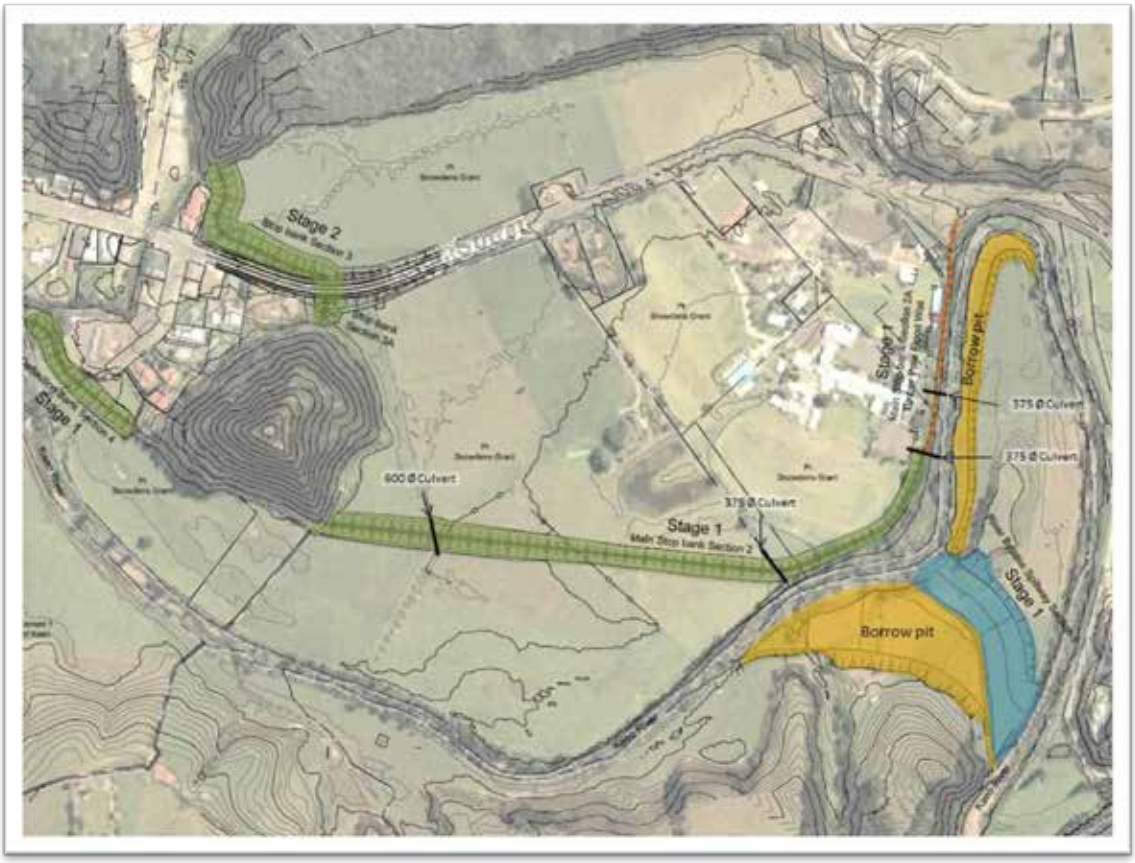
ASSET MANAGEMENT PLAN

KAEO FLOOD RISK REDUCTION SCHEME



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Contents

1 EXECUTIVE SUMMARY

The purpose of the Plan is to provide a single document that; provides for the present and future management of the Kaeo River Flood Scheme Assets, in a way that ensures efficient and effective delivery of specified levels of service; communicates and justifies funding requirements for the operation of the scheme assets and delivery of service levels; and ensures compliance with regulatory requirements

This Asset Management Plan addresses the management of the **Kaeo Flood Risk Reduction Scheme Stage 1 assets**. These assets are designed, operated and maintained to deflect floodwater away from the township and reduce the risk of high velocity water flooding through the township.

The objective of the scheme is to decrease the flow velocity of flooding through the township.

The Kaeo Flood Risk Reduction Scheme has been designed and maintained to provide river flood risk reduction to a 1% AEP plus climate change flood design standard.

Factors influencing future demand of the flood scheme include population growth/development, climate change, proposed capital improvements and development on floodplain areas.

The lifecycle management plans detail the physical parameters of the assets, asset capacity/performance, condition, valuations, maintenance plans, standards/specifications of maintenance, future costs, renewal/replacement planning, creation planning and disposal.

An average maintenance expenditure of $112,344.00 per annum over the first 10 years of the plan.

2 INTRODUCTION

2.1 Background

2.1.1 Purpose of the Plan

The purpose of this plan is to provide a single document that provides for the present and future management of the Kaeo Flood Risk Reduction Scheme Stage 1 assets, in a way that ensures efficient and effective delivery of specified levels of service.

