Meeting: Rangitāiki River Forum

Meeting Date: 7 June 2024

Tabled Documents and Presentations

Tabled Document 1

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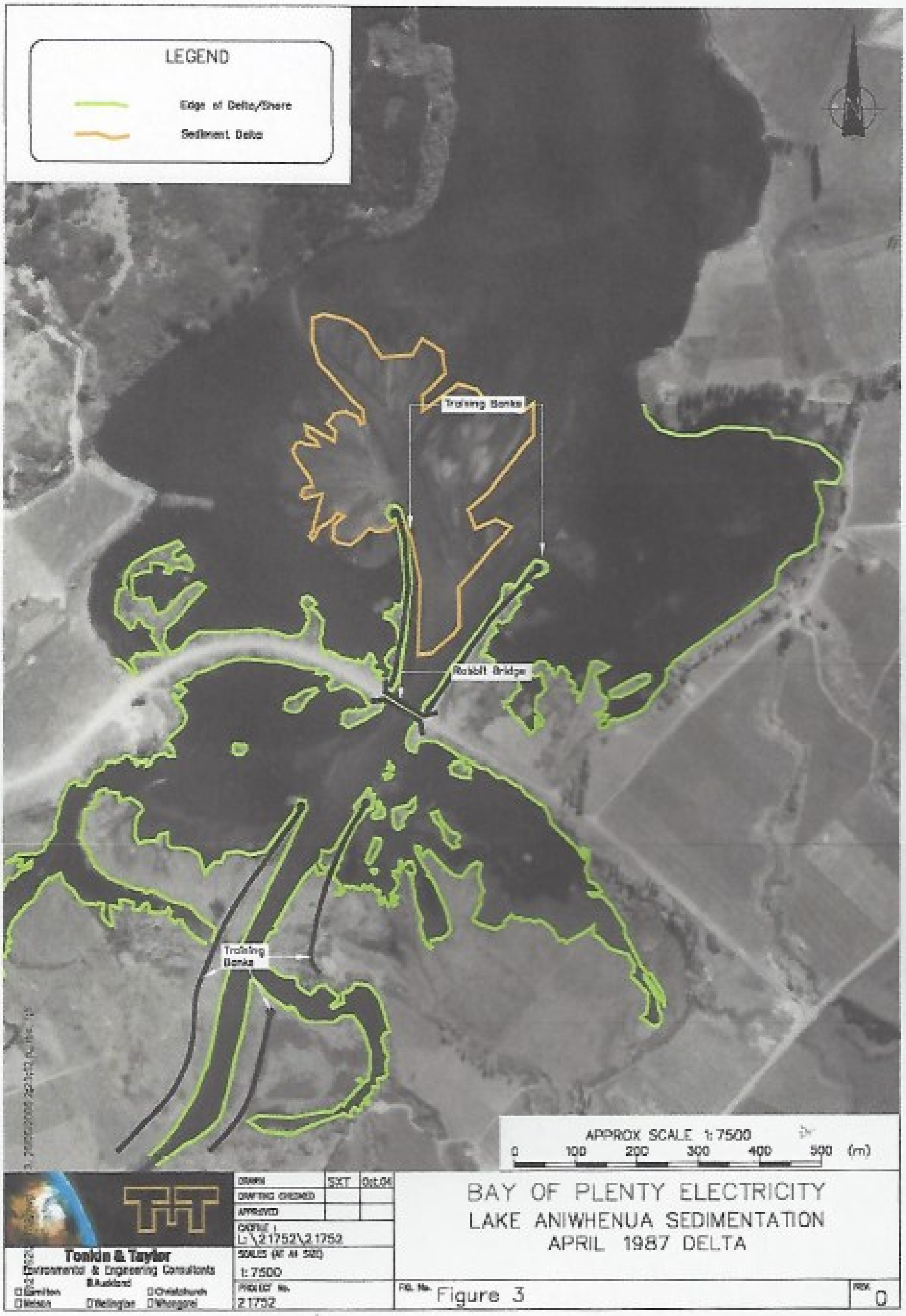

Figure 3-1. Lake Aniwhenua Sedimentation April 1987.

