier-infill netting (Fig. 3).

Fig. 3 Colliers Gorge NZFS Swingbridge, 2014 (no barrier-infill netting)

3.4 NZFS Swingbridge v. Current-Day Swingbridge Design

Fig. 4 Roberts Point Swingbridge, 2015

DOC's general approach has been to maintain and replace NZFS Swingbridges like-for-like, unless visitor numbers justify replacing with a new swingbridge.

New DOC swingbridge designs have solid timber decks with anti-slip netting and kerb boards to minimise the risk of people slipping off the deck. They are generally considered more user-friendly than NZFS Swingbridges.

Barrier-infill netting is installed on some new swingbridges, but with the additional security provided by a solid timber deck, it is generally considered that barrier-infill cables alone provide adequate fall protection. Typically, three or more barrier-infill cables are installed to ensure the SNZ HB8630 maximum vertical opening of 500mm is maintained (refer section 3.3), even if the infill cables become loose in-service.

3.5 Collier Gorge Swingbridge Service History

Significant events, work, load tests and inspections:

Jan	**1982**	-	Bridge built by the NZFS.
May	**2003**	-	Rock anchors and main cables replaced.
Jan	**2004**	-	Destroyed by flood, re-built like-for-like.
Oct	**2014**	-	DOC staff member reported alarming crossing in strong wind. Cables tightened and barrier-infill netting installed in response.
Apr	**2016**	-	Main cables and deck netting replaced, both in stainless steel (to reduce future maintenance).
Apr	**2016**	-	Most recent load test.
Apr	**2019**	-	Most recent inspection by a DOC Asset Inspector.
May	**2019**	-	Most Recent inspection by a DOC Engineer.
Jun	**2019**	-	Work requested by engineer in May completed (tighten main cables, tighten barrier infill cables, re-fix barrier infill mesh).
Jan	**2020**	-	Walk-over by DOC Rangers (Dylan Higgison and Katie Brennan). Bridge, including barrier infill netting, recalled as being in good condition.
May	**2020**	-	Visitor fall accident, 30 May 2020

4 Accident Description

A group of five Christchurch Tramping Club (CTC) members were on day-one of a three-day return trip to Frew Hut in the Whitcombe Valley, Hokitika. The weather was fine and calm.

The group reached the Collier Gorge Swingbridge and crossed, one at a time. The last in the group crossed, holding a pair of walking poles in one hand. About half-way across, with little warning, both their feet slipped sideways and they fell down and under the lower barrier-infill cable on the downstream side of the bridge. The barrier-infill netting had already detached when the group arrived, leaving an opening between the lower barrier-infill cable and the deck.

The trampers pack snagged on the bridge, holding their fall, but they could not regain the bridge deck. They slipped out of the pack and fell sixteen meters into the river, landing between rocks in water deep enough to cushion the fall. The Whitcombe River was at a low flow, allowing the tramper to reach the true left bank and climb up to the Whitcombe Valley Track.

They received bruised arms and a cut to one hand but were able to carry on with the trip as planned, re-crossing the Collier Gorge Swingbridge twice without further incident.

5 Accident Investigation

A member of the CTC notified DOC Canterbury staff of the accident on Tuesday 2 June, by email. The email was forwarded to DOC Hokitika staff on the same day and a site visit was arranged for the following day.

5.1 Site Visit

DOC staff Dylan Higgison (Ranger Supervisor), Stephen Roberts (Asset Inspector), Cameron Jones (Works Officer) and Jonathan Calder (Engineering Manager) flew in to the Collier Gorge Swingbridge site on the morning of Wednesday 3 June.

The bridge was inspected, and the barrier infill netting re-fixed where it had detached from the barrier-infill cable and deck netting. 1.2mm stainless steel wire loop ties were installed every two-to-three netting 'diamonds'.

