BEFORE THE HEARINGS PANEL APPOINTED BY CANTERBURY REGIONAL COUNCIL

UNDER the Resource Management Act 1991 (RMA)

AND

IN THE MATTER of an application by Canterbury Regional Council

for resouce consent to discharge agrichemicals to rivers and their connected waterbodies, air and the coastal marine area, and the clearance of vegetation, for the purposes of weed management to provide flood, erosion, drainage and river enhancement works.

STATEMENT OF EVIDENCE OF DAVID AIRES ON BEHALF OF CANTERBURY REGIONAL COUNCIL (APPLICANT)

11 March 2024

SUMMARY STATEMENT

1 I am an experienced civil engineer with over 20 years of operational experience in river management.

2 The discharge of agrichemicals is a critical component and efficient way to meet outcomes associated with flooding, erosion, asset management and wider biodiversity values endorsed by the communities funding these works across Canterbury.

3 Having permissions to carry out this work is fundamental to meeting the expectations of the community and council's ability to deliver on the work.

4 The impacts of not using agrichemicals to control unwanted vegetation would result in employing techniques which are more expensive and take longer to execute and thereby jeopardising the performance of those schemes.

5 Operationally the work is carried out by qualified and experienced council staff and contractors.

6 Basic river management levels of service can be summarised as follows:

(a) maintaining a cleared fairway for floodwaters to safely pass out to sea,

(b) providing an appropriate vegetated buffer to slow out of river floodwaters, and

(c) the construction of stop banks and associated structures to keep people and land safe. Drainage management is critical for regulating groundwater levels for land use and ensuring unrestricted passage for conveyance.

7 The use of agrichemicals has an interconnected application across the river corridor assets –

(a) from removal of vegetation which restrict or divert floodwaters,

(b) to managing weed species which threaten the desired vegetated berm plantings employed to slow floodwaters, and

(c) failure to get the management of this right in a timely manner can mean disaster for communities should any part of a defence against water fail.

8 The failure of flood protection assets can be catastrophic, including the risk of significant loss of life. Weed management is a key component of asset maintenance playing a critical role in preserving life, providing for well-functioning communities, economic resilience, and protection of public and private assets.

Introduction

9 My full name is David Aires. I am employed as the Acting Rivers Manager at the Canterbury Regional Council (Regional Council), and I have held this position since October 2022.

Qualifications and Experience

10 I am a Registered Engineering Associate with over 28 years in the civil engineering sector which has included 21 years operational experience in river engineering and flood mitigation management which has spanned across both the Canterbury and Marlborough regions.

11 As the Rivers Manager I have the responsibility for providing strategic leadership to Rivers staff offering flood warning and response, technical advice, planning capital works, and defining work standards for the maintenance of all river and drainage systems managed by Environment Canterbury, in addition to land survey, and programmes to enhance the biodiversity, community and cultural values of rivers across the region (ki uta ki tai). A key component of my responsibility includes the delivery of financial, project and contractor operational management in line with organisational requirements to ensure optimal use of resources.

Code of Conduct

12 I can confirm that I have read and am familiar with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and I agree to comply with it while giving any oral evidence during this hearing. Except where I state that I am relying on the evidence of another person, my evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

13 Although I am employed by the Regional Council, I am conscious that in giving evidence in an expert capacity that my overriding duty is to the Hearings Panel.

Scope of evidence

14 I have been asked to provide evidence to inform resource consent applications to discharge agrichemicals and clear vegetation.

15 My evidence addresses matters under the following headings:

(a) Established Rating Districts;

(b) Out of scheme works;

(c) Operational delivery;

(d) Impacts of uncontrolled weeds on flood protection assets.

16 In preparing my evidence I have reviewed the following documents:

(a) The application and assessment of environmental effects submitted by the applicant;

(b) Three requests for, and their responses of further information.

(c) The summary of submissions.

