AGENDA

Infrastructure Committee Meeting

Tuesday, 12 March 2024

Date	**Tuesday, 12 March 2024**
Time	**Following Environmental Services Committee**
Location	**Council Chamber** **Timaru District Council Building** **2 King George Place** **Timaru**
File Reference	**1656473**

Timaru District Council

Notice is hereby given that a meeting of the Infrastructure Committee will be held in the Council Chamber, Timaru District Council Building, 2 King George Place, Timaru, on Tuesday 12 March 2024, at the conclusion of the Environmental Services Committee meeting.

Infrastructure Committee Members

Clr Sally Parker (Chairperson), Clr Gavin Oliver (Deputy Chairperson), Clr Stu Piddington, Clr Peter Burt, Clr Owen Jackson, Clr Allan Booth, Clr Stacey Scott, Clr Michelle Pye, Clr Scott Shannon and Mayor Nigel Bowen

Quorum – no less than 5 members

Local Authorities (Members' Interests) Act 1968

Committee members are reminded that if you have a pecuniary interest in any item on the agenda, then you must declare this interest and refrain from discussing or voting on this item, and are advised to withdraw from the meeting table.

Andrew Dixon
Group Manager Infrastructure

Order Of Business

1 Apologies

2 Public Forum

3 Identification of Items of Urgent Business

4 Identification of Matters of a Minor Nature

5 Declaration of Conflicts of Interest

6 Chairperson's Report

7 Confirmation of Minutes

7.1 Minutes of the Infrastructure Committee Meeting held on 13 February 2024

Author: **Rachel Scarlett, Governance Advisor**

Recommendation

That the Minutes of the Infrastructure Committee Meeting held on 13 February 2024 be confirmed as a true and correct record of that meeting and that the Chairperson's electronic signature be attached.

Attachments

1. Minutes of the Infrastructure Committee Meeting held on 13 February 2024

MINUTES

Infrastructure Committee Meeting

Tuesday, 13 February 2024

Ref: 1656473

Minutes of Timaru District Council
Infrastructure Committee Meeting
Held in the Council Chamber, Timaru District Council Building, 2 King George Place, Timaru
on Tuesday, 13 February 2024 Following Environmental Services Committee 10.42am

Present: Clr Sally Parker (Chairperson), Clr Gavin Oliver (Deputy Chairperson), Mayor Nigel Bowen, Clr Stu Piddington, Clr Peter Burt, Clr Owen Jackson, Clr Allan Booth, Clr Stacey Scott, Clr Michelle Pye

In Attendance: **Community Board Members:** Gaye Broker (Temuka Community Board), Rosie Woods (Geraldine Community Board), Michael Thomas (Pleasant Point Community Board)

Officers: Nigel Trainor (Chief Executive), Andrew Dixon (Group Manager Infrastructure), Paul Cooper (Group Manager Environmental Services), Andrea Rankin (Chief Financial Officer), Beth Stewart (Group Manager Community Services), Nicole Timney (Manager of Property Services and Client Representative), Hannah Goddard-Coles (Group Manager Engagement & Culture), Grant Hamel (Waste Operations Manager), Claire Barlow (Community Experience Manager), Stephen Doran (Communications & Engagement Manager), Rosie Oliver (Development Manager), Matt Sisson (Property Projects Officer), Jessica Kavanaugh (Team Leader Governance), Rachel Scarlett (Governance Advisor)

1 Apologies

1.1 Apologies Received

Resolution 2024/1

Moved: Clr Sally Parker
Seconded: Mayor Nigel Bowen

That the apology of Clr Scott Shannon be received and accepted.

Carried

2 Public Forum

There were no public forum items.

3 Identification of Items of Urgent Business

No items of urgent business were received.

4 Identification of Matters of a Minor Nature

No matters of a minor nature were raised.

5 Declaration of Conflicts of Interest

No conflicts of interest were declared.

6 Chairperson's Report

5.1 Presentation of Chair Person's Report

Resolution 2024/2

Moved: Clr Sally Parker
Seconded: Clr Owen Jackson

The Chairperson has attended a number of meetings including: Council meetings, Workshop, Extraordinary Council Meetings, AGM for Venture Timaru and TDHL, City Town Steering Group Meeting, People and Performance Committee, Citizenship Ceremony, Tenders and Procurement Meeting, Aorangi Stadium Trust Discussion and a Meeting with the Group Manager Infrastructure.

Carried

7 Confirmation of Minutes

7.1 Minutes of the Infrastructure Committee Meeting held on 14 November 2023

Resolution 2024/3

Moved: Mayor Nigel Bowen
Seconded: Clr Allan Booth

That the Minutes of the Infrastructure Committee Meeting held on 14 November 2023 be confirmed as a true and correct record of that meeting and that the Chairperson's electronic signature be attached.

Carried

8 Reports

8.1 Actions Register Update

The Chairperson spoke to the report to provide the Infrastructure Committee with an update on the status of the action requests raised by councillors at previous Infrastructure Committee meetings.

Update included –

- Peel Forest Landfill risk assessment report coming back to the Infrastructure committee with the inclusion of commentary from Environment Canterbury and Iwi.
- Keep CityTown ongoing and request a breakdown of the 1.5m budget.
- Pareora Dam to be remain ongoing, and a requested a report in relation to the new legislation.

There was discussion on the State of the Highways, Seal Extension Policy, Waka Kotahi's update.

Resolution 2024/4

Moved: Clr Sally Parker
Seconded: Clr Owen Jackson

That the Infrastructure Committee receives and notes the updates to the Actions Register.

Carried

8.2 2024 - 2030 Draft Waste Management and Minimisation Plan

The Waste Operations Manager spoke to the report to present the Timaru District Council (TDC) Draft Waste Management and Minimisation Plan (WMMP) 2024 – 2030 (Attachment 1) and seek approval for the Plan to proceed with consultation with the community as required by legislation.

Discussion included estimated time lines and growing percentages of Timaru's waste collection due to curb side changes, benefits of recording composted waste data, enfaces on Council engaging with the public of the changed to Bin regulations by media coverage, a mail drop and focusing on working with businesses around the district to educate them to reduce their waste.

Discussion also included clarification of the weigh bridges functions at the Timaru waste management site and operations used at the site to gather waste data and time line of public consultation.

Resolution 2024/5

Moved: Mayor Nigel Bowen
Seconded: Clr Michelle Pye

That the Infrastructure Committee

1. Receives and endorses the Draft 2024 – 2030 Waste Management and Minimisation Plan for consultation.
2. Adopts the Statement of Proposal for community consultation in accordance with Section 83 of the Local Government Act 2002.

Carried

9 Consideration of Urgent Business Items

No items of urgent business were received

10 Consideration of Minor Nature Matters

No matters of a minor nature were raised.

11 Public Forum Items Requiring Consideration

There were no public forum items.

It is noted that due to a Conflict of Interest in item 13.1 Development Area Plans Clr Stacey Scott left the room during the Public Excluded report at 11.14am.

12 Exclusion of the Public

Resolution 2024/6

Moved: Clr Sally Parker
Seconded: Mayor Nigel Bowen

That the public be excluded from the following parts of the proceedings of this meeting on the grounds under section 48 of the Local Government Official Information and Meetings Act 1987 as follows at 11.15am:

General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Plain English Reason
13.1 - Development Area Plans	s7(2)(b)(ii) - The withholding of the information is necessary to protect information where the making available of the information would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information s7(2)(j) - The withholding of the information is necessary to prevent the disclosure or use of official information for improper gain or improper advantage	To protect commercially sensitive information To prevent use of the information for improper gain or advantage

Carried

13 Public Excluded Reports

13.1 Development Area Plans

14 Readmittance of the Public

Resolution 2024/7

Moved: Clr Allan Booth
Seconded: Mayor Nigel Bowen

That the meeting moves out of Closed Meeting into Open Meeting at 12.10pm.

Carried

The Meeting closed at 12.11pm.

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Clr Sally Parker

Chairperson

8 Reports

8.1 Actions Register Update

Author: **Rachel Scarlett, Governance Advisor**

Authoriser: **Paul Cooper, Acting Group Manager Commercial and Strategy**

Recommendation

That the Infrastructure Committee receives and notes the updates to the Actions Register.

Purpose of Report

1 The purpose of this report is to provide the Infrastructure Committee with an update on the status of the action requests raised by councillors at previous Infrastructure Committee meetings.

Assessment of Significance

2 This matter is assessed to be of low significance under the Council's Significance and Engagement Policy as there is no impact on the service provision, no decision to transfer ownership or control of a strategic asset to or from Council, and no deviation from the Long Term Plan.

Discussion

3 The Actions register is a record of actions requested by councillors. It includes a status and comments section to update the Infrastructure Committee on the progress of each item.

Attachments

1. Infrastructure Services Actions Required

Information Requested from Councillors (Infrastructure Committee)

Information Requested	Update on Peel Forest Landfill		
Date Raised:	08 August 2023	**Status:**	Ongoing
Issue Owner	Group Manager Infrastructure	**Completed Date:**	

Background:
The Councillors requested an update on the work at the Peel Forest Landfill.

Update: LINZ approval has been granted, and now ECan consent process is ongoing (oral update on timeframe to be provided at the meeting).

February 2024 Update: Liaison continues with Aoraki Environmental Consultants. Consent application is almost complete for lodging and work is now commencing on the preparation of tender documentation.

March 2024 Update: Report being presented to Infrastructure Committee following requests at last meeting. Consent application is ready to be filed.

Information Requested	Seal Extension Policy Review		
Date Raised:	05 September 2023	**Status:**	Complete
Issue Owner	Group Manager Infrastructure	**Completed Date:**	12/03/2024

Background:
The Councillors requested a report to include the Seal Extension Policy for the ability to review this document. Including a breakdown of numbers of vehicles/trucks on the roads, schools and residential dwellings.

Update: Officers to provide options in the Land Transport Unit's activity management plan as part of the Long Term Plan 2024-34.

February 2024 Update: Seal extension multi criteria analysis is under development. Expect to bring updated policy for approval during this calendar year.

March 2024 Update: Policy being presented to Infrastructure Committee.

Information Requested	Detailed Analysis on Traffic Management		
Date Raised:	14 November 2023	**Status:**	Ongoing
Issue Owner	Group Manager Infrastructure	**Completed Date:**	
Background: It is requested a detailed analysis on Traffic Management across our contracts, to look at delivering this differently. Update: Information has been gathered around current delivery, now looking at alternative options for delivery which will be presented for consideration. March 2024 Update: This report will be presented to the Infrastructure Committee on 16 April 2024.			

Information Requested	City Town Steering Group		
Date Raised:	05 September 2023	**Status:**	Ongoing
Issue Owner	Group Manager Infrastructure	**Completed Date:**	
Background: It is requested that all Councillors be sent the invitations for CityTown Steering Group Meetings. Update: Invitations to be provided for future meetings. February 2024 - Councillors advised to keep this action open and request a breakdown of the 1.5millon budget. March 2024 Update: This is being prepared to present to the next Infrastructure Committee Meeting.			

Information Requested	Pareora Dam		
Date Raised:	14 November 2023	**Status:**	Complete

Issue Owner	Group Manager Infrastructure	**Completed Date:**	12 March 2024

Background:
It is requested the regulated report comes back to the Infrastructure Committee.

Update: A report was presented to the Infrastructure Committee on 14 November 2023.

February 2024 - Councillors advised to keep this action open and request it be reported on in relation to new legislation.

March 2024 Update: The new regulations have been checked and do not apply to the Pareora Dam.

8.2 Infrastructure Key Project Updates for Third Quarter 2023/24

Author: **Jacky Clarke, Programme Delivery Manager**

Authoriser: **Andrew Dixon, Group Manager Infrastructure**

Recommendation

1. That the Infrastructure Committee receives and notes the Infrastructure Key Project Updates for the Third Quarter 2023/24.

Purpose of Report

1 To provide an update on key infrastructure projects.

Assessment of Significance

2 This matter is of low significance in terms of Council's Significance and Engagement Policy. It is a regular progress report on key infrastructure projects approved in the Long Term Plan 2021-31.

Discussion

3 Updates for the third quarter of the financial year are detailed in attachments 1 to 5. The key projects are:

- Road Renewal and Improvement Programme (Attachment 1)
- Pleasant Point Watermain Renewals (Attachment 2)
- South Street Bridge (Attachment 3)
- Redruth Landfill Cell 2.3/2.4 Landfill Gas (LFG) & Capping Works (Attachment 4)
- Geraldine Syphon (Attachment 5)
- Pareora Pipeline Renewal (Attachment 6)

Attachments

1. **Road Renewal and Improvement Programme**
2. **Pleasant Point Watermain Renewal**
3. **South Street Bridge March 2024**
4. **Redruth Landfill Cell 2.3/2.4 LFG & Capping Works**
5. **Geraldine Syphon**
6. **Pareora Pipeline Renewal**

KEY PROJECT

Road Renewal and Improvement Programme

Progress report – February 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

OVERVIEW

The Road Rehabilitation Programme is generally part of Contract 2494 with Fulton Hogan. The CAPEX figures are made up of funding under the low cost low risk program, Road to Zero Programme, seal extensions, capital improvements and road rehabilitations. Project updates are shown below.

Location	Type of work	Length	Status	Procurement
Construction underway				
District Wide	Road Resurfacing	Multiple sites	95% Complete for the season	Resurfacing Contract 2522
Unsealed Road Wearing Courses	Multiple Rural Roads	15km	Wearing Courses on unsealed roads to reinstate required level of service 90% complete	Contract 2494
District Wide	Road layout and safety improvements		Partially Complete	Various
Planned				
Pages Road - Combined Project with Stormwater and Sewer Renewal	Kerb and Channel and Pavement upgrade	500m	Design underway – 2022-23 Project – On hold pending Drainage and Water work	Open Tender
Coastal Connections, Port Timaru	Installing new shared path between Port Loop Road and Coastal Track off Stuart Street		On Hold – Transport Choices Funding cut	Contract 2494
Selwyn Street and Wai-iti Road, Timaru	Traffic Signals Upgrade	1	Controller parts procurement underway	Contract 2504
Timaru Transport Choices Package	Safer Schools, micromobillity, walkable neighbourhoods	1	On Hold – Transport Choices Funding cut	Multiple
Barker Street, Geraldine	Kerb and channel installation		Design underway	Quoted Works
Blair Street, Timaru	Kerb and channel installation		Design underway	Contract 2504
Port Loop Road, Timaru	Road Rehabilitation and shared path		Final design underway, working with Drainage and Water as a combined renewals package	Contract 2494
Shere Street, Pleasant Point	Stage 2 of kerb and channel installation		Design underway	Quoted Works

$17.8M
Total 2023/24 Annual Plan Budget

$13.5M
Spent to Date
(as of January 2024)

80%
Completed
(as of February 2024)

KEY PROJECT

Road Renewal and Improvement Programme

Progress report – February 2024

Completed				
Orton Rangiatata Mouth Road	Traction Seal Back	260m	Completed	Contract 2494
Elizabeth Street, Cave	Kerb and Channel Upgrade opposite shop and public toilet	100m	Completed	Beeby Construction
Unsealed Road Wearing Courses	Multiple Rural Roads	15km	Wearing Courses on unsealed roads to reinstate required level of service	Contract 2494
Ewen Road and Factory Road, Temuka	Structural Asphalt Resurfacing	2 Sites	Completed	Contract 2522
Fraser Street, Temuka	Kerb and Channel footpath and pavement	100m	Completed	Contract 2494
Collins Street, Timaru	Cul-de-sac head	100m	Complete	Paul Smith
South Street, Timaru	Bridge Replacement	1 Bridge	100% complete	Contract 2617
Levels Plain Road	Road Rehabilitation	1200m	100% Complete	Contract 2494
Woodbury Road, Woodbury	Road Rehabilitation	2 km	100% Complete	Contract 2494
Waitohi Pleasant Point Road	Road Rehabilitation	1.5 km	100% Complete	Contract 2494
Park Lane, Timaru	Road Rehabilitation	Wai-iti to June Street	100% Complete	Contract 2494
Mahoneys Hill Road, Timaru	Stage two kerb and channel installation		Complete	Rooney

KEY PROJECT

Road Renewal and Improvement Programme

Progress report – February 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

Glamis Street – Pedestrian Refuge Islands

Ashbury Park – Shared Path Installation

Fraser Street Temuka – Drainage Improvement and Path

KEY PROJECT

Road Renewal and Improvement Programme

Progress report – February 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

Hassall and Harper Street Roundabout

Hassall and Cain Street Roundabout

KEY PROJECT

Road Renewal and Improvement Programme

Progress report – February 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

Route Improvement Hassall Street

KEY PROJECT

Pleasant Point Watermain Renewals

Progress Report February 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

BACKGROUND

The replacement of water water mains in Pleasant Point is part of the on going work programme within the water infrastructure activity across the Timaru District. The concrete water mains in Pleasant Point have demonstrated a need for replacement due to material degradation and associated leakage issues.

OVERVIEW

Following a network hydraulic assessment a pipe replacement contract was developed with tenders being called in July 2023. On 5 September 2023 Paul Smith Earthmoving 2002 Ltd (PSE) were awarded Contract 2532 in the sum of $1,194,904. This contract entails work at six different sites, with a total of 2.6 kilometres of pipe to be laid.

PROJECT UPDATE

As of mid February PSE has completed work on Te Ngawai Road, Burgess Street, Maitland Street, and Kumara Terrace.

Currently, work is underway on Manse Road, and it is anticipated to be completed by the end of the first week of March.

PROJECT TEAM

Project Lead: Nick Houston **Project Manger:** Danny Vala **Project Engineer:** Grant Hall

PROJECT FINANCIALS

To the end of January 2024 $700,000 (58%) has been paid.

PROJECT RISKS

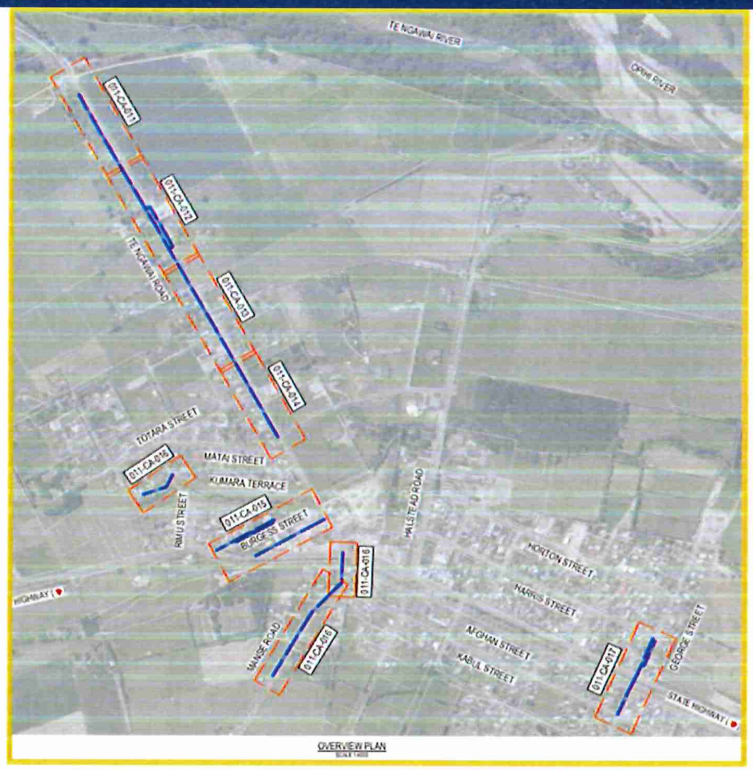
The main project risks relate to quality parameters being met, stakeholders being informed and traffic management being compliant at each site. Contract supervision across the 6 work sites involves both Water Engineering officers and Land Transport officers. The reinstatement of the various surfaces throughout the sites is particularly challenging.

KEY PROJECT

Pleasant Point Watermain Renewals

Progress Report February 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru



Pleasant Point Watermain Renewal Sites

Construction in Progress – Manse Road, February 2024

Page 2/2

KEY PROJECT

South Street Bridge

Progress report

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

BACKGROUND

South Street Bridge was aging and coming to the end of its useful life. The original timber bridge built in 1910 has been replaced with a single span precast concrete bridge. The new bridge layout includes a single traffic lane with a raised footpath and is wider to improve accessibility for larger vehicles and trucks.

OVERVIEW

This project was delivered on time and the bridge opened to the public on December 8 2023. The feedback from residents near the site and the contractor was excellent. There were zero complaints for this project, which is really positive for a project of this size and in an urban area. There were no concerns around Health and Safety on this project.

PROJECT TEAM

Project Sponsor: Andrew Dixon Project Lead: Adam Ward Project Support: Suzy Ratahi

PROJECT FINANCIALS

The project is complete and the total cost was $1,155,457.77.

KEY PROJECT

Redruth Landfill Cell 2.3/2.4 LFG & Capping Works

Progress Report

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

BACKGROUND

Following the completion of filling landfill cells 2.3 and 2.4, the installation of a gas collection system and capping works are required.

PROJECT UPDATE

The capping is the placement and compaction of a clay layer over the landfill cell to prevent water entering the refuse layers and creating leachate. The gas collection system consists of the installation of pipes that will collect and transfer the gas to the flare for burning. The burning of the methane gas collected reduces the carbon emissions liability.

- Tenders closed on 7 December 2023 and the Tenders and Procurement Committee approved the tender submitted by Rooney Earthmoving Ltd on 18 December 2023.
- Possession of the site was given on Monday 22 January 2024.

PROJECT TIMELINE

The contract period is 80 working days with the expected finish date being 16 May 2024.

PROJECT TEAM

Project Sponsor: Andrew Dixon – Project Lead: David Hooke – Project Support: Tonkin & Taylor

PROJECT FINANCIALS

The Contract award sum was for $1,241,645.24.

KEY PROJECT

Geraldine Sewer Syphon Duplication

Progress Report February 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

BACKGROUND

The sewer pipe connecting the main Geraldine township area to the Oxidation Ponds known as the Geraldine Sewer Syphon goes under the Waihi River.

In the recent past the sewer trunk main in Talbot St and the Geraldine Sewer Syphon have been shown to be under capacity and required upgrading.

OVERVIEW

In 2020 the Talbot St sewer was replaced in conjunction with a road rehabilitation project. At the same time geological investigations were undertaken to determine if it was possible to drill a new pipeline under the Waihi River to mitigate construction risks associated with potential flood events. These investigations proved that drilling through the gravels was most likely to be unsuccessful and therefore the open cut construction methodology was chosen for the duplication of the sewer syphon.

Obtaining Resource Consents, associated approvals and developing plans to excavate a pipeline trench through the Waihi River has been complex and time consuming. The following consents have been obtained:
Ecan 230205. Excavation of riverbed etc.
Ecan 230207. Divert water within a river bed.
Ecan 230208. Discharge Contaminants to water
TDC 102.2022.221.1 Land use consent to carry out earthworks and vegetation clearance
Authority FPB 125560 Flood Protection and Drainage Bylaw approvals

PROJECT UPDATE

Contract 2359 was let to Rooney Earthmoving Ltd (REL) on 5 February for the sum of $425,000.

PROJECT TIMELINE

The contract duration is 14 weeks and REL propose to start site works on 11 March and complete the work on site by the end of May 2024

PROJECT TEAM

Project Sponsor: Andrew Lester. **Project Leads**: Nick Houston and Shaun Johnstone

PROJECT FINANCIALS

The physical works have not commenced and therefore there has been no expenditure on this contract as at reporting date.

PROJECT RISKS

The two major project risks are the potential for flood water to interrupt construction progress and for non-compliance with all the consents and plans in place for the work. REL are very experienced in working within the confines of a river system and will be managing the flood risk as far as is practical in the circumstances. The monitoring of compliance with all the resource consent conditions and plan requirements is onerous and will be carried by staff of the Drainage and Water Unit.

A partnership approach to the work is required and has already commenced with contract meetings being held prior to site work commencing.

Pareora Pipeline Renewal

Progress report – Issue 16 – March 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

BACKGROUND

The Pareora pipeline, installed in the 1930s, is a critical pipeline that conveys raw water from Pareora River intake to the Claremont water treatment plant and reservoir. This source provides approximately 60% of water consumed annually in the Timaru Water Supply.

The renewal of the pipeline will ensure continuity of the Timaru Water Supply and minimise water loss.

OVERVIEW

Approximately 37km of pipeline is being replaced from Lindisfarne to the Claremont water treatment plant (WTP). The Pareora pipeline renewal was approved in the 2021-2031 Long Term Plan, and comprised three contract work packages, two of which were completed in 2022, these being:

Contract 2468 – Pareora Pipeline Renewal Section 1 (Lindisfarne to Pareora Gorge Road) – Completed in 2022.

Contract 2470 – Pareora Pipeline Renewal Section 3 (Pareora Gorge Road to Claremont WTP) – Completed in 2022.

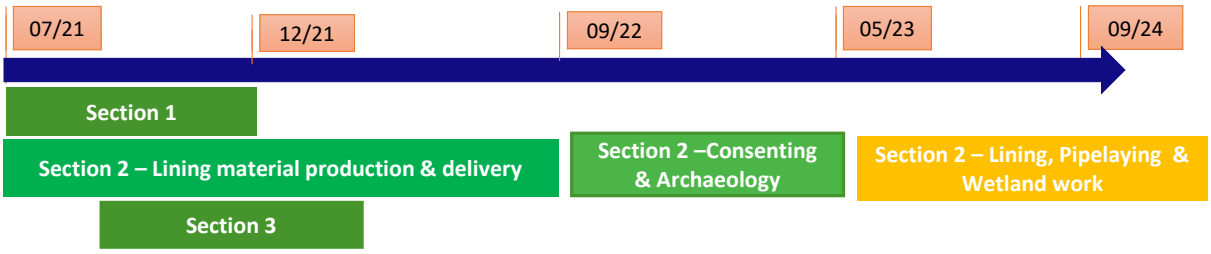
The current work is Contract 2469 – Pareora Pipeline Renewal Section 2 – through the Lower Pareora Gorge.

RECENT PROGRESS

Contract 2469 – While the whole job is challenging, getting the water through the gorge was particularly difficult and we are adopting an innovative liner technology to reuse the current pipe. This proven liner technology enables us to continue benefiting from the existing pipeline route, while ensuring the pipe is good for decades to come and lessens our impact on a culturally significant area.

Recent progress on section 2 includes 2.44km of the 4.3km of pipeline has been renewed to date by either lining process or replaced by open cut excavation. 2,140m has been lined with the Amex pressure lining system, while 300m of open cut excavation used pipe through a wetland and an area with an active slip zone. A further 1,865m of lining is scheduled to be installed from March through to September 2024. This timeline is weather dependent however, the contractor and the Council have been able to accelerate the programme by arranging longer shutdowns of the main and relying on Timaru' s alternative source of water supply.

TIMELINE



$22.7M Total 2021-2031 LTP Budget

$20.3M Spend to Date

100% Design
95% Construction Completed

Pareora Pipeline Renewal

Progress report – Issue 16 – March 2024

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

PROJECT TEAM

Project Sponsor: Andrew Dixon - **Project Lead**: Grant Hall - **Project Manager**: David Hooke

PROJECT FINANCIALS

The project is funded by loan, within the Urban Water Supply budget. The loan in turn will be financed by urban water supply ratepayers via the Uniform Annual Charge for urban water.

Total LTP 2021-2031 Budget - $14.7M

2021/2022 Budget - $11.6M

2022/2023 Budget - $3.1M (some of this is carried over to 2023/24)

PROJECT RISKS

WEATHER & GROUND CONDITIONS – We are heading into the winter months and dealing with ground conditions prone to slips. These factors may make access and working conditions unsuitable which could cause project delays. If there is an extended dry spell there may be a requirement to take more water from Pareora which will limit the duration of shutdowns.

Contract 2469– Pareora Pipeline Renewal Section 2

8.3 Peel Forest Closed Landfill Remediation

Author: **Jacky Clarke, Programme Delivery Manager**

Authoriser: **Andrew Dixon, Group Manager Infrastructure**

Recommendation

That the Infrastructure Committee;

1. Confirms its commitment to carry out remedial works for the Peel Forest Closed Landfill.
2. Confirms the approach to complete the work in one stage in the 2024/25 financial year.

Purpose of Report

1 To provide Council with the details regarding the risk of further erosion of the closed landfill and costings for a staged approach to remediation.

Assessment of Significance

2 This matter is of medium significance in terms of the Timaru District Council significance and engagement policy. There are several interested/affected parties, and there is potential for significant environmental impact.

Background

3 Waste in the gully section of the site was exposed through erosion, exacerbated by the 2020 flood events that saw the southern bank significantly reduced and the river channel encroaching closer to the landfill site.

4 During 2021, mitigation works were carried out to moderate the river changes and prevent catastrophic failure, along with removing exposed waste and managing stormwater. This was only seen as a temporary solution, and Council agreed through the Annual Plan 2023/24 to the complete removal of waste from the landfill as the permanent solution.

5 In July and August 2022 flooding has caused the subsequent loss of a further 10-15 metres of the boundary.

6 Work has been progressing to prepare applications for consents. However, at the 13 February Infrastructure Committee Meeting further information was sought around the cost implications of a staged remediation approach and a risk assessment setting out the consequences of delaying the works.

Discussion

Risk Assessment for Delaying Works

7 Pattle Delamore Partners (PDP), who are experts in landfill engineering, have been providing technical support to Council for a number of years in relation the Peel Forest Landfill. PDP has prepared a Risk Assessment for the existing Peel Forest Landfill with respect to river terrace (bank) erosion from high flow conditions along the Rangitata River (attachment 1).

8 The assessment indicates that the landfill is likely to be exposed to a potential erosion event at least once every two years.

9 Additionally a significant seismic event could cause direct river slope instability and possible river dynamic changes.

10 Environment Canterbury has produced a Flood Risk Assessment (attachment 2).

11 Committee Members requested that both Aoraki Environmental Consultancy, on behalf of Te Rūnanga o Arowhenua, and Environment Canterbury be invited to provide feedback regarding delaying works. Feedback from Aoraki Environmental Consultancy is included (attachment 3). Both Aoraki Environmental Consultancy and Environment Canterbury will have representatives at the meeting.

Cost Implications of a Staged Remediation Approach

12 PDP has been providing technical support to Council in relation the Peel Forest Landfill and they have prepared a report on Cost Implications of a Staged Remediation Approach for the existing Peel Forest Closed Landfill (attachment 4).

13 The cost implications of a staged approach include the following:

- ongoing monitoring and management of the waste as long as it remains in situ.
- remedial works following flood events.
- additional time on site to establish and disestablish the work site.
- additional technical input to ensure appropriate design and formation of the temporary landform.
- unknown cost escalations for technical support, works and disposal.

Options and Preferred Option

14 Option 1 – Complete Removal of Landfill Body in 1 Stage (preferred option)

This is the recommended option from PDP as it aligns with the most positive outcomes for human health and the receiving environment and eliminates future liability to the Council.

The total cost estimate for this option is $12,110,000.

15 Option 2 – Staged Removal of Landfill Body in 2 Stages over 10 years, the first stage commencing in 2024 and the second stage commencing in 2034.

The benefit to carrying out the work in stages is that Council could spread the costs across varying financial years. However, it will mean an increase in the total cost of the project. This option also carries reputational risk with Iwi and other Government agencies who have been collaborating on this project. The longer the landfill is left in situ, the likelihood of exposure increases. See table below:

- Orange – A minority portion of the landfills eastern extent likely exposed.
- Light Red – A minority to a majority portion of the landfills eastern extent likely exposed.
- Deep Red – A minority portion to all of the landfills eastern extent likely exposed.

Table 5: Risk Matrix - Landfill Exposure due to River Terrace Crest Regression Over Time

Years	Potential Crest Regression (m) over time	Risk of Landfill Exposure
2	1 – 4	
4	2 – 8	
6	3 – 12	
8	4 – 16	
10	5 – 20	

The total cost estimate for this option is $17,224,750.

16 Option 3 – Staged Removal of Landfill Body in 4 Stages over 10 years, the 4 stages will occur approximately 3 years apart starting in 2024.

The benefits and disadvantages to carrying out the work in multiple stages are the same as option 2, with the added disadvantages are that there may be an increase in costs not currently quantified like road rehabilitation and there will be considerably more disruption to the community.

The total cost estimate for this option is $17,272,750.

17 Option 4 – Delay work to be commenced in another FY to be determined

This option carries with it the risk that Council is liable if the landfill is exposed during an event prior to the removal. There would be ongoing costs involved with monitoring and management.

18 Option 5 – Do nothing and continue with monitoring and management

This is a high-risk option and leaves Council liable if the landfill is exposed during river flood events or seismic activity. There would be ongoing costs involved with monitoring and management.

Consultation

19 Initial consultation has occurred with neighbouring property owners and the wider Peel Forest community.

20 The Rangitata Restoration Group has been established which includes representatives from the Department of Conversation, Iwi, Environment Canterbury, Forest & Bird, Fish & Game, Land Information New Zealand, Ashburton District Council and Timaru District Council.

Relevant Legislation, Council Policy and Plans

21 Resource Management Act 1991

22 Waste Minimisation Act 2008

23 Local Government Act 2002

Financial and Funding Implications

24 Funding is currently available as this was an approved project as part of the 23/24 Annual Plan.

25 It should be noted that the physical landfill works be completed in the 24/25 financial year.

Other Considerations

26 As part of preparing the consent applications a remedial action plan (attachment 5) has been put together. This was initially drafted in September 2023 and updated in February 2024. This provides an overview of the site and the extent of the proposed remediation works.

