

# **Canterbury 2021 Flood Recovery Update 8**

October-December 2023

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## Executive summary

### Purpose:

This report provides an update on flood recovery progress by Environment Canterbury (ECan) for the period from October through December 2023. It follows updates 1 to 7 that have covered flood response and recovery from June 2021 through to the end of September 2023.

It documents progress with recovery works over this three-month period and provides a summary of costs to date. It also provides support for Claim 9 to the National Emergency Management Agency (NEMA) for eligible like-for-like replacement of assets lost as a result of the flood.

### Background:

The significant rainfall event of 28-31 May 2021 over much of Canterbury, resulted in wide-spread flooding across the region. A region-wide state of emergency was declared on 30 May 2021. Flood damage, as a result of the exceptional rainfall, was significant and widespread across the region, affecting community infrastructure, public and private property and damaging or destroying significant ECan flood protection assets. Physical works in response to this event commenced immediately following the event and flood recovery works are ongoing.

This report (**Update 8**) includes progress on repairs to infrastructure damaged in the 2021 floods. Some sites already repaired, but still vulnerable, particularly tree edge protection, were re-damaged (damage-on-damage) through high flows in July to August 2022, and again in July 2023. Other 2021 damage sites, not yet repaired, had 2021 flood damage exacerbated by the 2022 and 2023 high flows. It is understood with NEMA that further damage to both yet to be repaired, and repaired 2021 flood damage sites, will be eligible for NEMA subsidy (subject to the usual verification process).

### Response and Recovery Progress – this period October to December 2023:

Flood damage repairs during this period have focused on doing further tree planting until it became too hot and dry, then undertaking works that could be done in the dry parts of the rivers including earthwork and rock repairs to some damage-on-damage from the 2023 high flows.

Over this quarter, flood damage repair was completed at 35 sites, with 60 sites still requiring flood damage repair at the end of December 2023. Of these, it is planned to complete approximately one third in the quarter to March 2024, with the remaining two thirds requiring tree planting work that needs to be left till the cooler months (April-June 2024). The goal is to complete repairs to all remaining flood damage sites before the end of June 2024.

The interactive web interface at [www.ecan.govt.nz/FloodRepairMap](http://www.ecan.govt.nz/FloodRepairMap) provides real time progress on the status of 2021 flood recovery repairs.

The total number of 2021 flood recovery jobs are now 441 of which 374 or 86%<sup>1</sup> have been completed. Approximately 90% of the estimated total cost for flood recovery has been spent.

### Financial Status:

The total cost of works to the end of December 2023 for flood recovery (including response) is \$20.0 million. \$12.5 million of these costs, above the ECan threshold of \$4.1 million, are estimated to be eligible for application to the National Emergency Management Agency (NEMA) for a 60% central government contribution for like-for-like asset replacement.

Environment Canterbury has received payment to a total value of \$4.9 million on the six claims already approved by NEMA. Claims 7, 8 and 9 worth a combined \$2.6 million are under review or in preparation. When these claims are settled, NEMA will have co-funded approximately \$7.5 million of the \$20.0 million spent to date, with the remaining \$12.5 million funded by ECan.

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<sup>1</sup> 86% includes 16 jobs with monitoring status considered complete and excludes 8 jobs that have been deleted as duplicates or repairs deemed no longer needed.

The estimated total cost for 2021 flood recovery has increased back to \$22.2 million as a result of additional estimated expense for a complex stopbank repair on the Selwyn River. This total cost estimate is the same as it was for the March 2023 estimate. The likely overall claim to NEMA is estimated at \$8.1 million. The estimated remaining cost to Environment Canterbury will be \$14.1 million. This is \$1.9 million more than the original commitment from Environment Canterbury of \$12.2 million.

**Next Steps:**

Next steps will focus on completing flood damage repairs at the remaining 60 sites, before the end of June 2024.

**Consideration of Climate Change:**

Consideration has been given to options for betterment or improvement on what was previously in place, particularly improvements that account for climate change and the likelihood of increased frequency and more intense rainfall events.

The national guidance document “Application of Room for the River for NZ Rivers and Streams”, which includes knowledge gained from the Canterbury Floods, has been completed and is providing guidance to the river management sector for consideration of river management in the face of Climate Change. Where possible, repairs have been undertaken allowing more room for the river. Several examples are discussed in this report.

Since climate change betterment and other infrastructure improvements are outside of the like-for-like replacement of pre-flood infrastructure, they are not eligible for 60% NEMA co-funding and all betterment is therefore 100% Environment Canterbury funded.

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# 1 Introduction

This report is the eighth report to be provided to the National Emergency Management Agency (NEMA). It documents Environment Canterbury's flood recovery progress from October to December 2023. The previous seven reports have covered flood response and recovery from June 2021 to September 2023.

This report provides an update on recovery works undertaken to the end of December 2023, including a summary of their costs for the period from October to December 2023 inclusive.

Details of the flood event of 28-31 May 2021 have been provided previously so are not repeated in detail here, other than the following summary for completeness.

The significant rainfall event of 28-31 May 2021 over much of Canterbury, resulted in wide-spread flooding across the region. Rainfall amounts exceeding the largest 72-hour rainfall totals on record were recorded at 28 of Canterbury's 84 rain gauges. Mount Somers rain gauge recorded 546mm in 72 hours, more than double the previous record 72-hour total. A region-wide state of emergency was declared on 30 May 2021. Flood damage, as a result of the exceptional rainfall, was significant and widespread across the region, affecting community infrastructure, public and private property and damaging or destroying significant ECan flood protection assets. Peak flows exceeded design capacities in several rivers in the Ashburton, Timaru and Mackenzie Districts resulting in several stopbank breaches and extensive erosion control vegetation loss.