Observations:

1. The bridge's polyethylene barrier infill netting had worn through at the ring staple fixings, detaching from the deck netting and the top barrier infill cable in several places along the bridge (Fig. 5). Near mid-span, where the accident occurred, a 5.0m length of netting had detached from the deck on the downstream side (Fig. 6).
2. The netting wear didn't seem to be related to excessive vertical tension in the netting.

Fig. 5 Barrier-infill netting worn through at ring staples

3. Deck treadplates were secure and the deck netting was securely fixed to the deck cables with 1.2mm stainless steel wire loop ties.
4. At mid-span, the bridge deck had a very slight cross-fall downstream but in general, the main cables were well tensioned and the bridge felt stable.
5. Stainless steel chain-link deck netting has been used on this bridge, unlike the more common galvanised steel chain-link netting. The stainless steel netting is anecdotally more slippery than galvanised steel, but this wasn't noticeable on the day of the inspection. It was noted on site, and has been mentioned by members of the CTC group, that chain link netting has a right-to-left diagonal high-point (Fig. 6). This could direct a sliding boot off the left-hand edge of the deck.
6. M8 treadplate 'j-bolts' protrude approximately 15mm at each end of each treadplate (Refer Fig. 7) and would probably stop a boot sliding sideways off the end of a treadplate.
7. In general, except for the detached barrier infill netting, the bridge was in good condition.
8. In the experience of the DOC staff present, the bridge was not noticeably less stable or more slippery than a typical NZFS swingbridge.

Fig. 6 Detached barrier-infill netting where the fall occurred. Arrows show 'slip-direction' of chain link netting.

Fig. 7 Re-fixing barrier in-fill netting with wire loop ties.

5.2 Desk-top Investigation

The maintenance and inspection history for Collier Gorge Swingbridge, and maintenance work orders for all DOC NZFS Swingbridges, were obtained from DOC's Asset Management Information System (AMIS). Additional information was obtained from staff familiar with building and maintaining Collier Gorge and other DOC swingbridges.

Findings:

1. There were no overdue maintenance or inspection work orders against Collier Gorge Swingbridge on the day of the accident.
2. Detachment of the polyethylene barrier-infill on the Collier Gorge Swingbridge has been a recurring problem.
3. Deterioration of the barrier infill netting occurred in a 6-month period between DOC asset inspections and so wasn't seen by a DOC Asset inspector or Engineer (cable-structures are inspected every two years by a DOC Asset Inspector and every six years by a DOC Engineer).
4. The detached barrier-infill netting wasn't reported to DOC by visitors, prior to the accident.
5. Problems with polyethylene barrier-infill netting degrading and detaching from NZFS Swingbridges, and other bridge types, is common.
6. Regardless of how polyethylene barrier-infill netting is fixed, problems with the netting detaching are common.

6 Conclusion

The accident progressed from what should have been a minor slip to a serious fall, because the bridges polyethylene barrier-infill netting had failed, leaving a 450mm high opening between the lower barrier-infill cable and the deck. Problems with the polyethylene barrier-netting on this bridge had been recurring and are common across DOC's bridging infrastructure.

Apart from the failed netting, Collier Gorge Swingbridge was in good condition. There was nothing significantly unusual or defective that might have caused the tramper to slip. There was no failure of DOC's asset inspection regime; the barrier-infill netting deteriorated between inspections.

There is a greater risk of slipping on the flexible decks of NZFS Swingbridges, than on the solid timber decks of current swingbridge designs. But applying an effective anti-slip solution to all of DOC's 147 NZFS Swingbridges is not considered practical or economic (a slip-resistant solution is proposed for steep access ramps, refer Section 7 Recommendation 6).

The most practical solution is to install more reliable steel chain-link barrier-infill netting on all NZFS Swingbridges. Where possible, this requirement should be extended to other bridge types (steel chain-link netting is not compatible with all barrier/bridge types). Existing polyethylene netting should be replaced with steel chain-link netting when problems are recurrent or when deterioration is widespread.