Attachments

1. **Risk Assessment** ⇩
2. **ECan Flood Risk Assessment** ⇩
3. **Feedback Aoraki Environmental Consultancy** ⇩
4. **Staged Remediation Approach Cost Implications** ⇩
5. **Remedial Action Plan** ⇩

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solutions for your environment

28 February 2024

Jacky Clarke
Programme Delivery Manager
Timaru District Council
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TIMARU 7940

PEEL FOREST LANDFILL – RIVER EROSION RISK ASSESMENT

1.0 Introduction

Pattle Delamore Partners Limited (PDP) have been engaged by Timaru District Council (TDC) to provide a risk assessment for the existing Peel Forest Landfill with respect to river terrace (bank) erosion from high flow conditions along the Rangitata River.

The objective of the risk assessment is to provide some context around the likelihood of further bank erosion from flood events and expose of the Peel Forest landfill, this has been requested by TDC councillors to assist in the design making process and timelines for the proposed removal and relocation of the landfill waste.

2.0 Background

The landfill site is situated within a generally north to south trending erosional gully located on top of a river cut terrace approximately 30 m in height. It is indicated from geophysical survey that the eastern margin of the landfill footprint is located within 15 m of the existing riverbank crest, with the majority of landfill waste footprint located as close as 10 m, and some landfill waste exposed within the riverbank near the stormwater gully.

The river terrace generally comprises well graded river gravels with some rounded cobble to boulder sized greywacke gravels. Over time these terraces generally regress back to long term slope angles of approximately 45°, as observed across neighbouring section of river terrace. The majority of the existing riverbank slope angles steeper than 45°, with some areas as steep as 60°.

It is understood that three flood events in the Rangitata River since 2019 have caused erosion of the riverbank terrace, which is protecting the landfill mass. Table 1 below presents summarises details of the three erosion events and the subsequent river engineering works completed.

Table 1: Summary of Erosion Events		
Erosion Event Date	**Observed Damage**	**Remedial Action Taken**
December 2019	Erosion to riverbanks exposes landfill waste located near the stormwater gully area. Landfill waste deposited into the river.	Upstream river diversion to shift the river channel away from the riverbanks. Gravel embankment bund constructed along the riverbank toe protecting the stormwater gully area.
July 2022	Erosion of the riverbank toe and subsequent steepening of the riverbanks. River channel shifted closer to riverbanks.	Reprofiling of the slopes near the stormwater gully area.
August 2022	Loss of established vegetation cover. Further landfill waste deposited into the river.	

To assess the likelihood of further erosion event(s) potentially exposing landfill waste into the Rangitata River, available hydrological flow statistics and site-specific photography and survey data have been reviewed to evaluate the following:

- The likelihood and/ or frequency of a river flood event(s) that could lead to potential riverbank erosion.
- The potential extent of riverbank erosion under a significant river flood event, compared where possible against recent events.

3.0 Hydrology Assessment

To assess the likelihood and/ or frequency of potential future erosion events, Rangitata River flow statistics measured at Klondyke were requested from ECan. Klondyke is located approximately 12.5 km north of the Peel Forest landfill site. According to the NIWA flood frequency tool[1], the upstream catchment area at Klondyke is 1,501 km^2, while this is 1,586 km^2 at the Peel Forest landfill. Therefore, the river flow peaks observed at Klondyke are assumed representable of river flow peaks at the Peel Forest landfill.

3.1 Flow Statistics

An overview of historical flow records dating back to 1980 is shown below in Figure 1. Annual maxima flow peaks and flow peaks over 600 cumecs are indicated by dots and circles respectively. It should be noted that one cumec is equal to one cubic meter of water flowing past a point in one second (m^3/s).

[1] https://niwa.maps.arcgis.com/apps/webappviewer/index.html?id=933e8f24fe9140f99dfb57173087f27d

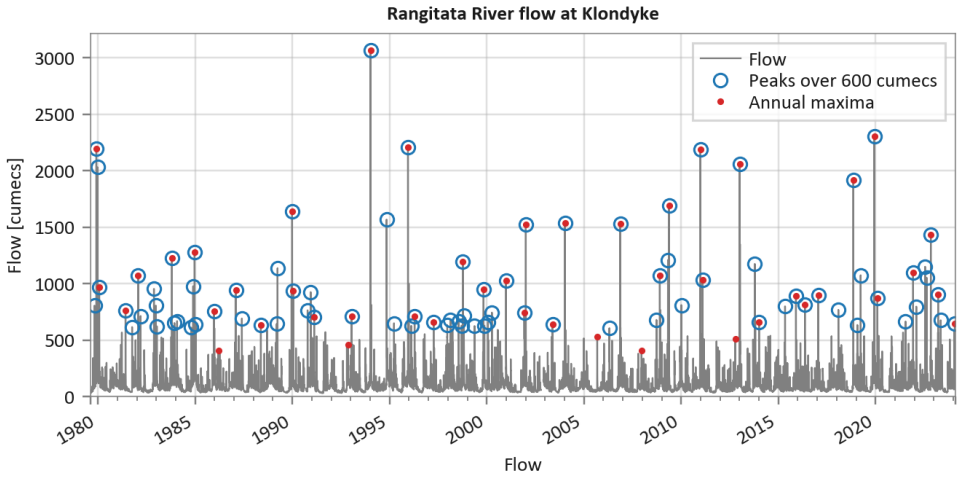

Figure 1: Historical flows with indicated annual maxima flow and flow peaks over 600 cumecs

The annual maxima flow peaks and flow peaks over 600 cumecs can be used to fit a discharge and annual recurrence interval distribution graph. Figure 2 below shows both sets of flow statistics empirically plotted with a fitted Gumbel extreme value distribution to derive exceedance frequencies of the plotted events.

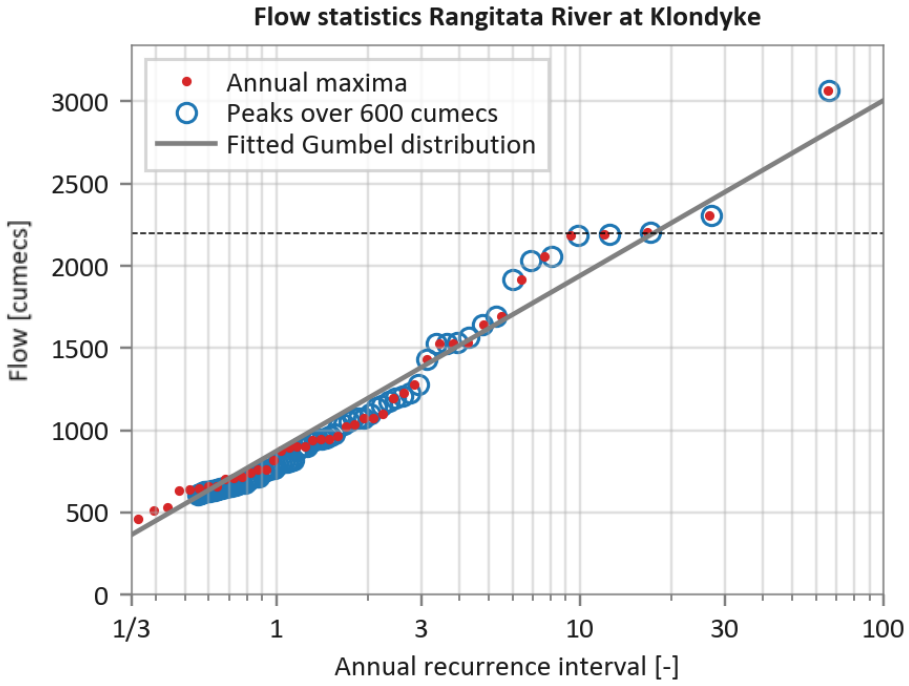

Figure 2: Empirical Flow Statistics and Fitted Gumbel Distribution

Table 2 below presents flow statistics with corresponding recurrence intervals that have been derived from the distribution shown in Figure 2. The first column gives the annual recurrence interval (ARI), which is the average time in between flood events that exceed the given flow. The annual exceedance

probability (AEP) is the probability of exceeding the specific flow in a year. The ARIs and corresponding flows for the three known flow events that have caused erosion upon the riverbanks in 2019 and 2022, as mentioned in Section 2.0 above.

Table 2: Recurrence Intervals associated with Flow Statistics, derived from Figure 2

Annual Recurrence Interval (ARI)	Annual Exceedance Probability (AEP)	Flow [cumecs]	Corresponding Erosion Event Date
1	0.63	873	
1.47	0.49	1050	2022-08-19
1.82	0.42	1150	2022-07-19
2	0.39	1194	
5	0.18	1618	
10	0.095	1939	
20	0.049	2260	
21.79	0.045	2300	2019-12-07
50	0.020	2685	
100	0.010	3006	

As indicated by Table 2, the 2019 event had a flow of 2300 cumecs and is considered a 1 in 20-year event, corresponding to an exceedance probability of 4.5% per year. The two 2022 events had flows of 1050 and 1150 cumecs and are considered to be 1 in 1-year to 1 in 2-year events, with exceedance probabilities ranging from 42% and 49% per year.

Considering the three observed erosion events have occurred from river flows above 1,000 cumecs, other flood events over 1,000 cumecs recorded at Klondyke since 2019 are displayed below in Table 3 below.

Table 3: Flows over 1,000 cumecs since March 2019 to January 2024

Date	Peak flow [cumecs]	Observed Erosion Event
2019-03-26	1075	
2019-12-07	2307	Yes
2021-12-06	1101	
2022-07-19	1151	Yes
2022-08-19	1053	Yes
2022-11-03	1431	

As shown within Table 3, there have been six flows recorded above 1,000 cumecs since March 2019.

4.0 Riverbank Erosion Events and Observations

This section presents a review of all available information pertaining to erosion of the riverbank caused by the river. A review of historical aerial photography and site-specific survey data has been completed to assess and quantify riverbank erosion, particularly during flood events.

4.1 Historic Aerial Photography Review – Pre 2019

A review of available historical aerial photographs pre-2019 has been undertaken for the site. This has been done to assess the general movements of the riverbank and river morphology before the 2019 flood event; with emphasis placed on any photographs post-dating significant flow events over 1,000 cumecs displayed in Figure 1.

Aerial photography sources viewed include Retrolens and Google Earth imagery, with the earliest aerial photograph available dating back to 1938. The following relevant observations are summarised in Table 4 below.

Table 4: Summary of Historic Aerial Photography

Date	Relevant Observations	Events Over 1,000 cumces
1938	River channel not located near site.	Not known
1962	River channel movements, but not located near site. No discernible changes to river terrace.	Not known
1984	River channel movements, but not located near site. No discernible changes to river terrace.	Two known events
1987	River channel movements, but not located near site. No discernible changes to river terrace.	Two events
1995	The main river channel is located adjacent to the landfill site. Loss of vegetation cover, possible loss of river terrace toe.	Three events
October 2011	The main river channel has shifted away from site. Significant regression, loss of vegetation, and steepening of river terraces located approximately 80 m south of the landfill site.	Eight events
September 2013	Notable widening of steepened river terraces located approximately 80 m south of the landfill site.	One event
May 2018	A significant river channel is located adjacent to the landfill site. Loss of river terrace toe and steepening of banks, particularly near the stormwater gully area.	One event
February 2019	Some river channel movements. No discernible changes to the river terrace.	One event

4.2 Known Erosion Events - 2019 to Present

Three flood events in 2019 and 2022 have been observed to have caused significant erosion of the riverbanks adjacent to the landfill site. Flow rates and dates associated with these events have been presented in Table 3.

Available site-specific survey information undertaken since 2019 have been reviewed to help quantify the extent of erosion upon the riverbanks as a result of the observed erosion events since 2019.

4.2.1 Aerial Survey

Two aerial drone photography surveys were undertaken in January 2021 and September 2022, which have been converted into a digital elevation model (DEM), have been compared to show the change in position of the riverbank over time. Significantly, two observed erosion events occurred between these dates, in July and August 2022, which postdate known river diversion and river embankment construction works.

The two aerial photographs with mark-ups showing the riverbank features are shown in Appendix A of this report. General comments on the observed changes are described below:

- Generally speaking, the river channel has shifted closer to the landfill site.
- For river terraces adjacent to the northern half of the landfill area:
  - The river terrace crest (terrane top - red) is generally situated in the same position.
  - The river terrace toe (terrane base - green) has moved towards the landfill area, which appears to have steepened these riverbanks and caused significant less vegetation loss.
  - The channel edge (blue) has also shifted towards the landfill.
- For river terraces adjacent to the southern half of the landfill area, near the stormwater gully:
  - The river terrace crest (red) shows some regression towards the landfill area.
  - It is understood that river terrace toe (green) and channel edge (blue) changes are due to riverbank reprofiling and the construction of an engineered river embankment.
  - A significant portion of the engineered river embankment has been eroded away when compared to construction drawings.
- For areas north of the landfill site, the river has notably shifted the channel edge (blue) and river terrace toe (green) to the west, where some vegetation loss has occurred upon river terraces.

4.2.2 Survey Cross-sections

Four survey cross-section profiles (section A, B, C, and D) that have been cut through the July 2021 and September 2023 digital elevation models (DEM) been measured. Significantly, the captures two known erosion events in 2022 have occurred between these dates.

The three survey measurements have been overlaid onto each individual cross-section output, and these show any changes to the surface profile over time. A plan showing the position of the survey transects and the individual section outputs are presented in Appendix B of this report.

General comments on the surface profile changes are presented below. It should be noted that the approximate landfill extent is represented as a solid green shape.

- Section A: It is understood that 2023 ground profiles reflect remedial works undertaken in December 2022, rather than slope profile changes due to river erosion.

- Section B: The riverbank shows no discernible regression at the crest. The riverbank toe appears to have regressed, but the amount is difficult to estimate due to the likely inclusion of vegetation within the survey. The existing slope angle is estimated to be approximately 35° to 45°.
- Section C: The riverbank crest and mid-slope area has regressed towards the landfill by approximately 1.5 m to 2.0 m as a result of the two 2022 erosion events that occurred between January 2021 and September 2023. The mid-slope has a slope angle of approximately 60°. The slopes toe location and slope profile (i.e. slope gradient) have undergone minimal change. The landfill area is indicated to be approximately 10 m from the slope crest.
- Section D: The riverbank shows no discernible regression at the crest. The riverbank toe appears to have regressed, but the amount is difficult to estimate due to the likely inclusion of vegetation within the survey. The existing slope angle is estimated to be approximately 40° to 50°.

5.0 Discussion

It is considered that regression of the river terrace crest indicates erosion that could lead to the exposure of landfill waste. The general mechanism for river terrace crest regression is summarised below:

- The river terrace slope is eroded at its toe and potentially undercut by a river channel located at its base.
- The slope gradient becomes steeper as slope failures occur due to the loss of support at the toe of the slope.
- Failures are commonly mid-slope leaving an overhanging portion near the crest, with time the over steepened slope regresses back to a shallower angle (typically 45°) as the overhanging crest also fails.
- Erosion and undermining occurs again at the toe repeating the process.

This process is considered to have occurred at cross-section profile Section C, where crest regression of approximately 1.5 m to 2.0 m is considered to have occurred as a result of two erosion events in 2022. It is uncertain whether crest regression occurred during both events or only occurred during one event.

Based on information contained within Section 3 and 4 above, the following estimates regarding flow rate frequencies and potential erosion regression rates can be conservatively assumed for the site.

5.1 Potential Flow Event Frequency

Considering the annual recurrence interval (ARI) of a 1,000 cumec flow event for the site is considered to be a 1 in 1-year to 1 in 2-year event, the site is:

- Likely to be exposed to a potential erosion event **at least once every 2 years**, and;
- possibly exposed to a potential erosion event **once every 1 year**.

5.2 Potential Erosion Regression Rate

Where existing river terrace slope gradients are over-steepened, the river terrace crest could potentially regress towards the landfill area at a conservative **rate of 1 m to 2 m** during an erosion event.

5.3 Estimate Exclusions

It should be noted that estimates described in sections 5.1 and 5.2 exclude the following events and scenarios which could affect estimates.

- A significant seismic event, which could cause direct river terrace slope instability and possible river dynamic changes.
- Heavy rainfall or overland stormwater run-off causing direct river terrace slope instability. Whilst remediation to prevent this erosion cause has been undertaken, it is anticipated that remediation works may be compromised at times as landfill removal commences.

6.0 Risk Matrix

The risk matrix presented in Table 5 below shows the risk of landfill exposure due to potential crest regression over time. The risk matrix has been compiled based on conservative estimates presented in section 5.

It is estimated that the eastern margin of the landfill waste footprint is situated at least 15 m back from the existing river terrace crest, with the majority of the landfill waste footprint situated at least 10 m from the existing crest, and some landfill waste situated within river terrace slopes near the stormwater gully area.

The Potential Crest Regression (m) amounts in Table 5 have been estimated from sections 5.1 and 5.2. Potential regression amounts are presented as ranges because they are dependent on the following:

- The amount of erosion events occurring over time (either 1 or 2 events every two years), and;
- the amount of actual crest regression that is likely to occur per event (estimated to be 1 m to 2 m per event).

As such, the potential crest regression accumulates over time as more events occur.

The Risk of Landfill Exposure presented in Table 5 has been categorised by colour, which are generally described as follows:

- Orange – A minority portion of the landfills eastern extent likely exposed.
- Light Red – A minority to a majority portion of the landfills eastern extent likely exposed.
- Deep Red – A minority portion to all of the landfills eastern extent likely exposed.

Table 5: Risk Matrix - Landfill Exposure due to River Terrace Crest Regression Over Time

Years	Potential Crest Regression (m) over time	Risk of Landfill Exposure
2	1 – 4	
4	2 – 8	
6	3 – 12	
8	4 – 16	
10	5 – 20	

6.1 Risk Matrix Conclusions

The risk matrix shows that river terrace crest regression will likely expose differing amounts of the known landfill footprint over time. Generally speaking, the longer the landfill footprint remains where it currently is, there is an increasing risk of landfill exposure that applies to a bigger proportion of the known landfill footprint.

Landfill waste situated close to the existing river terrace crests are considered the most at risk of exposure. Particularly, this applies to landfill waste situated within river terraces near the existing stormwater gully, and landfill waste situated at eastern margin of the known landfill footprint.

7.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Timaru District Council. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Timaru District Council**.** for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

PATTLE DELAMORE PARTNERS LIMITED

Prepared by

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Senior Engineering Geologist

Guus Rongen

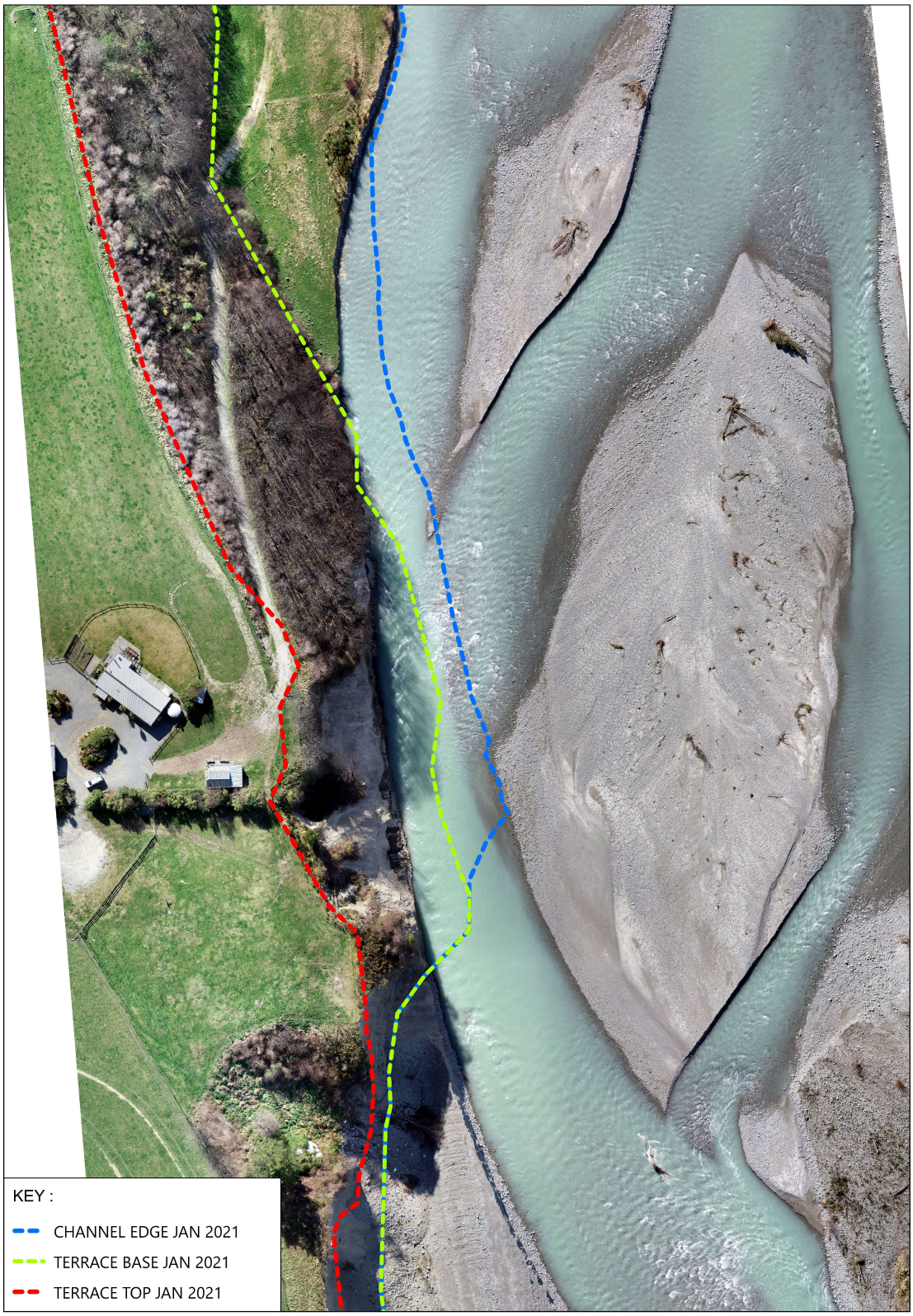
Senior Environmental Engineer

Reviewed & Approved by

Andrew Smith

Technical Director – Geotechnics

DENNISTOUN ROAD CLOSED LANDFILL, PEEL FOREST



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SEPTEMBER 2022 AERIAL PHOTOGRAPH

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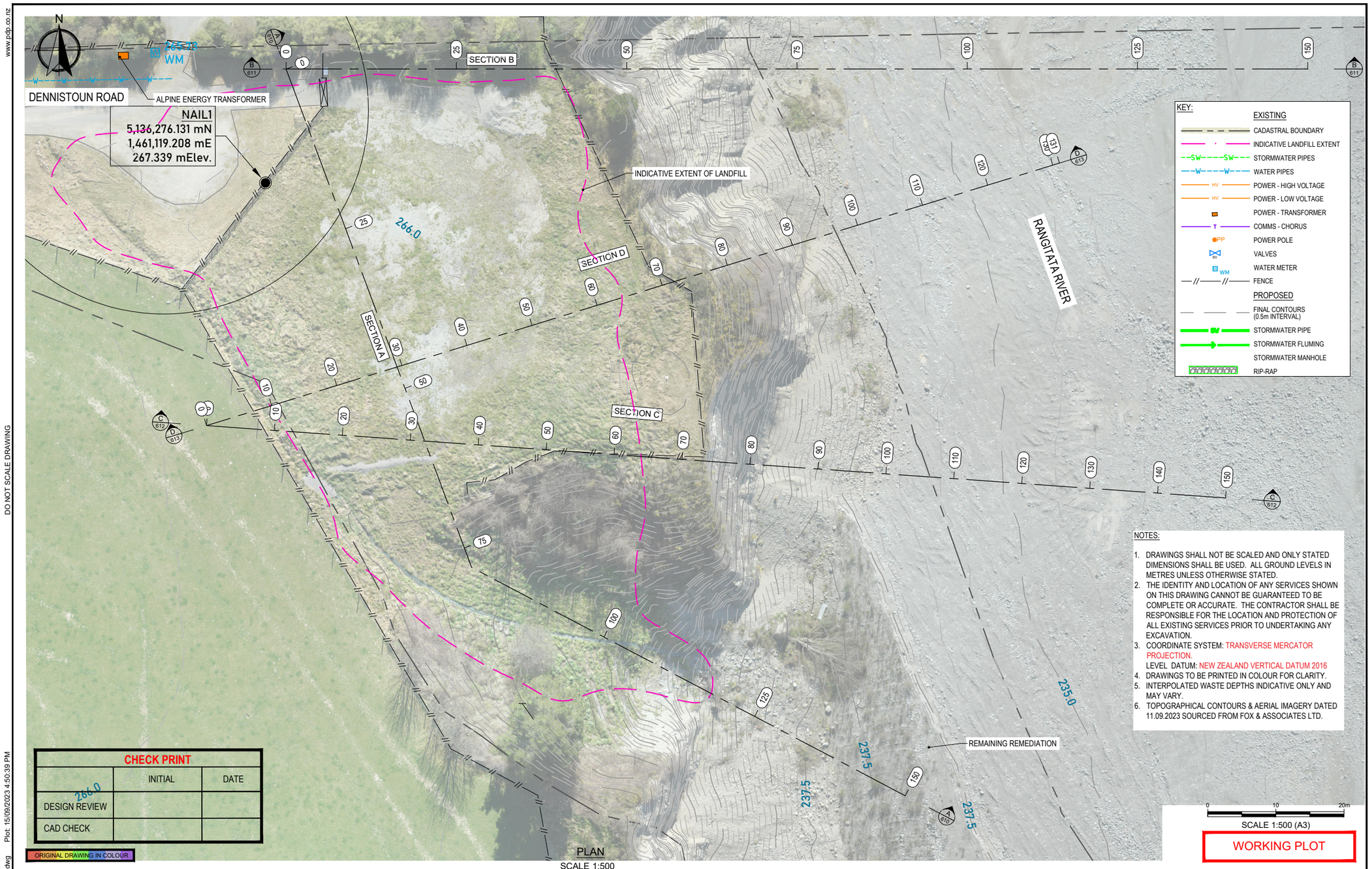

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PROJECT: PEEL FOREST LANDFILL

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SITE LAYOUT PLAN

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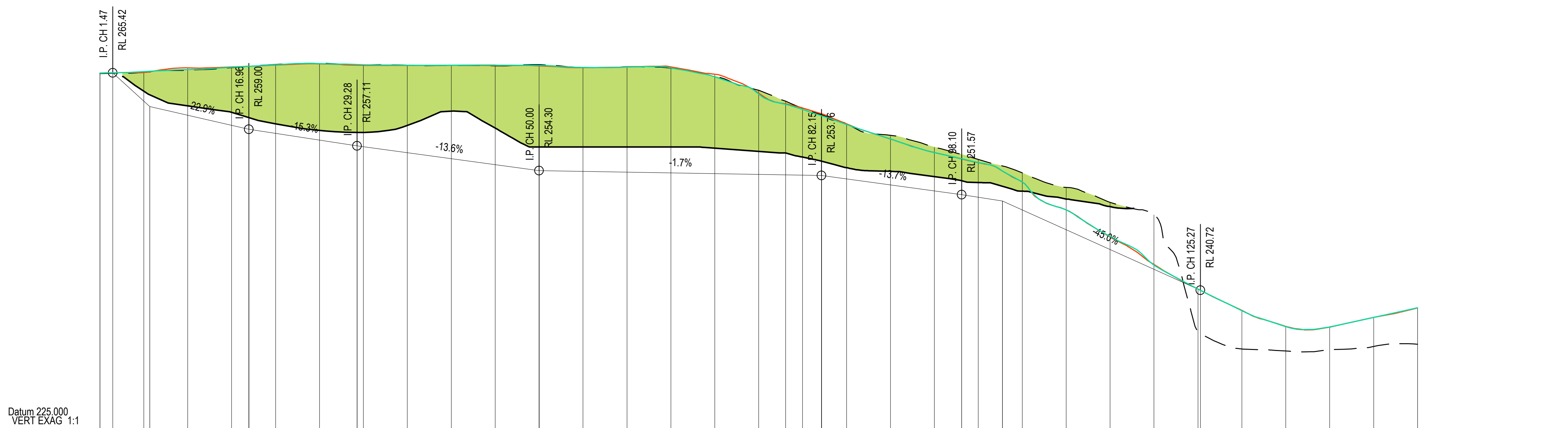

CHAINAGE (m)	GROUND LEVEL JANUARY 2021 (m RL)	LANDFILL BASE LEVEL JANUARY 2021 (m RL)	GROUND LEVEL MARCH 2023 (m RL)	GROUND LEVEL SEPTEMBER 2023 (m RL)
0.00	265.34		265.38	265.40
5.00	265.46	263.34	265.48	265.56
10.00	265.72	261.67	265.98	265.79
15.00	266.01	260.93	266.09	266.05
20.00	266.37	259.63	266.31	266.34
25.00	266.49	258.88	266.43	266.47
30.00	266.32	258.65	266.28	266.33
35.00	266.29	259.44	266.26	266.29
40.00	266.26	261.06	266.28	266.29
45.00	266.21	259.15	266.25	266.30
50.00	266.34	257.00	266.21	266.24
55.00	266.02	256.99	266.01	266.04
60.00	266.11	256.99	266.10	266.07
65.00	265.95	256.99	266.09	265.97
70.00	265.04	256.86	265.26	264.95
75.00	263.43	256.49	263.09	263.01
78.06				
80.00	261.40	255.84	261.43	261.26
85.00	259.62	254.64	259.62	259.54
90.00	258.31	254.25	257.90	257.90
95.00	256.98	253.63	256.36	256.36
100.00	255.58	252.96	255.21	255.23
105.00	254.05	251.97	253.00	253.03
110.00	252.40	251.08	249.85	249.83
115.00	250.71	250.23	246.78	246.84
120.00	249.30		243.65	243.56
125.00	236.03		240.86	240.85
130.00	234.05		238.44	238.40
135.00	233.83		236.63	236.58
140.00	233.98		236.54	236.56
145.00	234.34		237.64	237.65
150.00	234.58		238.72	238.74

SECTION A / 601
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WORKING PLOT

ORIGINAL DRAWING IN COLOUR

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LANDFILL SECTION A

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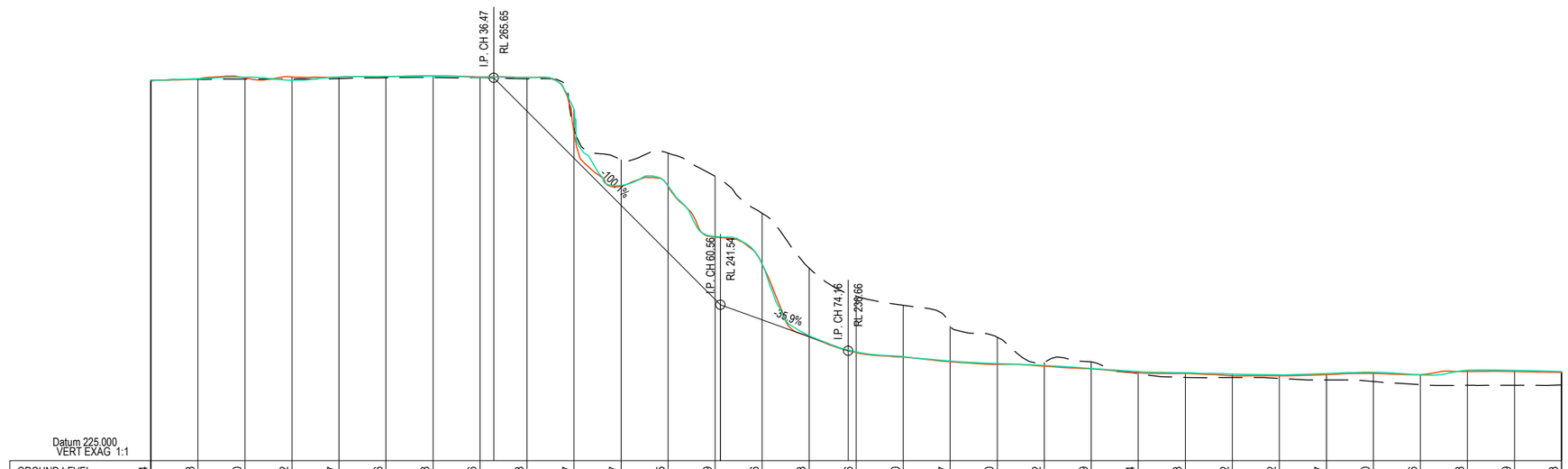