Long Term Sediment Management in Lake Aniwhenua
Adapted by Bay of Plenty Electricity

April 2007

4

Item 3.1, Tabled Document 1 – Aerial maps, monitoring and modelling information

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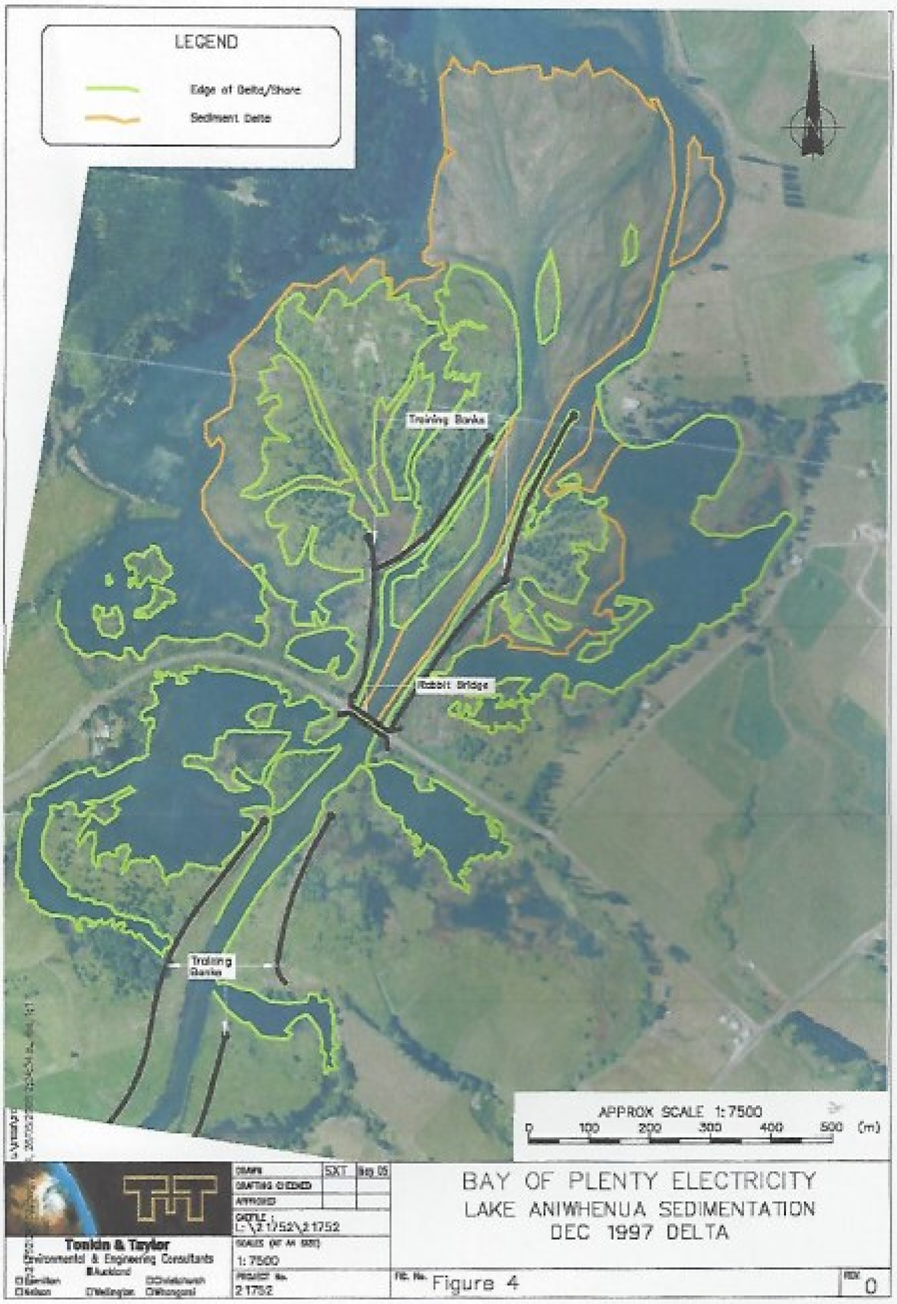

Figure 3-2. Lake Aniwhenua Sedimentation December 1997 Delta.

Long Term Sediment Management in Lake Aniwhenua
Adapted by Bay of Plenty Electricity