In general terms, steel chain-link barrier-infill netting should be used in preference to polyethylene netting wherever possible.

7 Commentary and Recommendations

1. Collier Gorge Swingbridge Barrier-Infill Netting

The bridge was left in a safe condition on the day of the site visit, but the existing polyethylene netting is likely to continue to deteriorate.

Replace existing netting with 75mm diamond x 2.5mm diameter grade 316 stainless steel wire x 850mm wide (overall width outside diamonds) plain knuckle chain-link netting* with 1.6mm x 150mm grade 316 stainless steel wire loop ties to deck netting and top infill cable, every second diamond. Recommend completing within 4 months.

***** This is a custom-made chain-link netting product imported from Australia in minimum quantities. Contact Advanced Engineering Group, Christchurch, for details. Stainless-steel wire loop ties are available from chain.com.au.

2. NZFS Swingbridge Barrier Policy

116 of DOC's 147 NZFS Swingbridges have barrier infill netting but it is not a clearly defined requirement.

The assumption has been, for those bridges without barrier-infill netting, that the two barrier infill cables meet the barrier requirements of *Standards New Zealand Handbook 8630 Outdoor Visitor tracks and Structures* (SNZ HB8630). But the lower infill cable, nominally 450mm above deck level, only needs to deflect 50+ mm to exceed the 500mm maximum gap of the required Type C barrier.

All NZFS Swingbridges should have barrier-infill netting. Barrier-infill netting should be installed, in accordance with Recommendation 1, on the 31 NZFS Swingbridges that currently have barrier infill cables only. Five years is suggested as a reasonable timeframe to complete this work.

Given the low numbers using these bridges and the low accident rate, five years is considered a reasonable timeframe. This allows the work to be programmed with other work, reducing overall transport and labour costs.

3. Existing Polyethylene Barrier-Infill Netting on NZFS Swingbridges

Issues with polyethylene barrier-infill netting are common on NZFS Swingbridges. Polyethylene netting has been used because it is light, easy to handle, and doesn't corrode, but it hasn't proved reliable enough as a fall prevention measure.

Existing polyethylene barrier-infill netting should be replaced with stainless steel chain-link netting when problems are recurrent e.g. detaching from bridge, or when deterioration is widespread. Stainless steel barrier-infill netting shall be installed in accordance with Recommendation 1.

Because the upper barrier-infill cable on NZFS Swingbridges are (typically/approximately) 810mm above the deck, bulk orders of custom made 850mm wide stainless-steel chain-link netting can be made, meeting minimum quantity requirements.

4. Existing Polyethylene Barrier-Infill Netting on Other Bridge Types

Issues with polyethylene barrier-infill netting are common across DOC's bridging infrastructure. The wide range of netting widths on non-NZFS bridge types removes the ability to make bulk orders of stainless-steel netting. A suitable alternative, available in custom widths with smaller minimum orders, is specified below.

Existing polyethylene barrier-infill netting should be replaced with steel chain-link netting when problems are recurrent e.g. detaching from bridge, or when deterioration is widespread, and when steel chain-link is compatible with the bridge's barrier construction details (seek engineers' advice).

Replace existing netting with 75mm diamond x 2.5mm diameter zinc-aluminium coated steel wire plain knuckle chain-link netting*, width to suit (measure outside diamonds). Fix with 1.6mm x 150mm grade 316 stainless steel wire loop ties and/or, 30 x 3.15 zinc-aluminium coated Cyclone staples to timber kerbs, every second diamond.

***** This is a custom-made chain-link netting product, manufactured in minimum quantities, by Paul Industries NZ (0800 330 320). Stainless-steel wire loop ties are available from chain.com.au.

5. Attaching Barrier-Infill Netting to Bridge Barriers

Of the four types of fixing typically used (refer section 3.3), stainless steel wire loop ties are the most reliable.