GROUND LEVEL JANUARY 2021 (m RL)	265.34	265.48	265.50	265.52	265.57	265.66	265.68	265.66	265.53	260.27	256.97	257.65	255.19	251.26	245.43	242.46	241.50	239.27	238.10	235.42	235.49	234.24	233.83	233.82	233.72	233.57	233.40	233.06	232.98	232.99	233.03
LANDFILL BASE LEVEL JANUARY 2021 (m RL)																															
GROUND LEVEL MARCH 2023 (m RL)	265.38	265.54	265.63	265.74	265.72	265.77	265.85	265.75	265.68	259.67	254.14	254.09	248.72	245.87	238.15	236.47	235.98	235.50	235.21	235.03	234.74	234.33	234.26	234.02	234.00	234.13	234.26	234.13	234.47	234.46	234.37
GROUND LEVEL SEPTEMBER 2023 (m RL)	265.40	265.55	265.71	265.40	265.72	265.78	265.82	265.69	265.67	262.27	254.21	254.17	248.80	245.87	238.28	236.54	236.04	235.57	235.31	235.11	234.79	234.45	234.33	234.19	234.11	234.23	234.38	234.11	234.60	234.59	234.46
CHAINAGE	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100.00	105.00	110.00	115.00	120.00	125.00	130.00	135.00	140.00	145.00	150.00

BUTTRESS SECTION B
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WORKING PLOT

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PATTLE DELAMORE PARTNERS

ace MEMBER

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PROJECT: PEEL FOREST LANDFILL

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LANDFILL SECTION B

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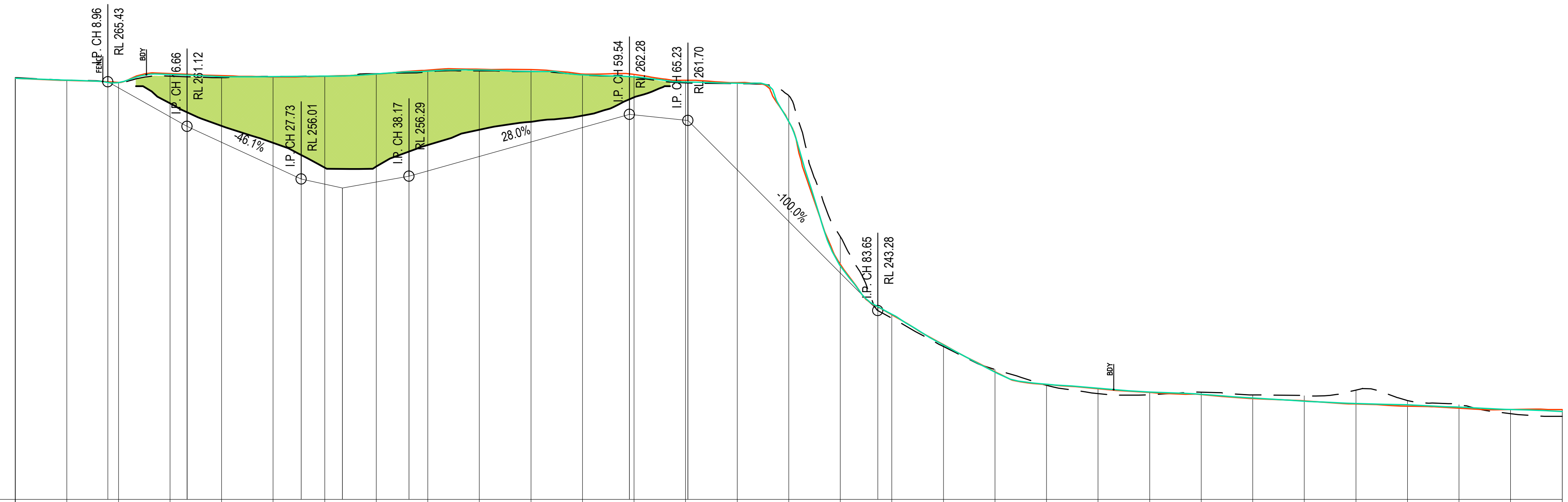

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VERT EXAG 1:1

CHAINAGE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
GROUND LEVEL JANUARY 2021 (m RL)	265.83	265.58	265.32	265.98	265.83	265.97	265.98	266.21	266.39	266.50	266.42
LANDFILL BASE LEVEL JANUARY 2021 (m RL)				265.00; 263.36	261.15	259.52	257.11	257.23	259.31	260.78	261.56
GROUND LEVEL MARCH 2023 (m RL)	265.83	265.58	265.32	265.98	265.83	265.97	265.98	266.21	266.39	266.50	266.42
GROUND LEVEL SEPTEMBER 2023 (m RL)	265.78	265.60	265.35	266.14	265.94	265.94	265.98	266.20	266.47	266.58	266.43

CHAINAGE (m)	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100.00	105.00
GROUND LEVEL JANUARY 2021 (m RL)	266.10	265.90	265.32	265.25	264.08	250.45	242.55	239.79	237.58	236.04	235.23
LANDFILL BASE LEVEL JANUARY 2021 (m RL)	262.15	263.94	265.00								
GROUND LEVEL MARCH 2023 (m RL)	266.10	265.90	265.32	265.25	264.08	250.45	242.55	239.79	237.58	236.04	235.23
GROUND LEVEL SEPTEMBER 2023 (m RL)	266.11	265.92	265.41	265.30	261.60	247.57	242.92	239.94	237.32	236.14	235.76

CHAINAGE (m)	110.00	115.00	120.00	125.00	130.00	135.00	140.00	145.00	150.00
GROUND LEVEL JANUARY 2021 (m RL)	235.14	235.37	235.12	235.05	235.57	234.57	234.17	233.29	233.03
LANDFILL BASE LEVEL JANUARY 2021 (m RL)									
GROUND LEVEL MARCH 2023 (m RL)	235.14	235.37	235.12	235.05	235.57	234.57	234.17	233.29	233.03
GROUND LEVEL SEPTEMBER 2023 (m RL)	235.39	235.17	234.82	234.51	234.28	234.15	233.92	233.70	233.51

BUTTRESS SECTION C/601
SCALE 1:500

0 10 20m
SCALE 1:500 (A3)

WORKING PLOT

ORIGINAL DRAWING IN COLOUR

Plot: 15/09/2023 6:46:23 PM

FILED: C02450100-GT-612.dwg

NO.	REVISION	DATE	APP.
	PRELIMINARY	15.09.23	
A	FOR DISCUSSION	27.03.23	SW

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

PATTLE DELAMORE PARTNERS

ace new zealand MEMBER

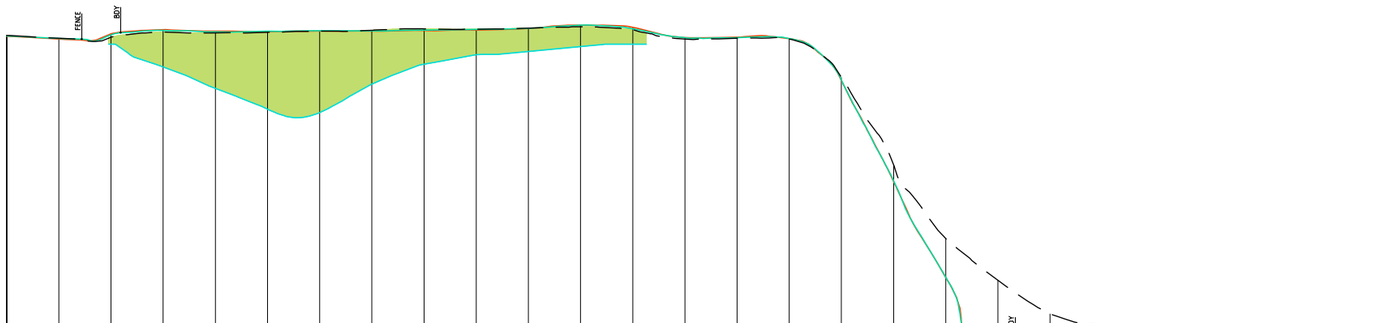
CLIENT: TIMARU DISTRICT COUNCIL

PROJECT: PEEL FOREST LANDFILL

DESIGNED	DESIGN REVIEW	DATE	APPROVED	DATE
DRAWN BM	DRAWING CHECK ----	DATE 15.09.23	THIS DRAWING IS NOT FOR CONSTRUCTION UNLESS SIGNED AS APPROVED	

LANDFILL SECTION C

SCALE :	DRAWING NO. :	REV :
AS SHOWN (A3)	C02450100-GT-612	B



Datum 225.000 VERT EXAG 1:1																														
GROUND LEVEL JANUARY 2021 (m RL)	265.83	265.57	265.67	266.17	266.08	266.13	266.23	266.33	266.47	266.44	266.54	266.66	266.38	265.49	265.56	265.50	261.82	253.47	246.38	242.38	239.18	237.96	234.23	235.04	235.13	234.87	233.89	233.75		
LANDFILL BASE LEVEL JANUARY 2021 (m RL)	265.83	265.57	265.67	266.17	266.08	266.13	266.23	266.33	266.47	266.44	266.54	266.66	266.38	265.49	265.56	265.50	261.82	253.47	246.38	242.38	239.18	237.96	234.23	235.04	235.13	234.87	233.89	233.75		
GROUND LEVEL MARCH 2023 (m RL)	265.76	265.50	265.98	266.38	266.24	266.20	266.26	266.24	266.32	266.36	266.51	266.82	266.61	265.62	265.67	265.52	261.52	251.86	242.66	236.58	236.10	235.72	235.25	235.11	234.77	234.62	234.20	234.08		
GROUND LEVEL SEPTEMBER 2023 (m RL)	265.78	265.55	265.88	266.31	266.17	266.25	266.28	266.27	266.34	266.41	266.52	266.82	266.47	265.62	265.62	265.53	261.55	251.93	242.68	236.65	236.14	235.73	235.32	235.16	234.82	234.65	234.27	234.20		
CHAINAGE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100.00	105.00	110.00	115.00	120.00	125.00	130.00	131.02		

SECTION D
SCALE 1:500 601

0 10 20m
SCALE 1:500 (A3)

WORKING PLOT

ORIGINAL DRAWING IN COLOUR

DO NOT SCALE DRAWING

Plot: 15/09/2023 6:29:09 PM

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NO.	REVISION	DATE	APP.
A	PRELIMINARY	15.09.23	

TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

PATTLE DELAMORE PARTNERS

ace MEMBER

CLIENT: TIMARU DISTRICT COUNCIL

PROJECT: PEEL FOREST LANDFILL

DESIGNED	DESIGN REVIEW	DATE	APPROVED	DATE
DRAWN BM	DRAWING CHECK	DATE 15.09.23	THIS DRAWING IS NOT FOR CONSTRUCTION UNLESS SIGNED AS APPROVED	

LANDFILL SECTION D

SCALE :	DRAWING NO. :	REV :
1:500 (A3)	C02450100-GT-613	A

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Memo

Date	4 March 2024
To	Timaru District Council
CC	Stephen Hall (Director Operations)
From	Leigh Griffiths (General Manager Field Operations)

Peel forest landfill risk

Timaru District Council has requested information from Environment Canterbury in regards to flood risk at an eroding landfill site at Peel Forest, Rangitata River. This information is attached along with a letter provided to Environment Canterbury from former CEO Bede Carran in 2021.

As well as addressing a long-term solution to this issue, Environment Canterbury strongly encourages Timaru District Council to include financial provision for maintenance of the short term in-river works in budget decisions if these are not provided for already. These in-river works are highly vulnerable and will likely not last a sustained moderate flood event or series of fast consecutive small events. These works were co-funded and carried out on the ground by Environment Canterbury as an act of good faith but the maintenance and responsibility for them sit with Timaru District Council. Environment Canterbury have not included maintenance of the Peel Forest site in our draft Long Term Plan budgets.

I am happy to attend your council meeting and speak to this matter if useful. Unfortunately, due to existing commitments I would need to attend via Teams/online.

Leigh Griffiths

Leigh Griffiths

Attachments:

1. **TDC letter to Environment Canterbury (2021)**
2. **Flood Risk Assessment, 26 February 2024**

TIMARU
DISTRICT COUNCIL
Te Kaunihera ā-Rohe
o Te Tihi o Maru

22 June 2021

Leigh Griffiths
Manager - Rivers at Environment Canterbury
Environment Canterbury
200 Tuam Street
Christchurch Central City
Christchurch 8011

By post and email: Leigh.Griffiths@ecan.govt.nz

Dear Leigh

Peel Forest Closed Landfill project

I am writing to provide confirmation of Council's commitment to address the closed landfill at Peel Forest, which experienced a breach of surficial waste in December 2019 as a result of the Rangitata River weather/flood event.

Council's Infrastructure Committee approved the resolution at the meeting of 24 November 2020 to:

1. *Additional funding of $500,000 to mitigate any further potential erosion of the closed Peel Forest landfill adjacent to the Rangitata River by:*

   (a) Commencing river engineering works to direct the main river channel away from the bank and forming a vegetated buffer at the base of the terrace;

   (b) Recap the landfill area at the top of the cliff to cover exposed rubbish and remove exposed rubbish on the terrace face.

2. *That the additional expenditure required for the landfill mitigation capital works be funded by loan.*

3. *The development of the long-term management plan for the closed Peel Forest landfill site and other closed landfills to reduce further risk exposure to be considered in the 2021-31 Long Term plan.*

2 King George Place - PO Box 522 Timaru 7940 - Telephone 03 687 7200 #1426955

Work completed to date has seen the development of the mitigation works as approved, subject to agreement with key stakeholders such as Arowhenua Rūnanga, Environment Canterbury, and Land Information New Zealand (LINZ) as the official landowners, and the inclusion of the long-term management plan in the draft Long Term Plan (LTP).

I can confirm that Council will keep its commitment to seeing through the development of the plan for Peel Forest in the first financial year of the 2021-31 LTP as stated, with the view of determining the permanent solution for Peel Forest that will be presented in a report to Council for a decision.

Timaru is grateful for the offer of financial assistance from ECan's Covid-19 "Keep it Safe" fund for the river works in the Rangitata to protect the river from having any further waste from the landfill spill into it in the case of a moderate flood event. We confirm that the $500,000 funding allocated is dedicated to this project. This will include investigative work at the site to help determine the recommendations to Council in 2022.

Timaru will be working closely with key stakeholders for this larger project around the long-term permanent solution for Peel Forest and the other closed landfills that are currently on our records. I welcome the opportunity for ECan to be part of that wider conversation as we work together to protecting the environment. We will be seeking central government support to help fund these legacy issues as all councils within Canterbury face similar problems, and collectively we can have a stronger impact on getting this support from Wellington if we work together.

Thank you for your offer of assistance with this project. I hope this letter gives you the assurance needed that Timaru is committed to protecting the environment from the risks posed in its closed landfills, and has provided for addressing it through its forward planning in the Long Term Plan 2021-31.

Yours faithfully

Bede Carran
Chief Executive

e. Bede.Carran@timdc.govt.nz
p. 03 687 7200

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

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26 February 2024

Timaru District Council
2 King George Place
PO Box 522
Timaru 7940

To whom it may concern

Flood Hazard Assessment – Comment on Erosion Risk to Peel Forest Landfill Dennistoun Road, Peel Forest

The following is a summary indicating the potential frequency of flows in the Rangitata River that may result in erosion adjacent to or into the Peel Forest Landfill area.

Context

Following the December 2019 Rangitata River flood event, and subsequent smaller floods, significant river management works have been undertaken to reduce the risk of erosion and flooding damage to the Peel Forest landfill. These works include use of gravel guide banks within the river, channel diversion works, gravel fill, and some planting, all of which are intended to guide flood flows away from the terrace edge on which the landfill sits and reduce potential for erosion of that site.

The works undertaken were considered by the design engineer (refer attached Memo Christensen Consulting) unlikely to be overtopped by floodwater in flows equal to or less than the 2019 flood flow (2300 cumecs at Klondyke). However, the most likely failure mechanism was considered erosion prior to overtopping which would be dependent on changes to the main river position and alignment during floods. The flows at which erosion may be an elevated risk were unspecified at that time, something this summary attempts to address.

The Rangitata River is a large, braided, mobile, gravel-bearing river. Changes to the river flow patterns and gravel distribution that occur during flood events make predicting the potential for erosion very difficult in specific locations. The river in this reach is steep, high energy (significant gravel movement) and generally highly erosive during flood times.

Flows that may have elevated erosion potential.

Environment Canterbury River works staff involved in overseeing the river management works in this area (and assessing and monitoring their performance thereafter) indicate the following estimates regarding the potential for erosion into the river works adjacent to the Peel Forest landfill. Before making these estimates, staff were able to include observation of the river works performance during multiple high flows for example 1430 cumecs (November 2022) which resulted in some damage to river management works, 900 cumecs in March 2023, and 675 cumecs in May 2023.

- At flows at or above 1200 cumecs at the Klondyke recorder there is a higher potential for flow paths to shift back toward the landfill site and cause erosion damage of river management works including guide banks.

Key Ref: 24024
Contact: Chris Fauth

- It would take significant time for flows in the vicinity of 1200 cumecs to erode through the works, meaning that flows would have to stay elevated for extended periods or a series of similar flows would have to occur in succession to threaten the landfill itself. This means that while a weakening of overall protection to the site may occur during flows at or about 1200 cumecs it is unlikely that a one-off occurrence of such a flood will reach the landfill itself.
- As flows increase above 1200 cumecs the likelihood of erosion occurring, and of that erosion causing more extensive damage to river works will also increase. As flows exceed 1500 cumecs erosion of management works is significantly more likely.
- Flows similar to the 2019 event (2000 cumecs or more) are likely to cause extensive erosion to in-river works and are more likely to significantly threaten erosion of the landfill site itself.

The above flows and comments are the best estimate of Environment Canterbury staff with knowledge of the river and river works in the area. It is important to understand that the unpredictable nature of the Rangitata River in this reach is such that lateral erosion damage to river management works could occur at lower flows if unanticipated changes occur to flow patterns upstream of the site during a flood.

It is also important to note that a succession of subsequent high flow events may have the ability to cause increased erosion damage in the area and threaten to expose the landfill site. If an initial high flow opens up/alters flow paths within the river to direct these more toward the gravel guide bank, terrace and landfill, subsequent flows may cause increased damage even if those flows are lower than the above estimates. Expensive repair/re-establishment of in-river works with heavy machinery may reduce this risk post damaging floods, but such works come with no guarantee of success and may not always be possible if high flows occur in succession. The clearest example of this was the very damaging 2019 flood event which peaked at 2300 cumecs on 7 December but was preceded by 3 flows of 400 cumecs early in November of that year, a flow of 1030 cumecs on 3 December and a flow of 940 cumecs on 5 December.

The Environment Canterbury contributions toward the river management works in this area of the river were from a one-off funding source and Environment Canterbury has no planned budget for further in-river works specific to the landfill site.

Flow Probability Estimates

Rangitata River flows that reach or exceed 1200 cumecs at the Klondyke recorder have occurred 17 times in the last 40 years (1984 – 2024). Of the 17 flows that reached 1200 cumecs, 12 exceeded 1500 cumecs and 5 exceeded 2000 cumecs. Based on this:

- A flow that poses a higher threat of erosion damage to river management works associated with the landfill site (1200+ cumecs) may have an Average Recurrence Interval (ARI) of about 2 years.
- A flow that is likely to cause erosion damage to river management works (1500+ cumecs) may have an ARI of around 3 - 3.5 years.
- A flow likely to cause extensive river works damage and significantly threaten the landfill site in a single event (2000+ cumecs) may have an ARI of around 8 years.
- The occurrence of elevated flows in quick succession has the potential to increase erosive potential and threat to the site while also limiting the potential for mitigation/post flood repair (notwithstanding the significant cost of such works).

Note: Average Recurrence Interval (ARI) represents the average time period between floods of a certain size.

When using the information provided in this letter it is important the following points are understood:

- The information provided is the best information Environment Canterbury has at this time.
- Environment Canterbury's understanding of flooding at the property may change in the future as further investigations are carried out and new information becomes available.
- This is a highly dynamic reach of the Rangitata River and there is uncertainty in predicting flow impacts, particularly at a very specific location. Unpredictable changes in flow patterns may occur within the riverbed in smaller floods than those referenced in this letter, resulting in erosion in the area.

The prediction of flooding and erosion requires many assumptions and is not an exact science.

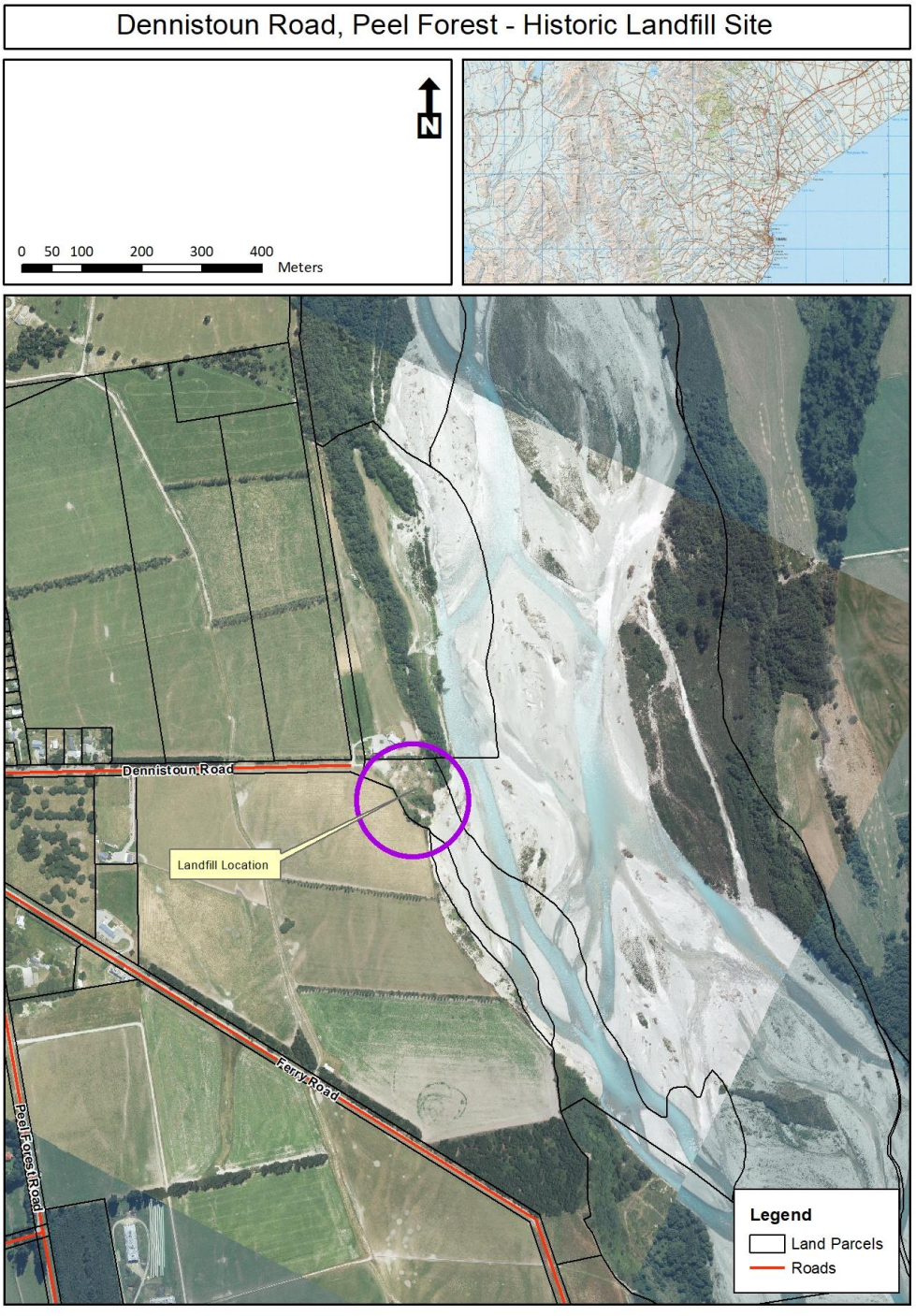
I hope this information is of assistance. Please do not hesitate to contact me if you require any clarification.

Yours sincerely

Chris Fauth
Senior Scientist (Natural Hazards)

Attachments:

- Aerial photograph showing location of the property.
- Google maps (more recent) aerial photograph indicating some of the river management work that has occurred adjacent to the landfill site
- Pages 1 – 2 of 26 March 2021 Christensen Consulting Ltd Memo regarding "Peel Forest Landfill – Proposed River Management Works"



Aerial photograph taken prior to much of the in-river protection works undertaken.

Aerial photograph showing channel alignment changes and in-river guide banks (google maps).

CHRISTENSEN CONSULTING LTD
Kyle Christensen
Rivers & Stormwater Engineer
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MEMO

DATE 26 March 2021

TO Vincie Billante

RE Peel Forest Landfill – Proposed River Management Works

This memo provides a summary of the basis of design for the proposed river management works to reduce the risk of erosion at the Peel Forest Landfill. Drawings of the proposed works along with an approximate cost estimate are also provided.

Description of Issue

The Rangitata River has been eroding the right bank river terrace at Dennistoun Road where a historic landfill is located. Further erosion of this terrace could result in exposure of the waste and contamination of the river.

Evaluation of Options

Two general options have been considered for managing the risk of further river erosion.

- Rock Groynes;
- River Management.

A series of four 750 tonne rock groynes were considered as an option for directing the river away from the terrace. Rock groynes would be reasonably effective in small to moderate floods but the dynamic nature of the Rangitata River at this location means that the rock groynes would be at risk of being outflanked upstream and also have the potential for sharp channel crossovers to erode in-between them. The outline cost estimate of these rock groynes was circa $1.5M. Due to the risk of failure and high cost associated with this option it has not been pursued any further at this stage.

A river management option has also been considered which was based on extracting gravel from a centrally located beach to direct flood flows into the middle of the river corridor and away from the right bank. The extracted gravel would be placed at the base of the terrace in the shape of gravel groynes or an open-ended embankment and be integrated with willow planting. This option would also be at risk of failure but could be relatively easily repaired and added to with future placement of gravel. The success of the establishment of the willows would be dependant on the river not experiencing any large floods for 3 – 5 year period and rely on the active channel not flowing directly into the willows. The outline cost estimate for this option was $0.4K.

The river management option was selected as the preferred option for further consideration. A drone based topographical survey was completed on 25 January 2021 to be used for generating design drawings and estimating the quantities required for the works.

Preferred River Management Option

The preferred river management option has been developed through consideration of the local river morphology adjacent to the landfill and providing a means for guiding the river away from the toe of the terrace on which the landfill is located.

The river is not currently flowing along the base of the terrace and has cut down several metres into an active channel that is approximately 100 m away from the landfill toe. To further encourage the river to stay in a more central location the large gravel beach in the middle of the overall river corridor can be cut down and shaped in a way that would encourage a further secondary channel to form during a flood. This more central channel could be very temporary with subsequent floods reshaping this area and potentially directing the river elsewhere. Nonetheless, it is considered a useful location to extract material and to then use that extracted material to construct an open-ended gravel guidebank in front of the eroding terrace and landfill.

The location of the guidebank is approximately in line with the upstream terrace and extends for 230 m downstream. It is for the purpose of directly floodwaters downstream without eroding the toe of the terrace at the base of the landfill. The upstream end ties in with the existing terrace at 240 mRL and is somewhat protected by the existing upstream vegetated terrace. The guidebank crest slopes down to 237 mRL at its downstream end and then down to the existing river bed at 3.5:1 slope. Space has been left at the base of the terrace to allow existing stormwater discharging off the terrace to flow around the back of the guidebank and out the downstream end.

Based on the current river bed morphology and main channel position the guidebank is not likely to be overtopped during an event equivalent to the December 2019 flood which was approximately a 20-year return period flood peaking at 2300 m^3/s. The most likely failure mechanism will be erosion prior to overtopping and this will be dependent on changes to the main channel position and alignment during floods. As previously discussed, the extraction of gravel from the centre of the river will likely provide some relief in this regard.

To further protect the guidebank from erosion, willow planting could be undertaken on the river side of the guidebank. This would be particularly vulnerable for the first 3-5 years while being established but could in time provide a useful buffer from the erosive forces of the river.

Design drawings showing the guidebank location and geometry as well as the area of the central beach to be extracted are attached to this memorandum. The required volume of material required to construct the guidebank has been calculated at 30,000 m^3. There is sufficient cut within the area identified for extraction to provide this volume of material. An updated cost estimate is also attached.

It has been assumed that this work can be under the Environment Canterbury permitted river works activities.

I trust the above adequately covers the requirements for this stage of the project and I look forward to working with Timaru District Council to see this project through construction.

Prepared by

Kyle Christensen

Director - Christensen Consulting Limited

ATTACHMENTS

AORAKI ENVIRONMENTAL CONSULTANCY LTD

1 March 2024

Jacky Clarke
Programme Delivery Manager
Timaru District Council
Timaru

[*delivered to: jacky.clarke@tdc.govt.nz*]

Kia ora Jacky

PEEL FOREST LANDFILL – RIVER EROSION RISK ASSESSMENT

Thank you for providing the opportunity to review the work undertaken Pattle Delamore Partners Limited (PDP) to assess the risk erosion to the terrace from high flow conditions in the Rakitata River (dated 28 February 2024). We anticipate the question is being asked to assess the risks to delay or halting the removal of the Peel Forest Landfill.

Te Rūnanga o Arowhenua has been clear that it supports an approach which results in the complete removal of the landfill. Arowhenua understands that removal of this landfill comes at a considerable cost to the Council and by association the community. However, the PDP assessment states the longer the landfill remains the risk of landfill exposure increases. This increases the risk to the health of the Rakitata as a result.

As has been done to date, we anticipate continued engagement with any discussions arising from this PDP assessment.

Please contact the undersigned in the first instance if you have any questions or require further clarification.

Ngā mihi

Ally Crane
General Manager
Aoraki Environmental Consultancy Limited
Mobile: 027 622 3460 | Office: 03 684 8723

PATTLE DELAMORE PARTNERS LTD
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Christchurch Central, Christchurch 8011
PO Box 389, Christchurch 8140, New Zealand

Tel+64 3 **345 7100**
Web **www.pdp.co.nz**

28 February 2024

Jacky Clarke
Programme Delivery Manager
Timaru District Council
PO Box 522
Timaru 7940

Dear Jacky

COST IMPLICATIONS OF A STAGED REMEDIATION APPROACH – PEEL FOREST CLOSED LANDFILL

1.0 Introduction

PDP is currently in the process of preparing the resource consent applications and associated documentation for the remediation of the Peel Forest Closed Landfill. Remediation has been deemed necessary in response to recent flood events in the Rangitata River causing instability and collapse of the 30 m high river terrace, in which the landfill is located, resulting in some landfill waste becoming exposed and released into the Rangitata Riverbed. Emergency interim remediation and river engineering works have been undertaken to reduce the immediate threat of the potential loss of additional waste material, however, these are only temporary mitigative measures and could still be overcome by future flood/rainfall events.

A Remedial Options Assessment[1] was prepared to identify and recommend an option (or combination of options) that meets most (if not all) remedial goals and objectives for the landfill. Remedial options considered included take no action, in-situ management and engineered controls, partial removal of the landfill body and complete removal of the landfill body. The resulting recommendation was complete removal of the landfill body as it aligns with the most positive outcomes for human health and the receiving environment and eliminates future liability to the Council.

A query was raised at a Council Infrastructure Committee meeting on 13 February 2024 regarding whether the remediation and removal of the landfill could be staged so as to spread the cost over a longer time period. PDP was engaged by Timaru District Council (TDC) to provide a high level assessment of cost implication should the Peel Forest Closed Landfill remedial works be completed in a staged approach over a number of years rather than all at once. At the request of TDC, the staging scenarios being considered for the purposes of this assessment are:

1. Complete Removal of Landfill Body in 1 Stage (2024-2025) – Current recommended option. It has been assumed the remedial works will be completed in one stage commencing in 2024.

[1] Pattle Delamore Partners Limited, September 2023. *Remedial Options Assessment: Peel Forest Closed Landfill, Dennistoun Road, Peel Forest*

2. Staged Removal of Landfill Body in 2 Stages over 10 years - It has been assumed the two stages will occur approximately 10 years apart, the first stage commencing in 2024 and the second stage commencing in 2034.

3. Staged Removal of Landfill Body in 4 Stages over 10 years - It has been assumed the 4 stages will occur approximately 3 years apart, with each stage commencing in 2024, 2027, 2030 and 2033.

2.0 Considerations and Assumptions Associated with Staging Remedial Works

A number of factors have been considered if a staged remedial approach is adopted based on the fact the landfill waste (or portion of) will be left in situ for a longer period of time and the associated risks and costs in doing so. There will be additional costs for ongoing monitoring and management of the waste as long as there is waste left in situ. A number of assumptions have been made for the purposes of assessing cost implications for adopting a staged approach and these are shown in bold in Table 1.