This Asset Management Plan aims to cover the following attributes, to provide the basis for the present and future management of the scheme assets:

- **Description of the assets** – both physical and financial
- **Levels of service** – setting the performance of the asset, linked to strategic/community outcomes
- **Growth management** – demand forecasts for the scheme for a 10 year period, based on latest growth forecasts and demand drivers
- **Risk Management** – identification of critical assets and associated risks and management strategies
- **Lifecycle (optimised) decision making** – identification of gaps between current service capability and that required to meet future demand, with gaps reflected in an asset development programme.

- **Financial forecasts** – physical aspects of planned maintenance, renewal and new work translated into financial terms for the ensuing 10 years
- **Planning assumptions and confidence levels** – statement of assumptions and an indication of degree of confidence of data reliability underpinning the AMP
- **Improvement programmes** – processes for improving asset management techniques
- **Review** – review of the AMP process by suitably qualified peer
- **Commitment** – approval and adoption of the plan by Council executive management, setting the direction for asset management.

2.1.2 Relationship with Other Planning Documents

Other documents that deal with internal processes are also integrated into operational requirements as a result of this plan.

Such documents include:

· NRC Long Term Plan and Annual Plans
· Northland River Management Policy
· Regional Policies and Plans
· Health and Safety Policy and Manual
· NZ Coastal Policy Statement
· AS/NZS ISO 31000: 2009 Risk Management – Principles and Guidelines
· ZBS9401:2008 Managing Flood Risk – A Process Standard
· ME891: Preparing for Climate Change: A guide for local government in NZ

2.1.3 Infrastructure Assets Included in the Plan

This plan deals with the infrastructure assets that form the Kaeo Flood Risk Reduction Scheme. These infrastructure assets are stopbanks, floodgates and spillway designed and operated to reduce flood risk to Kaeo Township. Management of non-financial assets are included in this plan, which includes river channels and floodway's.

In summary, these assets are comprised of:

· Spillway – 21,100 m^3 bulk excavation
· Main stopbank – 24,000 m3 of earth fill
· Deflection bank – 6,000 m3 of earth fill
· Floodwall – 1 meter high timber pole wall
· Floodgates/Headwall/Pipe – four units

2.1.4 Key Stakeholder

The key stakeholders of the Kaeo Flood Scheme are represented through the Kaeo River-Whangaroa Catchment Liaison Committee, comprised of the following stakeholder representatives:

- One Northland Regional Councillor, who will chair the Committee
- One Far North District Councillor
- One member nominated by Te Runanga O Whaingaroa
- One member nominated to represent the communities of Taupo Bay, Pupuke, Totara North, Matangirau, Tauranga Bay, Mahinepua, and Te Ngaire and ratepayers outside of the Kaeo River catchment

- One member to represent business and commercial interests within Kaeo
- Three representatives of the rural ratepayers of the Kaeo River catchment, one from each area:
  - Area 1 Floodplain and catchment area from Waiare Road to Whangaroa Harbour;
  - Area 2 The middle catchment area from the Waiare Gorge to Waiare Road – SH10 intersection;
  - Area 3 The catchment area upstream of the Waiare Gorge
- One member to represent farmers within the former Whangaroa Ward.
- One member to represent the Wai-Care Group
- One member to represent the marine farming industry (
- One member to represent Whangaroa Health Services
- One member to represent the Ministry of Education/Whangaroa College/Kaeo Primary School
- One Member to represent Transit New Zealand

Organisation Structure

The organisation structure for the administration of the scheme consists of the following:

- Northland Regional Council River Team – Responsible for the management of the scheme and assets, and investigations into flood hazard and options for improving the scheme to further reduce flood risk.
- Kaeo River- Whangaroa Catchment Liaison Committee – responsible for assisting and advising the Northland Regional Council in the management of the scheme.
- Northland Regional Council Environmental Management Committee – receives minutes from the meeting of the Liaison Committee and makes recommendations to the Northland Regional Council.
- Northland Regional Council – receives recommendations from the Environmental Management Committee and makes final resolution as to the recommendations received.

2.2 Goals and Objectives of Asset Ownership

2.2.1 Justification for Ownership

Northland Regional Council are the owners of the scheme assets. NRC has easements over the land upon which the scheme assets are located, including easements for the right to flood. Table 1 shows the easements over affected properties.

2.2.2 Organisation Vision, Mission, Goals & Objectives

The vision of the Northland Regional Council is ‘Creating a region of choice’, this is backed up by the mission statement ‘Through growth, putting Northland first by providing regional leadership, environmental protection, economic opportunities and integrated infrastructure’.