When repairing existing or installing new barrier-infill netting, use 1.6mm x 150mm grade 316 stainless steel wire loop ties, every second netting diamond (available from chain.com.au).

6. Steep NZFS Swingbridge Access Ramps

Following the accident, the CTC raised a related issue; some NZFS Swingbridges have very steep access ramps. The risk of slipping and falling on these is high.

The author isn't aware of any related accident history, but it is acknowledged this is a risk that could be reduced with a relatively minor upgrade.

A proactive, precautionary approach would be to improve the slip resistance of the tread plates on NZFS Swingbridge ramps that exceed a yet to be determined maximum gradient. This could be achieved by installing slip resistant plates over the existing tread plates.

Fig. 8 Architects CK Swingbridge, 2006

Improve the slip resistance of tread plates on steep NZFS Swingbridge ramps (method and ramp gradient to be determined). Five years is suggested as a reasonable timeframe to complete this work.

Given the low numbers of people using these bridges, and the apparent accident-free history, five years is considered a reasonable timeframe. This allows the work to be programmed with other work, reducing overall transport and labour costs.

7. Visitor Accident Register

DOC doesn't record visitor accidents in a centralised database. There is no ability to analyse visitor accidents for frequency and common cause, or determine if risk reduction measures are effective.

DOC should consider establishing a system to record and analyse visitor accidents.

Learning Team Outcomes

Context
An incident with an unexpected outcome has occurred. This meets the requirements of the Department's Learning Team process, rather than a full investigation.
Purpose
Within a learning environment the purpose is to 1), highlight the things that go well in this work and 2), identify what lead to the incident, along with solutions.

Particulars of the incident	
Title of incident: Collier Gorge Swing bridge	
Incident No: 115768	Incident Date: Saturday 30th May 2020
Learning Team Facilitator: Prue Fothergill	
Learning Team Members: Nicole Kunzmann Operations Manager- Hokitika, Tony Thrupp Senior Ranger Recreation/Historic, Jono Calder Engineering Manager , Dylan Higgison Supervisor Recreation/Historic , Ian Wightwick Senior Visitor Advisor, Tarsh Deck (Admin)	

Description of Findings: *(copy and paste the full text below into Risk Manager under "Description of Findings" – do not simply enter a DOCCM reference)*

Details of incident:

On Saturday 30th May 2020 a tramping party of 5 was heading to Frew Hut when one tramping member out of the 5 (last one to cross Collier Gorge swing bridge) got about halfway across the bridge and slipped and fell through the trawler mesh on sides and was left hanging by his tramping pack caught on the swing bridge.

Instantly 2 friends from the tramping party came to his s.9(2)(a) aid and one got told by the other friend to get off the bridge as he was concerned about the bridge loading limit. The friend who was helping tried to get s.9(2)(a) back on the bridge by holding the pack, however his pack was snagged on the bottom wire. After no luck, s.9(2)(a) unclipped his waistbelt of his pack and then allowed the chest strap to slide up above his head. s.9(2)(a) then dropped approx. 16.5m into a deep river pool, narrowly avoiding rocks within the surroundings. After, initially reaching the riverbank s.9(2)(a) was then sept downstream. After a few failed attempts of getting a grip on smooth rocks, s.9(2)(a) managed to swim to the true left of the river and safely got back to the track that was close by and re-united with the tramping party.

After a thorough check over s.9(2)(a) walked away with scrapes, a cut on his hand and bruising. There was dry clothing for s.9(2)(a) to get changed into and the tramping party continued onto Frew Hut.
For further details see copy of incident report from s.9(2)(a) *shared with Operations Manager – Nicole Kunzmann.* https://doccm.doc.govt.nz/wcc/faces/wccdoc?dDocName=DOC-6359955

Further detail, including images, also available in s.9(2)(a) *witness account*
Images: https://doccm.doc.govt.nz/wcc/faces/wccdoc?dDocName=DOC-6359971
Email account: https://doccm.doc.govt.nz/wcc/faces/wccdoc?dDocName=DOC-6359975

Extra Context:

The tramp to Frews Hut is suitable for fit and experienced trampers and takes approximately 7 hours. Approximately 300 people undertake the trip per year.