Table 1: Considerations and Assumptions

Consideration	Comments and Assumptions
Fluvial Flood Events	Observations of the terrace edge receding over the past four years suggests that further erosion of the river terrace as a result of future flood flows will likely occur in the future. Three flood events in 2019 and 2022 have been observed to have caused significant erosion of the river terrace adjacent to the landfill. As a result, two separate river remedial works have been undertaken to date to address the immediate risk to the landfill. These measures are still considered temporary and could be overcome during future flood events. A longer remediation timeline will increase the likelihood of a weather event occurring that leads to erosion of the river terrace requiring further emergency remedial works to be undertaken to continue to protect the landfill from being exposed. A risk assessment for the likelihood of a flood event occurring and the associate consequence has been prepared separately. **It has been assumed that:** ⁘ **The frequency of a flood event occurring that threatens the landfill and requiring immediate emergency works is difficult to predict with any certainty, but given two phases of river engineering works to divert river channel away from the landfill have been required within the last 4 years, it has been assumed that remedial works would be required every 3 years over the course of the 10 year staged remediation programme.** ⁘ **Costs relate to undertaking emergency remedial river works to protect the landfill only. There has been no cost included for any cleanup works related to the exposure and release of waste into the river (i.e. assumes that no waste is lost to the environment). Incorporating cleanup costs would be too difficult to predict and beyond the scope of this assessment.**

	⁘ **$500,000 present day value has been used per emergency river remedial works event. This is consistent with the costs for the works completed to date.**
Temporary Management and Mitigation Measures	Ongoing monitoring of the landfill will be required between each of the staged works until the landfill has been removed in its entirety. This includes inspections after fluvial flood events in the Rangitata River, local catchment rainfall events (i.e. overland flow over the landfill) and local earthquakes at a minimum. **It has been assumed that:** ⁘ **3 monitoring visits per year will be required over the staged remedial programme.**
Duration of the works	Completing the work in stages will result in additional time on site to establish and disestablish the work site as well as to import and place temporary cover and form the temporary landforms that are to remain between stages to secure the area. **It has been assumed that:** ⁘ **The total duration of the remedial work is assumed to be 9-12 months if being removed as a single stage. This has been divided equally in the staged scenarios with an additional 1 month added for each stage for re-establishment, placing temporary cover and de-establishment.**
Volume of Waste	The total volume of in situ waste is estimated to be approximately 18,000 m^3. Over excavation into the underlying natural soils has been allowed for to remove any impacts of leaching (estimated at an additional 5,000 m^3). **It has been assumed that:** ⁘ **The volume of waste to be disposed of will be divided equally between stages.** ⁘ **Density is approximately 1.6 tonne/m^3, therefore 28,800 tonnes of waste has been used to estimate disposal costs for the waste itself.** ⁘ **An over excavation depth of 1 m will be required to remove impacts of leaching from landfill waste. Assuming the same density, this equates to an additional 8,000 tonnes requiring offsite disposal.** ⁘ **Assumes 100 m^3 of additional material to be disposed of as a result of placement of imported temporary cover for each stage (disposed of at Frews).**
Offsite Disposal Facilities	Offsite disposal facilities are based on current plans whereby the majority of the waste will go to Redruth landfill, with the remaining material going to Frews operated Hororata Managed Fill where test results indicate this is suitable.

	It has been assumed that: ⁘ **70% of the landfill waste will be disposed of at Redruth Landfill, and 30% will be suitable for disposal at Frews operated Hororata Managed fill. This has a cheaper disposal rate, although will require additional soil characterisation to confirm material meets its acceptance criteria.** ⁘ **The Redruth Landfill disposal rate of $312.50/tonne used in preparing these high level cost estimates was provided by TDC in a phone call on 20 February 2024. This may reduce to $172.50 if they can negotiate a deal whereby no waste levies will be charged for this material. As negotiations are still in progress a worst case scenario was adopted. Any rate changes over the 10 year period are assumed to be in line with inflation.** ⁘ **The current Hororata Fill disposal rate of $110/tonne has been adopted and no significant changes have been assumed aside from the inflation rate.** ⁘ **There will be capacity at each landfill option over the next 10 years.**
Temporary Cover Requirements	For a staged remediation approach, the waste exposed in cut faces at the end of each stage will need to be covered with clean, imported material to provide a stable, maintainable landform and minimise water ingress through the remaining waste. This temporary cover will facilitate plant growth as required, control water ingress and reduce leachate generation. **It has been assumed that:** ⁘ **A geotextile marker layer (i.e. bidim cloth) will be laid across the exposed waste at the end of each stage.** ⁘ **Temporary cover of 0.3 m thick imported pit run with some topsoil will be placed. Note this thickness is not in line with landfill capping specification as this is considered to be a temporary cover only.** ⁘ **The temporary cover will be grassed.**
Temporary Landform Design	The temporary landforms between remedial stages will need to be designed with input from geotechnical and stormwater engineers to ensure slope stability, and suitable stormwater flow pathways. **It has been assumed that:** ⁘ **Additional technical input of 1 to 2 weeks per stage will be required to ensure appropriate design and formation of the temporary landform.** ⁘ **No surveying of temporary landforms has been allowed for. A subcontractor will be engaged to survey the final landform.**
Leasing of Land	It is proposed to lease land from the neighbouring property for a contractor's yard to facilitate the remedial works. Consideration will be needed as to how

	this would work with a Staged approach. Additional costs could be expected from additional establishment/disestablishments of the yard (i.e. including temporary fencing, site facilities, validation testing of soils to demonstrate no cross contamination has occurred during each stage, re-seeding the area each time as required etc). A risk would also remain that the landowner will not want to commit to leasing land in future, or the landowner could change in time and new agreements would need to be arranged. **Note:** **Costs associated with leasing the land have not been included in this assessment. This is due to no contract having yet been established. The costs are not expected to be significant. The biggest risk would be if the land is not available for use. This cannot be quantified as a cost.** **It has been assumed that:** ∴ **Fencing and materials imported to form the subcontractors yard can be retained on site between remediation stages.**
Public Perception	Media interest in the project to date has reported that council supports full removal of the refuse[2] and this has also been communicated to the local Peel Forest community. Early liaison with the local community would be prudent to inform them of how a chosen staged approach will look. This risk isn't quantifiable but consideration should be given to how TDC may be perceived if a staged approach is adopted.
Waste Levy	As it stands the expansion for the waste levy will be complete July 2024. The expansion of the national waste levy is part of the Government's wider plan to reduce the waste volumes entering landfill. The possibility that future governments will introduce schemes that further increase disposal costs should be considered. **It has been assumed that:** ∴ **No changes to the current waste levy scheme will occur over the next 10 years.**
Roading modifications / maintenance	No costs have been included for any roading modifications or maintenance over the period of the staged works.
Inflation	Future inflation rates are difficult to predict but can be assumed to increase, resulting in increased costs for time and materials required for remedial works. As of January 2024, the annual inflation is 4.7 %[3]. The Reserve Bank of New Zealand's target range of inflation is 1-3 %.

[2] Stuff Article dated 3 April 2023: https://www.stuff.co.nz/timaru-herald/news/131678032/heightened-risk-remains-that-closed-peel-forest-landfill-may-be-exposed

[3] Stats NZ, accessed on 21 February 2024: https://www.stats.govt.nz/news/annual-inflation-at-4-7-percent/#:~:text=The%204.7%20percent%20increase%20follows,senior%20manager%20Nicola%20Growden%20said.

	It has been assumed that: ⁘ **Inflation rate will be on average 4% for the next 10 years to cover time and materials costs unless otherwise stated. This is below current levels but rates have recently been reducing. This value exceeds the Reserve Bank of New Zealand's current target range and also exceeds the majority of rates recorded over the last 20 years, so it is considered to be relatively conservative.**
Project Team Discontinuity	A longer project duration will increase likelihood of personnel familiar with the project moving on, and additional time will be required to bring new staff up to date with project requirements. **It has been assumed that** ⁘ **Some staff will change between each stage and an additional 2 weeks of technical specialist time will be required to familiarise new staff with the project.**

3.0 High Level Cost Estimate (Excl. GST) and Comparison by Remedial Option

A high-level estimate of costs has been prepared based on the considerations and assumptions presented in Table 1 for the three scenarios. These are presented in Table 2 below. These have been prepared assuming an annual inflation rate of 4%. External contractor costs are based on rates provided to PDP for the interim remedial works. It should be noted that the site remedial works is going to tender, and contractors may approach costings differently in that situation. The removal of waste levies could also make a significant change to the costs.

The highest cost item (approximately 70% of the overall cost) is related to the disposal of the waste/soil so the final costs will be very sensitive to any changes to the disposal rates. Therefore, any significant changes to the disposal rates at Redruth or Frews, or any initiatives such as increased levies from the Government could have significant consequences to the overall costs, particularly those further away in time. At this stage only a 4% inflation rate has been used over the 10 year period for account cost increases for disposal.

The estimated costs below do not account for the increased level of risk and liability to Council for leaving the waste in-situ for a longer period of time and the potential for a rainfall event to erode the river terrace and expose the landfill. It is important to point out that there have been no costs included for any cleanup works if waste was to enter the environment. This could be significant. There has also been no quantifiable cost associated with the public and other key stakeholders reactions to moving to a stage approach for remediation of the site. All of these factors will need to be considered when making a decision for the remediation of the site.

Table 2: High-level Direct Cost Estimate and Comparison (Excl. GST) by Remedial Option

Cost Categories	Remedial and Management Options							
	Key Tasks	Option 1: Complete Removal of Landfill Body (1 Stage)	Option 2: Staged Removal of Landfill Body (2 Stages)		Option 3: Staged Removal of Landfill Body (4 Stages)			
		2024	2024	2034	2024	2027	2030	2033
Specialist Support (Including Contaminated Land, Geotechnical and Water Infrastructure Engineers)	**Geotechnical and Contaminated Land Services** – Includes: ⁘ Health and Safety ⁘ Staff accommodation ⁘ Regulator and Client Consultation, and Technical Specialist Coordination ⁘ Benchmark Soil Sampling ⁘ Air monitoring ⁘ Remediation Oversight (Monitoring of RAP Controls, Validation Observations, Record Keeping, Site Reinstatement, Project Oversight) ⁘ Consumables/Purchases/Field equipment ⁘ Remediation Validation Reporting ⁘ Final landform Reporting. Fees include technical and senior (SQEP) review/sign-off	*$410,000*	*$215,000*	*$353,500*	*$102,500*	*$159,000*	*$206,000*	*$258,500*
Laboratory Costs	Includes: ⁘ Benchmark soil sampling ⁘ Stockpile sampling ⁘ Asbestos air monitoring ⁘ Validation soil sampling	*$70,000*	*$35,000*	*$57,000*	*$17,500*	*$25,000*	*$33,000*	*$42,000*
Remediation Earthwork Subcontractor and Waste Disposal	**Remedial Earthworks** – Includes: ⁘ Health and Safety ⁘ Enabling works (mobilisation, site set up, haul road construction, erosion, sediment, stormwater controls) ⁘ Excavation Works, Haulage of Waste to Redruth Landfill and Hororata Landfill ⁘ Disposal costs (waste and soil) ⁘ Site Reinstatement (sourcing Cleanfill, Topsoil, Earthworks, etc.) ⁘ Consumables/Purchases/Gear ⁘ Demobilisation	*$11,628,000*	*$5,927,000*	*$8,675,000*	*$3,078,000*	*$3,359,000*	*$3,778,000*	*$4,254,000*

Table 2: High-level Direct Cost Estimate and Comparison (Excl. GST) by Remedial Option

Cost Categories	Remedial and Management Options							
	Key Tasks	Option 1: Complete Removal of Landfill Body (1 Stage)	Option 2: Staged Removal of Landfill Body (2 Stages)		Option 3: Staged Removal of Landfill Body (4 Stages)			
		2024	2024	2034	2024	2027	2030	2033
Ongoing Mitigation and Management Measures	Includes: ⁘ Site inspections after an event occurrence ⁘ Emergency river remedial works	*$2,000*	*$2,000*	*$1,960,250 over 10 year period (3 emergency events)*	*$2,000*	*$577,600*	*$649,750*	*$730,900*
Total Estimated Cost		**$12,110,000**	**$6,179,000**	**$11,045,750**	**$3,200,000**	**$4,120,600**	**$4,666,750**	**$5,285,400**
			$17,224,750		**$17,272,750**			

4.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Timaru District Council others (not directly contracted by PDP for the work), including Frews Contracting. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Timaru District Council for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

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Reviewed and Approved by

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Technical Director

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Remedial Action Plan – Peel Forest Closed Landfill, Dennistoun Road, Peel Forest

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Prepared for

Timaru District Council

February 2024

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Quality Control Sheet

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Limitations:

This Remedial Action Plan (RAP) has been prepared on the basis of information provided by Timaru District Council (and others not directly contracted by PDP for the work). PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the RAP. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This RAP has been prepared by PDP on the specific instructions of Timaru District Council for the limited purposes described in the RAP. PDP accepts no liability if the RAP is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

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Acronyms

ACM	Asbestos containing material
AFM	Airborne fibre monitoring
ARCP	Asbestos Removal Control Plan
COCs	Contaminants of concern
DMMP	Dust Management and Monitoring Plan
DSI	Detailed Site Investigation
ECan	Environment Canterbury
LARC	Licensed Asbestos Removal Contractor
LEL	Lower explosive limit
LFG	Landfill gas
LWRP	Land and Water Regional Plan
m bgl	Metres below ground level
MfE	Ministry for the Environment
OCP	Organochlorine pesticides
PACM	Presumed asbestos containing material
PAH	Polycyclic aromatic hydrocarbons
PDP	Pattle Delamore Partners Limited
PPE	Personal protective equipment
NESCS	*Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011*
RAP	Remedial Action Plan
ROA	Remedial Options Assessment
SQEP	Suitably Qualified and Experienced Practitioner
TCLP	Toxicity Characteristic Leaching Procedure
TDC	Timaru District Council
TPH	Total petroleum hydrocarbons
TSRC	Target Soil Remedial Criteria
VENM	Virgin Excavated Natural Material

1.0 Introduction

Pattle Delamore Partners Limited (PDP) has been engaged by Timaru District Council (TDC) to prepare a Remedial Action Plan (RAP) for the remediation of the Peel Forest Closed Landfill (also referred to as the Dennistoun Road Landfill) located at the eastern end of Dennistoun Road, Peel Forest (i.e., 'the site' or 'the landfill'). The landfill is accessed via Dennistoun Road from Peel Forest Road. The location of the landfill, key features, and the immediate surroundings are shown in Figure 1, Appendix A.

The landfill, which is currently vacant, covers an estimated total area of 5,025 m^2. This is comprised of 'the main landfill area' (3,420 m^2) and 'the gully area' (1,605 m^2). Multiple flood events in the Rangitata River between 2019 and 2023 caused erosion of the terrace toe resulting in instability of the terrace and subsequent and ongoing collapse of the 30 m high terrace in which the landfill is located. This has resulted in landfill waste becoming exposed on the face of the terrace in the area of the gully with some waste falling onto the riverbed below. The most significant flood flow event of the past several years occurred in early December 2019 with what was considered a 1 in 20-year event generating a peak flow of 2,300 m^3/s; however, other events (e.g., July and August 2022) and overland stormwater flow through the gully area have also resulted in additional terrace edge erosion, exposing more waste and resulting in additional waste material falling onto the riverbed.

Emergency interim remediation and stabilisation works have been undertaken to reduce the immediate threat of the potential loss of additional waste materials into the Rangitata River and/or riverbed, however, these are only temporary mitigative measures and could still be overcome by future flood/rainfall events. These include pulling the waste back from the eroding edge as well as river engineering works to stabilise the terrace toe and redirecting the river flow away from the terrace. A remedial options assessment (ROA) prepared by PDP (2023b) has identified the preferred remedial option for the landfill to be 'Complete Removal of Landfill Body'. This option eliminates the long term liability of the landfill being exposed by future flood events, particularly given the powerful and dynamic nature of the Rangitata River and unpredictability of when the next flood event may occur.

This RAP details the general methodology and controls requirements for the excavation, handling and off-site disposal of landfill materials (including consideration for protection of human health), as well as reinstatement principles and concepts.

2.0 Background

The site was used as a municipal landfill from c.1962 to 2004 and received waste from the local and surrounding settlements. Historical aerial images from the 1960s suggest landfilling originally occurred on top of the terrace, before starting to fill the original gully that existed in the area. Over time waste appears to have been pushed further down the gully with some waste rolling/extending down the gully a

considerable distance. Since the landfill closure, the site has been used for grazing horses (up until 2020). The gully area has remained disused and overgrown. The main landfill area, which includes a portion of the turnaround and parking area at the end of Dennistoun Road, sits on a 30 m high terrace of the Rangitata River (i.e., the Rangitata).

The site is fenced along the western extent from the northern to southern boundary. Entry into the site is gained through a gate in the northwestern corner. Fencing once present along the eastern boundary of the main landfill area has been compromised by land erosion.

Interpretation of the geophysical survey carried out at the main landfill area by Southern Geophysical (2021)[1] indicates that landfill waste could range in depth from 6 to 9 metres below ground level (m bgl) over the main landfill area. The thickness of waste further down the gully was found to range from a shallow layer to meters thick in places. An engineered landfill final cover is not known to have been placed when the landfill was closed.

The slope of the main landfill area naturally grades towards the gully area, and surface water from storm events preferentially flows out to the Rangitata via the gully. The gully was likely originally formed associated with erosion from surface water runoff from the wider catchment being directed to this area. Stormwater from the wider catchment continues to be directed towards and down the gully, passing through a shallow drain on the southern side of the main body of the landfill and through a temporary stormwater control system down the gully. The site details and setting are described under Section 4.0.

Significant Rangitata River flood flow events over recent years have resulted in terrace slope failures that have exposed landfill waste along the eastern edge of the main landfill and gully areas. As a result, some of the landfill waste has been released into the Rangitata riverbed. Emergency interim remedial works have pulled the exposed waste back from the gully edge in the terrace and stabilised the gully area, however, some waste material remains on the riverbed within the 'fall' debris zone. This debris is currently adding some stability to the terrace wall so has been left in place but contains some waste material (intermixed with natural soils) and could be quickly eroded during a flood event. Emergency river engineering works to redirect the river and the construction of an embankment were also completed to reduce the immediate threat of the potential loss of the main body of the landfill during future river flood flow events. The emergency interim remediation and stabilisation works are only temporary mitigative measures and could still be overcome by significant future flood and/or rainfall events.

To prevent further and potentially more significant impacts to the Rangitata River and associated users and ecosystem, TDC intends to excavate and remove the landfill waste. Based on current estimates, the landfill body is comprised of approximately

[1] *Geophysical Investigations 105 Dennistoun Rd, Peel Forest, Canterbury* (Southern Geophysical Ltd., 2021)

18,000 m^3 (in situ) of waste, the majority of which will require off-site disposal to a Class 1 landfill facility (i.e., Redruth Landfill, in this instance).

PDP has carried out landfill waste characterisation and testing at the site between 2019 and 2023 (summarised in Section 6.0). Full details are included in the Detailed Site Investigation (DSI) report (PDP, 2023a). Key findings are that the landfill has a thin (<0.1 m) cover layer and, where bottomed, was not observed to be lined. Waste material included timber, plastic, metal, textiles, building materials and animal bones.

Analysis of the soil matrix component of the landfill identified heavy metals, organochlorine pesticides (OCPs) and total petroleum hydrocarbons (TPH) variously above background levels and Australian and New Zealand Guidelines (ANZG, 2018) default sediment guidelines. Asbestos has been recorded at concentrations exceeding the ALGA (2017)[2] guideline criteria for all land uses. There is no appreciable landfill gas (LFG) generation and leachate does not appear to be significantly affecting groundwater quality beneath the site.

The RAP (**which includes site management procedures**) has been prepared to define the remedial goals as well as outlining the general methodology for the remedial works including the required controls and protocols for the appropriate handling and management of contaminated soils and waste materials during the remediation of the landfill. These management protocols and processes will aid in mitigating potential risks from the landfill waste to human health (i.e., the exposure of remediation personnel and neighbours) and the receiving environment (e.g., via off-site transport of contaminants and waste entrained in dust or stormwater discharges). Additionally, the RAP has been prepared to support obtaining the applicable resource consents required to permit the work in accordance with the relevant regulatory planning frameworks with consideration for resource consents governed by TDC and Environment Canterbury (ECan).

3.0 Roles and Responsibilities

The RAP provides guidance to parties involved in remediation enabling works, remediation earthworks, and post-remediation site reinstatement works, with regard to the intended methodology for the excavation and removal of the landfill waste. It is intended to assist TDC in meeting their legal obligations with respect to health, safety and the environment. However, it is not intended to cover the general site safety procedures required for a typical excavation site. The RAP does not relieve the owner of their legal responsibilities. While this RAP specifically relates to the management of identified contaminated soils and landfill waste, **the lead contractor undertaking the excavation works will need to develop a site-specific health and safety plan (HASP) to supplement this RAP**. **The Licensed Asbestos Removal Contractor (LARC) will also need to prepare an Asbestos Removal Control Plan (ARCP)** since asbestos results from the landfill have triggered Class B licensed asbestos work as per Figure 1 of the ALGA (2017) asbestos guidelines.

[2] *New Zealand Guidelines for Assessing and Managing Asbestos in Soil* (ALGA Ltd, 2017).

The lead contractor and LARC will be confirmed (by a limited tender process) after the relevant resource consents have been obtained.

3.1 Contact Details

Table 1 below outlines the various organisations and their responsibilities in the context of this RAP. It also provides relevant contact numbers to ensure clear lines of communication are possible. This table will be updated as information becomes available:

Table 1: Roles and Contact Details

Role	Name (organisation)	Contact Number
Site Owner, Occupier and Interested Parties		
Site Owner: LINZ		
Site Lessee: TDC		
Local Iwi/Cultural Consultants		
Remedial Works Contractors		
Lead Contractor/Site Supervisor		
Site Health & Safety Officer		
Asbestos Removal Contractor		
Compliance Monitors		
Regional Council Compliance Monitor		
Timaru District Council Compliance Monitor		
Environmental Consultants		
Suitably Qualified and Experienced Practitioner (Contaminated Land)		
Geotechnical Engineer/Final Landfill Design and Stability		
Senior Environmental/Engineering Geologist (Site Health & Safety, and Supervision)		

3.2 Responsibilities

In terms of day-to-day activities relating to the management of the remediation programme, the lead contractor and the SQEP will primarily be involved but will coordinate with TDC and Te Rūnanga o Arowhenua/Aoraki Environmental Consultancy Limited and other relevant subcontractors or experts (e.g., the LARC, the analytical laboratory, etc.) required for progression of the remediation work.

TDC is responsible for:

- Gaining approvals from neighbouring property owners for access to their land to support undertaking of remediation activities as required. This includes land for the establishment of a contractor's yard (i.e., for a waste triage area, lead contractor base, and remediation support areas) and for access to the toe of the terrace (e.g., use of the graded track located in the residential property to the north access the riverbed).
- Liaising with project partners (e.g., Te Rūnanga o Arowhenua and LINZ) and other interested parties/stakeholders as necessary to provide information on the progress of the remedial works and get input on any required change in methodology.
- Establishing media communication protocols and relaying these to the Lead Contractor and the SQEP.
- Any roading improvements and traffic management requirements (i.e., speed limits, road signage, etc.) beyond the remedial area relating to the increased traffic volumes for the transport of material to and from the site.

The **Lead Contractor** is responsible for:

- Liaising with the SQEP, geotechnical engineer and TDC as remediation work progresses.
- Adhering to health, safety, and environmental protection requirements outlined in this RAP over the course of the remediation.
- Day to day site control and overarching health and safety for the protection of site workers.
- Excavation, handling and disposal of the landfill waste in accordance with this RAP, with oversight by the LARC and SQEP.
- The implementation, management and monitoring of the stormwater redirection design, erosion, sediment and dust control systems and associated discharges. This includes sourcing water for dust suppression, equipment and plant, and personnel decontamination.
- Setup, maintenance, and decommissioning of the contractor's yard.
- Monitoring the weather forecast to identify any possible Rangitata River flood/erosion events, which, if identified, could result in remedial works being put on hold until the event has passed and the SQEP and geotechnical

engineer have completed an assessment of the terrace and any exposed and/or released landfill waste.

- Monitoring road conditions during the remedial works and, where necessary, arranging with TDC for the regrading of gravel roads approaching the site likely to be affected by increased truck movements.
- Regular inspections of the Rangitata riverbed and, as far as practicable, retrieval of any waste debris lost over the terrace edge during remedial works.
- Monitoring and record keeping throughout the duration of the works, including maintaining and ultimately providing records of waste disposal to the SQEP.
- Ensuring that their equipment is in good working order ahead of each workday with no oil/hydraulic fluid leaks etc.
- Implementing spill response procedures in the event of a spillage of hazardous substances.
- Maintaining regular contact with the SQEP over the duration of the remediation works, including communicating any foreseeable delays or interruptions that may adversely impact progress of the remedial works.
- Site reinstatement in accordance with site rehabilitation design specifications.

The **Licenced Asbestos Removal Contractor (who can be the lead contractor or be engaged by the Lead Contractor)** is responsible for:

- Preparation and maintenance of the ARCP.
- Establishment and control of the asbestos control zone areas.
- Notification requirements to WorkSafe New Zealand.
- Implementation and management of all asbestos control measures during the disturbance of asbestos contaminated soils.
- Implementation and management of designated asbestos decontamination zones.
- Management and disposal of asbestos contaminated personal protective equipment (PPE) used by workers within the asbestos zones.
- Notifications to neighbouring properties, where required (**with prior TDC and SQEP consultation**).

The **SQEP (PDP)** is responsible for:

- Liaising with key project partners, TDC, the lead contractor and the LARC, as required.

- Providing regular (e.g., weekly) project status reports to TDC regarding the progress of the remediation in terms of timeframes, milestones, any unforeseen significant costs, and potential setbacks.
- Undertaking and benchmarking/validation sampling over the duration of the remedial works.
- Determination of suitable offsite disposal locations for the landfill waste material and obtaining the appropriate disposal documentation, other than those addressed in this Plan.
- Provide general oversight of the site controls and management practices for compliance with the RAP.
- Provide general contaminated land advice, including carrying out all soil quality testing and management requirements for any other unexpected contamination encountered during earthworks (i.e., accidental contamination discovery).
- Provide advice to the lead contractor following any Rangitata River flood event that may occur during the remedial works.
- Coordinate the implementation and oversight of the fibre air monitoring programme during soil disturbance activities.
- Updates to the RAP as/if needed.

3.3 Distribution and Implementation

A copy of the RAP will be distributed to all key project partners identified in Table 1 of the RAP. A copy of this RAP shall be kept on site at all times. **It is the responsibility of the lead contractor to distribute RAP information to any sub-contractors and personnel entering the site and ensure compliance**. The provisions of this RAP are mandatory for all persons (employees, contractors, and sub-contractors) who enter the site while earthworks associated with the remediation are underway.

3.4 Applicability

This RAP has been prepared for the sole use of TDC to guide remediation earthworks management and to comply with all applicable resource consents required to permit the work at the landfill and contractor's yard only.

The RAP is a living document, subject to updates and adjustments (to be implemented by the SQEP, with input from project stakeholders (i.e., project partners) in response to project needs). The RAP will only apply over the course of the remediation project (i.e., from commencement of contractor's yard enabling works to the point of site rehabilitation) and is site-specific (i.e., not transferrable to any other site). For clarity, the RAP covers the following areas:

- The main landfill area,
- The gully area,

- The toe of the terrace beneath the landfill on the bed of the Rangitata River,
- Private land (west) – designated contractor's yard,
- Private land (north) – adjacent land and access point for riverbed, and
- The gravel section of Dennistoun Road.

The RAP does not cover any roading upgrades or traffic management related works on the sealed roads between the site and the disposal facility. This is being co-ordinated directly by TDC, however, there will be communication between the Lead Contractor and TDC traffic management team during the works to ensure any issues are identified and resolved quickly.

3.5 Pre-Start Toolbox Meeting

Prior to the commencement of any remedial works at the site, a toolbox meeting will be held onsite between the SQEP, lead contractor and LARC. It is possible that other project partners (e.g., TDC, Aoraki Environmental Consultancy/Te Rūnanga o Arowhenua, ECan, etc.) would also like to attend. The purpose of the toolbox meeting will be to clarify the following for all attending the site:

- Confirmation that all parties on-site understand the objectives of the RAP and remedial excavation works. Confirmation all parties on-site understand the objectives of the Erosion Sediment Control Plan (to be prepared in consultation with the Lead Contractor) and the Dust Management and Monitoring Plan (i.e., DMMP; refer to Section 11.3)
- Provide an overview of the risks and requirements for all parties involved with the implementation of the RAP;
- Site security, media and public communication protocols;
- Accidental Discovery Protocol and accidental discharges of contaminants to the environment over the course of the remediation; and
- Field any subsequent questions relating to appropriate environmental management of the earthworks/site development works.

In addition to the above, the LARC will discuss the contents of the ARCP, particularly the set out of the asbestos work zone, decontamination procedures and health and safety controls.

3.6 Review and Update

The RAP will be reviewed and amended as necessary during the remedial works to ensure the environmental and human health risks associated with asbestos/contaminated soils and waste materials are managed appropriately. Any amendments to the RAP are to be approved by the SQEP prior to the implementation of updates. The updated version of the RAP shall be made available to all relevant parties/project partners as required by relevant consent conditions.

4.0 Site Details and Setting

The site details are presented in Table 2 below.

Table 2: Site Details	
Address	East end of Dennistoun Road, Peel Forest, Timaru
Legal Description	Crown Land (under action) Survey Office Plan 3144
Land Owner	Land Information New Zealand (LINZ)
Land Lessee	Timaru District Council
Other Interested Parties	Te Rūnanga o Arowhenua/Aoraki Environmental Consultancy, Environment Canterbury (ECan), Department of Conservation (DOC), Peel Forest Community, Rangitata River Restoration Group
Landfill Area	Approx. 5,025 m^2 (0.5 ha)
Zoning	Rural Zone
Grid Reference	BY19: 6115-3626
Current Land Use	**Main landfill area** – Vacant, hummocky paddock under grass and weeds (Previously used for grazing horses). Western most edge includes a compacted gravel turning circle at the eastern end of Dennistoun Road. **Gully area** – Vacant, downward sloping topography. Interim remedial works have included armouring of the lower gully area face and terrace edge with boulders and the installation of BioCoir coconut matting across the full gully slope which was then seeded with a ryegrass and clover pasture mix. Stormwater from the main landfill area and also the wider catchment drain is directed to a bunded area which drains through culvert with a lay flat hose discharging water directly into the riverbed (i.e. to avoid overland flow erosion effects on the steeper gully section). These temporary stormwater controls were recently installed to reduce the erosion effects on the gully edge from overland stormwater flow.
Surrounding Land Use	Rural Residential –to the north of the site and Dennistoun Road with a livestock grazing paddock located to the west and south. The Rangitata Riverbed bounds the site to the east.

5.0 Regulatory Context

The proposal to remove the waste from the landfill will require an integrated suite of resource consents from TDC and ECan as laid out below.

5.1 NESCS[3]

Remediation and reinstatement of the landfill site will require significant soil/waste disturbance, off-site disposal of contaminated soil and landfill waste, and the importation of clean material for reinstatement. The overall volume of ground disturbance will significantly exceed NESCS triggers (i.e., no more than 25 m^3 per 500 m^2 is disturbed, soil removal and no more than 5 m^3 per 500 m^2 is removed from the site per year). Given the presence of contaminant levels above human health criteria, the proposed soil disturbance works and offsite disposal of hardfill material and soil material falls under a **Restricted Discretionary Activity** (as per Regulation 10(3) of the NESCS).

5.2 Timaru District Plan

A land use consent will be required from the Timaru DC for the development of a temporary contractor's yard in a rural zone, and for earthworks in an area of special interest to Māori.

5.3 Canterbury Land and Water Regional Plan (LWRP)

A discharge consent for construction phase stormwater is required from ECan as well as two land use consents for the excavation in proximity of a river and over an unconfined or semi unconfined aquifer.

6.0 Summary of Previous Site Works/Investigations

The RAP has been informed by previous work and investigations carried out at the landfill. For a comprehensive account, reference should be made to the PDP (2023a) DSI report (attached to the resource consent application and Assessment of Environmental Effects; AEE).

A summary of the key information obtained during the investigation works is as follows:

- A geophysical survey of the landfill indicated the waste was up to 9 m deep within the filled gully area. The total volume of waste was estimated at 18,000 m^3 (in situ). This excludes the waste on the riverbed within the 'fall' debris zone. This is an estimate only as excavation to the base of the waste was not possible in all areas given the unknown nature of the original methodology of forming/placing the waste (i.e. to avoid breaching a containment layer that may be present)

[3] *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011*.

- The groundwater table has been measured between 24.6 and 25.9 m below ground level (bgl) indicating there is at least 15 m of natural soils between the base of the landfill and groundwater table. Groundwater sampling showed no definitive or obvious evidence of leachate impacts in groundwater beneath the site.
- A series of shallow test pits were excavated within and around the landfill to aid with the delineation and enable the waste to be characterised. A summary is as follows:
  - A thin cover layer (generally <0.1 m) was observed above the majority of the landfill.
  - The landfill did not appear to be lined, although there were discrete layers of low permeability soils, however, this is likely associated with disposal of material or interim cover as opposed to any direct engineering (i.e., lining) consideration. Test pits in the deepest areas of waste were not possible.
  - Localised perched water was noted entering a test pit at 1.7 m depth. Installation of shallow bores within four of the test pits showed no evidence of any water/leachate when inspected approximately 1 week later.
  - The materials encountered can be divided into 'Cover' (either a thin layer of topsoil or discontinuous layer of sandy gravel); 'Waste Mixture' (a high proportion of anthropogenic waste in a soil matrix); 'Soil-Waste Mixture' (soil with some fragments of waste materials); and 'Visibly Clean Soils'. The proportion of soil in the landfill waste varied between test locations but was the predominant fraction (i.e., accounting for between 54 and 91% of the waste) in all cases.
  - The waste types observed included **Timber** (including fence posts, branches, tree trunks, woodchip, sawdust), **Plastic** (including bale/silage wrap, food and drink containers, netting), **Metal** (including wire, vehicle parts), **Textiles** (including old clothing, rags and shoes, rope, netting), **Building materials** (concrete, brick, asbestos containing fibre cement sheet), and **Animal bones** (a few observed in each screened test hole). The dominant waste type (excluding soil) was plastic in most test pits (up to 76%), with high levels of timber (up to 46%) and metals (up to 25%) also observed.
  - A metal vehicle fuel tank was observed in one location; however, no other large chemical containers were encountered.
  - The surface Cover material showed concentrations below the residential/recreational guideline criteria (i.e., suitable for the current land use).
  - The Waste Mixture and Soil-Waste Mixture material showed the highest concentrations of contaminants with heavy metals, organochlorine

pesticides and total petroleum hydrocarbons being recorded above background levels and ANZG (2018) default sediment guidelines.