Several high flow events have occurred since the 2021 flood, specifically in the winter of 2022 (July and August) and again in July 2023. These high flows have exacerbated the 2021 flood damage at a number of sites where flood damage repairs were either not complete or still in a fragile state, for example where tree edge protection was still being re-established. It is understood from discussions with NEMA that further damage to 2021 flood damage sites, will be eligible for NEMA subsidy (subject to the usual verification process).

## 2 Flood Repair Progress at 2021 Damage Sites

2021 flood repair progress is being tracked on the Environment Canterbury flood recovery webpage with an up-to-date flood damage repair status map located at: [ecan.govt.nz/FloodRepairMap](https://ecan.govt.nz/FloodRepairMap). A screen clip of this web site is shown in Figure 6-1.

The total number of flood damage repair jobs now stands at 441 of which 374 are considered complete (status is completed or monitoring). This is up from 340 reported as complete in September 2023. Flood damage repairs (to the end of December 2023) are summarised for each district in Table 2-1 below. While these numbers match the web site snapshot (shown in Figure 6-1), the website is updated daily with direct links to the ECan job management system, so will always reflect the latest flood repair status.

**Table 2-1: Status of flood damage repairs by District on 31 December 2023.**

District or Description	Deleted	Draft	Accepted	Open	Monitoring	Completed	Total
Selwyn		4	1	2		15	22
Ashburton	4	17	8	3	6	197	235
Orari-Waihi-Temuka		2	2	2	6	76	88
Opihi		1	5	1	4	13	24
Ashley						5	5
Waimakariri-Eyre-Cust						15	15
Upper Hinds	4	6				34	44
Lower Hinds		4		1		2	7
Little River						1	1
<b>Totals</b>	<b>8</b>	<b>34</b>	<b>16</b>	<b>10</b>	<b>16</b>	<b>358</b>	<b>441</b>
Remaining					Completed & Monitoring		% C+M
<b>60</b>					<b>374</b>		<b>86%</b>

There remain 60 current (draft+accepted+open) repair jobs. Note that of the total 441 jobs (Table 2-2), 8 have been deleted (as duplicate or no longer requiring repair), leaving 433 “valid” jobs. 86% of the valid jobs have been completed (i.e. status is complete or monitoring).

The location and estimated cost for work still to be undertaken is shown in Table 2-2 below. Two thirds of the remaining 60 works require tree work, either anchored tree installation or pole planting. This work will need to be done in the cooler months of April-June 2024. Table 4-3 in the Financials section shows the forecast distribution of expenditure by quarter.

**Table 2-2: Current flood damage repair jobs and their estimated cost to complete.**

District or Description	Current Jobs	Estimated Cost \$	Tree work
Selwyn	7	686,000	2
Ashburton Rivers	28	544,800	20
Upper Hinds River	6	65,000	6
Lower Hinds River	5	105,000	0
Orari-Waihi-Temuka	7	311,400	7
Opihi	7	100,000	7
Region Wide Overhead (staff, consultant, contingency)		428,888	
<b>Totals</b>	<b>60</b>	<b>2,241,088</b>	<b>42</b>

Key points to note from the tables above are that flood damage repairs have progressed steadily over the three-month reporting period.

The focus over the past three months has been on:

- river edge protection tree replacement. Tree works that could not be completed have been left to the April-June quarter of 2024.
- Rockwork
- Stopbank repairs

These are described in more detail below.

Progress is reflected in the expenditure tracking chart shown in Figure 4-1.

## 2.1 Progress at specific sites (October to December 2023)

Progress at key sites where repairs were undertaken during the reporting period are described in more detail below, with corresponding figures presented in Appendix A.

### Waihi River at Geraldine Heyman fence repairs

In the previous report (Update 7), damage-on-damage to the Heyman fences on the Waihi River at Geraldine, caused by high river flows in the winters of 2022 and 2023 was reported. This included scour out of the river rock infill from behind the Heyman fences. Repairs at three sites have been completed.

At the site on the right bank directly upstream of the SH79 bridge, repairs included bringing in larger rock to fill behind the Heyman fence at the upstream edge, while river stone was used in areas where washout was not as pronounced. Good growth of the willow poles in the Heyman fence was noted (Figure A-1).

The site on the left bank downstream of the SH79 bridge was more severely scoured with the bank supporting a footpath and road at risk of collapse. Repair included backfilling with river rock overlaid with a revetment of large rock. A groyne was also constructed at the upstream end of the Heyman fence (Figure A-2).

At the site further downstream on the left bank at Geraldine High School, scour behind the Heyman fence was backfilled with river stone. Groynes of large rock were constructed abutting out from the Heyman fence to reduce scour in future (Figure A3).



**Sweetwater Creek**

Repairs to the rock weirs on Sweetwater Creek were previously reported (Update 7) including the damage-on-damage to one of the weirs. During this period scour downstream of the damaged weir was repaired with additional rock on the weir apron and shaping of the banks downstream of the weir (Figure A4).

**Ashburton River South Branch at Mount Somers**

Two high eroded vertical faces on the true left bank of the Ashburton South Branch at Mount Somers were repaired during this period. This involved river diversion and installation of anchored tree protection along the steep scour face to replace washed out tree edge protection (Figure A5).

**Waihi River at Hawke Road**

Three sections of river edge tree protection and stopbank on the left bank of the Waihi River in the vicinity of Hawke Road were washed out in the 2021 flood. Repairs to these sections have been reported previously. Temporary bunding was implemented on the right bank in the same area, where river edge protection had washed out. The stopbank on the right bank was at risk but had not yet been breached. It was further weakened in the 2022 high flows and breached in the 2023 high flows (Figure A-6(a)). Rebuild of the stopbank was undertaken in the September – December 2023 quarter, with final completion in early January 2024. Damage to this stopbank with partial completion of the works is shown in Figure A-6. The bulk of costs for this repair will be included in the next reporting period.