As the owners of the scheme assets, the Northland Regional Council has the following high level goals and objectives:

- Regional leadership – provide leadership for the management of the scheme, coordinating all aspects with close liaison with other stakeholders.

- Environmental protection – minimise the risk of flooding to the community in a manner that also seeks to enhance environmental outcomes and sustainability.
- Economic opportunities – manage the scheme in a manner that provides for investor confidence and business opportunities in the local community, by enabling growth through effective and efficient management of scheme assets.
- Integrated infrastructure – manage the scheme in a manner that seeks to integrate flood management with other infrastructure, including close liaison and management with FNDC and NZTA infrastructure providers.

2.3 Sophistication/Limitation of the AMP

This plan has been compiled from the existing information that was available at the time of compilation.

The plan is only as robust as the integrity of the information and data on which it is based. As such, revisions to the plan will be required over time, as improved information/data become available in accordance with the Asset Management Plan improvement plan programme (Refer to Section 11).

3 THE KAEO FLOOD RISK REDUCTION SCHEME (Stage1)

3.1 Overview of the Flood Scheme

The flood Risk Reduction scheme proposed for the Kaeo Township comprises of two stages of works, as described in the following, and shown in Figure 1.

3.2 Description of Flood Scheme Management Area

3.2.1 Physical Description

Kaeo Township is situated on the floodplain of the Kaeo River at about the limit of tidal influence and as far upriver as the flat-bottomed scows could reach at high tide. The Kaeo River has a catchment area of 114 square kilometres, but the catchment area above Kaeo Township is 88 sq.kms. Waiare Stream, a major tributary of the Kaeo River, drains the eastern and northern slopes of the Puketi Range, flowing in a bouldery channel through rolling hill country and an upper basin before passing through the Waiare Gorge. The upper portions of the catchment are steep, reaching a maximum elevation of 456 metres above sea level on Omataroa Ridge Road in Puketi Forest.

Kaeo River from the Opokorau Road area is joined by Waiare Stream as it emerges from the Waiare Gorge. The upper Kaeo River and its tributaries drain the north-western slopes of the Kerikeri-Waipapa Plateau and the south-western edge of the Taraire Plateau falling over soft shale rocks that have been eroded to produce steep slopes and deeply entrenched gullies. The Kaeo River then flows through a middle basin containing distinct terraces before passing under Waiare Road. Within the middle basin the river is joined by a number of short, steep-graded streams, each of which drops off the Taraire and the Kerikeri-Waipapa Plateau, and off a 300 to 400 metre high range on the western edge of the basin, south of Kaeo Township, with high points at Haunga, Te Painga and Ngarahu. The middle basin is

separated from the lower valley by a narrow gorge between Waiare Road Bridge and the end of Green Lane.

After emerging through a narrow gap at the end of Green Lane, the Kaeo River flows from just upstream of the schools for approximately eight kilometres on a 500metre-wide floodplain past Kaeo Township and down to the Whangaroa Harbour. The river is tidal for the last five kilometres and, in the lower basin between SH10 Bridge and the harbour, is stop banked between reclaimed tidal flats.

3.2.2 Climate

The Puketi Plateau, at 456 metres above sea level and exposed to weather systems from both the east and the west, receives a high annual rainfall, an average of 2250mm per year with more than 190 rain days. The catchment, particularly the eastern half, is prone to high intensity, short duration rainstorms with over 134mm being recorded in two hours in 1974 and over 180mm in the same time in June 2002. From the severity of slipping and debris avalanches resulting from the July 2007 storm, it is most probable that there were even greater rainfall intensities in a band that tracked from west to east across the lower catchment from Takakuri to Huia Stopbanking and Floodgates

3.2.3 Land Use

As is evidenced by the rate at which ground levels on the floodplain are rising throughout the river system, the floodplain is very effectively trapping sediment, particularly sands and silt. Constraining flood flows between stopbanks or in flood channels will prevent this sediment from being trapped in grass on the floodplain and will rapidly increase the rate of silting in the lower river channels and in the harbour. Generally the spread of floodwaters across the floodplain is to be encouraged rather than prevented effects of Flooding

3.2.4 Effects of Flooding

Despite the relatively small size of the Kaeo River catchment, rainfall patterns can be very variable with some storms affecting only one tributary of the river and others causing more extensive flooding. The various tributaries draining the slopes of Puketi meet above the Waiare Gorge. Downstream of the gorge, the river flows between distinct terraces, a second terrace some two to three metres above a narrow floodplain, until a few kilometres above the Waiare Road Bridge, where it ponds before flowing through a narrow gap to Green Lane.