- Heavy metals were recorded above the Redruth Landfill screening criteria with zinc also recorded above the Toxicity Characteristic Leaching Procedure (TCLP) leachability criteria. This appears to be an isolated occurrence with the majority of the samples showing acceptable concentrations for disposal at Redruth Landfill.
- Asbestos was detected (i.e., within the Waste Mixture only) at concentrations up to 0.01828% w/w and above the recreational land use criteria. Sampling did not necessarily show the presence of asbestos fibres in the soil matrix at all locations tested, however, ACM fragments were visually detected in the majority of the test pits suggesting asbestos was generally present throughout. Asbestos will therefore be the driver for controls around the handling and disposal of the waste/soils.
- Trial screening successfully segregated bulk waste material using a 25 mm screen, however, waste sorting and finding a suitable reuse/recycling point may prove difficult given the waste was 'dirty' and would likely need to be cleaned. The potential for asbestos fibres to be present on the waste material adds further complication for handling and disposal. Items such as large boulders or other smooth surfaces could be cleaned and reused onsite and will be considered during any remedial excavation works.
- Sampling of the underlying natural soils was limited to three locations and did not include the deepest areas of waste. Results indicate that some degree of leaching has occurred, although does not appear to be widespread or significant and limited to <1 m below the waste. If an additional 1 m of soil was removed from beneath the waste, this would add an additional 5,000 m^3 to the total volume of material to be excavated.

- LFG monitoring within the shallow bores installed within the selected test pits showed generally low levels of LFG and no flow rate (pressure). The two monitoring bores drilled to 25.8 m and 32 m bgl in natural soils between the landfill and river terrace showed no methane was detected; however, carbon dioxide was recorded up to 4.0%. The low-level readings are not unexpected given the age of the landfill and support the observations of minimal organic material in the waste.

Based on the results of the soil sampling, the Waste Mixture would need to be disposed of at a landfill authorised to receive this level of contaminated soils as "special waste". Some soils, in particular the soils underlying the waste that may need to be excavated to meet remedial goals, may be suitable for disposal at a managed fill facility.

Note – to date, test pits have not been advanced into the vehicle turning area (outside the wooden fence on the northwest end of the landfill) which has also been identified as part of the landfill. Landfill waste within this area could be between 1 to 4 metres thick based on geophysical data and is expected to be comprised of a similar make-up as the waste previously observed in test pits elsewhere on the landfill.

A risk assessment for the landfill in its current state shows that the risks to human health and the environment is either incomplete or considered to be currently low. This is because the site is currently unused and is likely to remain so in the near to distant future, a cover (albeit thin) manages the current risk of direct contact with contaminants in the waste, there is no appreciable LFG generation and leachate does not appear to be significantly affecting groundwater quality beneath the site. However, this risk assessment assumes that the landfill will remain in its current state. The vulnerability of the landfill to erosion means that this is unlikely and the potential for landfill waste exposure as a result of future rainfall/flood events is high and cannot be reliably predicted. Depending on the severity of the rainfall/flood event, this could have catastrophic effects to human health and environmental receptors if the main body of the landfill is exposed and falls into the river. The vulnerability of the landfill to erosion is therefore the driver to mitigating the risks identified for this landfill. As reported in the ROA, the reliability of river protection works is low due to the dynamic and powerful nature of this section of the Rangitata River. Therefore, removal of the landfill waste was the preferred approach to manage the risks identified.

7.0 Purpose and Objectives

This RAP (**which includes earthworks site management procedures**) has been prepared to guide the appropriate management of remedial earthworks at the site and to provide supporting information for relevant resource consent required to permit the work (i.e., under the NESCS and the CLWRP). It also includes Target Soil Remedial Criteria (TSRC; refer to Appendix B) that are to demonstrate the satisfactory remediation of contaminant concentrations within soils remaining in situ following the remedial earthworks.

Note – Dust Management Plans and Erosion, Sediment and Stormwater Management Plans will be prepared separately and later appended as addenda to the RAP (subject to resource consent conditions).

The RAP should be read in conjunction with the resource consent application documents (including accompanying AEE documents).

The RAP sets out and/or provides references for the following procedures:

- Establishment and decommissioning of the site to support the remediation work, including an area immediately west of the landfill that will be leased for use as the 'contractor's yard';

- Methodology for the remedial excavation, handling (including segregation) and disposal of the landfill waste;
- Appropriate management of soils/waste to ensure the protection of site workers and the general public during the disturbance activities;
- Mitigation of dust, sediment and stormwater run-off generated over the period of the remedial works;
- Air monitoring (i.e., for airborne asbestos, odour, dust, etc.);
- Soil quality benchmarking and validation sampling;
- Protocols for accidental discovery of contamination including known or unknown/unexpected contamination types, unexpected volumes, and complex presentations (e.g., ruptured, or intact, unmarked, or marked chemical containers);
- Health and safety to supplement the contractor's health and safety plans for the landfill waste disturbance and removal activities;
- Appropriate off-site disposal and associated documentation;
- Reinstatement principles and concepts; and
- Remediation completion documentation and reporting.

This RAP has been prepared in general accordance with the Ministry for the Environment (MfE) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2021)* (MfE, 2021a) (CLMG No. 1) and has been informed by the findings of the PDP (2023a) DSI and the PDP (2023b) Remedial Options Assessment (ROA). The ROA is held by TDC and should be reviewed for full context, in terms of the steps and considerations involved in the ROA process.

The RAP has been reviewed and signed-off by suitably qualified and experienced practitioners (SQEPs) as outlined by the NESCS[4].

8.0 Remedial Targets

Remediation targets dictate the end point at which the landfill site will be considered remediated. In developing the remedial targets for the remediation, two key drivers have been considered:

- **Cultural/Social** - includes consideration for potential human health, environmental ethics and guardianship, and aesthetic impacts.
- **Environmental** - includes consideration for potential impacts to groundwater, surface water, ecology and natural resources/amenities.

The following three remediation goals have been developed to satisfy the key remediation drivers:

[4] *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.*

Remedial Goal 1 - Visible Waste Removal

To remove all visible waste materials within the main landfill body and gully areas (as far as reasonably practicable). This includes the waste materials mixed within the debris at the toe of the terrace where waste is known to have fallen onto the riverbed.

It is assumed that the majority if not all of the risks to cultural/social and environmental indicators will be eliminated by achieving this remedial goal.

Note – this remedial target could be limited if there is cause for concern in terms of obvious risks to the physical health and safety of workers undertaking or overseeing the landfill remediation (e.g., risk of sudden land loss).

Remedial Goal 2 – Target Soil Remedial Criteria

A remedial excavation over dig of up to 1 m may be required over parts of the remedial excavation to remove underlying natural soil that has been impacted by contaminant leaching from the landfill waste.

Proposed Target Soil Remedial Criteria (TSRC) have been selected and proposed to be used as the benchmark for satisfactory remediation of contaminants concentrations within soils remaining in-situ. The proposed TSRC were selected after consideration for the receptors (i.e., should waste and contaminants be released from the landfill) as follows:

- Protection of human health – although this land area is not intended to be routinely occupied, it is possible that people could occasionally be present (i.e., general public or maintenance workers).
- Protection of terrestrial biota – includes protection of soil microbes, invertebrates, plants and wildlife.
- Protection of ecological receptors – the remaining soils will continue to be vulnerable to erosion and could be mobilised during future storm and flood events and enter the Rangitata River system.

Based on the key receptors highlighted, the following criteria were considered:

- Background Concentrations - Regional – Intergrade Soil Group (ECan, 2007; MfE, 1998);
- Human Health Soil Contaminant Standards (MfE, 2011a and 2011b; and NEPC, 2013);
- Ecological Soil Guidelines (Landcare Research, 2016 and update 2019); and
- Default Guideline Values for Sediment Quality (ANZG, 2018).

PDP's memorandum to TDC (27 October 2023) provides the rational and values for the proposed TSRC (refer to Appendix B). The TSRC are presented in Table 3 below.

Table 3: Remedial Soil Targets		
Parameter (All parameters in mg/kg unless otherwise stated)		**Proposed Target Soil Remedial Criteria**
Heavy Metals		
Arsenic		**20**
Cadmium		**1.5**
Chromium		**80**
Copper		**65**
Lead		**50**
Nickel		**21**
Zinc		**170**
Organochlorine Pesticides (OCP)		
ΣDDT		**0.431**
Petroleum Hydrocarbons		
Benzo(a)pyrene eq.		**2.8**
Total polycyclic aromatic hydrocarbons (PAHs)		**10**
TPH	C_7-C_9	**280**
	C_{10}-C_{14}	
	C_{15}-C_{36}	
Asbestos		
Asbestos		**No detectable asbestos**
Additional Contaminants		
Should any additional contaminants/contamination sources be encountered during the remedial work, these will be dealt with under the accidental discovery protocol (Section 16.0). Contaminant specific remedial target criteria will be developed as part of this approach.		

In addition to validation testing of the remediated landfill area, testing of the contractor's yard will be required after it is decommissioned. The trigger levels for comparison of these results will be the higher value of either the Environment Canterbury reference background levels or the maximum concentration obtained during a benchmarking investigation undertaken prior to commencing waste removal activities.

Remedial Goal 3 - Site Reinstatement

Upon completion of the remediation works, the landfill site will be reinstated in accordance with the final design agreed to by the project partners.

The contractor's yard will be returned to as close to the original state (i.e., gradient, topography, topsoil type, etc.) as is practicable, using topographic survey outputs (obtained in August 2023) as a reference.

9.0 Remedial Methodology

9.1 Phases and Tasks

At a high level the remediation of the landfill will include the following key steps:

- **Contractor's Yard Definition** – TDC has sought and obtained permission to use private land immediately west of the landfill as a contractor's yard (for waste stockpiling, sorting/separation, lead contractor office, storage, and restrooms, etc.).

  A topographical survey has already been carried out (August 2023) over the area of land proposed to be used as the contractor's yard to benchmark the topography of the land before it is disturbed. The topographical survey will be used to guide appropriate reinstatement of the farmland upon completion of remediation works.

  The extent of the area with provisional agreement to be leased for the duration of the remedial works is presented in Figure 2 in Appendix A.

  The layout of the contractor's yard will be confirmed in consultation with the lead contractor to ensure the space is optimised for efficient waste management during the remedial works. This space will be used as the primary entrance to the remedial work area and will include the administration/office, parking, personnel decontamination areas and waste triage/processing areas.

- **Pre-Remedial Works Soil Benchmarking** – Testing of surface soils at two spatially separate pieces of land (located adjacent to the landfill) will be carried out prior to the commencement of remedial works. The first location is the land situated immediately west of the landfill that will be used as the contractor's yard (currently used for grazing deer). The second location is the land situated immediately to the north of the landfill that is occupied by a rural/residential dwelling (refer to Section 14 for further details).

  Soil quality benchmarking at both locations is a proactive step by TDC to understand current soil quality ahead of the remedial works, which could inadvertently cause contamination of surficial soils.

  The results will serve as a reference for validation testing at both areas at the end of the remedial works. The soil quality testing will be undertaken by the

SQEP, who will determine the distribution and frequency of test locations at each of the two pieces of land subject to soil quality benchmarking.

- **Site Establishment** (general methodology only as it may differ slightly following discussions with the contractor once engaged).
  - Removal of the current fencing at the western side of the landfill, and the establishment of new temporary fencing around the extent of the contractor's yard with scrim/litter fencing signposted with relevant 'hazards on site' posters. Fencing will need to be sufficient to keep out livestock which will be grazing the remainder of the paddock to the south and west.
  - Removal of the topsoil from the surface of the contractor's yard and used to form bunds around the boundary of the yard area. Bunds to be seeded with grass and maintained over the duration of the works. Physical stormwater and ESCP controls will be concurrently installed. Benchmarking of the contractor's yard will be undertaken at this point (i.e. after the topsoil has been removed). A separation layer such as Bidim A29 (or similar) will be placed across the yard. Cleanfill may need to be imported to create a suitable base for vehicle and plant movements within the contractor's yard. This will be confirmed in consultation with the geotechnical engineer and the lead contractor. Additional benchmarking may be required depending on the source of the fill material. Additional details of the temporary works are provided in the 'Peel Forest Landform Design Principles – Geotechnical And Stormwater Management' letter (Appendix D).
  - Stormwater management controls shall be implemented for site stormwater and to divert catchment wide stormwater through the operational area. These requirements are outlined in the 'Peel Forest Landform Design Principles – Geotechnical And Stormwater Management' letter (Appendix D).
  - Site security measures (e.g., fencing and live feed cameras) will be installed (x 2 cameras – one with a view of the contractor's yard and the second showing the active remediation area). Live feed cameras will be used for security, but also to enable remote monitoring of site conditions by the consultant.
  - Stabilised entry/exit vehicle accessways will be established off Dennistoun Road, ideally at the northwestern corner of the contractor's yard.
  - Access to the landfill area for plant and/or trucks will be established at the eastern end of the contractor's yard. A pathway for stormwater from the wider catchment will be maintained to allow water pass through the area.

- Placement of the site office and staff facilities including lunchroom, toilet and handwashing facilities. This will ideally be powered so it is possible to recharge equipment on site, such as personal gas alerts and air monitoring pumps.
- Water source for dust suppression activities and decontamination of plant (as required) which will be required throughout the remedial works to suppress dust associated with the following sources:
  - the gravelled portion of Dennistoun Road;
  - the contractors yard surface
  - Soil/landfill waste stockpiles
  - truck loading area
  - remedial excavations
  - wheel wash (if required)
  - decontaminating plant (i.e. excavator buckets in contact with asbestos containing waste)
  - Washing down larger boulders/materials for retention on site/offsite disposal.

  NOTE: This may be a water truck(s) however the refill point is to be confirmed as it is unlikely there is one in the immediate vicinity. The time taken for refilling and the likely volume of water required on site will need to be considered.

- In accordance with the Dust Management Plan, installation of a wind speed gauge which will be used to inform the potential need for additional dust mitigation measures.
- Definition of triage areas for temporary stockpiling of material that requires testing to support the final disposal location of the material. The triage areas will need to accommodate multiple stockpiles at times during the works.
- Placement of skips for larger waste items/hazardous waste items.
- Definition of the asbestos work zone and decontamination areas – including a wash down area for plant and facilities for personal decontamination. Asbestos work areas will be established in accordance with ARCP, which is to be prepared by the LARC.
- Completion of roading upgrades and traffic management requirements (outside the scope of this RAP).
- Installation of a noticeboard at a suitable location within the local Peel Forest area to notify the community of progress of the project.

- **Remedial Excavation** – It is anticipated that approximately 18,000 m^3 (in situ) of waste could be excavated and removed from the landfill. This does not include an over dig into natural soils impacted by leaching. The extent of the over dig will be determined by the SQEP in conjunction with the geotechnical engineer and lead contractor, but is anticipated to be <1 m in additional cut depth (approx. 5,000 m^3).

  The specific methodology and heavy machinery used for the excavation and removal of the landfill waste will be defined in consultation with the geotechnical engineer and lead contractor involved in the remedial work. However, the general methodology shall comprise the following:

  - The landfill area is to be broken down into sections so only small manageable areas are open at one point in time.
  - At the completion of the remedial works of the main landfill body and gully areas, an assessment of the removal of the waste intermixed within the debris at the toe of the terrace shall be made in consultation with the geotechnical engineer to determine whether the work can be undertaken safely.
  - Works are to be undertaken in accordance with the controls outlined in this RAP (asbestos, LFG, leachate, dust and erosion and sediment control measures).
  - Removal of vegetation in the area to be remediated. This will include removal of some trees. The above ground portion of the vegetation is considered uncontaminated provided it is segregated appropriately.
  - Excavation and removal of the waste material in a controlled manner with a spotter present at all times to inspect the cut area for signs of hazardous materials/chemicals and implementation of the accidental discovery protocol.
  - All waste/soil is to be treated as containing asbestos unless proven otherwise.
  - Waste material is to be preferably placed directly into the trucks/ bins for disposal, however, given the nature of the site (slopes and uneven surfaces), this may not always be possible and stockpiling and double handling waste may be necessary.
  - Materials that are too large for the waste bins are to be separated and managed in the triage area until a disposal solution is determined.
  - Materials that have the potential to be cleaned and redirected from the landfill waste disposal are to be segregated and stockpiled in the triage area and a cleaning/testing strategy determined in conjunction with the SQEP. This includes smooth surfaced items such as railway irons and boulders that have the potential to be easily cleaned and redirected from the landfill waste stream.

- Soils that have no or very little visible waste is to be segregated and stockpiled in the triage area for testing and determination of the appropriate disposal location (i.e. possible divert from the landfill waste stream).
- Significant water/leachate is not expected to be encountered. However, a vacuum truck shall be utilised with disposal of any pockets of water/leachate encountered at a suitably licensed liquid waste treatment facility (i.e., ChemWaste or EnviroWaste).

- **Waste Processing/triage** – Part of the contractor's yard will be used for stockpiling of materials that may be able to be redirected from the landfill waste stream and either recycled, reused onsite or taken to an alternative disposal facility.
- The waste processing location within the yard is to be confirmed with the lead contractor and LARC. Any material stockpiled in the contractor's yard shall be managed assuming it may contain elevated levels of contaminants (including asbestos) until proven otherwise.
- Further details of the waste processing activities and controls are presented in Section 12.
- **Monitoring of Rangitata Riverbed** – The Rangitata Riverbed will be routinely inspected for waste materials that may have been inadvertently lost over the terrace edge during remedial excavation activities. Where practicable these waste materials will be hand-picked and removed from the riverbed. Access to the riverbed will likely be through the rural/residential property to the north of the site via an existing vehicle track that runs along the eastern edge of the property (i.e., subject to TDC obtaining approval from the landowner).
- **Remediation Area Validation** – This will involve visual and quantitative (soil quality analysis) checks to confirm that the landfill area has been remediated to the remedial goals outlined in this RAP (see Section 8).
- Additional validation work (including soil quality analysis and landfill waste recovery) shall be undertaken over the contractor's yard (based on potential for incidental contamination from landfill waste handling and sorting) and the toe of the terrace immediately east of the landfill (resulting from landfill waste falling from above).
- Remediation validation will be carried out by the SQEP who will consult with relevant partners (i.e., TDC/Te Rūnanga o Arowhenua, and ECan) as/if required throughout the process.
- **Reinstatement Works** – A reinstatement contoured plan has not been prepared as the level of cut is unknown and will be dependent on meeting remedial goals #1 and #2. Large scale filling of the remediated area is not being proposed, although some general contouring and importing materials will be required depending on the quality of the material encountered.

- The final site surface will be suitable for re-establishment of vegetation and allow for stormwater conveyance to the Rangitata riverbed. The types of vegetation or plantings chosen for landscaping the reinstated site will be subject to consultation with TDC, Te Rūnanga o Arowhenua and LINZ.

  The principles of the final reinstatement shall include the following:

  - The final landform must promote all surface water flow towards the central gully for discharge to the Rangitata River.
  - Reinstatement of a vehicle turn around areas at the end of Dennistoun Road and construction of a fence to secure the area from vehicular traffic and protection from the terrace edges.
  - All cut batters into natural gravels must not exceed a gradient of 2.5 horizontal to 1 vertical or a slope angle of 23°.
  - The crest line of all cut batters must be within the landfill cadastral boundaries, a 4 m wide access strip must be allowed for between the northern boundary and the crest of the slope.
  - The base angle of the central gully must be such to reduce flow velocity and subsequent surface erosion and discharge of sediment to the river.
  - Topsoil should be placed in discrete areas where planting will take place as per the landscaping plan. It is not recommended to place topsoil across the entirety of exposed slopes or within stormwater flow paths within the gully floor.

  This is discussed in more detail in the 'Peel Forest Landform Design Principles' letter (Appendix D).

  A permanent access track to the riverbed has not been considered as this will require ongoing monitoring and maintenance.

- **Site Disestablishment –** Vehicle entry/exit points to the contractor's yard will be removed along with the imported fill placed across the contractor's yard, with the material either placed within the remedial excavation (if testing deems it suitable) or disposed of at an appropriate facility with the required approval.

  A surface scrape will be undertaken across the contractor's yard and other operational areas prior to undertaking validation soil sampling to ensure contaminants associated with the remedial works are not present. If contaminated soils are present above benchmark concentrations, additional soil removal will be undertaken until soil sampling results are acceptable.

  Following confirmation of acceptable contaminant concentrations across the yard, the topsoil will be placed back across the area and reseeded. As much as practicable, fencing will be replaced and reinstated to the current configuration on the property used for the contractor's yard; however,

fencing configuration could change at the remediated landfill site, to accommodate the agreed final design.

- **Site Validation Reporting –** The purpose of the Site Validation Report (SVR) is to document the remediation works from commencement to completion. Specifically, the SVR documents whether the stated objectives of the remediation programme have been achieved. The SVR also documents unforeseen circumstances that have led to a deviation from this RAP, and how these are managed. Information about final remediation depths, extents, waste disposal volumes and tonnages, and implementation of site reinstatement will also be documented.

  The SVR will be prepared by the SQEP in general accordance with MfE CLMG No. 1 and will be submitted to TDC and ECan.

The total time that will be required for the remediation to progress through from start to completion is unknown but is expected to be in the order of between nine to twelve months. This remediation programme estimate considers downtime from active remediation work due to unforeseen circumstances.

9.2 Remediation Oversight

The SQEP and/or lead contractor are responsible for overall remedial works and oversight ensuring that all controls and site management requirements detailed in the RAP are adhered to. This includes, but is not limited to:

- Adhering to all relevant resource consent conditions governing the remediation of the landfill.
- Implementing appropriate responses to all, if any, accidental contamination discoveries or contamination discharges.
- Appropriate handling or disposal of waste materials to the designated waste disposal facility (i.e., with relevant approvals).
- Upkeep of physical controls recommended by the site specific ESCP.
- Record keeping (site photographs, records of site visitors, records of complaints, regular collection of remediation progress photographs, etc.).
- Ensuring the site (including the contractor's yard) and any gear remaining on-site, while the site is unattended is secure.
- Ensuring that appropriate fencing (and construction scrim/litter fences) and site hazard signage remain intact throughout the remediation.
- Installing and monitoring security cameras from which to inspect the site during weekends and public holidays and for the SQEP to remotely monitor progress when not on site.
- Ensuring that haulage vehicles using Dennistoun Road adhere to the appropriate speed limits.

- Keeping periods of site work within the hours and days of the week specified by the AEE (i.e., to ensure reduction of traffic and noise nuisance effects) and ensure adequate site security, especially where the site could be left unattended for an extended time (e.g., long weekends and/or public holidays).
- Ensuring that all plans controlling the work (e.g., dust management plan, ESCP, ARCP, etc.) are adhered to.
- Confirmation of appropriate off-site landfill waste disposal to Redruth Landfill or another appropriately licensed facility.

Since the remediation is expected to carry on over many months and involves a complex and sensitive site, in terms of possible community and media interest, and known and potential contaminants of concern (COCs), full-time oversight by the lead contractor and/or the SQEP will be required. The SQEP and lead contractor will liaise to ensure this occurs.

In addition, the cultural consultant (i.e., Te Rūnanga o Arowhenua) will also attend and monitor the remedial works as required.

The following sections outline the risks to human health and the environment and the mitigation measures that need to be implemented to ensure the risks are suitably managed.

10.0 Potential Human Health Risk for Site Workers

The typical composition of landfill waste, coupled with the period that the landfill received waste means that hazardous substances/materials are likely to be encountered as part of the complete removal of the landfill waste. As such, controls and management will be required during the disturbance works to mitigate undue exposure/potential risks to excavation workers and other contractors involved in the earthworks phase of the development.

10.1 Asbestos

Based on the previous soil sampling at the landfill (i.e., PDP, 2023a), asbestos is a primary contaminant requiring special management (i.e., handling, and appropriate disposal). As noted in Section 6, soils with elevated asbestos concentrations have been detected within the materials described as 'Waste Mixture'[5]. These materials generally accounted for 50% or greater of the overall waste make-up in test pits.

The primary risk driver for asbestos exposure is inhalation of airborne asbestos fibres. If there is no airborne asbestos present, there is no risk to human health. There is no definitive relationship between potential airborne fibre concentrations (i.e., the primary risk driver) and the asbestos content of a soil.

[5] '*Waste Mixture' - Higher proportion of waste including metal, timber (including some pockets of sawdust), plastics, textiles, and small fragments of glass, and presumed asbestos containing material (PACM).*

There is a risk that asbestos fibres can be released during remediation of the landfill, which could present a human health risk not only to excavation workers but also to those on neighbouring properties and the general public. This RAP is therefore directed at controlling site works to avoid fibres becoming airborne during such activities.

10.2 Other Contaminants

Soil sampling showed relatively low-level concentrations tested in soils, therefore there is considered to be an acceptably low risk to site workers for the majority of the works provided the provisions of this RAP are adhered to. However, landfill waste is inherently heterogeneous and hazardous materials/chemicals may be encountered during the remedial works. The accidental discovery protocol shall be implemented in the event potential hazardous materials/chemicals are discovered and suitable mitigation measures to protect human health and the environment will be implemented (refer Section 16).

10.3 Landfill Gas

Ground gas monitoring has not identified a significant LFG risk and the waste materials were generally observed to be inert rather than organic, which would have the higher potential to generate hazardous landfill gases. There is the possibility that deeper landfill waste, not yet investigated, may contain more organic waste and that some pockets of LFG may still be present and could be encountered during the intrusive works.

Health and safety issues associated with the potential for LFG being encountered during the site works include:

- Inhalation of toxic vapours by personnel involved in the construction works;
- Explosion risk associated with any hot work activities carried out at the site; and
- Asphyxiation risk for personnel entering low lying areas where gases may displace oxygen levels.

The risk is currently considered to be low based on the results of LFG monitoring and the observed contents of the fill material being predominantly inert wastes. Furthermore, given the disturbance activities will occur in an open area (i.e., not enclosed or confined), there will be higher dilution and atmospheric dispersion of any residual ground gas. Irrespective of this, given the high consequence if LFG is unknowingly encountered, provisions for monitoring of atmospheric conditions via a personal gas monitor is recommended (see Section 19.3).

10.4 Leachate

No testing of any leachate has been possible to date to understand the leachate composition and potential risks to human health and the environment. Landfill leachate is a complex liquid that is formed from the composition of the waste

material that is present. The composition is likely to contain high organics including nitrogen, as well as heavy metals and other components associated with any hazardous chemicals present.

Any leachate that is observed shall be considered to be hazardous and managed in accordance with this RAP. Provided the provisions of this RAP are adhered to, including appropriate erosion and sediment controls, decontamination and good hygiene practices are followed, the risk to site workers and the environment are considered to be low.

11.0 Earthwork Controls During Excavation/Soil Disturbance Works

Given the variable nature of fill material present within the landfill, coupled with elevated asbestos fines and ACM concentrations identified, appropriate asbestos controls will need to be implemented to manage exposure risks during any excavation/disturbance of the landfill waste. Asbestos will be the driver for controls during the remedial works, although additional controls may be adopted through the accidental discovery protocol.

This section discusses specific measures and controls in relation to potential human health risks associated with exposure to asbestos as a result of excavation and disturbance of the landfill waste. Note that by default, the management of asbestos impacted soils will also appropriately manage other soil contaminants that have been identified at the site.

11.1 Statutory Requirements, Codes of Practice and Guidelines

There are a number of regulatory requirements, codes of practice and guidelines that apply to the assessment, management and removal of asbestos (including in soil) in New Zealand. The most important of these are:

- *Health and Safety at Work Act 2015*;
- *Health and Safety at Work (Asbestos) Regulations 2016* (referred to as the 'Asbestos Regulations');
- *Approved Code of Practice: Management and Removal of Asbestos* (WorkSafe NZ, 2016) (referred to as the 'ACOP'); and
- *New Zealand Guidelines for Assessing and Managing Asbestos in Soil* (ALGA, 2017).

11.2 Asbestos Risk - Control Measures

Based on the tested concentrations of asbestos in soil/landfill waste, the earthworks associated with the remediation of the landfill would be classified as **Class B '*licenced asbestos work*'** (refer to the Figure 1. '*Decision flowchart for work involving asbestos in soil*' in the ALGA document). In line with this, a Licensed Asbestos Removal Contractor (i.e., LARC) will need to be engaged to control and supervise the disturbance activity and an ARCP prepared. The ARCP should be submitted to the SQEP for review and include further details regarding:

- Description of works and the asbestos isolation areas within the site;
- Details of site establishment, daily controls and handover and completion of works;
- Layout of asbestos works area including the entry/exit points, signage locations, decontamination unit locations for plant and contractors, etc;
- Wind speed restrictions, including cessation of earthworks if dust suppression measures cannot effectively control the generation of dust; and
- Details of dust suppression measures, waste management (including the management of any stockpiled material) and disposal and decontamination procedures.

All practicable measures to avoid tracking or inadvertently removing soils from the work area by site workers or plant and machinery shall be implemented. Good hygiene practices shall also be adopted (refer to Section 19.4).

Following the completion of the disturbance activities, all plant and equipment that comes into contact with the asbestos impacted soils are to be appropriately decontaminated prior to leaving the site.

Visual monitoring shall be undertaken by the SQEP and/or lead contractor during all the remedial earthworks to check for signs of ACM and the accidental discovery of caches of contaminants (e.g., demolition waste placed deeper than previously observed, stained or odorous soils). If identified, accidental discovery protocols are applicable (refer to Section 16.0), and the SQEP contacted to assess the identified hazard at the site.

Provided procedures within this RAP and the ARCP are adhered to, there should not be significant human health effects associated with the presence of asbestos in soil during the disturbance activities.

11.2.1 Air Monitoring

Previous airborne fibre monitoring (AFM) undertaken by PDP both at the site during interim remedial and landfill characterisation works, and in similar projects, have shown that if the excavation and removal activities are carried out in accordance with the management procedures and dust suppression measures outlined in this RAP, then asbestos fibres are unlikely to be detected in air.

However, in accordance with the ALGA (2017) guideline document, AFM will be undertaken during the disturbance of the landfill material to provide reassurance that the methods and controls being implemented are not generating potential airborne asbestos fibres.

The requirement and frequency of AFM will be determined by the SQEP in consultation with the LARC. It is anticipated that air monitoring will initially occur daily. Assuming acceptable laboratory results are recorded, AFM frequency will decrease as works progress to a minimum of twice weekly as these early results will indicate satisfactory control measures and dust suppression. AFM frequency will be

reviewed should elevated results be recorded. AFM will not be completed in wet weather (i.e., a natural dust suppressant).

AFM will be positioned to target landfill excavation activities and also in the vicinity of any stockpiles and processing areas within the contractor's yard. The positions of the monitoring points will also be influenced by wind direction.

The results of any monitoring should be made available immediately to the LARC. If elevated concentrations of fibres are detected (i.e., trigger level of >0.01 fibres/mL of air) then the LARC shall cease work and the methodologies and dust control measures reviewed and modified where necessary to allow work to continue. Any changes to the work methodologies or management measures and controls are to be discussed with the SQEP.

All AFM must be carried out in accordance with the Asbestos Regulations and the samples analysed by an accredited laboratory in accordance with the National Occupational Health and Safety Commission Australia – NOHSC:3003(2005) *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* 2nd Edition.

11.2.2 Adjacent Landowner Reassurance Soil Sampling

To provide reassurance to the neighbouring property bounding the landfill to the north, it is proposed that the SQEP collect up to four soil samples within the neighbouring property for semi-quantitative asbestos analysis. It is anticipated that this soil sampling activity will be completed as follows:

1. Prior to works commencing to form a baseline for comparisons of future results.
2. Up to three times during the remedial works (i.e., approximately every three to four months).
3. Following completion of the remedial works and removal of asbestos controls.

The purpose of the soil sampling is to demonstrate that the asbestos present within the landfill waste is not being spread outside of the work area and onto the neighbouring property to the north during the excavation and removal activities.

Should any asbestos impact be identified, the SQEP will report this to TDC along with recommended interim management measures to feed back to the site owner. A remedial strategy will then be derived and implemented in consultation with TDC and the landowner.

11.3 Dust Control Measures

Dust control measures will be laid out in a comprehensive standalone DMMP that will be an addendum to this RAP. Further details will be provided in the ARCP. The remainder of this section provides a high-level approach to dust control, supplemental to the DMMP.