-Bridge has 2 infill cables and trawler mesh on sides that detached and caused a gap at the bottom of the bridge.
-Collier Gorge swingbridge is exposed to high winds.
-Trawlers mesh is usually attached to bridge decking with ring staples.
- Swing bridge had maintenance done in June 2019 and mesh was tightened & inspected by engineer Dec 2019. Inspections are re occurring every 2 years. There was no outstanding maintenance. Bridge was built in 2004 and upgraded in 2016
-Bridge was walked over by rec ranger in Jan 2020 and no gap in mesh was identified.
- Netting was already frayed when staff arrived on site for incident inspection.
-Within 48 hours of notification DOC staff flew into Collier Gorge and inspected swingbridge and carried out repairs.
- There were other trampers/hunters within the vicinity of the weekend it occurred, and no further reports of damage were received.
- Tramping party were competent, experienced, and fit trampers. First time tramping on West Coast.
- Collier Gorge is approx. 4-5 hours from the Hokitika road end.

What worked well:

- 5 in the tramping party were able to assist, and prevent further injury.
- Good weather for tramping, calm day.
- Tramping party were well prepared, had correct gear, able to carry on to Frew hut.
- Bridge was well maintained, and inspections up to date with no outstanding work orders.
- Bridge cables and anchors were completely replaced approximately 10 years ago.
- DOC responded to the incident very swiftly. Report received on Tuesday 2nd June 2020, inspection was organized to be carried out next day, 10am Wednesday team were flown to bridge. Bridge was repaired within 48 hours of bridge incident being notified.
- DOC staff, with appropriate skills required to investigate incident and make repairs were gathered fast and materials flown into site to repair bridge and fixtures.
- The Engineering Manager made all DOC Operations Managers, Senior & Supervising Rangers, Asset Inspectors and engineers aware of the incident so they could take immediate local action if required (e.g. Complete outstanding barrier mesh work orders on NZFS swingbridges), and it requested feedback as to the prevalence of this issue.
- Very good collection of information by DOC staff following the incident and staff made contact with tramping party.
- s.9(2)(a) have been informed throughout this process and were contacted once inspection and repairs has been completed. Nicole will share safety learning report with s.9(2)(a)
- Design of bridge is engineered, and "safe".
- The tramping party informed DOC very quickly, which empowered a quick response.

What didn't go so well and how did it lead to the incident?

- Tramper carrying walking poles when crossing bridge, potentially contributed to incident
- Nylon mesh barrier infill mesh, worn through where it joins the deck mesh.
- New use of ring staple to attach mesh, vs bag ties. Ring Staples appear to wear through the mesh quicker than wire loop ties ('bag ties'), it would appear to inspectors.
- Nylon mesh wears through at these sites, and maybe not the best type to use, especially where we are relying on it to prevent fall.
- In hindsight and reviewing previous work orders for this bridge, the mesh was repaired multiple times, look at a better type of mesh.
- Bridge has been used prior to this group, and there were no reports of the damaged bridge.

Describe the local learnings/improvements that were identified:

- Timeline of bridge maintenance and inspection to be completed.
- When looking at the works orders, replacement of trawlers mesh has been a re-occurring theme for this site. Reoccurring themes to be reviewed for future prevention on other structures.
- Is there a non-slip alternative to the foot mesh? Respond to s.9(2)(a) email.
- Media statement to ensure that visitor's privacy is respected.
- Extra communication with the tramping groups to ensure messaging is out there that these bridges should always be crossed with walking poles securely stashed and people to use both hands-when cables on bridges. Reminder that the back-country bridges are well maintained but should require caution with use.
- Investigation of different type of mesh to be used and consider using stainless wire loop ties ('bag ties')
- Education package about reporting damage to DOC structures.
- Follow up with results of investigation and perhaps a formal safety alert.
- Jono Calder is currently writing a DOC Cable Structure Maintenance Manual, it will include details of barrier infill mesh and how to fix it well, as influenced by this incident.
- Follow-up action to include this specific issue (detached barrier infill mesh) in the next revision of DOC's *Structure Inspection Manual* (DOC-2806404)