17 Such evidence is within my area of expertise.

Established Rating Districts

18 Environment Canterbury manages river and drainage schemes that were established through historic legislation, and now managed through the Soil Conservation and Rivers Control Act 1941 and Land Drainage Act 1908. The annual works programmes for the fifty-eight (58) schemes (Appendix A) managed by Environment Canterbury range in scale from a few hundred dollars a year for drain maintenance, to the Waimakariri-Eyre-Cust River Improvement Scheme, with an annual works budget of about $4 million. Leigh Griffiths evidence discusses the funding mechanisms of these schemes, the focus of my evidence is the delivery of works and functional need for weed management.

19 These schemes can be split into three categories: (1) Comprehensive schemes have been designed to provide agreed levels of protection against flooding over significant areas; (2) Drainage schemes generally aim to control ground water levels; and (3) Localised River schemes attempt to reduce the impact of river behaviour on adjacent land to varying degrees.

20 The combined value (depreciated replacement value) of the scheme assets is $852 million (June 2022). About $12 million per year (2020) is spent maintaining the scheme assets to reduce damage to floodplain assets (i.e. land, buildings, roads etc) valued at around $143 billion (2020).

21 The asset classes with the largest values are trees and stopbanks, followed by groynes, rockwork, and drains. Tracks, fences, culverts, and floodgates form a minor part of the total asset value.

22 Our River schemes cover a little over 2,000km of the 78,000km of rivers in the region. These include protection to parts of Christchurch/Ōtautahi, Kaikōura, Rangiora, Kaiapoi, Ashburton, Geraldine, Pleasant Point and Temuka, as well as many smaller urban areas and extensive rural areas.

23 Annual ratepayer meetings are held for most rating districts (see Appendix A), where among other matters, the agenda comprises of:

(a) works and costs completed for the year to date,

(b) proposed work programmes and costs for the following financial year, and

(c) a report on the condition of scheme assets with regard to the specific levels of service for that scheme.

Out of Scheme protection

24 Whilst the majority of Regional Council flood protection works occur within established schemes, flood recovery, community requests or other opportunities result in the Regional Council undertaking flood, erosion or drainage protection works, often associated with other river enhancement work, outside of schemes.

25 In the past three years there has been an additional investment of approximately $46M through ‘Shovel Ready’ Climate Resilience Projects and the 2021 flood recovery programme.

26 Greg Stanley’s evidence provides examples of out of scheme works that were enabled by Central Government ‘shovel ready’ / covid funding.

27 This type of out-of-scheme works often requires delivery within a short timeframe, due to either funding opportunities or in response to a flood. It is therefore important that we have the required permissions set up ahead of time.

Operational delivery

28 Environment Canterbury staff operate out of five depots and two main offices. Within the wider Rivers section, there are approximately 45 staff operating out of the depots primarily tasked with delivering on-the-ground works, and a similar number based out of the offices tasked with preparing works programs, contract management and regional environmental, health and safety, engineering and planning technical support.

29 Staff focus on different tasks throughout the year, as each job have a seasonal cycle to them. During spray season, we may have up to half of the field staff tasked with spray operations at any time (weather dependent). In delivering that work, we have

nine trucks and two tractors equipped with spray equipment, along with other handheld spray related equipment, personal protective equipment, signage, and chemical Supplies. We also operate five agrichemical storage facilities from our depots.

30 The works programs are designed subject to our existing job set up systems, including engagement with our partners and identified interested people/groups to ensure good environmental decision making. Melissa Shearer's evidence explains this in more detail.

31 The agrichemical weed control program is delivered by a mix of contractors using their own equipment and staff using Environment Canterbury's equipment. Ground based operations (vehicle and knapsack) may be undertaken by either contractors or staff, while all aerial operations are delivered through contractors.

Impacts of uncontrolled weeds on flood, erosion, and drainage infrastructure

32 To ensure our performance standards are met our scheme works are inspected each year. Most schemes have a level of service which will inform the frequency for full coverage for weed control. This is balanced against available funding and the condition of the scheme at the time of inspection. The purpose is so that flood carrying capacity is not compromised in schemes where stopbanks exist, and to assist with alignment of river flows and combatting erosion where stop banks do not exist.