Soil disturbance activities across the landfill and contractor's yard will be carried out in a manner that results in minimal dust generation, particularly since asbestos has been detected at concentrations that trigger Class B licensed asbestos work. In addition, exposed surface soils and the unsealed road leading to the site can be a source of dust generation during strong wind events, especially when tracked over by heavy machinery and trucks.

Windblown sediments/dust can become a significant form of air pollution from earthworks and also be a nuisance. Dust is to be managed so that no nuisance dust extends beyond the property boundary. The lead contractor is responsible for implementing dust mitigation measures.

- Advising all site workers of the need to minimise dust by the responsible operation of machinery;
- Maintaining a water supply on site (e.g., water cart, K-Line irrigation, etc.) for the dampening down of soils on a regular basis, particularly during hot/dry and windy periods, ensuring water application does not generate surface flow runoff. This applies to the landfill, contractor's yard and the unsealed portion of Dennistoun Road which will support truck movements. If dusty conditions persist, consideration of applying a polymer (soil stabiliser such as Stonewall, or similar product) to the exposed surfaces shall be made by the lead contractor;
- Avoid the spreading of soil beyond the work areas by vehicle movements and daily tidying up of excavation works;
- Suspending dust generating activities when dust control measures become ineffective due to increased wind speed. The objective of these measures is to prevent visible dust emissions beyond the site boundary;
- Limiting vehicle access and speed (<5 km/hr) and controlling traffic movements to minimise dust generation and transport of affected soil on vehicle tyres; and,
- Any temporarily stockpiled soils (i.e., imported approved 'clean' fill) shall be kept damp or covered with a geotextile fabric (or similar) to prevent dust generation.

11.4 Erosion and Sediment Control Plan

Erosion and sediment and stormwater management controls will be laid out in a comprehensive standalone site-specific ESCP document. This document will be prepared by PDP in consultation with the lead contractor once they have been engaged to ensure controls compliment the contractors site set up and excavation plan. The information relating to erosion and sediment control in the remainder of this section provides a high-level approach, supplemental to the ESCP.

There is the potential for sediment to be mobilised when entrained in stormwater from the landfill site and the contractor's yard during the remedial earthworks. As such, stormwater and erosion and sediment control measures will need to be

implemented at all times during the remedial earthworks and are to be undertaken in accordance with the Erosion and Sediment Control Toolbox developed by ECan (http://esccanterbury.co.nz/).

11.4.1 Perimeter Control Measures

Perimeter fencing will be installed where practical around the landfill and contractor's yard areas, utilising existing fencing where possible, to provide separation between the remedial activities and neighbouring sites. The exception will be improving fencing along the eastern landfill boundary which forms the terrace edge.

11.4.2 Site Access

Site access will be confirmed with the selected contractor but is expected to be from Dennistoun Road into the northwestern corner of the contractor's yard.

Throughout the earthwork's mobilisation, it is important to minimise any sediment tracked off site in vehicle tyres, which will reduce the spread of sediment over public roads.

In order to prevent sediments being tracked off site, the following solutions shall be used:

- **Stabilised Entranceway:** Stabilised all weather access shall be established at the entrance to the site by laying a base of 50-150 mm washed aggregate over a needle punched geotextile membrane. The minimum length of these entranceways is 10 m, with a minimum width of 4 m. The stabilised entranceway shall be contoured to suit the entrance point. Refer to Appendix E for an example of a stabilised entranceway.
- **Wheel Wash:** A wheel wash may be required should the stabilised entry point(s) not sufficiently manage sediment being tracked off-site.

Furthermore, in addition to the above measures, any sediment that is tracked off-site shall be immediately removed as far as practicable to prevent it becoming entrained in stormwater, and to not cause a nuisance.

11.4.3 Exposed Surface Control Measures

It is important to ensure that stormwater runoff from any disturbed soil does not leave the site in an uncontrolled manner. During site remedial earthworks, stormwater will be allowed to infiltrate through the existing site soils as an initial natural passive means of stormwater disposal, which is also the existing stormwater discharge method. All practicable measures shall be undertaken to minimise the discharge of sediment-laden stormwater offsite.

Appropriate options for dealing with stormwater discharges include the following options:

- **Dirty/clean water diversion bund:** A topsoil bund can be used as a temporary barrier to ensure all sediment laden stormwater is retained in the landfill and the landfill waste processing areas of the contractor's yard and that clean stormwater does not enter. A checklist and image of diversion bunds are provided in Appendix E.
- **Silt fence:** A silt fence could be installed on downgradient edges of the contractor's yard, to further ensure that sediment-laden runoff does not escape to the neighbouring sites. The silt fences must be installed in accordance with the checklist provided in Appendix E.

11.4.4 Location of Control Measures

Erosion and sediment control measures shall be positioned by the contractor prior to commencement of earthworks. Site plans showing the recommended locations of the erosion and sediment control measures will be included in the site specific ESCP.

The ESCP may be amended for the purpose of improving the efficacy of the erosion and sediment control measures but should not result in reduced discharge quality. Any amendments by the contractor or project manager need to be submitted in writing to TDC and/or ECan. Changes shall not be implemented until notified by Council's Team Leader Monitoring & Enforcement of the authorisation.

11.4.5 Discharge of Sediment-Laden water

The discharge of sediment laden water is to be to land within the site (i.e., within the remedial excavation footprint). Sediment-laden water shall be managed and retained within the site boundaries and should not enter neighbouring areas, the, the Rangitata River or the road.

11.4.6 Rainfall Response and Contingency

Work in heavy rain shall be avoided. In the event water ponding onsite is a problem, then a vacuum truck can be utilised for off-site disposal of excess water. Given the contaminant concentrations present over parts of the site (including heavy metals, asbestos and detectable TPH), the water must be taken to a suitable facility for disposal. Guidance will be provided by the contaminated land specialist should a vacuum truck be required.

11.4.7 General Inspections

Any erosion and sediment control measures implemented shall be visually inspected by the lead Contractor during active site works**, prior to any rain** that is forecast, as well as **after each rainfall event** where more than 5 mm of rainfall occurs. Following inspections, any accumulated sediment shall be deemed contaminated and removed immediately with the other identified contaminated soils/landfill waste. Any damaged or deficient components or structures shall be repaired.

Should any stormwater be observed migrating beyond the Works Area, the source of the water shall be identified, and measures shall be taken to ensure the source of the water is channelled towards the correct discharge location within the site.

11.4.8 Decommissioning

All exposed surfaces shall be stabilised once the remedial earthworks are completed. All spoil and other waste material from the works shall be removed from site under the guidance of the contaminated land specialist. Erosion and sediment control measures shall not be removed until the site has been stabilised.

12.0 Controls During Waste Processing Activities

As previously discussed, waste processing activities will be carried out as part of the remedial strategy at the site. The intention is separate out items that could be redirected from landfill (i.e. boulders) and larger items unable to fit into the waste bin.

Given the presence of asbestos in the landfill material, it is considered possible that asbestos (ACM and or asbestos fines) will be adhered to larger fragments within the landfill, unless proven otherwise. Due to the potential presence of ACM fragments and asbestos fines, the handling and sorting activity will require control measures to ensure the following:

- ACM fragments are not inadvertently crushed in the process;
- Any adhered asbestos fines in soils on the surface of cobbles/boulders/waste fragments are immobilised during the handling and process; and
- Airborne asbestos is eliminated, so far as is reasonably practicable;

Details of the process to be followed and relevant control measures are further discussed below. Further details of the waste processing methodology should be included in the ARCP. The asbestos removalist will need to provide guidance and supervision throughout this process.

This activity will take place at least 50 m from the residential dwelling that neighbours the site to the north.

12.1 Segregation of Waste for Processing

As mentioned, it is likely that the main materials to be separated out will be cobbles and boulders of greywacke, with some larger waste fragments that will be relatively easy to wash down (i.e., not too degraded and with smooth surfaces).

The method of segregation is to be agreed with the lead contractor but is likely to include some screening with the excavator/loader and some hand picking by site staff overseen by the SQEP.

In addition, visually clean layers of material encountered within the landfill maybe separated out, temporarily stockpiled and sampled by the SQEP to determine

whether it could be reused on site or disposed of at a facility other than Redruth landfill.

If materials are to be stockpiled for longer than 2 weeks, consider covering with geotextile or polymer to manage dust.

12.2 Visual Inspection

A visual assessment of segregated materials shall be undertaken by the onsite asbestos supervisor. The supervisor will check material for any visual signs of ACM. This could be present as fragments of ACM adhered loosely to the surface of the cobbles/boulders/waste fragments.

Individual fragments of ACM will be picked out and disposed of to Redruth Landfill along with the bulk of the landfill waste.

12.3 Cleaning Process

The following process shall be adopted for any material clean works:

- A low earth bund (i.e., 0.25 m height) should be constructed around a dedicated cleaning area and a double layer of bidim cloth laid across it.
- Using dust suppression, the segregated material should be placed in small volumes on the bidim cloth and cleaned with a fine mist or running water pressure. An excavator with a root rake bucket would be effective to lift the material for complete cleaning.

Note - No high-pressure sprays can be used in the cleaning process due to the possibility of mobilising asbestos fines.

- Once cleaned, the material will be separated into piles no more than 16 m^2 in footprint and water will be applied via a sprinkler system to manage any possible dust generation during handling. It is important to separate materials into small piles to facilitate the validation sampling.
- Throughout the duration of the waste processing works the current weather conditions will be monitored by the lead contractor and asbestos supervisor and if wind conditions are unfavourable, works will cease until such time as the wind dies down.
- PDP will undertake reassurance AFM when waste processing is being undertaken. The number and placement of pumps will be determined by PDP. Monitoring results will be provided to the lead contractor and asbestos supervisor daily.
- The bidim and associated sediments shall be removed as asbestos containing waste. This area shall be regularly maintained (kept damp) and cleanout and reinstated (as required).

12.4 Validation Sampling

- Representative composite swab samples will be collected by PDP for laboratory asbestos analysis from each pile of cleaned material.
- If samples return a negative result the materials in this pile will be deemed asbestos free and the concrete will be acceptable for reuse on site.
- If a sample returns a positive result the material within this pile will need to go through the Cleaning Process and be retested.
- If a pile is repeatedly returning positive results, it may be more appropriate to dispose of it along with the rest of the landfill waste to a suitably licensed facility.
- The frequency of sampling will be determined by the SQEP but is expected to involve testing of each pile during the initial phases of the work, and reducing if these results indicate the procedure is successful.

13.0 Disposal Options

All waste generated during the remediation programme, which cannot be recovered and re-used on-site (e.g., coarse gravel and large cobbles) or redirected to a licensed managed fill or recycling facility, will be removed to Redruth Landfill (Redruth; Class 1 Landfill), Timaru. Written approval for disposal of the waste generated during the remediation to Redruth is provided under Appendix G. The lead contractor is responsible for ensuring that all wastes generated during the remediation are appropriately disposed and that all records of waste disposal are obtained and provided to the SQEP.

All soil disposal records will need to be documented by way of a soil waste transfer manifest, recording the disposal location and the volumes and/or tonnages of soil removed offsite. A copy of a generic form, which could be used for tracking material to the disposal facility is presented in Appendix G.

Other options for disposal include Frews Managed Landfill for soil with no or very little visible waste and concentrations that meet the acceptance criteria of the facility. Determination of the suitability of disposal to Frews shall be determined by the SQEP.

Provided vegetative waste has not been in contact with waste material, this shall be deemed to be free of contamination and removed accordingly.

Materials that have been cleaned and redirected from the landfill waste stream may be suitable for recycling. This shall be determined through testing under the direction and approval of the SQEP.

14.0 Characterisation/Benchmarking/Validation Sampling

All testing will be undertaken by the SQEP who will determine the distribution and frequency of test locations and also the analytes required to be tested. The following soil sampling will be required over the duration of the remedial works:

- Benchmark/validation soil sampling across any neighbouring land proposed to be leased for the contractor's yard and/or used for vehicle access to the riverbed (e.g., for fallen waste retrieval) prior to use of these areas. Sampling is to be completed on the intended soils that will form the surface of the operational areas (i.e. not any topsoil that is temporarily stockpiled). The benchmarking results will serve as a reference for the validation testing at the end of the remedial works. The trigger levels for validation of these areas will be the higher value of either the Environment Canterbury reference background levels or the maximum concentration obtained during a benchmarking investigation undertaken prior to commencing waste removal activities.
- Characterisation sampling of any material that appears visually 'clean' (i.e., minimal waste fragments and no staining or odours) within the landfill that has been suitably segregated and stockpiled. This will determine whether this material could be disposed of at a facility other than Redruth landfill or, if geotechnically suitable, remain on site to be used to backfill the remedial excavation.
- Validation of materials removed from the waste and cleaned for redirection from the landfill waste stream (i.e. boulders and other smooth surfaced items).
- Validation soil sampling within the remediated area to confirm that the contaminant concentrations in the remaining soils meet the adopted Target Soil Remedial Criteria.
- Characterisation sampling to determine the level of contaminants present in areas where the Accidental Discovery Protocol has been implemented to assist with undertaking an assessment of the risk to human health and the environment.

15.0 Dewatering/Leachate Removal

Given the depth of groundwater (approximately 25 m bgl), dewatering may not be necessary during remedial excavation and general ground disturbance activities.

During previous test pitting at the site, minor seeps have been observed at isolated locations across the landfill area at depths between approximately 1.7 to 2.1 m bgl. This suggests perched water/leachate volumes within the landfill are not significant, however waste >4 m bgl has not been investigated and it is possible larger volumes of leachate may be encountered with depth. For short term dewatering activities, a vacuum truck could be utilised with disposal of the water/leachate at a suitably licensed liquid waste treatment facility (i.e., ChemWaste or EnviroWaste).

16.0 Accidental Discovery Protocol

Due to the past use of the site as a landfill that accepted a variety of waste, the likelihood of encountering contamination at concentrations that exceed those reported during previous testing at the site (i.e., PDP, 2023) is considered to be high. Furthermore, encountering unexpected concentrations or caches of waste is possible since test pits advanced at the landfill to date have not achieved the total landfill depth.

This section details the Accidental Discovery Protocol in the event obvious contamination sources and waste (e.g., drums or containers, or caches of unknown and potentially hazardous substances) are encountered during the remediation earthworks.

Typical indicators of contaminated soils or other potential sources of contamination include:

- Stained or discoloured soils (black, grey or green staining);
- Petroleum hydrocarbon or solvent odours/vapours;
- Waste material, including putrescible waste, general and/or commercial/industrial rubbish;
- Caches of asbestos containing materials (ACM; e.g., cement sheet fragments);
- Detection of high vapour/gas concentrations (e.g., methane, hydrogen sulphide, etc.) on personal gas alerts, PID and FID; and,
- Chemical containers/drums (marked and unmarked).

If the above visual, olfactory, device monitored indicators of contamination are encountered, then the following actions must be taken:

- Excavation works in that area should cease immediately and the lead contractor contacted. **The lead contractor must notify the SQEP** (if occurrence is not detected by the SQEP) who will evaluate the potential risk to human health and the receiving environment. In the event of an uncontrolled discharge of contaminants, take all practical steps to contain the discharge and prevent further discharge;
- Any intact chemical containers shall be segregated and isolated within a contained area (i.e. bin) for formal identification and specialist disposal (i.e., ChemWaste or EnviroWaste).
- If contaminants have been discharged to ground or the area of hazardous material/chemicals extends further into the waste pile, the area of concern must be fenced, barricaded, or isolated (e.g., by soil cover placement) to prevent unrequired site workers from entering the area.
- Personnel must not enter excavations or subsurface confined spaces where volatile compounds are present (i.e. possible toxic or hazardous atmospheric

zones) without approval/permission by a person qualified to issue permits; and

- The contaminated land specialist shall be contacted immediately to determine the appropriate course of action in relation to the environmental and human health requirements and the need to characterise the soils to assess the risk to site workers both during the site development or once the site has been completed.

Note - To detect vapours, a suitable monitoring device shall be used (see Section 19.3). **Personnel attending the remediation must not sniff materials recovered from the remedial excavation regardless of the material's appearance or touch such materials without appropriately gloved hands (i.e., cut and/or chemical gloves). Personnel on-site will not enter remedial excavations greater than 1 m deep or subsurface confined spaces, as volatile compounds and/or landfill gases could be present.**

17.0 Additional Considerations

17.1 Traffic Management

The remediation of the landfill will require the movement of numerous truckloads of waste to be transported off-site. This is likely to cause higher than normal heavy vehicle traffic in and out of the site along Peel Forest Road and Dennistoun Road. It is understood at the time of preparing this RAP that TDC currently have no roading improvements planned along Dennistoun Road, with the exception of regular regrading. It should be noted that only high-level discussions have been undertaken to date.

Where necessary, TDC will engage roading experts (internal and/or external to TDC) in regard to roading improvements. It is suggested that the lead contractor will need to be consulted as part of that process and should also complete regular inspections of the road to identify if/where improvements are required.

It is not expected that ongoing traffic management will be required over the entirety of the remediation; however, road signage, including temporary speed limits, along the inbound and outbound route to the site will need to be installed and maintained by a traffic management provider engaged by TDC to mitigate risks to other road users. Traffic management may also be required during regrading activities and any other road improvements required over the course of the remedial works.

17.2 Spill Response and Emergency Procedures

The Lead Contractor is responsible for providing and maintaining an adequate spill response kit onsite. **Any spill** must be reported immediately. The spill report form (refer to Appendix F) must be completed in the event of a spill of >5 L. The form is to be kept onsite for the duration of the project in an accessible location.

Practicable steps will be implemented to ensure oil and fuel leaks are prevented from vehicles and machinery, including the following:

- Fuel will be stored securely or removed from the site overnight; and
- A spill kit, capable of absorbing the quantity of oil and petroleum products that may be spilt on site at any one time, will always be kept on site.

In the event of a spill of fuel or any other hazardous substance, the spill will be cleaned up as soon as practicable, the stormwater system shall be inspected and cleaned, and a recurrence should be prevented.

Any incidents that result in off-site effects including, but not limited to odour, dust, or discharge of water, shall be reported to TDC's Monitoring Officer immediately unless otherwise permitted or authorised by resource consent. This shall be conducted by the lead contractor onsite.

17.3 Imported Fill Material

All backfill material imported to the site, shall meet the requirements of 'clean fill' as defined by WasteMINZ (2023)[6], meaning that the material will *comprise VENM* (virgin excavated natural material)*, such as clay, soil and rock that are free of combustible, putrescible, degradable or leachable components*. In addition, clean topsoil will need to be imported to the site for surface reinstatement and landscaping purposes. All materials imported to reinstate the site must exclude any potentially hazardous content and must not be contaminated by or mixed with any other non-cleanfill material. Any material not sourced from a quarry or pristine riverbed may require additional testing or certification prior to being used on site. Import of clean materials to the site will be overseen by the SQEP (including screening of materials upon arrival to the site). Any materials received on-site that is unsuitable as clean fill will be returned to the source site.

17.4 Public and Media Interest

If the site, or anyone approved to be undertaking work on the landfill during the remediation, is approached by the media or members of the public with questions about the remedial works, this could pose issues for their health and safety.

Unknown site visitors are unlikely to possess appropriate PPE and be familiar with site-specific health and safety protocols and should be directed calmly away from the site by the lead contractor or SQEP and be referred to TDC's media liaison. Additionally, if the site is approached by any unmanned aerial vehicles (UAV; e.g., drone) not belonging to the SQEP or anyone contracted to undertake and/or document the remediation, TDC's point of contact should be notified.

18.0 Dis-Establishment of Asbestos Controls on Remedial Earthworks

The presence of ACM and detected asbestos fibres and fines above the ALGA (2017) guidelines has typically been associated with the materials referred to as 'Waste Mixture' in the landfill. Once visible evidence of this material is removed all

[6] *Technical Guidelines for Disposal to Land* (WasteMINZ, 2023; Revision 3.1).

remaining work associated with the reprofiling of the landfill area can be undertaken under generic earthwork controls without the asbestos-specific measures subject to:

- validation soil sampling results demonstrating no asbestos impacts remain; and
- the requirements of the ARCP.

This approach is transferrable to the designated contractor's yard as/if needed.

It is expected that at this point, the LARC will hand over the control of site to the lead contractor, and relevant clearance certificates provided.

It is however recommended that nuisance dust and sediment and stormwater run-off are continued to be managed appropriately.

19.0 Health and Safety Considerations

19.1 General

This section discusses safety and subsequent protocols in relation to potential human and environmental hazards associated with exposure during the landfill remediation.

The RAP is not intended to relieve the lead contractor of their responsibility for the health and safety of their workers, contractors and the public, or their responsibility for protection of the environment. It is recommended that the lead contractor develop a site-specific health and safety plan (HASP) to complement this RAP and to address other health and safety requirements that may be applicable to their particular works.

Based on the current information, the likely key contaminant of concern is asbestos in terms of a risk that asbestos fibres/fines can be released into the air during the soil disturbance/excavation activities, which could present a human health risk to workers onsite and beyond the site boundary. In addition to asbestos, other COCs and landfill gases could be present at concentrations not detected during previous investigations. Provided procedures within this RAP are adhered to, there are not expected to be any significant human health or environmental effects during the remediation works.

As a general principle, to mitigate any potential adverse effects to the identified contaminants, all site workers are to be advised of the potential risks associated with the site and in the use of all safety and PPE and personal hygiene procedures before the commencement of remediation excavation works.

Further hazards (e.g., physical hazards such as loose or unstable ground) may be identified during the course of the remediation works. The lead contractor is responsible for reviewing any new work element and assessing whether there are any new associated hazards, and whether these can be eliminated, isolated or minimised. The lead contractor shall then instruct all staff on the health and safety procedures associated with the new hazard and update the site HASP.

19.2 Personal Protective Equipment

Protective and safety equipment must be made available to all site workers during the soil disturbance/excavation works at the site. In particular, during soil disturbance works associated with the existing site soils all contractors will need to wear the appropriate PPE for asbestos related excavation works.

As such, PPE shall include but not be limited to the following:

- P2 dust masks or half face respirators (**the type of mask to be determined by the LARC and defined in the ARCP**);
- Disposable Tyvek suit and gloves;
- Boot covers or the use of a boot washing system to be established to prevent site workers tracking material outside of the work zone; and
- Goggles or safety spectacles during windy/dusty conditions.

Standard PPE for a typical commercial development site will be required outside of soil disturbance works associated with the existing site soils. First aid equipment will be available at the site (e.g., eye wash kits).

19.3 Personal and Ambient Air Monitoring for Landfill Gas

While considered to be low risk based on current information, there is a potential for landfill gas to be present during disturbance works. As such, the following monitoring and safety measures shall be implemented:

- No personnel should enter the excavation areas deeper than 1 m unless they are trained and experienced in confined space entry;
- At least one person, ideally the excavation spotter, is recommended to wear a personal gas alert unit appropriately calibrated for landfill gas monitoring.
- Monitoring of ambient air using landfill gas meter is also recommended.
- No flames, smoking or sparking equipment are to be permitted within at least 8.0 m of the edge of the excavation area. Appropriate site hazard signage is to be clearly visible at the site boundary.

The following landfill gas monitoring trigger limits shall be used in accordance with the New Zealand Workplace Exposure Standards (WorkSafe New Zealand, 2022):

- Methane (CH_4) 0.5% (i.e. LEL 10%)
- Carbon Dioxide (CO_2) 5%,
- Oxygen (O_2) shall be between 19.5% and 21%,
- Hydrogen Sulphide (H2S) 10 ppm for 15 mins, and
- Carbon Monoxide (CO) 200 ppm for 15 mins.

In any event the alarms of the gas alert meter are triggered works should immediately cease and all personnel must leave site and assemble at a pre-

designated area for at least an hour or until normal atmospheric conditions have been reached. The designated evacuation area will be agreed in consultation with the lead contractor. Site access along Dennistoun Road should be monitored to ensure no one inadvertently enters the work area. Advice from the SQEP shall be immediately obtained before entering the area or recommencing work.

19.4 Personal Hygiene

Site personnel will be made aware of the importance of personal hygiene. Direct skin contact with potentially affected soils and dust should be avoided but if contact does occur it shall be washed off before eating/leaving site. The following general measures will be implemented during the excavation works undertaken across the site:

- Establish designated personnel break and restroom areas away from the identified areas containing impacted soils;
- Hands and other exposed parts of the body are to be washed prior to entering the designated eating and break areas, and on leaving the site. Water will be available on site for hand washing **(lead contractor and TDC to coordinate water supply);**
- Any protective gloves worn must be removed prior to eating, drinking or smoking; and
- No eating or drinking will be allowed within areas suspected or confirmed to be contaminated outside the designated eating area.

20.0 Record Keeping

The lead contractor shall provide the following information to the SQEP within 1 month of the completion of the landfill remediation works:

- Excavation depths across the site should be surveyed/recorded and photographs taken by the lead contractors and the SQEP during the earthworks;
- The depth of any natural material layers placed as part of site rehabilitation;
- Copies of the weighbridge receipts for all waste material removed from the site showing its disposal location and volume;
- Records of the location and dimensions of any excavation where additional sources of site contamination are encountered or whether unusual soil staining and/or odour are observed during the earthworks;
- Records of the LARC's clearance certificates (where/if applicable);
- Copies of air monitoring results; and
- Details of any complaints and/or visits from local or regional councils for contaminated land related issues (i.e. discharges from the site).

At the completion of the works the SQEP shall provide details of any additional soil sampling undertaken. A site validation report will be completed and distributed to TDC and ECan for their records.

21.0 Future Site Controls

Following completion of the remedial works, site rehabilitation works will be carried out in accordance with the final design specifications; **possibly subject to change depending on circumstances encountered during remediation works**).

It is expected that the site will be rehabilitated with clean imported fill and imported landscaping materials. Assuming the remedial goals are achieved, landfill waste will be completely removed from the site and little or no residual contamination is expected to remain in-situ. On this basis, there will be no requirement for any ongoing liability for management or maintenance of the site in terms of contamination or landscaping, and following initial landscaping/revegetation, the site will be allowed to return to a natural state.

22.0 References

ALGA, November 2017. *New Zealand Guidelines for Assessing and Managing Asbestos in Soil*.

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Pattle Delamore Partners Ltd., 2023b. *Remedial Options Assessment: Peel Forest Closed Landfill, Dennistoun Road, Peel Forest*

Pattle Delamore Partners Ltd, February 2024. *Peel Forest Landform Design Principles – Geotechnical and Stormwater Management*

Resource Management (National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

WasteMINZ, 2022. *Technical Guidelines for Disposal to Land (Revision 3)*

WorkSafe New Zealand, April 2022. *Workplace Exposure Standards and Biological Exposure Indices (13th edition)*

Appendix A: Figures

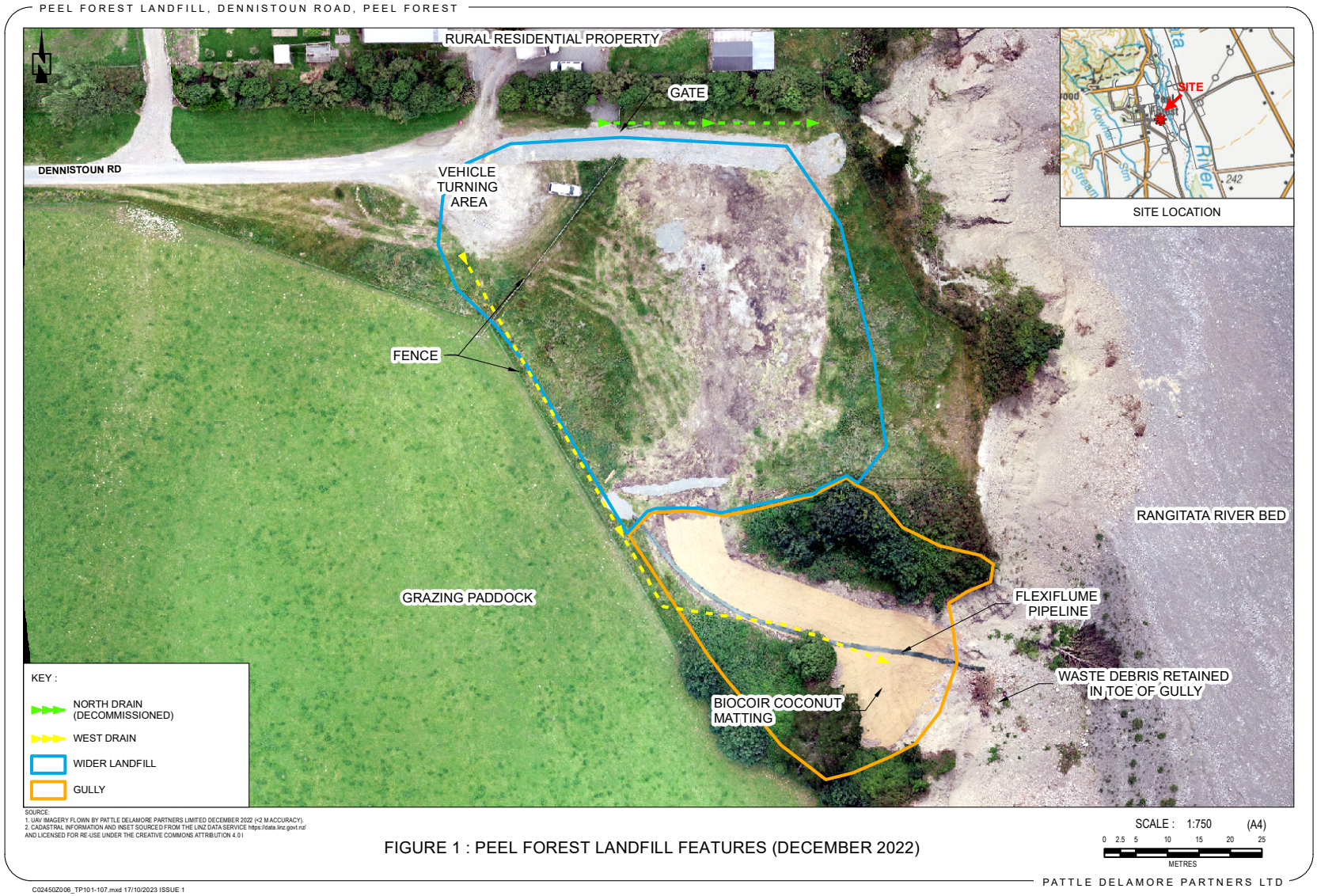

FIGURE 1 : PEEL FOREST LANDFILL FEATURES (DECEMBER 2022)

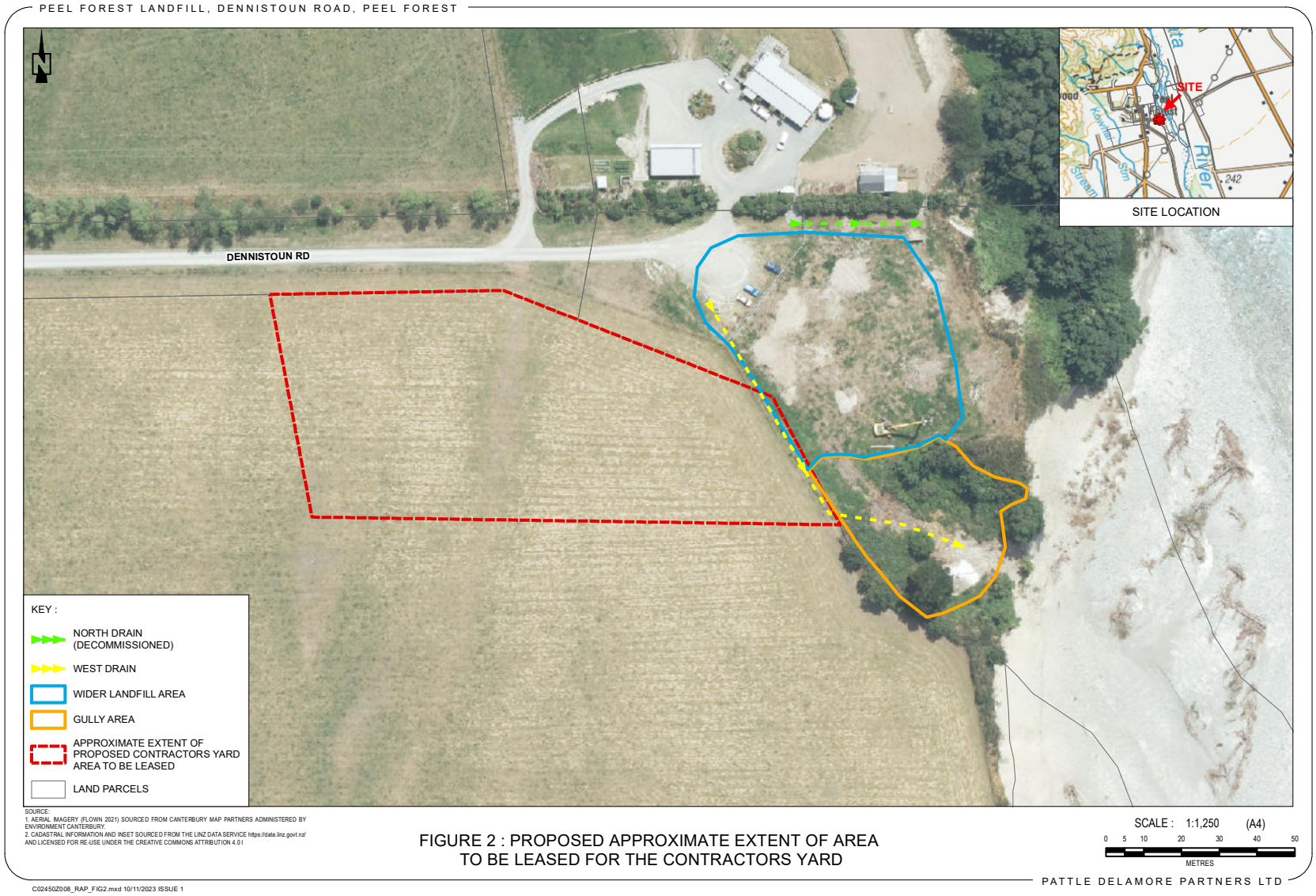

FIGURE 2 : PROPOSED APPROXIMATE EXTENT OF AREA TO BE LEASED FOR THE CONTRACTORS YARD

Appendix B: Target Soil Remedial Criteria Memo

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solutions for your environment

memorandum

TO	Timaru District Council	FROM	Lucy Duffus
	c/o Vincie Billante	DATE	27 October 2023
RE	Target Soil Remedial Criteria – Peel Forest Closed Landfill		

1.0 Introduction and Background

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on behalf of the Timaru District Council (TDC) to indicate the remediation criteria that are proposed to be used to demonstrate the satisfactory remediation of contaminant concentrations within soils remaining in situ following the remedial earthworks (i.e. the removal of visible waste and impacted soils) at the Peel Forest closed landfill (i.e., 'the landfill' or 'the site').