**Orari River at Taylor Road**

Challenges on the Orari River in the vicinity of Taylor Road were reported previously in Report Update 6 and these included the narrowing of the riverbed in this area and previous repairs undertaken in May 2022 that were completely washed away in the winter 2022 high flows. A more robust repair design was reported in Report Update 7. These repairs have now been completed (Figure A-7). They included reinstating washed out tree edge protection further inland to give the river more room.

## 2.2 Key sites that still need works

60 sites still require 2021 flood damage repairs. The location by District and those sites still requiring tree work (approximately two thirds) are shown in Table 2-2. Tree work which includes tree edge protection or infill pole planting will be undertaken in the April to June quarter of 2024. Sites requiring earthworks construction or river diversions will be remediated in the January to March quarter while river levels are low. Some preparatory diversion and earthwork prior to tree work may also be undertaken. Key sites that still need works are highlighted below.

**Bowyers Stream at Lochheads Road**

A number of flood damage sites on Bowyers Stream, described in the previous report (Update 7), still need to be repaired. Repairs were not possible in the previous period because river diversion could not be undertaken. Further site inspection has been undertaken and repairs are planned for the upcoming period.

**Waihi River at Geraldine stopbank repair**

Details of the stopbank repairs required at this site were discussed in Update 7. This involves repair where a 200m section of stopbank and heavy anchored bank protection were washed away at this site upstream of Geraldine. A contractor has been procured and works will be undertaken in the January to March quarter of 2024.

**Selwyn stopbank repair**

A 70m breach occurred in the lower Selwyn River right bank in the 2021 flood (Figure A-8). This was initially repaired in early 2022 (Figure A-9), however seepage was detected in the high flows of July/August 2022 and the stopbank failed again in the high flows of July 2023 (Figure A-10). A temporary flood barrier was installed following the 2023 breach. The temporary flood barrier remains in place while further investigation, design and landowner consultation is underway. Costs for the temporary barrier, the detailed investigation and the estimated cost of a significant stopbank rebuild at this location have increased the overall 2021 flood damage cost estimate. Repair is expected to be undertaken by once landowner access agreement is in place.

## 2.3 Next steps

The goal for January to June 2024 is to complete flood damage repairs at the remaining 60 sites. In river and earthwork will be undertaken as much as possible in the January to March quarter and tree work left to the April to June quarter.

Preparation for 2024 planting will also be a priority to ensure it can start as soon as cooler conditions allow, to enable completion by June 2024.

## 3 Procurement

Previous emergency response work and temporary flood damage repairs were undertaken using ECan's list of pre-qualified contractors. The same procedure is being followed with the current emergency and temporary works. Some reinstatement works, particularly anchored tree protection will also need to still be procured in this way. This is because the work is complex and hard to specify, it is best completed by experienced operators on an hourly rate basis under adequate supervision.

Wherever possible, larger works have been and will continue be put to tender for competitive pricing following best procurement practice.

## 4 Financials

### 4.1 Flood response and recovery

Flood response costs to the end of December 2023 are \$20.0 million as summarised in Table 4-1 below. Approximately \$1.7 million has been spent on flood recovery during the report period from October to December 2023. Costs are subdivided into the flood affected river rating districts. A summary of the total costs to date separated into estimated non-eligible and eligible costs for claim to NEMA for subsidy is provided in Table 4-2.

**Table 4-1: Canterbury 2021 flood recovery costs on 31 December 2023.**

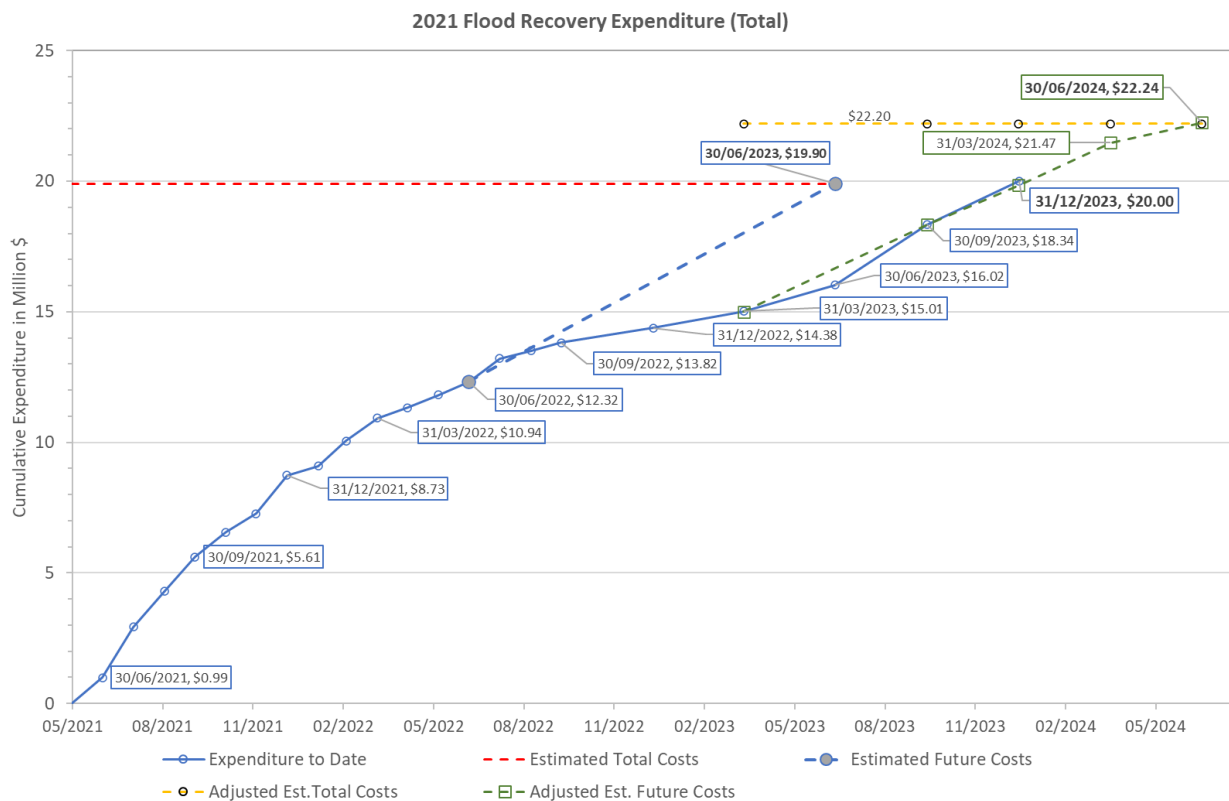
Description	Costs for Period Oct-Dec 2023	Total Costs to Date
Flood monitoring costs	0	275,129
Selwyn 2021 Flood Repair	243,749	869,176
Ashburton 2021 Flood Repair	684,724	11,481,359
OWT 2021 Flood Repair	501,499	4,738,039
Opihi 2021 Flood Repair	58,765	501,656
Ashley 2021 Flood Repair	46	132,391
WEC 2021 Flood Repair	0	516,036
Upper Hinds 2021 Flood Repair	177,825	447,383
Lower Hinds 2021 Flood Repair	0	123,008
Little River 2021 Flood Repair	0	4,427
	1,666,608	19,088,604
CDEM Response	-	414,523
Regional Parks Repair	-	63,806
Other Costs	-	439,168
	1,666,608	20,006,101