33 As outlined in our Asset Management Plan, the Local Government Act requires 6-yearly reporting on scheme performance. For our six largest schemes one of the matters to be reported is whether more than 30% of the fairway is obstructed by vegetation greater than 1m in height. Therefore, a key performance measure is directly related to the scale and density of vegetation growth within the fairway for specific schemes. Given the area and lengths of riverbeds maintained under existing rating districts using other available methods would be very costly and possibly prohibitive to achieve for some schemes.

34 Whilst Melissa Shearer, in her evidence, has explained the types of weeds we spray, my evidence has focused on the consequences of not spraying on flood, erosion and drainage infrastructure.

35 While our major schemes have formed stop banks to protect communities from flooding the structures themselves rely on the both the integrity of the berm to slow floodwaters to mitigate erosion and the integrity of the fairway to safely convey high flows.

36 The valuable relationship between a clear fairway and a well planted vegetated berm running adjacent to a stopbank is demonstrated in figure 1. The condition of the berm can be as important as the condition of the stopbank for it to perform as expected. For example, the failure of a discrete section of erosion control planting in the berm could lead to the failure of a section of stopbank, and cause flooding of adjacent and downstream properties. The failure of a river control system could undermine the ability of roads, communications, and lifelines infrastructure networks to perform their functions.

Figure 1: Aerial imagery of the Hakatere / Ashburton North Branch during 2021 floods. The left image is looking downstream, the right image is looking upstream. These images show fast, high energy water in the centre of the river, trees in the berm slowing the water to protect the stopbanks.

37 The failure of flood protection assets can be catastrophic, including the risk of significant loss of life. Weed management is a key component of asset maintenance playing a critical role in preserving life, providing for well-functioning communities, economic resilience, and protection of public and private assets.

Stopbanks, groynes, and other soil and earth-based defences:

38 Stopbanks are specially designed and maintained mounds of earth that help to limit or prevent the spread of floodwater onto surrounding land. Stopbanks usually include grass cover, smooth surfaces, a consistent height and no bare soil, holes, or ruts.

39 Stopbanks are a significant component of flood protection for many towns and cities in New Zealand. Stopbanks are designed to contain a flood of a specified size and at a point in time. Environment Canterbury have 647km of stopbanks that are of varying age, construction, and design level.

40 The purpose of a stopbank is to be resistant to water, capable of resisting the forces resulting from the differential head of water across the structure (river to land side) and from high velocity erosion inducing floodwaters.

41 Whilst there are a number of risks that compromise stopbank integrity, relevant to this proposal is the control (or lack thereof), of weeds and unwanted plants.

42 Large plant roots that penetrate deep into stopbank can create weaknesses that compromise the stopbanks integrity during flood events. These roots may cause slipping or slumping of the banks as well as internal preferential flow paths. These internal preferential flow paths can cause piping (internal erosion) where the pressure of the differential head of flood waters push through or under the stopbank, eroding fine materials from the structure resulting in coarser materials collapsing and ultimately resulting in failure of the stopbank. Figure 2 illustrates a section of stopbank that failed during the 2021 Ashburton floods. Whilst the failure in this situation cannot solely be attributed to the tree roots through the stopbank (the river was overtopping), the image does illustrate how far roots can permeate through the bank.

Figure 2: Section of washed out stopbank. The longitudinal crest followed the red lines, and the stopbank profile is shown by orange and blue.

43 While the presence of appropriately planted vegetation creates resistance to flow and assists with redirecting high energy floodwater back toward the river fairway, inappropriate vegetation can lead to the formation of backwaters and high-energy flow vortices. These powerful vortices have the potential to erode the stopbank, creating vulnerabilities that may eventually lead to its failure. Piping and lateral erosion failures can occur even when the flows are below the intended flood protection level.

44 To maintain stopbanks and other earth-based defences, large woody weeds are targeted with spraying, leaving grass to form a homogenous cover over the bank. Operationally, stopbank spraying is done using ground-based techniques and not in locations where there is a risk of direct discharge to water.