In addition to the removal of all visible waste and waste impacted soils, a remedial excavation over dig of up to 1 m is currently being proposed based on preliminary investigations to remove underlying natural materials that have been impacted by contaminant leaching from the main landfill body. Additional material may need to be removed depending on contaminant levels in the soils. The contaminant levels present within the remaining natural soils will form one of the key remedial end points. Determination of what levels of contaminants are suitable to remain at the completion of the remedial works is important to define and gain support from the key stakeholders at this early stage as this can have significant impacts on the costs.

2.0 Considered Target Remedial Criteria

To determine the most appropriate remedial criteria, an assessment of the key receptors at the completion of the remedial works has been undertaken. These include the following:

- Protection of human health – although this land area is not intended to be routinely occupied, it is possible that people could occasionally be present (i.e., general public or maintenance workers).
- Protection of terrestrial biota – includes protection of soil microbes, invertebrates, plants and wildlife.
- Protection of ecological receptors – the remaining soils will continue to be vulnerable to erosion and could be mobilised during future storm and flood events and enter the Rangitata River system.

On the basis of the key receptors, the following criteria have been considered and are presented in Table 1:

- Background Concentrations - Regional – Intergrade Soil Group (ECan, 2007; MfE, 1998)
- Human Health Soil Contaminant Standards (MfE, 2011a and 2011b; and NEPC, 2013)
- Ecological Soil Guidelines (Landcare Research, 2016 and update 2019)

- Default Guideline Values for Sediment Quality (ANZG, 2018)

The key contaminants of concern that have been considered include heavy metals, petroleum hydrocarbons, organochlorine pesticides and asbestos. These are considered the primary contaminants of concern from an ongoing risk posed to human health and the environment by any remaining impacts. Additional contaminants may be included depending on what is uncovered/encountered during the remedial excavation.

2.1 Background Concentrations (ECan, 2007; MfE, 1998)

Achieving heavy metal background concentrations for the soil group in which the site is located would appear to be the ideal outcome and may be achieved in some areas, however this can be hard and costly to achieve across the entire site due to these concentrations being so low. Any slight exceedances in remaining visibly clean soils following the removal of all visible waste and the over dig would result in the requirement to continue to excavate and remove even more material from the site when in fact the concentrations reported may not present a risk to human health or the environment. This could lead to significant additional soil removal with little to no environmental benefit.

Negative impacts of removing soils that do not pose a risk to human health or the environment include:

- Direct costs associated with additional time on-site, effort to excavate and dispose of an unknown volume of natural materials;
- Direct costs associated with the potential need to import/source additional material (clean fill) for reinstatement;
- Negative impacts of the sustainability of the remedial works (i.e., more plant and truck movements); and
- Possible increase in the potential to destabilise the remedial excavation walls.

Whilst OCP compounds are anthropogenic it is important to note that due to their historical ubiquitous application in agriculture, parklands, and turf management they can be considered to also be present at low but detectable 'background' concentrations (MfE, 1998). While there is no official ECan background soil concentrations, ECan has recognised that some OCPs are ubiquitous in the environment and has adopted an interim 'background' level (0.431 mg/kg) for ∑DDT (OCP compounds).

2.2 Human Health Soil Contaminant Standards (MfE, 2011a and 2011b; and NEPC, 2013)

As the site will remain vacant and not routinely be used by humans following successful remediation and reinstatement, typical land use scenarios for protection of human health (i.e., residential – standard and rural/lifestyle, recreational, and commercial/industrial) are not directly relevant. Of the typical land use scenarios available for protection of human health, the site is considered to align best with the recreational land use (refer to Table 1); however, the site will not be designated for recreational use so these guidelines have been included for reference only. For those guidelines without a recreational land use scenario (i.e., MfE, 2011b), residential land use has been included as a conservative approach.

2.3 Soil Guideline Values For The Protection Of Ecological Receptors (Eco-SGVs 2016/2019)

The ecological soil guideline values (Eco-SGVs) have been developed to protect terrestrial biota (soil microbes, invertebrates, plants, wildlife and livestock) and provide a useful way to readily assess the potential environmental impact from environmental contaminants. These guidelines have been developed and promoted by Landcare Research and although they have not been recognised formally, are being used to provide an assessment of the soil quality to protect terrestrial biota. A land use scenario of 'non-food production land' has been used as it best fits the intended land use and values shown in Table 1.

2.4 Default Guideline Values for Sediment Quality (ANZG, 2018)

The vulnerability of the landfill to erosion (i.e., due to the potential for significant future flood events) and the release of contaminated material/soil into the Rangitata River is the main driver for remediation. Even after the remedial works are completed the river will continue to remain one of the key receptors as the remaining soils will still be vulnerable to erosion and could be mobilised during future storm and flood events and enter the Rangitata River system. Therefore, comparison to the toxicant default guideline values (DGV) for sediment quality in the ANZG (2018) is suitable in this instance, albeit not directly comparable and considered a conservative approach. The DGV have been derived to define a concentration level below which there is a low risk of unacceptable effects occurring. The applicable DVG's are shown in Table 1 below.

3.0 Proposed Target Remedial Criteria

Table 1 summarises the considered remedial criteria for specific parameters and outlines the proposed adopted Target Soil Remedial Criteria that is intended to be applied as the contaminant remedial end point.

The human health contaminant standards were the highest levels for all contaminants considered and therefore not limiting for the remedial end point. In addition, the background concentrations have not been adopted as reaching background levels could be extremely difficult to achieve and could result in significant cost to the project for little to no environmental benefit. The exception being DDT, which is considered ubiquitous in the agricultural setting and therefore considered applicable in this instance and has been adopted. The remainder of the adopted remedial criteria are based on the lower concentration of either the Eco-SGV's and sediment DGV (ANZG, 2018). This aligns with the primary receptors identified for the project.

Should any additional contaminants/contamination sources be encountered during the remedial work, these will be dealt with under the accidental discovery protocol outlined in the Remedial Action Plan. Contaminant specific remedial target criteria will be developed as part of this approach.

Table 1: Target Remedial Criteria for Remaining Soils [1]						
Parameter *(All parameters in mg/kg unless otherwise stated)*		**Human Health Based Soil Contaminant Standard – Recreational Land Use**	**Environment Canterbury Background Concentrations- Regional – Intergrade soil type**	**Eco-SGV Non-Food Production Land**	**DGV for Sediment Quality**	**Proposed Target Soil Remedial Criteria**
Heavy Metals						
Arsenic		80	7.0	20	20	**20**
Cadmium		400 [2]	0.14	4.8	1.5	**1.5**
Chromium		2,700 [3]	25.9	190	80	**80**
Copper		>10,000	16.3	100 [6]	65	**65**
Lead		880	30.3 (135.8)	280	50	**50**
Nickel		1,200	16.4	-	21	**21**
Zinc		30,000	83.5 (147.75)	170 [6]	200	**170**
Organochlorine Pesticides (OCP)						
ΣDDT		400 [4]	0.431	2.4	0.0012 [5]	**0.431**
Petroleum Hydrocarbons						
Benzo(a)pyrene eq.		40	-	2.8	-	**2.8**
Total PAHs		-	-	-	10	**10**
TPH	C_7-C_9	-	-	110	280	**280**
	C_{10}-C_{14}	-	-	70		
	C_{15}-C_{36}	-	-	300		

Table 1: Target Remedial Criteria for Remaining Soils [1]					
Parameter *(All parameters in mg/kg unless otherwise stated)*	**Human Health Based Soil Contaminant Standard – Recreational Land Use**	**Environment Canterbury Background Concentrations- Regional – Intergrade soil type**	**Eco-SGV Non-Food Production Land**	**DGV for Sediment Quality**	**Proposed Target Soil Remedial Criteria**
Asbestos					
Asbestos	0.001 % weight for weight asbestos fines; and 0.02 % bonded ACM	-	-	-	**No detectable asbestos**
Additional Contaminants					
Should any additional contaminants/contamination sources be encountered during the remedial work, these will be dealt with under the accidental discovery protocol outlined in the Remedial Action Plan. Contaminant specific remedial target criteria will be developed as part of this approach.					

Notes:

1 *The final validation analysis suite is yet to be determined and subsequently some of the individual parameters listed here may not be included.*
2 *Based on a default pH of 5.*
3 *Soil contaminant standard for Cr VI used as a conservative approach.*
4 *Results for DDT, DDD and DDE summed.*
5 *Normalised to 1% organic carbon (OC) within the limits of 0.2 to 10%. Thus if a sediment has (i) 2% OC, the '1% normalised' concentration would be the measured concentration divided by 2, (ii) 0.5% OC, then the 1% normalised value is the measured value divided by 0.5, (iii) 0.15% OC, then the 1% normalised value is the measured value divided by the lower limit of 0.2.*
6 *Values based on the Updated Ecological Soil Guideline Values for copper and zinc in a 'typical soil type' with 'aged' contamination (June 2019)*

4.0 References

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia.

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Landcare, 2019. Updating the Ecological Soil Guideline Values (Eco-SGVs). JE Cavanagh. Landcare Research New Zealand Limited.

Ministry for the Environment, 1998. Ambient Concentrations of Selected Organochlorines in Soils. Ministry for the Environment, Wellington.

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Ministry for the Environment 2011b. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011). Ministry for the Environment, Wellington.

National Environment Protection Council, 2013. Guideline on the Investigation Levels for Soil and Groundwater. National Environment Protection Council Australia.

5.0 Limitations

This document has been prepared by Pattle Delamore Partners Limited (PDP) on the specific instructions of Timaru District Council for the limited purposes described in the document. PDP accepts no liability if the document is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by

Lucy Duffus

Senior Environmental Geologist

Reviewed and approved by

Scott Wilson

Contaminated Land – Technical Director

Appendix C: Land Lease Approvals

Lucy Duffus

Subject: FW: Re: Lease of land for the closed landfill removal
Attachments: image307558.png; image307558.png; 20231005_ProposedLeaseArea.pdf

---------- Forwarded message ----------
From: Mark Tapley <mark@pfe.nz>
Date: 17/10/2023 21:59
Subject: Re: Lease of land for the closed landfill removal
To: Vincie Billante <Vincie.Billante@timdc.govt.nz>
Cc: Graham Carr <graham@pfe.nz>

Sorry it slipped through my radar. It will be fine to lease that section but it will need to be deer fenced off so we can still graze the remaining paddock. If you can agree to this I see no problem. I've got a huge day tomorrow so can't talk tomorrow but if you call me Thursday morning we can go through the details

Regards,

Mark Tapley
Peel Forest Estate
+64277799008

> On 17/10/2023, at 10:58 AM, Vincie Billante <Vincie.Billante@timdc.govt.nz> wrote:
>
> Hi Mark
>
> I'm following up on my previous emails regarding the above. I need to get this sorted urgently as we need to have this confirmed for the consent application – can I urgently get either a teams meeting with you and Graham, or come out to see you this week, to get it sorted??
>
> Please make contact with me either via email or phone me on 0274-388-326.
>
> Again, attached is area we are talking about.
>
> Many thanks, hope to hear from you soon.
>
> Kindest regards,
> Vincie

Vincie Billante | LTP Project Lead

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Appendix D: Peel Forest Landform Design Principles – Geotechnical and Stormwater Management

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19 February 2024

c/o Jacky Clarke
Timaru District Council
2 King George Place
TIMARU 7910

PEEL FOREST LANDFORM DESIGN PRINCIPLES – GEOTECHNICAL AND STORMWATER MANAGEMENT

1.0 Introduction

Pattle Delamore Partners Limited (PDP) have been engaged by Timaru District Council (TDC) to provide stormwater and geotechnical engineering advice to assist in construction phase works for the permanent landform for Peel Forest Landfill remedial works. The intent of this document is to provide generalised advice to assist during the earthwork's construction phase.

This letter should be read in conjunction with the Remedial Action Plan (RAP) which has also been prepared by PDP for TDC dated February 2024.

2.0 Background

2.1 Site Setting

The landfill is situated within a generally north to south trending erosional gully located on top of a river cut terrace approximately 30 m in height. The landfill has experienced loss of waste into the Rangitata River from erosion and instability of the river terrace caused during rainfall events over the past couple of years. Erosion and slope instability of landfill waste within the gully are attributed to stormwater flow through the gully. Larger scale river erosion and river terrace failures have been remediated through modifications to the river morphology and is separate to this scope.

The river terrace comprises well graded river gravels with some rounded cobble to boulder sized greywacke gravels. The river terrace is generally over steepened, over time these terraces regress back to long term slope angles of approximately 45° as can be seen across neighbouring slopes.

From the stormwater perspective the landfill is situated immediately west of the Rangitata River (i.e., 'the Rangitata') on a 30-metre-high river terrace. Stormwater leaving Dennistoun Road flows out to the Rangitata River along a shallow drain immediately north of the landfill and a narrow drain that runs to the west of the landfill before flowing out through the landfill valley area. Surrounding land use is rural with a rural residential property to the north and grazing paddock to the west.

2.2 Work Completed to Date

During the landfill removal works it is proposed to lease land from the neighbouring property to be used as a waste triage area, lead contractor base and remediation support area (hereafter, 'contractor's yard'). A topographical survey has already been carried out by Fox Surveys Limited (August 2023) over the area of

land proposed to be used as the contractor's yard to benchmark the topography of the land before it is disturbed.

An additional topographical survey was completed by Fox Surveys on the 11 September 2023 to validate the LiDAR data and pick up general site details to be utilised in design. The topographical survey and pre-existing digital elevation model (DEM) derived from drone photogrammetry have been combined to generate an updated DEM to aid the design process.

To prevent on-going erosion / instability of the landfill mass and migration into the river, temporary erosion works were completed in December 2022 which included grading / pulling back the landfill mass to for a slope back into the gully. This profile was covered with coconut matting (jute) pinned to the slope and sown with grass seed. In addition, a bund was formed at the crest of the gully slope to divert sheet flow water into a culvert and lay flat hose which is directed down to the riverbank. During these works the shallow drain immediately north of the landfill was infilled to prevent runoff over the river terrace.

Additional details on the background of the site can be found in the PDP DSI report.

3.0 General Design Considerations

The purpose of this assessment is to provide the following design considerations:

Temporary Works

Provide advice on a suitable erosion and sediment control measures during landfill removal works including during construction of the Contractor Yard and diversion of stormwater away from the landfill excavation area.

Provide advice on possible geotechnical risks during the landfill removal.

Permanent Landform

1. Provide recommendations on final landform slope angles from a slope stability perspective once the landfill waste is removed. Slope angles must consider the final landform landscaping agreed with stakeholders and be suitable for landscaping purposes.
2. Provide recommendations on a suitable gully base angle to slope catchment stormwater disposal through the final cleared gully, provision for landform modification through benching with cut or fill into or using natural gravels to reduce the flow velocity and erosion.

4.0 Stormwater Design Intent and Considerations - Landfill

4.1 General

The following gives the stormwater design intent to be followed through landfill removal and formation of the final landform. As the actual thickness / extent of the landfill mass is unconfirmed it is likely there will be some amendments during earthworks as such a final design can't be provided at this stage.

4.2 Catchment Analysis

To assess sizing of the temporary and permanent surface water controls, the overland flow paths from the upgradient catchment, currently discharging through the landfill site have been evaluated using LiDAR for four different event durations as follows:

- The 1 in 5-year average recurrence interval (ARI) flow is estimated as 0.4 m^3/s.
- The 1 in 10-year ARI flow is estimated as 0.7 m^3/s.
- The 1 in 100-year ARI flow is estimated as 3.5 m^3/s.

- The 1 in 250-year ARI flow is estimated as 4.5 m^3/s.

It is recommended the flows used for the construction phase stormwater temporary works design are in the order of magnitude of the 1 in 10-year ARI. It is recommended that the 100-year ARI flows are used for the design of the final landform surface post construction. If the client would prefer a lower level of risk, the 250-year ARI flow could be considered for design for the final landform.

4.3 Landfill Temporary Stormwater Control

During construction, the upgradient catchment stormwater is proposed to be diverted around the landfill site by installing a suitably sized diversion swale along the western boundary of the landfill site. An indicative location for this diversion swale is shown in Figure 1, attached. At this stage, no changes are proposed to the existing 340 mm internal diameter culvert under Dennistoun Road near the landfill site. The diversion swale is proposed to tie into the existing levels of this culvert. The diversion swale will then discharge into the Rangitata River at a point downstream of the exposed landfill works. The diversion swale and controls will be designed in accordance with Environment Canterbury's (ECan's) Erosion and Sediment Control Toolbox (ESCT).

The diversion pathway from the top of the landfill to the Rangitata River will be stabilised to minimise any erosion. Where required, imported material or a flume will be used. The exact flow pathway will likely change throughout the duration of works due to the nature and location of the remediation works proposed.

It is expected that during prolonged rainfall, localised stormwater flows will form within the landfill excavation area during the works. The following control measures are recommended to control landfill stormwater:

- Exposure of the landfill waste must be minimised as much as practicable with provision for temporary cover of exposed areas where rain is forecast. This temporary cover may include geofabric, anchored with sandbags / rocks or small earth bunds.
- Excavation control so that the working surface is near level and graded back on itself to reduce runoff from the site.

4.4 Permanent Landform Stormwater

The permanent landform is intended to include natural in-situ materials with a base channel to convey most of the stormwater flow. Appropriate rip rap sizing will be included to reduce the effects of erosion along this channel, as well as having grades as shallow as possible to aid with minimising erosion.

Once the landfill remediation is complete, stormwater is proposed to be redirected to its original flow path, through the current landfill area and discharging into the Rangitata River. The landform will be graded and formed such to minimise erosion by reducing the velocity of the stormwater flowing through the gully. Sinuosity will be incorporated into the final design where practicable to further reduce grade on the steeper sections.

5.0 Contractor Yard – Temporary Works

The following outlines preliminary recommendations to be incorporated into the temporary contractor yard development.

5.1 Yard Preparation

It is expected that the topsoil will need to be removed from the temporary contractor yard and temporarily stockpiled in a suitable location or used within the diversion bund construction. A separation layer such as Bidim A29 (or similar) will be placed across the yard after the removal of the topsoil. A

running / working surface of imported aggregate should be placed to the contractors' requirements to form a near level platform preferentially graded to promote surface water drainage towards appropriate erosion and sediment control measures.

Depending on post works contamination testing, the imported aggregate may be suitable for re-use or may need to be cut to waste at the end of the landfill operations.

5.2 Stormwater Control

It is expected that the topsoil stripped from the site will be stockpiled and used to create stormwater diversion bunds in accordance with ECan's ESCT to manage and control stormwater from the contractor's yard. These bunds will be grassed to provide treatment of the stormwater.

Stormwater from the contractor yard diversion bunds will be directed to discharge into the temporary landfill diversion swale located on the upper western boundary of the landfill. Indicative bund locations are shown in Figure 1, attached. From here it will mix with the upgradient catchment stormwater and discharge into the Rangitata River (avoiding any open landfill area). The flow path from the top of the landfill to the Rangitata River will be stabilised to reduce erosion.

The bund sizing will be in general accordance with ECan's ESCT. Any bunds shall have a maximum side slope of 1V:3H and be compacted with an excavator bucket and grassed. The exact dimensions of the bund will be designed once the area of the contractors' yard is confirmed.

Following project completion, the topsoil from these bunds may be suitable for respreading across the site, subject to contamination suitability testing.

6.0 Final Landform Intent

To date the landfill sub-surface profile has only been confirmed using Ground Penetrating Radar (GPR) which can be in extremely variable. As such there needs to be flexibility in the earthworks required to complete the final landform after removal of the landfill waste. As such the following are general recommendations to be incorporated into form the final landform:

- All landfill waste must be removed as per the RAP with temporary stormwater control measures discussed in Section 4.3 implemented.
- All cut batters into natural gravels must not exceed a gradient of 2.5 horizontal to 1 vertical or a slope angle of 23°. This is to ensure topsoil retention for the landscaping.
- The crest line of all cut batters must be within the landfill cadastral boundaries, a 4 m wide access strip must be allowed for between the northern boundary and the crest of the slope.
- The final landform within the landfill must promote all surface water flow towards the central gully for discharge to the Rangitata River.
- The base angle of the central gully must be such to reduce flow velocity and subsequent surface erosion and discharge of sediment to the river.
- It is expected that the gully channel will disperse directly over the edge of the existing terrace and into the loose gravel material already at the toe. It is probable that in an extreme flood or multiple floods that the toe material will be excavated but prior to this potentially occurring, the toe material will add some initial protection to the terrace.
- Fill will be sourced from natural river gravels cut during the earthworks, assuming the results of contamination testing indicate this material is suitable to remain on site. This material must be stockpiled and placed as outlined in Section 7.0.

- Topsoil should be placed in discrete areas where planting will take place as per the landscaping plan. It is not recommended to place topsoil across the entirety of exposed slopes or within stormwater flow paths within the gully floor.

7.0 Earthworks Specification Recommendations

7.1 General Requirements

The handling and disposal of all identified landfill material is covered in the PDP RAP. These earthwork specifications are only for the cutting into natural river gravel and placing of fill.

Erosion, sediment, and dust control is excluded from this specification, the RAP should be referred to.

The earthworks specification is not fully in accordance with NZS4431:2022 and is not suitable for building on. The purpose of this specification is to ensure the formation of a stable fill area.

7.2 Excavation

It is anticipated that approximately 18,000 m^3 (in situ) of waste could be excavated and removed from the landfill. This does not include an over dig into natural soils impacted by leaching (potentially up to 5,000 m^3). The extent and volumes of excavation is dependent on the actual depth of the landfill waste. The RAP is considered the leading document to guide controls that should be implemented as the landfill waste is being removed.

The existing temporary slope protection measures should be kept in place as long as possible during the earthworks.

Cut areas shall be progressively excavated to form a uniformly graded surface within the batter limits as directed by PDP. The Contractor shall form the excavations in a logical and orderly manner to minimise wastage and ensure safe stable temporary cut batters within the landfill mass and natural ground cuts.

Any unexpected variations in material types, evidence of slope instability, buried vegetation, groundwater flows, or seepages should be immediately reported to the PDP Engineer.

7.3 Cut to Fill – Natural River Gravels

Excavation shall be by excavator and truck operations, planned and managed to the Engineer's approval such as to maximise the extraction and separation volumes of the various material types. The natural river terrace between the landfill mass and the river must be preserved, i.e. cuts into the natural gravels must be kept to a minimal. The direction and extent of earthworks cuts must be approved by the supervising engineer to ensure no effects on neighbouring properties during cutting.

The Contractor shall undertake continuous visual inspections of materials and shall immediately report to the Engineer any visual changes, slope movement or groundwater that affects the borrow source.

Temporary stockpiles of natural gravels to be used as fill must be kept at least 3 m away from the crestlines of the river terrace and working slopes.

7.4 Spreading of Fill

Prior to compaction, the fill materials shall be spread uniformly in horizontal layers not exceeding 300 mm uncompacted thickness.

To ensure adequate compaction of the materials forming the final fill surface profile, all fill batter faces shall be overfilled as necessary and carefully trimmed back to the required design profile.

7.5 Benching

Where fill abuts sloping ground with a gradient steeper than 1V:4H, the ground being filled shall be benched into for a sufficient distance so that the vertical height of the bench is at least twice the thickness of the compacted fill layer.

7.6 Compaction

The Contractor shall employ sufficient dedicated compaction plant so as to achieve the specified compaction. Compaction plant shall cover the entire area of each layer of fill and give each layer a uniform degree of compactive effort. The combined operations of spreading and compacting shall be undertaken using systematic and properly managed procedures, to the Engineer's approval, so as to ensure that each loose layer receives the required passes of the roller or other approved compaction equipment before further loose material is spread.

7.7 Compaction standards and testing

The tests and testing frequency described and defined in Sections 7.8 and 7.9 will be used to confirm that the placed fill materials meet the required standard, design criteria and parameter values. At any time either prior to or during construction, the Engineer may direct modifications to the compaction standards, frequencies and test methods defined in this Section with the object of ensuring that the design criteria and objectives for the materials and conditions encountered, are achieved.

A compaction trial should be considered to provide a method specification for the compaction of the cut gravels.

7.8 Compacted Fill Acceptance Criteria

The following is acceptance criteria for placed compacted fill:

- The number of blows per 100 mm to drive the Scala penetrometer from a depth of 100 to 300 mm below the fill surface shall be not less than five when carried out to NZS 4402:1986, Test 6.5.2.
- The average Clegg Impact Value from a Clegg Impact Test completed in accordance with ASTM D5874-95 shall not be less than 25.

The base of any excavation prepared for filling shall also be compacted to the relevant standards specified above for fill. If this surface fails the above criteria or contains organic or other unsuitable material as defined by the Engineer, undercutting to a depth specified by the Engineer shall be required.

7.9 Frequency of testing

The frequency of testing shall be as described below and is the minimum considered acceptable. Additional tests and/or changes to the testing frequency may be instructed by the Engineer as the works proceed.

Should any test result fail to meet the required design criteria, the Contractor shall propose remedial measures for the Engineer's approval. Such measures are expected to usually comprise the removal, replacement and satisfactory retesting of any fill within the agreed area of influence of the failed test location.

The minimum required frequency of testing is:

- Maximum Dry Density (MDD) and Optimum Moisture Content (OMC) – heavy compaction, one (1) initial test for each material type and then one (1) test per 5,000 m^3 for that material type.
- Clegg Impact Value, Hardfill compaction, One (1) test per 20 m^2 per 200 mm layer.

The Contractor shall re-work and re-compact areas disturbed by any testing undertaken within the site, to the Engineer's approval.

7.10 Shaping & Topsoiling

The finished shape of the earthworks shall be determined during the earthworks to the intent given in this document or as instructed by the Engineer. The earthworks profiles shall generally be trimmed to match and blend with adjacent sections of undisturbed existing ground.

Topsoiling shall be in accordance with the final landscaping plan to be provided by TDC / AECL, although topsoil shouldn't be placed within the expected drainage pathways.

7.11 Inspections and approvals

The following earthworks inspections are required throughout the construction works.

- Inspection of the temporary stormwater control measures.
- Inspections during landfill removal as outlined in the RAP.
- Inspection of the striped landfill waste when natural gravels are exposed.
- Inspection of benching as required prior to fill placement.
- Inspection to inform the final cut / fill landform.

The frequency of inspections is dependent on the final earthworks programme.

8.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Timaru District Council. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Timaru District Council**.** for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared & approved by

Andrew Smith

Technical Director – Geotechnics

Reviewed by

Ingrid Cooper

Service Leader - Water Infrastructure


105
Dennistoun Road
N
Key:
Landfill Works Area
Proposed Diversion Swale
Proposed Contractors Yard Area
Existing Stormwater Culvert
Approximate Lay Flat Discharge Location TBC
Proposed Contractors Yard Bund
NZ Property Titles
pdp
FIGURE 1: PEEL FOREST LANDFILL
GENERIC ESC MEASURES
NOTES:
1. AERIAL IMAGERY SOURCED FROM THE LINZ DATA SERVICE [https://data.linz.govt.nz] AND LICENCED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE.
THIS DRAWING REMAINS THE PROPERTY OF PATTLE DELAMORE PARTNERS LTD AND MAY NOT BE REPRODUCED OR ALTERED WITHOUT WRITTEN PERMISSION. NO LIABILITY SHALL BE ACCEPTED FOR UNAUTHORISED USE OF THE DRAWING
0 15 30 m
METERS
SCALE : 1:800 (A4)
REVISION: 01 | DATE: 18/12/23 | BY: DT
CLIENT: TDC
© 2023 Pattle Delamore Partners Limited

Appendix E: Erosion Sediment Control

EROSION AND SEDIMENT CONTROL TOOLBOX
FOR CANTERBURY

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

CHECKLIST 1: 'Clean water' or 'dirty water' diversion channel and bund

Contractor:	Date:	Consent number:	Site:
	Time:		

Construction checklist Check back to Managing 'clean water' and Managing 'dirty water' sections for full information. Also see the Figures over the page.	Yes ✔	No ✘ (Add comments to explain)
Route avoids trees, services, fence lines or other natural or built features		
Channels are trapezoidal or parabolic in shape		
Internal side slopes are no steeper than 3:1 External side slopes are no steeper than 2:1		
Drains are constructed with a uniform grade along the invert (as sudden decreases may cause sediment to accumulate causing the bank to overtop)		
Bunds are well compacted		
Outlets are stable and protected as needed		
Diversions are stabilised to prevent erosion		
Perimeter diversions are regularly maintained		
If necessary, specific geotechnical design is followed to ensure the stability and integrity of the structure		
Inspection and maintenance checks are done, dated and recorded, along with any comments		

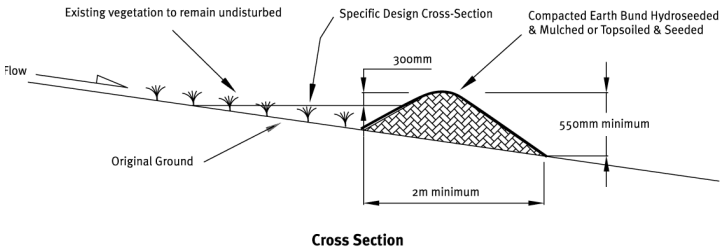
Note: this is an on-site, self-check list for contractors to use. Keep your completed checklists to show Compliance Officers your set up, monitoring and maintenance, if requested.

Signature:

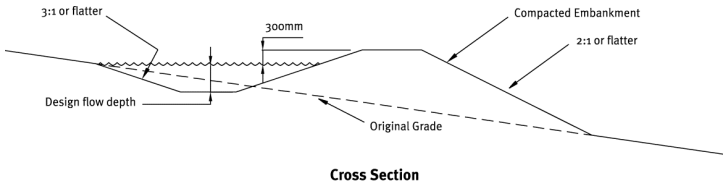
EROSION AND SEDIMENT CONTROL TOOLBOX
FOR CANTERBURY

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

CHECKLIST 1 FIGURES: 'Clean water' or 'dirty water' diversion channel and bund



Cross section of a clean water diversion



Cross section of dirty water diversion

EROSION AND SEDIMENT CONTROL TOOLBOX
FOR CANTERBURY

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

CHECKLIST 5: Stabilised entranceway

Contractor:	Date:	Consent number:	Site:
	Time:		

Construction checklist Check back to 'Stabilised entranceway' section for full information. Also see the Figures over the page.	Yes ✔	No ✘ (Add comments to explain)
Area has been cleared of unsuitable material and smooth graded		
Woven geotextile has been placed over the area, and is properly pinned and overlapped		
At least 10 m of aggregate has been placed (extending from site boundary), 4 m wide and minimum 150mm deep, using 50–150 mm washed aggregate		
Vehicles cannot bypass the entranceway		
Street sweep/suction is done and date recorded		
Inspection and maintenance checks are done, recorded and dated, along with any comments		

Note: this is an on-site, self-check list for contractors to use. Keep your completed checklists to show Compliance Officers your set up, monitoring and maintenance, if requested.