**Table 4-2: Estimated NEMA eligible and non-eligible flood recovery costs for Canterbury 2021 Flood on 31 December 2023.**

Description	Estimated Non-Eligible Costs	Estimated Eligible Costs	Total Costs to Date
River Rating Districts	2,391,670	16,602,110	18,993,780
CDEM Response	414,541		414,541
Regional Parks Repair	330,511	4,264	334,775
Other Costs	150,059	21,742	171,802
<b>TOTAL</b>	<b>3,286,781</b>	<b>16,628,116</b>	<b>20,006,101</b>

Figure 4-1 below shows the 2021 flood recovery expenditure profile to date as well as the forecast expenditure through to the end of the project. The rate of spending in the October to December quarter matched very closely the projected costs (Figure 4-1).

Forecast flood recovery expenditure by quarter, including physical works, pole planting and other costs (contingency, design, staff, plant etc) are shown in Table 4-3 which feeds into the forecast expenditure graphic in Figure 4-1.

**Figure 4-1: 2021 flood recovery expenditure profile.**

The estimate of total 2021 flood recovery costs, including damage-on-damage has been adjusted back to \$22.2 million (see Table 4-5 that follows). This is the same as was estimated in March 2023, yet more than the September 2023 estimate of \$21.5. The increase in the estimated cost is due to the Selwyn stopbank breach in July 2023, that is requiring complex investigation, design, and landowner engagement (refer to discussion in Section 2-2 above). Not only is the investigation and design expensive, but time consuming and an expensive temporary flood barrier is being rented until the permanent repair can be made.

The goal is to complete all 2021 flood damage repairs by June 2024 as shown in the spend profile.

**Table 4-3: Forecast flood recovery expenditure by quarter from 1 January 2024 through to completion expected by June 2024.**

Quarterly forecast flood repair costs by rating district	Q3 To Mar 2024	Q4 To Jun 2024	Totals \$
Selwyn	675,000	11,000	686,000
Ashburton Rivers	239,000	305,800	544,800
Upper Hinds River	0	65,000	65,000
Lower Hinds River	105,000	0	105,000
Orari-Waihi-Temuka	240,000	71,400	311,400
Opihi	0	100,000	100,000
Contingency, Design, Staff, Plant etc.	214,444	214,444	428,888
<b>Totals</b>	<b>1,473,444</b>	<b>767,644</b>	<b>2,241,088</b>

## 4.2 NEMA eligible costs

Government policy<sup>2</sup> is to reimburse 60 percent of the combined eligible costs. These include response and essential infrastructure costs above 0.002 percent of the net capital value in the case of regional councils. For ECan, this threshold has been determined to be \$4.1 million.

As presented in Table 4-4 below, ECan has assessed that \$16.7 million of the flood recovery expenditure to the end of December 2023, are NEMA eligible costs (subject to NEMA confirmation).

ECan has submitted eight claims to NEMA covering costs through the end of September 2023. Table 4-4 shows the value of each of these claims. Reimbursement of \$4.9 million has been received for the first six claims.

Note that Claim 1 was subject to deduction of the initial threshold of \$4.1 million. Claims 7 and 8 are still under review. Claim 9 for \$0.88 million, supported by information provided in this report, is currently under preparation to be submitted to NEMA.

**Table 4-4: Estimated flood recovery costs with portion estimated as claimable from NEMA.**

Claim	Period	Eligible Cost (\$)	Threshold (\$)	Claimable from NEMA (60%)	Cumulative Value Received (\$)
Claim 1	June - Sep 2021	4,930,462	4,113,817	489,987	489,987
Claim 2	Oct 2021-Feb 2022	3,075,412		1,845,247	2,335,234
Claim 3	Mar-May 2022	1,650,540		990,324	3,325,558
Claim 4	June 2022	334,772		200,863	3,526,421
Claim 5	July-Sep 2022	1,306,367		783,820	4,310,241
Claim 6	Oct 2022-Mar 2023	1,056,651		633,991	<b>4,944,232</b>
Claim 7	Apr-Jun 2023	797,271		478,363	In progress
Claim 8	Jul-Sep 2023	2,073,120		1,243,872	In progress
Claim 9	Oct - Dec 2023	1,465,312		879,187	In progress
<b>TOTAL to Date</b>		<b>16,689,907</b>		<b>7,545,654</b>	

## 4.3 Estimated flood recovery costs and their apportionment.

The estimated total cost for 2021 flood recovery on 31 December 2023 has been put back to \$2.2 million. As discussed above, the total cost is the same as the March 2023 estimate, but with a slightly different estimate of the NEMA contribution. A summary of the latest estimate of cost at the end of December

<sup>2</sup> Section 33 of the Guide to the National CDEM Plan, 2015.