Flood protection vegetation

45 Flood protection vegetation provides the main defence against erosion and forms the highest value component of Environment Canterbury's asset infrastructure. approximately 50%. The key purpose within a flood protection system is to absorb the energy of the river and control river alignment to protect the stopbank (or natural bank).

46 Environment Canterbury have 1601km of flood protection vegetation, typically comprising of willow and poplar tree species. These species are chosen for their strong and complex rooting systems, and they can be indiscriminate and vigorous growers. These days, specific clonal species of these trees are selected for their known ability to provide flood protection, whilst being minimally invasive. Whilst existing invasive species of willow provide critical flood protection, they also require constant management to ensure they do not overwhelm the river fairway (addressed more below).

47 Appropriately planted and maintained flood protection vegetation (which may comprise willows, poplars, natives and any purposely planted vegetation) that form the river 'berm' contribute to flood protection in three key ways:

a) Their strong and complex root systems bind the soil and banks together, forming a strong barrier against land-ward erosion;

b) The vegetation's above-ground mass acts as a buffer, slowing down water flow and absorbing some of its energy. This process effectively retains most of the water and its energy within the fairway during floods by slowing it down in the berm area. Consequently, the energy of floodwaters in the berms is diminished,

thereby reducing the risk and scale of erosion to both the stopbank and natural banks. Additionally, when flood protection vegetation is planted in windrows (often referred to as chevron planting), it serves as a physical barrier during floods, guiding water back towards the river fairway.

c) Trees play a crucial role in establishing a stable berm alongside rivers, which helps prevent or minimize encroachment from farming or urban development near riverbanks. This maintained space is essential as it provides the river with the necessary room to accommodate large flows during flood events.

48 Vine species including Old Mans Beard (OMB; *Clematis vitalba*), Ivy and Hops can grow up into flood protection trees and native berm vegetation, eventually completely overwhelming and smothering them. Additionally, lower scrubby growth like blackberry, gorse and broom are sprayed around new flood protection (poles) or native planting areas (release spraying) to facilitate the establishment of young plants and to outcompete the weeds.

Fairway

49 The fairway refers to the central open gravel-bedded region of the riverbed, consistently occupied by the river and responsible for carrying primary flood flows. Typically, this segment of the riverbed reaches its capacity during the average annual flood. Fairway management aims to uphold stable alignment and ensure the channel remains free from vegetation that could hinder flows or lead to the diversion of floodwaters onto the fairway's edges, potentially causing erosion.

50 The condition of the fairway is equally crucial for facilitating the smooth passage of high-energy flood flows through the system and out to sea. If high-velocity flows occur along the stopbank, the risk of erosion and potential bank failure increases. Additionally, when vegetation establishes and accumulates, it raises the riverbed level, thereby diminishing the flood carrying capacity at that specific point or reach of the river. This compromise in capacity jeopardises the integrity of the scheme.

51 Spraying weedy islands within river fairways helps ensure that the flood carrying capacity of the river is maintained and that the river can erode and re-work those island deposits allowing the formation of braids and encourages natural character.

52 When left unmanaged, excessive weed growth limits the space for floodwaters, leading to the formation of erosion-resistant islands that anchor braids in a fixed position, potentially becoming entrenched. Concentrating large flows into fewer channels or a single channel can result in increased erosion of farmland as the river

oscillates from side to side. Consequently, the impact of high-flow events worsens as the river's natural ability to dissipate flow energy diminishes.

53 Some rating districts have their own particular weed species e.g. false tamarisk, grey willow, sycamores, alders, or wattles. In all these cases, the management is one of ongoing control rather than eradication. There is a potential risk that these species become more widespread, adding to the cost of control.

54 For many years, "fairway" lines, or vegetation control lines, have been employed on several rivers across the country, including Canterbury, to delineate the boundary between areas where it's necessary to clear vegetation for unimpeded floodwater passage and areas where vegetation is encouraged to mitigate erosion and create a protective buffer on the berm between the fairway and productive land. These lines serve as the foundation for ongoing long-term strategies for planting, edge protection, and vegetation clearance.