Describe the organizational learnings/improvements that were identified:

- Visitor risk management system – would be helpful to be able to search by incident
- Do all forest service bridges require mesh updated from ring staples back to bag ties?
- Do the bridges without the mesh require it?
- Clear guidelines on whether bridge require mesh or not.
- Investigate whether we should replace nylon mesh with chain link mesh in high wind, high damage areas?
- Feature to record accident against assets in AMIS
- When looking at the works orders, replacement of trawlers mesh has been a re-occurring theme for this site. Occurring themes to be reviewed for future prevention on other structures.
- The Engineering report produced by Jono Calder as part of this process is referred to below and brings some recommendations to DOC that need to be discussed and endorsed by the Senior Leadership Team.

Current state:

- s.9(2)(a) have been kept updated throughout this process.
- Stainless steel infill mesh has been ordered by the Hokitika District to begin the mesh replacement on NZFS bridges within the District.
- Discussions have begun with FMC around socializing Best Practice Use of NZFS bridges.

Engineer's report: https://doccm.doc.govt.nz/wcc/faces/wccdoc?dDocName=DOC-6336042

This report provided the following seven recommendations which are discussed in further detail within the report:

1. *Replace polyethylene barrier-infill netting on Collier Gorge Swingbridge with stainless steel chain-link netting.*
2. *All NZFS Swingbridges should have barrier-infill netting. Install stainless steel chain-link netting on 31 NZFS Swingbridges that currently have no barrier-infill netting.*
3. *Replace polyethylene barrier-infill netting with stainless steel chain-link netting on NZFS Swingbridges, when problems recur or when deterioration is widespread.*
4. *Replace polyethylene barrier-infill netting with zinc-aluminium coated steel chain-link netting (where compatible with barrier construction details) on other bridge types, when problems recur or when deterioration is widespread.*
5. *When repairing or installing new barrier-infill netting, use 1.6mm x 150mm stainless steel wire loop tie fixings.*
6. *Improve the slip resistance of tread plates on steep NZFS Swingbridge access ramps.*
7. *DOC should consider establishing a system to record visitor accidents.*

Corrective Actions - *to be entered in Risk Manager against the incident (see doc-5542482).*

Action Title	Action Description	Name of Person Responsible	Due Date
Share with Visitor	s.9(2)(a) have been informed throughout this process and were contacted once inspection and repairs has been completed. Nicole will share safety learning report with s.9(2)(a)	Nicole Kunzmann	
Review Maintenance	Timeline of bridge maintenance and inspection to be completed.	Jono Calder	
Themes	When looking at the works orders, replacement of trawlers mesh has been a re-occurring theme for this site. Occurring themes to be reviewed for future prevention on other structures.	Jono Calder	
Material Review	Is there a non-slip alternative to the foot mesh? Respond to s.9(2)(a) email.	Jono Calder	
Update National Document	Follow-up action to include this specific issue (detached barrier infill mesh) in the next revision of DOC's *Structure Inspection Manual* (DOC-2806404).	Jono Calder	

Review the Learning Team Process – *describe how those involved felt about this process and what, if anything, could be improved. Report improvements through to the Health & Safety Manager.*

9. Report accepted by Manager		
Nicole Kunzmann	s.9(2)(a)	9/7/20
Manager's Name	Signature	Date

Ensure this form is linked to the incident under Notes & Document Links on Incident Summary page