2023 is provided in Table 4-5 below. For comparison purposes the original estimate and the March 2023 estimate are included in the table.

Based on these estimates and what we have learnt through processing NEMA claims to date, the overall cost for 2021 flood recovery to ECan is estimated to be \$14.1 million with an expected central government contribution of \$8.1 million through claims to NEMA.

**Table 4-5: Estimated 2021 flood recovery costs.**

Estimated Costs	Original est. 31 July 2021	Update to 31 Mar 2023	Update to 30 Sept 2023	Update to 31 Dec 2023
	(Million \$)	(Million \$)	(Million \$)	(Million \$)
Flood Recovery costs (to date)	2.9	15.0	18.3	20.0
Estimated Future Flood Recovery Costs	16.8	7.2	3.2	2.2
<b>Total Flood Response &amp; Recovery Estimate</b>	<b>19.7</b>	<b>22.2</b>	<b>21.5</b>	<b>22.2</b>
Estimated non-Eligible Recovery Costs	-3.1	-5.0	-4.0	-4.6
ECan Threshold for NEMA claim	-4.1	-4.1	-4.1	-4.1
<b>Eligible for 60% government subsidy (NEMA)</b>	<b>\$12.50</b>	<b>\$13.10</b>	<b>\$13.40</b>	<b>\$13.50</b>
Estimated Funding Mix	Million \$	Million \$	Million \$	Million \$
ECan initial threshold	4.1	4.1	4.1	4.1
ECan – Non Eligible Costs	3.1	5.0	4.0	4.6
ECan – 40% of Eligible Costs	5.0	5.2	5.4	5.4
<b>Total ECan Estimated Cost</b>	<b>12.2</b>	<b>14.3</b>	<b>13.5</b>	<b>14.1</b>
NEMA – 60% of Eligible Costs	7.5	7.9	8.0	8.1
<b>Total</b>	<b>19.7</b>	<b>22.2</b>	<b>21.5</b>	<b>22.2</b>

## 5 Risks

Most of the major stopbank breaches have now been repaired and the majority of tree edge protection re-planted. The highest risk remains possible wash-out of the fragile newly established vegetation, that is susceptible to wash-out with relatively minor high flows, until the vegetation is properly established. It will still take 5 to 10 years for river edge vegetation to become fully established.

The following table provides a summary of residual risk and ongoing risks to the flood recovery programme together with mitigation actions to reduce the likelihood of the risks becoming issues.

**Table 5-1: Residual and flood recovery project risks**

Risk	Description	Mitigation Action
Further floods	Severe weather may cause further flooding before or during flood damage repairs. This could increase the flood damage.	Undertake temporary repairs as soon as possible. (Complete)  Communicate elevated residual risk to the community, especially in areas where river break-out has occurred. (Complete & Ongoing)
Spring thaw	High spring flows in the rivers when snowmelt occurs could pose further flood risk.	Assess most likely locations of high flows following spring thaws. Undertake priority temporary repairs in these areas. (Complete)
Funding	Security of funding	Ongoing communication with ECan Councillors is needed to keep them aware of funding needs from Council Reserves and potential risks. (Underway / Ongoing)

Risk	Description	Mitigation Action
		Work closely with NEMA to maximize NEMA contributions and flood recovery. Closely monitor contractor and materials cost. Follow council procurement processes. Public tender for large works. (Underway / Ongoing)
Cost of works Fuel cost Increases	The cost of fuel has increased significantly since the initial cost estimate was undertaken. Contractor rates reflect this.	Initially a contingency of 15% was applied to the remaining physical works cost estimate. As works draw to an end, the contingency has been reduced to 10%. The contingency is one of the elements of the total cost estimate.
Material availability	The availability of material, particularly to undertake tree replacement. Both heavy and light anchored bank protection requires significant lengths of cable and anchors (typically concrete blocks).	Councils around the country have been made aware of ECan's need for steel cable. Alternative sources are being investigated. Immediate needs are covered.  The availability of concrete blocks for ATP is critical and currently in short supply. Arrangements are being made to use moulds closer to the points of need and stockpile blocks before the 2024 planting season.  Contingencies may need to be considered, including the use of higher cost rock protection where material availability limits the reinstatement of anchored tree protection.
Tree growth time	The time for re-establishment of tree edge protection poses a risk until trees can be established.	In critical areas of high risk, alternatives, particularly rock protection, may need to be considered to mitigate risk.  As far as is practicable, live trees are being salvaged from the river fairways and being utilised in repair works. Many of these large trees will resprout and form the future erosion protection.
Staff resource	Staff resources are limited to undertake oversight and coordination of significant flood damage repairs.	Consider additional contract resource for flood damage assessment, prioritisation and works and on-site works supervision that cannot be delivered in-house.
Programme length	Property owners want works associated with their property undertaken first.	Prioritise flood damage repairs based on risk and develop and implement a communications plan. (ongoing) Communicate directly with property owners, and with the community, keeping them informed of works priorities. (ongoing)
Ground conditions	River levels from time to time will restrict access and be generally unsuitable to undertake large scale works.	Monitor river levels and plan works for drier months if possible. Communicate this risk to directly affected landowners. (ongoing)
Work stoppage	Any work stoppage due to a health and safety risk could significantly impact remediation.	A pole planting SOP has been developed and was used effectively in the 2023 pole planting season to reduce the H&S risk and minimise the possibility of work stoppages during planting. The same approach will be continued in the 2024 planting season.
Further damage-on- damage	Further damage to recently completed and still vulnerable repairs is likely with high flows.	It is recognised that some further damage-on-damage will occur in future. A contingency has been included in the costs estimates to accommodate further repairs of damage-on-damage and the programme extended to June 2024 to allow for further repairs.
Seasonality	Tree planting can only occur in winter and early spring.	Preparation of trees, and contractors ahead of time to maximise the ability to undertake works during the planting season. (ongoing)
Environmental considerations	Works are restricted by fish spawning and bird nesting.	Plan to undertake works outside of these periods. (ongoing)