55 Operationally, fairway spraying may occur using all methods available to us. For large areas requiring treatment contracted helicopters are utilised, while for smaller areas staff equipped with spray vehicles and knapsacks are used.

Tracks

56 Maintaining the vast network of tracks within river berms is essential to ensure they remain easily accessible, particularly during flood events. These tracks are used to access locations for maintenance and provide the public access for recreational activities. Additionally, any weed clearance along these tracks helps to manage infestations.

Drainage networks

57 Environment Canterbury oversees the management of around 613km of drainage network with approximately 370km sprayed each year. Drainage schemes are designed to regulate groundwater levels and/or provide a path for shedding surface water. The consequences of drain failure include elevated groundwater levels, prolonged ponding durations, damage to crops and pasture and road closures.

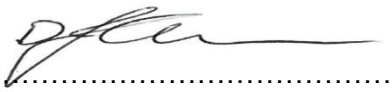
58 Many of the watercourses/drains managed as part of council’s drainage networks feature very low gradients, resulting in slow water flows. In these networks, even minor fluctuations in weed growth and/or water levels have a noticeable adverse impact on water levels and can impede the expected level of service for many kilometres upstream. For instance, the Halswell scheme has a 10m fall over its 40km length which equates to a 0.025% grade. The Ashburton-Hinds scheme has a 0.5% grade.

59 Excessive macrophyte growth in drainage channels impairs the drainage function of those waterbodies. Thick growth reduces capacity of the channels and impedes flows, which can cause water to ‘back up’ causing out-of-channel and groundwater flooding. Where flood events rip out untreated dense weed growth this often results in blockages at downstream culverts. Excessive growth along the bank poses a risk of collapse into the drain causing erosion and further blockages.

60 Drain clearance and spraying generally targets emergent introduced species such as monkey musk, water twitch and water cress. Ideally, drains are sprayed during periods when they are dry.

61 There is no widespread or blanket spraying of the banks as this can exacerbate erosion, sedimentation, and bank collapse. Spot spraying is carried out to manage gorse, broom and bramble and other weedy trees growing along the banks. There is a growing trend to plant natives, such as carex Spp., and spot spraying is required to support their healthy establishment. Maintaining healthy grass, or native plantings, on the bank provide stability and shading which can help reduce the rate of weed growth.

Dated 11 March 2024



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David Aires

Appendix A: List of River and Drainage Rating Schemes throughout Canterbury and ratepayer meeting frequency.

	Major schemes with liaison committees	Localised and drainage schemes with liaison committees	Localised and drainage schemes without liaison committees	
	Liaison committee meetings at least annually, public meeting and elections 3-yearly.		Ratepayer meetings at least annually.	Informal or ratepayer meetings on request –very small schemes
North	Kaikoura Rivers and Drainage Ashley / Rakahuri Waimakariri-Eyre-Cust*	Hanmer West and Upper Chatterton Waiau Township North Kowai Kowai Sefton-Ashley	Conway Waiau-Rotherham Lower Pahau Sefton Town	Lower Flats Waiau Waiau-Bourne Lyndon School Creek Upper Pahau Lower Hurunui (2 year spray cycle)
Central	Te Waihora/ Lake Ellesmere* Selwyn / Waikirikiri Lower Rakaia Ashburton Rivers / Hakatere Upper Hinds Lower Hinds	Halswell Drainage* Ashburton-Hinds Drainage	North Rakaia Dry Creek Mt Harding Creek Rakaia Double Hill Cleardale	Prices Valley Greenstreet Creek Buttericks Rd Drain Chertsey Rd Drain Staveley Stormwater Channel
South	Rangitata Orari-Waihi-Temuka Opihi Pareora Waihao-Wainono Rivers and Drainage Lower Waitaki*	Seadown Drain Otaio	Washdyke Creek Saltwater Creek Esk Makikihi Kapua Drain Penticotico Twizel Omarama	Seadown Rd