April 2007

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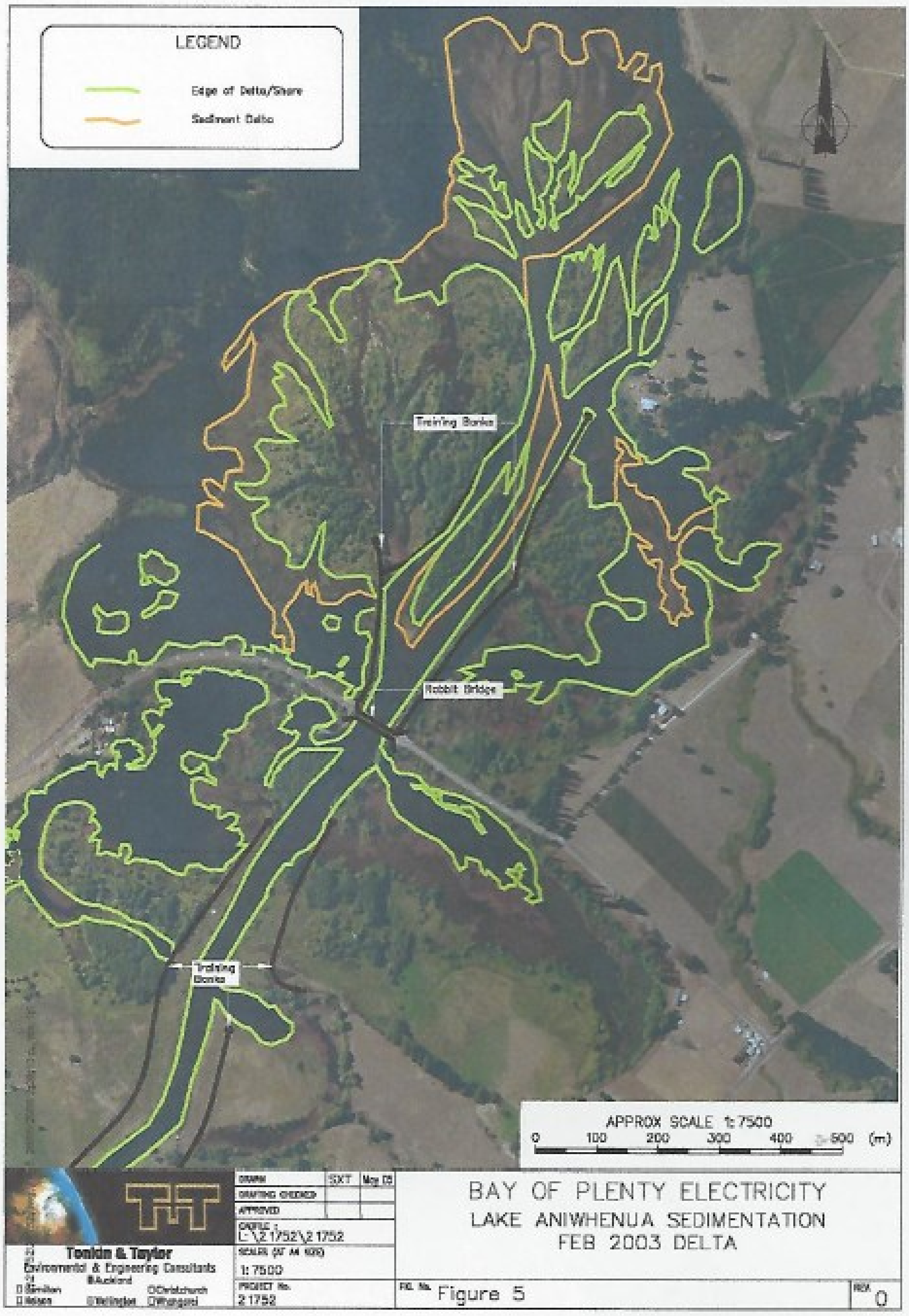


Figure 3-3. Lake Aniwhenua Sedimentation Feb 2003 Delta.

Item 3.1, Tabled Document 1 – Aerial maps, monitoring and modelling information

Nermn River and Stream Channel Monitoring Programme - 2011 - 2018

differ. Figures provided in the appendix therefore represent calculations including these stopbanks. Minimum bed levels since the last survey have risen in some places in the reach, especially in the lower parts from cross-section 1-10. Considering the settlement of most benchmarks, aggradation can be expected to be greater than shown by the survey data.

Upper Rangitāiki River (above Aniwhenua)

The Upper Rangitāiki River has been resurveyed in April/May 2019 following the April 2017 floods.

Above Aniwhenua surveys were done in December 1992, March 1996, November 2001, September 2007 and December 2012.

2012-2019:

The recent survey shows a **net volume gain of 263,000 m^3** of material for the period 2012 to 2019. The main gains were observed in the reach immediately above Rabbit Bridge (cross-sections 1 to 14); while small losses occurred at cross-section 10, 16 and 28.

2007-2012:

The 2014 survey showed an **overall volume gain of 31,000 m^3** of material in this reach, which is relatively small compared to previous periods. Significant losses occurred at cross-sections 19 and 20, with the main gains observed in the lower reach between cross-sections 1 and 10.

2001-2007:

The most recent survey demonstrated a **net volume gain of 223,000 m^3** of material. There were very few sections that experienced bed degradation. Within sections 9, 18, and 26 - 28 losses were minimal. All other sections show material deposition, the most significant gains were in sections 4-7, 11, 14, 16, and 17.