## 6 Communications and Community Engagement

An essential part of undertaking flood recovery is ongoing communication and community engagement.

The Environment Canterbury Flood Recovery web page is the primary means of communicating information regarding flood recovery efforts. Communication via the website is an effective way to communicate project progress to a wide audience and engage the community. The Flood Recovery webpage is located at: [ecan.govt.nz/flood-recovery](https://ecan.govt.nz/flood-recovery)

A live map indicating the status and location of flood damaged sites needing repairs is still available. This interactive map can be accessed from the above webpage, or located directly at: [ecan.govt.nz/FloodRepairMap](https://ecan.govt.nz/FloodRepairMap)

This map and its associated summary tables provide information on all flood damage repair jobs for the affected Canterbury districts. Summaries can be viewed based on user selection either of "All" areas, or by selecting a specific district. Clicking on each individual repair site on the map gives high-level information about the nature of the repair at that location and its status. A screen clip of the website is included in Figure 6-1 below.

One-on-one communication continues with affected landowners particularly around works planned or underway on or adjacent to their land. The interactive web page provides a valuable tool to keep landowners updated on the status of works at specific sites that affect them or are of interest to them.

### Meetings

Further updates have been provided by way of the following meetings with council and rating district liaison committees. Additionally, many one-on-one meetings with impacted landowners have been undertaken to discuss works proposed at their properties.

**Table 6-1: Summary of public / external meetings, since previous report.**

Date	Meeting Description
19 November 2023	Stuff news article. Bumper willow pole planting season protects from flooding in South Canterbury. Link: <a href="#">Willow pole planting boosts flood protection   Stuff</a>
23 November 2023	Councillor bus tour to several flood repair sites. Included meetings with local residents and committee representative along the Ashburton River.