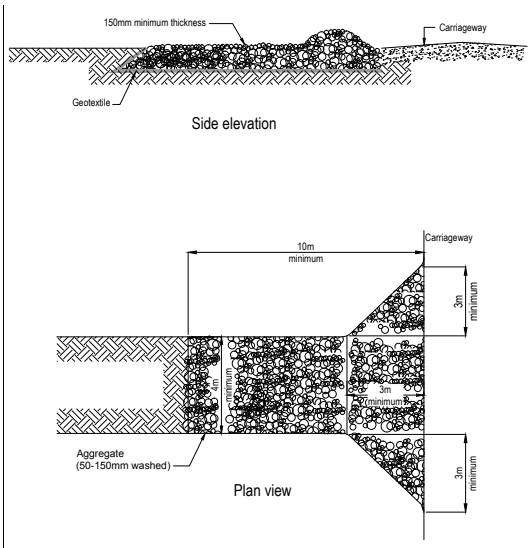
Signature:

EROSION AND SEDIMENT CONTROL TOOLBOX
FOR CANTERBURY

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

CHECKLIST 5 FIGURES: Stabilised entranceway

Stabilised entranceway *(Source: SouthernSkies)*



Stabilised entranceway

EROSION AND SEDIMENT CONTROL TOOLBOX
FOR CANTERBURY

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

CHECKLIST 17: Silt fence

Contractor:	Date:	Consent number:	Site:
	Time:		

Construction checklist Check back to sections 5.3 [link] for full information. Also see the Figures over the page.	Yes ✔	No ✘ (Add comments to explain)
The silt fence material suits the site conditions and is used to the manufacturer's specifications		
Silt fences are installed along the contour		
There is a trench at least 100 mm wide and 200 mm deep along the proposed line of the silt fence		
Support posts/steel waratahs are installed at least 1.5 m long and 2–4 m apart		
Support posts/waratahs are installed on the downslope edge of the trench, with silt fence fabric on the upslope side of the support posts to the full depth of the trench. The trench is backfilled with compacted soil		
The top of the silt fence fabric is reinforced with a support made of high tensile 2.5 mm diameter galvanised wire. The wire is tensioned using permanent wire strainers attached to angled waratahs at the end of the silt fence		
The silt fence fabric is doubled over and fastened to the wire with silt fence clips at 500 mm spacings		
Where ends of the silt fence fabric come together, they are overlapped, folded and stapled/screwed to prevent sediment bypass		
Inspection and maintenance checks are done, recorded and dated, along with any comments		

Note: this is an on-site, self-check list for contractors to use. Keep your completed checklists to show Compliance Officers your set up, monitoring and maintenance, if requested.

Signature:

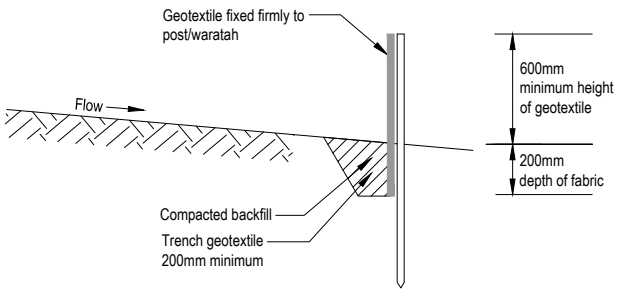
EROSION AND SEDIMENT CONTROL TOOLBOX
FOR CANTERBURY

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

CHECKLIST 17 FIGURES: Silt fence

Slope steepness %	Slope length (m) (maximum)	Spacing of returns (m)	Silt fence length (m) (maximum)
Flatter than 2%	Unlimited	N/A	Unlimited
2 - 10%	40	60	300
10 - 20%	30	50	230
20 - 33%	20	40	150
33 - 50%	15	30	75
> 50%	6	20	40

Silt fence design criteria



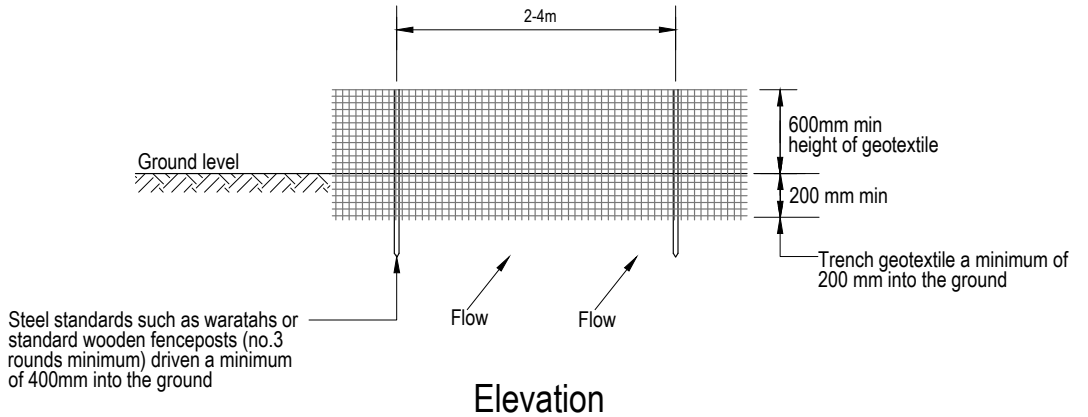
Cross - section

Silt fence cross section

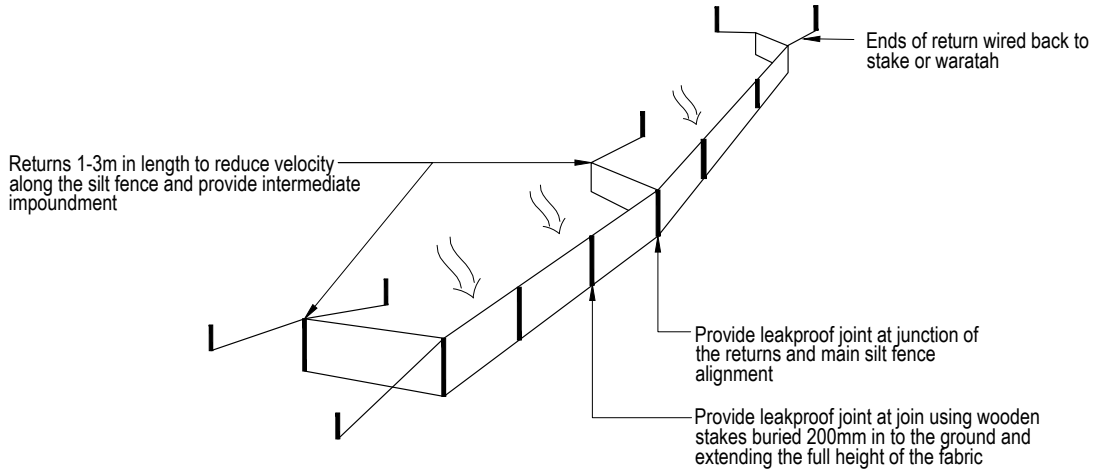
EROSION AND SEDIMENT CONTROL TOOLBOX
FOR CANTERBURY

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

CHECKLIST 17 FIGURES: Silt fence



Elevation



Silt fence with returns and support wire

Schematic of a silt fence

Appendix F: Spill Report Form

Environmental Incident Report

Date	**Time of Incident**
Description of Incident (cause)	
Contaminants spilt	
Description of Response Procedure	
Description of Clean up and Disposal	
List of Authorities Informed	
Comments	
Signed:	**Position: .....**

Appendix G: Redruth Landfill Disposal Approval & Manifest Form

MANIFEST FOR MOVEMENT OF CONTAMINATED SOIL

SECTION 1 To be completed by the Waste Removal Contractor

MANIFEST No.(e.g. CJ310123/1)……..

PDP PROJECT No…… PDP SITE SUPERVISOR……

SITE NAME…… SITE No……..

CLIENT .....

LOCATION .....

.....

CONTRACTOR .....

DESCRIPTION OF REMOVED SOIL Backfill Natural Ground

Clay Silt Sand Scoria Rock GAP 7

DESCRIPTION OF CONTAMINANT Petrol Diesel Other .....

COMMENTS .....

DECLARATION BY REMOVAL CONTRACTOR

I declare that the above waste is accurately described and is in a proper condition for transport in accordance with the applicable national and local regulations.

Name ..... Signature ..... Quantity of Waste ..... m^3

Title ..... Date ..... Weight of Waste ..... kg

SECTION 2 To be completed by Environmental Consultant (following approval from client).

I approve the removal from site of the waste consignment described above;

Name ..... Signature ..... Quantity of Waste ..... m^3

Title ..... Date ..... Weight of Waste ..... kg

SECTION 3 To be completed by Transporter

I acknowledge the receipt of the waste consignment described above;

Name ..... Signature ..... Quantity of Waste ..... m^3

Title ..... Date ..... Weight of Waste .....kg

SECTION 4 To be completed by Disposer/Storer

I declare that the waste consignment described above has been received

Location .....

Name ..... Signature ..... Quantity of Waste ..... m^3

Title ..... Date ..... Weight of Waste ..... kg

Method of Disposal (please circle) landfill managed fill treatment storage recycling

SECTION 5

RETURN THE COMPLETED FORM TO:

PATTLE DELAMORE PARTNERS LIMITED
PO BOX 389, CHRISTCHURCH, 8140

PATTLE DELAMORE PARTNERS LIMITED
PO BOX 9528, AUCKLAND, 1149

PATTLE DELAMORE PARTNERS LIMITED
PO BOX 6136, WELLINGTON, 6141

THIS FORM HAS TO BE COMPLETED IN CONJUCTION WITH THE ACCOMPANYING DANGEROUS GOODS FORM AND RETURNED AS ABOVE

TIMARU DISTRICT COUNCIL

2 King George Place
PO BOX 522 Timaru

'WASTE MANIFEST'

APPLICATION FOR DISPOSAL OF HAZARDOUS OR SPECIAL WASTE

GENERAL INFORMATION

1. The customer must complete section 1 and 3 of the form below and send it to sachin.narkhede@timdc.govt.nz for approval. On receiving approval contact Ku Brown at EnviroWaste to arrange the time for disposal. Ku Brown - Ku.Brown@envirowaste.co.nz ; 027 404 7459. Notice period to contractor (EnviroNZ) should be atleast 24hrs prior to disposal.
2. Hazardous waste/Asbestos waste has to be double wrapped during transportation and disposal. PPE's must be used all the times during handling hazardous waste.
3. The applicant shall provide all relevant information and documentation, including details showing that disposal is the last option.
4. The applicant shall not give less than three working days notice to waste team for approval to dispose of the Waste at the disposal sites.
5. Waste will not be accepted for disposal on Saturday, Sunday or on a public holiday.
6. Waste transport vehicles shall provide suitable sample points.
7. The Applicant hereby states that all the information contained in the Manifest is true and correct in every respect and that no material information (including any known or suspected hazards) has been omitted, and the Applicant acknowledges that the Timaru District Council relies entirely on the accuracy of such information in exercising its judgement on the appropriate methods of treatment and disposal and the associated risks.
8. The Applicant hereby accepts full responsibility for any loss or damage, of whatsoever kind (including direct, indirect, special or consequential loss) arising as a result of any inaccuracy in or omission from the information provided by the Applicant and agrees to fully indemnify the Timaru District Council for any claims which may be made against The Timaru District Council arising from such inaccuracies or omissions.
9. This manifest is valid for 3 months from the date of issue.
10. The Charge Per Tonne is based on the current 2023 – 2024 Fees and Charges and is therefore subject to change with effect from 1st July 2024.

IMPORTANT INFORMATION

1. All Wastes will be considered but not necessarily accepted for disposal.
2. The Applicant shall provide attached documentation to prove that all options of Reuse/Recycle/Recovery has been fully investigated before considering disposal as a last option.
3. The Applicant shall attach any appropriate material safety data sheets with the application.
4. The Applicant shall attached suppliers/manufacturers recommendations for disposal.
5. Should a Generator, Waste Disposal Contractor or Transporter fail to comply with the 'conditions' (listed over) then Wastes may no longer be accepted for disposal from that person or company.
6. Any person discharging or depositing undeclared Waste at any Timaru District Council site may be prosecuted.
7. Random sampling and analysis of wastes will be carried out to ensure compliance to the Waste Manifest.
8. The Transportation of non-segregated incompatible loads of Hazardous Waste is prohibited in terms of New Zealand Standard 533: 1988. (7.2) and may lead to prosecution pursuant to the Transport Act (1998).
9. The Timaru District Council has a responsibility under Section 31 f the Resource Management Act 1991, to control any actual or potential effects of the use of land, including the implementation if rules of the prevention and mitigation of adverse effects of the disposal of Hazardous or Special Substances.

COUNCIL CONTACTS

For enquiries regarding waste disposal contact the

WASTE MINIMISATION UNIT at the Timaru District Council.

PHONE: 03 687 7200 EMAIL: sachin.narkhede@timdc.govt.nz or WasteMin@timdc.govt.nz

Section 1: APPLICANT DECLARATION BY PERSON DISPOSING OF SOLID WASTE		
Waste Manifest number TDC to assign refer # 1477058	66 2324	
Is it one-off disposal or multiple? TDC to organise JDE number for customer if they require account at weighbridge and if its multiple disposal	Multiple disposals	
Applicant Information (Name of Individual/Company/Business paying the disposal fees	Timaru District Council (Waste Unit)	
Phone/cell phone	3687-7700	
Address	PO Box 522	
Consultant Name & Address	Pattle Delamore Partners, Christchurch	
Waste Description	Closed landfill solid waste	
Waste form : Solid or Liquid	Solid	
Waste category **Refer the instructions at the end of the form**	**Waste Category (Table A):** 17	**L-CODE:** 17 06
	Hazard Class (Table B): **9**	**Estimated quantity (m^3) :** 30,000
Current storage location	Peel Forest Closed Landfill	
I hereby declare the above consignment is accurately described.		
Name	Vincie Billante	
Designation	Special Projects Consultant, TDC	
Signature		
Date	20 Nov 2023	

Section 2: WASTE ASSESSMENT BY TIMARU DISTRICT COUNCIL	
Product inspected: No	**Information Checked: Yes**
Code: WIC (Waste In Closed Landfill)	**Charge per tonnes $ 323/tonne**
Disposal/Recovery Recommendations: Bury as per hazardous waste regulations in the designated area	
I certify that the consignment described above (delete/strike out non-applicable). **Is Acceptable for Disposal** ~~**Is not Acceptable for Disposal**~~	
Name	Sachin Narkhede
Designation	Waste Assets and Compliance Technician
Signature	Sachin
Date	13.12.2023

Section 3: TRANSPORTER INFORMATION **CANNOT BE COMPLETED UNTIL TENDERED** **This section to be completed by Transporter of the Waste prior to arrival at site, email this to all parties (use Reply all).**	
Company Name	
Vehicle Reg No.	
Date	
Estimated volume of load	
I acknowledge receipt of the above described waste for transport, and that it is suitable for transport	
Name	
Designation	
Signature	
Date	

Transporter to contact Ku Brown, by phone 027 404 7459 to arrange time of delivery.

Section 4: DISPOSAL INFORMATION **This section to be completed by the weighbridge operator and emailed to all parties (use reply all).**	
Disposal Date	
Weighbridge docket No	
Nett Weight of Load	
Sample Taken: Y/N	
I acknowledge receipt of the above described waste	
Signature	
Designation	
Date	

DISPOSAL CONDITIONS:

SOLID WASTE:

1. No liquid wastes shall be accepted for disposal to landfill. For waste to be considered non-liquid it must meet one of the following requirements:
    - a solids content of at least 20% and liberate no free liquids when transported; or
    - no free liquids when tested in accordance with the US EPA Paint Filter Liquids Test (US EPA Method 9095A 1996) and liberate no free liquids when transported.
2. Medical wastes shall only be accepted in accordance with NZS 4304:2002 'Healthcare Waste Management', or subsequent amendments.

3. Asbestos waste shall be accepted only in accordance with the Asbestos Regulations 1998, or subsequent amendments.

4. The following waste are not acceptable for disposal at the landfill:

   i) wastes marked with an asterisk on the NZ Waste List (L Code), with the following exceptions:

      - solid wastes which, following testing using the US EPA Toxicity Characteristic Leaching Procedure (TCLP), result in leachable concentrations of contaminants less than the leachable concentration values listed in Hazardous Waste Guidelines (MIE, 2004); or
      - solid wastes which, following testing for total concentration, result in total concentration values less than the screening criteria listed in Hazardous Waste Guidelines (MIE, 2004): or
      - any asterisked waste stream from the waste list identified as containing asbestos – if they are labelled, packaged and disposed in accordance with the requirements laid out in the Asbestos Regulations 1998: or
      - small quantities of waste products containing potentially hazardous components that are not likely to have adverse effects on the environment, such as can reasonably be expected to be contained in the municipal waste stream.

   ii) wastes or substances classified as explosive, flammable, oxidizing or corrosive under the Hazardous Substances and New Organisms Act 1996.

TABLE A – NEW ZEALAND WASTE LIST WASTE CATEGORIES

01 Wastes resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals

02 Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing

03 Wastes from wood processing and the production of panels and furniture, pulp, paper and cardboard

04 Waste from leather, fur and textile industries

05 Waste from petroleum refining, natural gas purification and pyrolytic treatment of coal

06 Wastes from inorganic chemical processes

07 n/a

08 Wastes from the manufacture, formulation, supply and use of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks

09 Waste from the photographic industry

10 Wastes from thermal processes

11 Wastes from chemical surface treatment and coating of metals and other materials; non-ferrous hydro-metallurgy

12 Wastes from shaping and physical and mechanical surface treatment: of metals and plastics

13 n/a

14 Waste organic solvents, refrigerants and propellants (except 07 and 08)

15 Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified

16 Wastes not otherwise specified in the list

17 Construction and demolition wastes (including excavated soil from contaminated sites).

18 Wastes from human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care)

19 Wastes from waste management facilities, off-site waste water treatment plants and the preparation of drinking water and water for industrial use

20 Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions

NZ WASTE LIST L-CODE:

These codes area available on the Ministry for the Environment (MfE) website (www.mfe.govt.nz) under 'Hazardous Wastes"
https://environment.govt.nz/guides/new-zealand-waste-list-l-code/

Further information and procedures for identifying hazardous waste is given in MfE 'Guidelines for the Management of Hazardous Waste'.

TABLE B – LIST OF HAZARD CLASSIFICATIONS

Hazard Characteristics Class

1 Explosives

An explosive substance or waste is a solid or liquid substance or waste(or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and as such a speed as to cause damage to the surroundings.

3 Flammable Liquids

The word 'flammable' has the same meaning as 'inflammable'. Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc., but not including substances or wastes otherwise classified on account of the dangerous characteristics) which give off a flammable vapor at temperatures of not more than 61 degrees Celsius.

4.1 Flammable Solids

Solids, or waste solids, other than those classed as explosives, which under conditions encountered in transport are readily combustible, or may cause or contribute to fire through friction.

4.2 Substances or Wastes Liable to Spontaneous Combustion

Substances or wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.

4.3 Substances or Wastes which, in Contact with Water, Emit Flammable Gases

Substances or wastes which, by interaction with water, are liable so become spontaneously flammable or to give off flammable gases in dangerous quantities.

5.1 Oxidizing Substances

Substances or wastes which, while in themselves are not necessarily combustible, may generally by yielding oxygen cause, or contribute to, the combustion of other materials.

5.2 Organic Peroxides

Organic substances or wastes which contain the bivalent –o-o- structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.

6.1 Acutely Toxic

Substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.

6.2 Infectious Substances

Substances or wastes containing viable micro-organism or their toxins which are known or suspected to cause disease in animals or humans.

7 Radioactive Material

Spontaneously emits radiation greater than background level. Includes alpha, beta, gamma, x-rays, neutrons, high energy electrons, protons, other atomic particles.

8 Corrosives

Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or in the case of leakage, will materially damage, or even destroy, other goods or the means of transport, they may also cause other hazards.

9 Ecotoxic

Substances or wastes which if released, present or may present, immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems.

ASBESTOS NOTES

WASTE CATEGORY: TABLE A……17
NZ WASTE LIST L-CODE……..17 06
INSULATION MATERIALS CONTAINING ASBESTOS…..17 06 01
CONSTRUCTION MATERIALS CONTAINING ASBESTOS ……..17 06 05
https://www.worksafe.govt.nz/topic-and-industry/asbestos/

8.4 Seal Extension Policy

Author: **Selina Kunac, Transport Strategic Advisor**
Susannah Ratahi, Land Transport Manager

Authoriser: **Andrew Dixon, Group Manager Infrastructure**

Recommendation

That the Infrastructure Committee

1. Receives the updated Seal Extension Policy
2. Adopts the proposed Seal Extension Policy to enable assessment when needed using prioritisation model.

Purpose of Report

1 The purpose of this report is to present proposed updates to the Road Seal Extension Policy, for adoption by the Committee.

Assessment of Significance

2 This report is considered of low significance in accordance with Council's Significance and Engagement Policy. There are no significant material changes to existing policy proposed as most changes are to improve the criteria used for road seal extension project prioritisation. As there is no available budget for seal extensions, there are no immediate impacts (financial or other).

Background

3 Council has a Road Seal Extension Policy that details the approach taken to prioritise and fund road seal extension projects within the District. The current policy was adopted by Council's District Service Committee in February 2016.

4 Due to changes in funding, and the availability of more data to inform the prioritisation process, the current policy is no longer fit for purpose and requires to be updated.

Discussion

5 A proposed update of the current Road Seal Extension Policy is presented to the Infrastructure Committee for consideration (Attachment 1). Key changes are as follows:

6 Section 2 – Background

Change	Reason
Addition: Council support for road seal extension projects to be subject to available funding.	There is currently no available budget for seal extension projects in the Timaru District, and no forecast budget for these projects in the Long Term Plan 2024-34.

7 Section 4 – Policy

Change	Reason
Clause 4 – reference to District Services Committee update to Infrastructure Committee	Infrastructure Committee is now the governing Committee for Land Transport matters
Clause 7 - removed	This clause is now superseded by criteria included in Section 5 – prioritisation guidelines

8 Section 5 – Prioritisation Guidelines

Change	Reason
The previous prioritisation guidelines have been replaced by a broader range of benefit, cost and risk-based criteria, weighted according to the relative impact on maintenance frequency and cost. The model for assessment has been removed from the Policy as these are an operational process.	The new criteria include a broader range of benefit, cost and risk factors, providing a greater evidence base for prioritisation. Once finalised, the Policy will be supported by a refresh of the Road Seal Extension Prioritisation Model. Theis will outline the operational processes to implement the assessment described in the Policy.

9 The weightings applied to the updated assessment criteria are relative to their impact on the frequency and cost of road maintenance. The assessment will strongly weight roads that have:

- High or critical lifeline priority
- A high level of heavy vehicle usage
- A high number of dwellings per kilometre
- A high level of private financial contribution for seal extension (e.g. from neighbouring residents, road users or other interested parties) – 1 point is awarded per 1% private financial share
- Significant regional value e.g. access to regionally significant reserves/parks, access to development/growth areas identified in the District Plan, supports economic growth/tourism in the District.

10 The Committee is asked to consider these weightings and discuss the impacts on prioritisation.

Options and Preferred Option

11 **Option 1 (Preferred option)**

That the Infrastructure Committee adopts the proposed update to the Seal Extension Policy (refer Appendix 1). This option would update the current policy, incorporating a broader evidence base for prioritisation and ensuring it is fit for purpose if and when funding becomes available in the future.

12 **Option 2**

That the Infrastructure Committee adopts the proposed update to the Seal Extension Policy (refer Appendix 1), with amendments to criteria weighting to be advised by the Committee. This option would update the current policy and align criteria weighting with the Committee's priorities. The Committee should consider that the proposed criteria weightings are relative to the impact of each criteria on frequency and cost of maintenance, therefore the Committee should also consider the impact that changes to criteria weightings may have on efficacy of the assessment.

13 **Option 3**

That the Infrastructure Committee does not adopt the proposed update to the Seal Extension Policy (refer Appendix 1) and retains the existing policy. This option is not recommended, as the existing policy is no longer fit for purpose.

Consultation

14 In developing the updated Policy, Council Officers have used feedback from Customer Complaints and Annual and Long Term Plan Submissions. Other than this input, no specific outreach consultation has taken place.

Relevant Legislation, Council Policy and Plans

15 Timaru District Council Road Seal Extension Policy – adopted February 2016

16 Timaru District Council Long Term Plan 2021-31

Financial and Funding Implications

17 As there is currently no available budget for road seal extensions, the adoption of this policy update is required. Should funding become available for road seal extensions, this policy would then guide prioritisation of projects.

Other Considerations

18 The Policy Advisor has reviewed the Policy and feedback has been incorporated.

Attachments

1. **Draft Seal Extension Policy Update** ⇩
2. **Draft Timaru District Council Seal Extension Prioritisation Model.docx** ⇩

Seal Extension Policy

1. Purpose

This policy details the approach taken by Timaru District Council to prioritising and funding road seal extension projects within the District.

2. Background

The Timaru District Council supports road seal extensions in the District that meet policy criteria, subject to available funding.
The principles on which this policy is based are:

1. Appropriate Criteria:
    - The policy must use relevant factors that can be objectively assessed.
2. Fairness:
    - The policy established must be perceived by most people as fair and consistent.
3. Effective:
    - Evidence based and logical in application;
    - Consistent over time.
4. Transparency:
    - The prioritisation system uses simple mechanisms easily understood by all.
5. Community Benefit:
    - Recognition that communities are interdependent and the cost of seal extensions cannot wholly be placed on the specific user.
6. Uniform Availability:
    - That funding is provided by all District communities, and projects must be considered in a District wide manner for entire District community benefit.

7. Funding Efficiency:
    - Funding from sources external to Council will be maximised (e.g. government funding assistance, contributions).

3. Key Definitions

Contribution: Funding provided by an external person/ratepayer, organisation or trust.

Funding Assistance: Previously referred to as "Subsidy" or "Financial Assistance". This shall mean the government funding assistance from National Land Transport Programme allocated by New Zealand Transport Agency (NZTA) for activities.

Road: This is the designated Council road and has the meaning assigned to it as defined in the Local Government Act 1974, section 315, and Land Transport Act 1998, part 1, section 2.

Seal: The surfacing known in New Zealand as a chipseal and consist of stone chip embedded in a 1-2mm think film of bituminous (or synthetic) binder, to provide a thin waterproofing layer as the top surface of a pavement.

Seal extension: Increasing the sealed carriageway pavement length.

Unless specifically defined in this policy, all words and expressions shall have the meaning as defined in the Local Government Act 1974 and 2002, the Land Transport Act 1998, and any Acts passed in amendment or substitution thereof.

4. Policy

1. Council will fund seal extensions to a budget determined during the Long Term/Annual Plan process.
2. Council will seek to maximise funding assistance from NZTA and contributions for seal extensions.

3. The Timaru District Council Land Transport Unit will maintain a prioritisation model to guide assessment of prioritisation of seal extension projects. This model will be utilised to rank unsealed roads as/when funding is available. At minimum the model will incorporate an assessment against the following criteria:

    - Number of traffic movements
    - Number of dwellings per kilometre
    - Lifeline priority assessment [Note 1]
    - Roughness index average [Note 2]
    - Historic maintenance costs [Note 3]
    - Crashes [Note 4]
    - Heavy vehicle usage [Note 5]
    - Extent of private funding contribution.
    - Regional and local value of the project e.g. improving access to regionally significant reserves/parks, improving access to development/growth areas identified in the District Plan, supports economic growth/tourism in the District.

4. The following criteria will be assigned greater weight in the assessment, due to the higher relative impact of these criteria on maintenance frequency and cost: Lifeline priority assessment, heavy vehicle usage, extent of private funding contribution, dwellings per kilometre. Projects of relative regional value will also be weighted more greatly.
5. Council may undertake road seal extensions that are not eligible for funding assistance or contributions (100% Council funded) in special circumstances subject to available budgets and approval by the Infrastructure Committee.
6. Council will monitor all unsealed roads and any changes will be documented in the road asset management software.
7. Ratepayers or residents wishing to seal the road adjacent to their property at their own cost will require Council approval before proceeding. All sealing work must meet Council standards and adjoin an existing seal.

Note 1 Lifeline priority assessment determines the criticality of a road in supporting community connections to essential services. It is used by Council's Land Transport Unit to assist with prioritisation during emergency events and is a proxy for contribution to community resilience.

Note 2 Roughness index average is calculated using average eIRI over the previous two years (best data available at time of assessment).

Note 3 Historic maintenance costs are calculated using the average maintenance cost over the previous five years (best data available at time of assessment).

Note 4 Crashes refers to the documented, within NTZA manages Crash Analysis System, crashes that have occurred on the unsealed road in the previous five years. If more than one crash has occurred, the highest crash severity recorded will be used to determine scoring.

Note 5 Heavy vehicle usage is movements of a vehicle with a gross vehicle mass of greater than 3.5 tonne vehicle/axis

Timaru District Council Road Seal Extension Prioritisation Model

Draft 28 February 2024

This model describes the assessment process used by Timaru District Council to prioritise unsealed roads being considered for sealing. This process is aligned with the Timaru District Council Road Seal Extension Policy and is undertaken as/when there is available funding. The outcome is to rank unsealed roads. Further refinement of priorities within the highest priority roads will be carried out during subsequent project feasibility, investigation and design process phases.

The assessment process has two stages:

1. Multi-criteria assessment including a range of benefit, cost and risk factors
2. Regional and local priority adjustment

Stage 1 – Multi-criteria assessment

The unsealed roads being considered for seal extension are assessed using Table 1 to produce a numerical total score. The scoring of each factor is weighted according to the relative impact on the frequency and cost of maintenance. The assessment strongly weights roads that have:

- high or critical lifeline priority*
- a high level of heavy vehicle usage
- a high number of dwellings per kilometre
- a high level of private financial contribution (e.g. from neighbouring residents, road users or other interested parties) – 1 point is awarded per 1% private financial share

Best available data is used to inform all assessments and can be variable based on network priorities. Additional data collection can be requested to inform assessment, costs for collection will be on-charged to the applicant.

Table 1 – Multi-criteria assessment

Traffic movements	Score	Dwellings/km (Total)	Score	Lifeline priority assessment Note 1	Score	Roughness index average Note 2	Score
1-50	2	1-4	2	Not lifeline priority	0	eIRI below 5	2
51-100	4	5-10	6	Low	2	eIRI 5-8	4
101-200	6	11-15	10	Medium	10	eIRI 8-10	6
201-500	8	16-20	15	High	30	eIRI 11-15	8
>500	10	>20	20	Critical	50	eIRI 16+	10
SCORE:		**SCORE:**		**SCORE:**		**SCORE:**	
Historic maintenance costs Note 3	**Score**	**Crashes Note 4**	**Score**	**Heavy vehicle usage Note 5**	**Score**	**Funding contribution**	**Score**
Class E – bottom 40%	2	No crash	0	1-5	4	1 point awarded per 1% financial share provided	
Class D – top 60-30%	4	Non injury crash(es)	1	6-10	8		
Class C – top 30-10%	6	Minor injury crash(es)	2	11-15	12		
Class B – Top 10-5%	8	Death or serious injury crash(es)	5	16-20	16		
Class A – top 5%	10			>20	20		
SCORE:		**SCORE:**		**SCORE:**		**SCORE:**	
TOTAL SCORE (Sum of all scores):							

Note 1 Lifeline priority assessment determines the criticality of a road in supporting community connections to essential services. It is used by Council's Land Transport Unit to assist with prioritisation during emergency events and is a proxy for contribution to community resilience.

Note 2 Roughness index average is calculated using average eIRI over the previous two years (best data available at time of assessment).

Note 3 Historic maintenance costs are calculated using the average maintenance cost over the previous five years (best data available at time of assessment).

Note 4 Crashes refers to the documented, within NTZA manages Crash Analysis System, crashes that have occurred on the unsealed road in the previous five years. If more than one crash has occurred, the highest crash severity recorded will be used to determine scoring.

Note 5 Heavy vehicle usage is movements of a vehicle with a gross vehicle mass of greater than 3.5 tonne vehicle/axis

Stage 2 – Regional and local priority adjustment

The total score determined through stage 1 of the assessment is then adjusted for the regional and local value of sealing the road, as below. Additional criteria may be considered during the second stage of assessment e.g. in the case of unforeseen changes or events.

1. **High priority value – total score +30%**

- Sealing an unsealed through route or diversion/detour/freight route
- Improves access to a regionally significant park, reserve, walking or cycling track, beach, waterway, facility or amenity
- Improves access to development/growth areas identified in the District Plan and/or promotes the outcomes of the District Plan
- Promotes economic growth and/or tourism, such as completion of a scenic route or connecting strategic District assets/infrastructure
- Supports significant improvements to water quality in sensitive catchments or natural land/marine environments
- Supports access to/prudent management of natural resources e.g. construction gravels.

Supplementary condition: Roads which have significant physical or economic barriers to undertaking seal extension works cannot be assigned a high priority value.

2. **Medium priority value – total score +15%**

- Improves access to local park, reserve, walking or cycling track, beach, waterway or local facility
- Improves access to local community amenities reducing community isolation/building resilience

3. **Low priority value - total score + 0%**

- All other unsealed roads
- Roads that have significant physical or economic barriers to undertaking seal extension works

9 Consideration of Urgent Business Items

10 Consideration of Minor Nature Matters

11 Public Forum Items Requiring Consideration

12 Exclusion of the Public

Recommendation

That the public be excluded from the following parts of the proceedings of this meeting on the grounds under section 48 of the Local Government Official Information and Meetings Act 1987 as follows:

General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Plain English Reason
13.1 - Public Excluded Minutes of the Infrastructure Committee Meeting held on 13 February 2024	s7(2)(b)(ii) - The withholding of the information is necessary to protect information where the making available of the information would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information s7(2)(j) - The withholding of the information is necessary to prevent the disclosure or use of official information for improper gain or improper advantage	To protect commercially sensitive information To prevent use of the information for improper gain or advantage

13 Public Excluded Reports

13.1 Public Excluded Minutes of the Infrastructure Committee Meeting held on 13 February 2024

14 Readmittance of the Public