1996-2001:

Between 1996 and 2001 a **total volume of 95,000 m^3 was gained**. Main volume gains were observed at cross-sections 3 to 5, and 11. Minimum bed levels have slightly dropped at cross-sections 1, 7, 12, and 14 to 18, while they have risen at cross-sections 2 to 4, and 24.

Gravel extraction and recommendations

Recent extractions occurred in 2009 in the Rangitāiki River above Aniwhenua. Approximately 20,000 m^3 was removed for river management purposes. Previous extractions above Lake Aniwhenua have been minor (e.g. 3,000 m^3 was extracted in 1994/95). However, **future extraction should be encouraged in this reach of river.**

Rangitāiki River – Waiohau area

The Rangitāiki River in the Waiohau area has not been resurveyed since the April 2017 floods. Recommendations below are therefore only based on the surveyed data from before the floods, and will be updated once new survey data is available. [A new survey was carried out in 2021 but no analysis carried out to date].

4 Hydraulic and sediment transport modelling

This section describes the modelling methods employed to model the hydraulics and sediment transport of the Rangitaiki River and Aniwhenua Reservoir. The modelling has been designed to evaluate the effectiveness of sediment flushing and options to enhance sediment flushing. The modelling was split into two steps, firstly, the hydraulic model, and secondly, the sediment modelling. The method for both steps, data sources, calibration/ verification and assumptions are explained in this section.

4.1 Hydraulic model

The purpose of the hydraulic modelling was to simulate the river and upper reservoir hydraulics. The results provide input for sediment transport calculations and enable the assessment of the potential flooding effects of sediment management options on upstream properties. The hydraulics is complicated due to backwater from the reservoir, overtopping of flood banks and training banks and the mobile bed material of the Rangitaiki River.

The HEC-RAS model developed by the United States Army Corps of Engineers (USACE) has been used. This model is well respected and is used extensively for the hydraulic modelling of river systems. HEC-RAS is a one dimensional model. Where multiple channels or floodplains exist it is necessary to schematise the river for modelling purposes. This is done with a series of channels with links as appropriate.

The model has its downstream extent at BoPE Section 8 located part way up the Aniwhenua Reservoir (ch 0) and an upstream extent at EBoP Section 7 located upstream of the Horomanga confluence (ch 8000) (Figure 4-1).

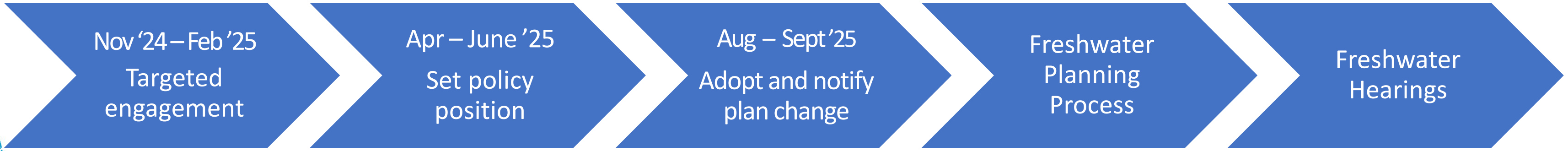
The Rangitaiki River and Aniwhenua reservoir system has been modelled as a main channel, with over flow channels outside the main channel to represent the floodplain and spill from training banks into the lake (Figure 4-1). The spill from main channel to over flow channels is modelled with lateral weirs, which represent the crest of stopbanks and training banks. Water in the over flow channels can re-enter the main channel via the lateral weirs if the water level in the over flow channel exceeds the water level in the main channel. Water in the over flow channel can also re-enter the main channel at junctions where the over flow channel and main channel connect directly.

The model interpolates cross-sections every 10 m between surveyed cross-sections. This is necessary for the computational stability of the model.

The model uses the lake level at the barrage as the downstream boundary condition. This level has been applied to the downstream extent to the model at BoPE Section 8 located part way up the reservoir. It was assumed that any slope on the lake water surface is minimal between BoPE Section 8 and the Barrage. This assumption is within the order of accuracy of the computations because the of the relatively large cross-sectional area of the lake downstream of BoPE Section 8.

Item 3.1, Tabled Document 2 – Aerial map 1941 pre-dam construction

Essential Freshwater Timeline (new)



- August-September 2024 - Opportunity to have an informal workshop with the Rangitāiki Forum
- October 2024 - Council to approve the draft for targeted engagement (RNRP PC 19 & RPS Change 7)
- November/ Dec 2024 – draft released for feedback.