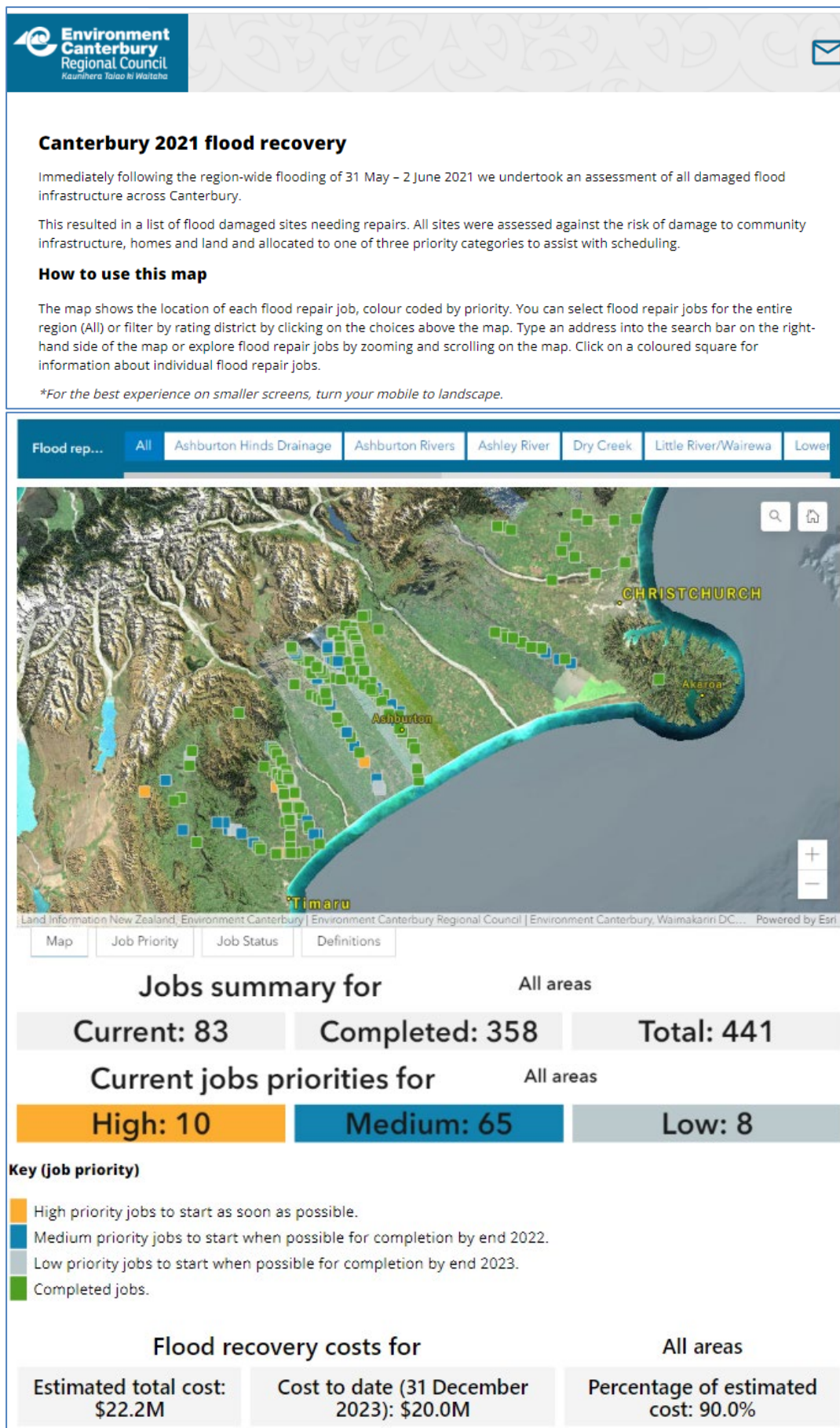


Figure 6-1: Screen clip of flood recovery interactive job status web page to 31 December 2023.



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## 7 Betterment Opportunities

The future state of Canterbury's braided rivers may well look different to the pre-flood state, particularly when referencing overall river width, indigenous biodiversity, mahinga kai, recreation and other values. Because fairway widths have been reduced over the last 50 years, in many cases it may not be acceptable to simply build back 'like-for-like'.

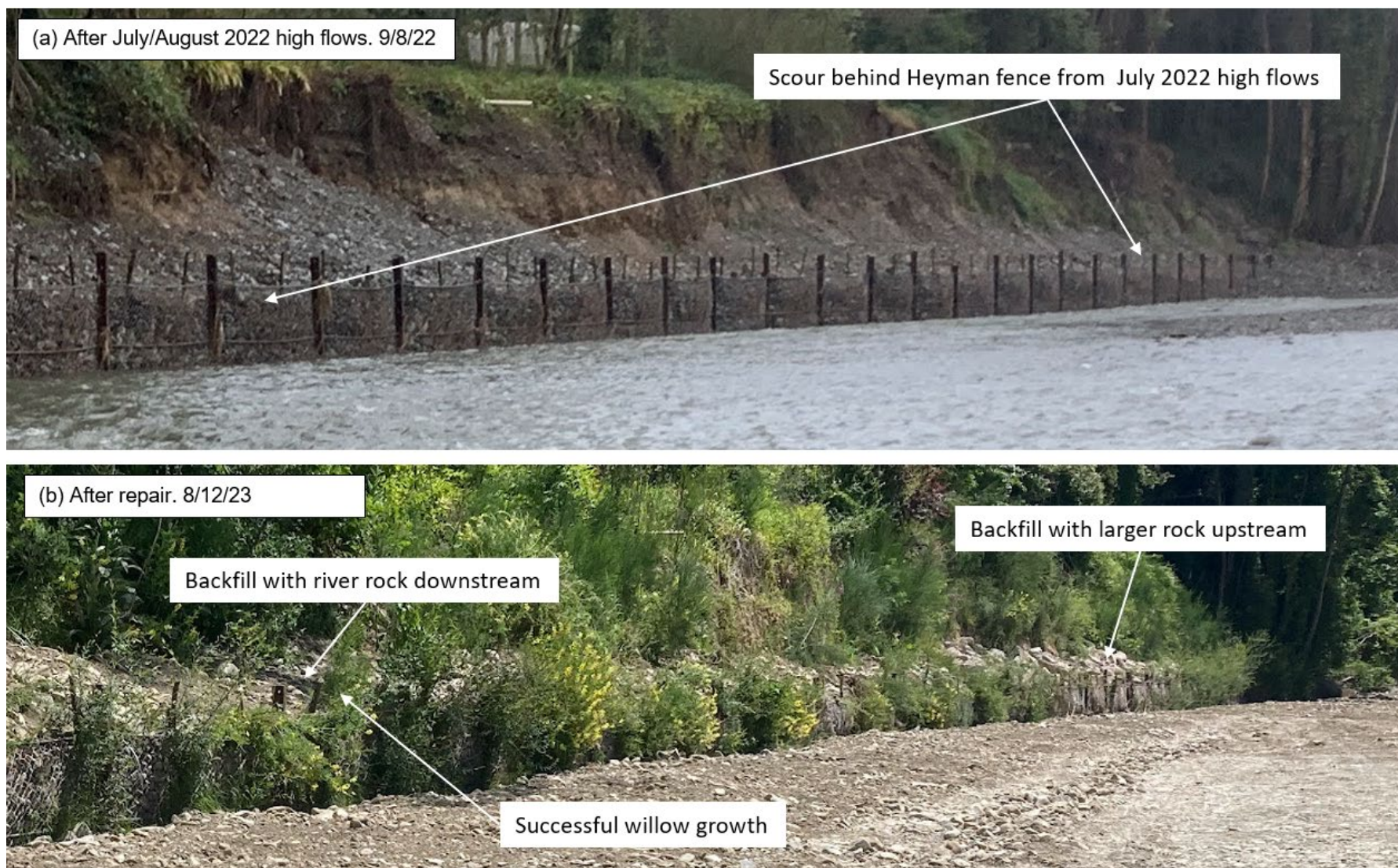
In undertaking flood recovery repairs consideration is being given to opportunities for betterment that create a better balance between:

- providing an acceptable (or design) level of flood protection,
- incorporating the effects of climate change,
- restoring river ecosystems,
- incorporating "Te Mana o te Wai" principles,
- allowing more room for rivers,
- recognizing land owner expectations and
- providing a fair and reasonable transition pathway for change.

Furthermore, there may be some inadvertent betterment. This includes the need to replace the function of an asset with a different asset that performs the same function. For example, there may be certain locations where it is necessary to replace tree river edge protection with rock protection because of the level of risk, and the time limitations to re-establish replacement tree edge protection. As these opportunities are considered there will be ongoing discussion with NEMA as to the government co-funding eligibility.

**Appendix A. Flood Recovery Repair Figures**

## **A. Flood Recovery Repair Figures**



**Figure A-1: Waihi at Geraldine, Heyman fence on left bank upstream of SH79, (a) before and (b) after repair.**



**Appendix A. Flood Recovery Repair Figures**



Figure A-2: Waihi at Geraldine, Heyman fence on left bank downstream of SH79, (a) before and (b) after repair.



**Appendix A. Flood Recovery Repair Figures**

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**Figure A-3: Waihi River at Geraldine, Heyman fence on left bank at Geraldine High School, (a) before and (b) after repair.**



**Appendix A. Flood Recovery Repair Figures**

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**Figure A-4: Sweetwater Creek rock weir, (a) following 2023 high flow, and (b) after repair.**



**Appendix A. Flood Recovery Repair Figures**

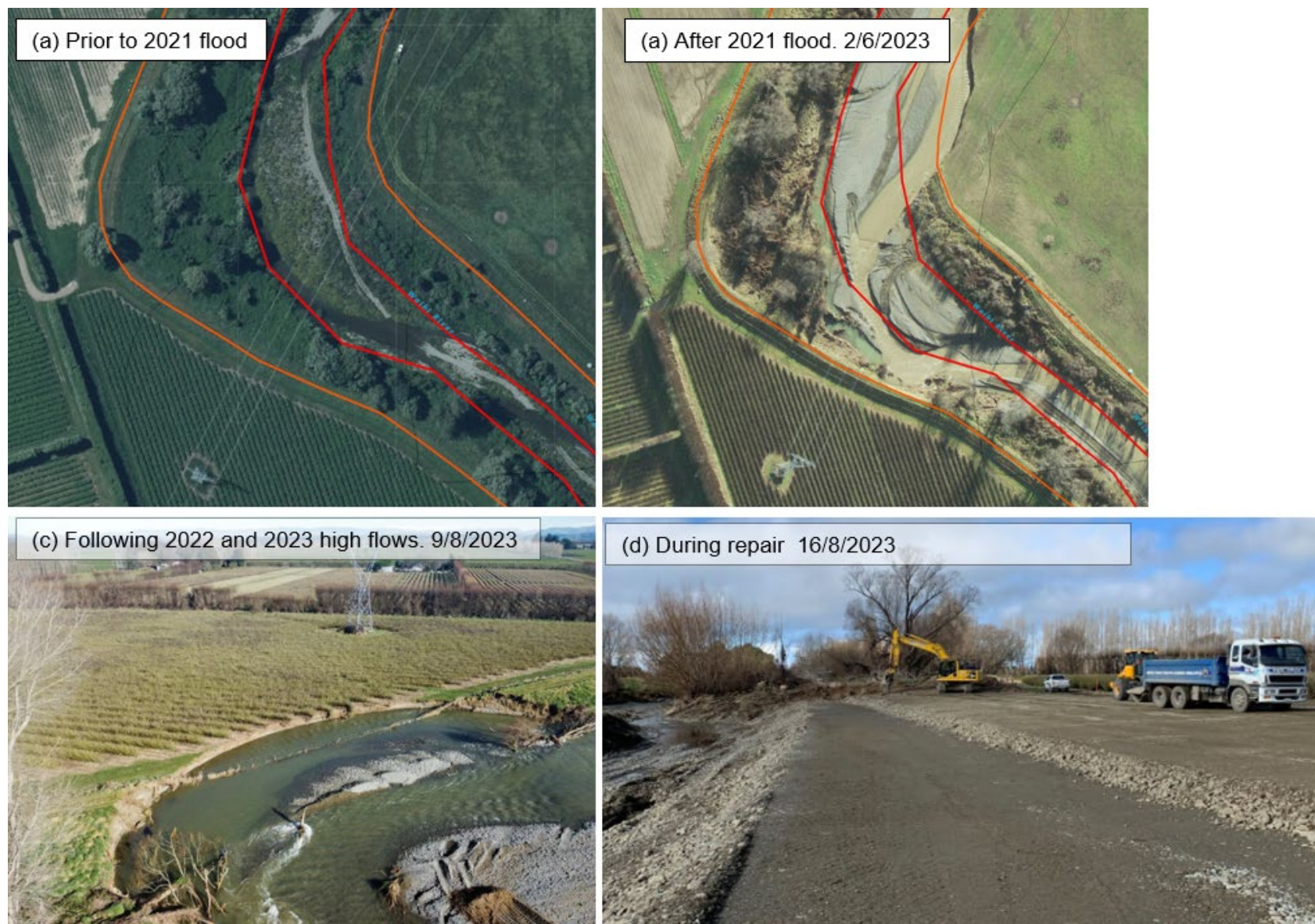
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**Figure A-5: Ashburton River South Branch at Mount Somers, (a) prior to repair, and (b) after repair.**



**Appendix A. Flood Recovery Repair Figures**



**Figure A-6: Waihi River at Hawke Road TRB (a) prior to 2021 flood, (b) after 2021 flood, (c) after 2022 and 2023 high flows, and (d) during repair.**



**Appendix A. Flood Recovery Repair Figures**

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**Figure A-7: Orari River at Taylors Road TLB (a) following flood damage in 2021 exacerbated in 2022 and 2023 and (b) after repair in 2023.**



**Appendix A. Flood Recovery Repair Figures**

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**Figure A-8: Selwyn River stopbank breach immediately after 2021 flood.**



**Figure A-9: Selwyn River stopbank following initial stopbank repair (a) April and (b) July 2022.**



**Appendix A. Flood Recovery Repair Figures**

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**Figure A-10: Selwyn River failure of stopbank and temporary flood barrier. 24/8/2023.**