After emerging from the gorge at Green Lane the river flows in a loop between distinct terraces until it reaches the schools, although there is a natural high level overflow across the loop. The two schools, Whangaroa College and Kaeo Primary School are situated on the lower floodplain of the river with several of the College buildings sited in a filled cut-off loop of the river. If it were not for a stopbank behind the Primary School across the back of the College, the river would frequently overflow its right bank through the area occupied by the schools. While State Highway 10 is built on a causeway from in front of the schools to the edge of Kaeo, floodwaters have frequently flowed across the highway at sufficient depth and velocity to damage the road surface. This water flows across SH10 into a low-lying area and then flows back onto SH10 past the Memorial Hall and via the main street of Kaeo

before flowing back into the Kaeo River near the Fire Station West of the town centre.

The Waikara Creek, which runs through the middle of the Kaeo Township, also contributes to flooding, but generally peak flows from this creek arrive at the township before peak flows from the Kaeo River. The Waikara Creek catchment is approximately 1.8 km2, located immediately North East of the Kaeo Township. The depth of flooding associated with Waikara Creek peak flows is considerably less than the flooding from the Kaeo River

The Kaeo River has developed distinct natural levees along its banks in the vicinity of Kaeo, with the immediate riverbank being over one metre higher than the floodplain back towards the foot of the hills or the next terrace. In flood, the river overflows its left (southern/western) bank upstream of the town and flows down the southern/western side of the valley, across Omaunu Road. A proportion of the floodwater flows back into the Kaeo River near its confluence with Mangaiti Stream at the intersection of Omaunu and Dip Roads. The rest flows on down the western/southern side of the valley, across Dip Road and back into the river.

The natural levee on the right (north) bank downstream of Omaunu Road is high enough to restrict overflows and divert most of the floodwaters onto the left bank, Dip Road side. When floodwater does overflow the right bank downstream of Omaunu Road it re-joins the river upstream of Sanford's oyster processing plant, and then overflows again across the loop on Brown's property. Floodwaters continue on down the floodplain on both sides of the river between Brown's and SH10 Bridge, flowing across or along SH10 in several places.

In a major flood, the river overflows its left bank and across SH10 on the northern side of the single-lane bridge and into a stopbanked pocket of farmland north of the road. In a major flood water also overflows the right bank across Whangaroa Road north of Leacock Road and across the extensive flats bounded by Waikoura Road, which acts as a storage area.

The river is then confined between ridges on both sides of the valley before discharging into Whangaroa Harbour, with the ends of the ridges on each side of the valley less than 300 metres apart.

4 LEVEL OF SERVICE

4.1 Customer Research and Expectations

The Northland Regional Council meets with the Kaeo River Management Liaison Committee on a minimum basis of twice yearly.

Advice from the Committee assists and determines the stakeholder requirements in terms of the management of the scheme and the required levels of service. The Committee is instrumental in providing recommendations relating to management of assets and expenditure of budgets based on the provision of information and advice from NRC.

In addition to this, technical reports are developed and discussed with the Committee to inform discussion around management options. An example of this is the current revision of levels of service being developed through river modelling.

4.2 Strategic and Corporate Goals

Section 2.2.2 details the strategic and corporate goals of the NRC. The relevant goals, being Regional Leadership, Environmental Protection, Economic Opportunities and Integrated Infrastructure, link closely to community well beings and align with the overall goals of this AMP and the levels of service.

4.3 Legislative Requirements

The following legislation and Council Policy/Strategy is linked to the operation of the scheme and its assets and/or impacts on the defined levels of service (refer Table 2 - Table 3)

4.4 Current Level of Service

The The key objectives of the Kaeo Flood Risk Management Scheme, and respective levels of service (LOS) provided by the NRC, are:

Objective 1:Kaeo Township Flood Risk Reduction

- To reduce river flood risk to buildings and people in Kaeo Township to an agreed standard as determined through consultation with the Kaeo Flood Risk Management Liaison Committee (herein after referred to as the Liaison Committee) and the public .

LOS for Objective 1: Urban Flood Risk Reduction

- Provide information (by an effective hydraulic model) on flood risk and options to reduce flood risk, including cost, to enable the Liaison Committee to agree a standard of risk reduction.
- Implement risk reduction measures in accordance with the standard agreed by the Liaison Committee.
- Update Asset Management Plan to include agreed standard and implement changes through LTP in accordance with the programme agreed in consultation with the Liaison Committee.
- Undertake maintenance of the river channels and renewals of scheme assets in accordance with the river maintenance schedule agreed in consultation with the Liaison Committee.

4.5 Desired Level of Service

Objective 1: Kaeo Township Flood Risk Reduction

The objective of the scheme is to decrease the flow velocity of flooding through the township caused by a 1% AEP storm event.

LOS of Objective 1: Kaeo Township Flood Risk Reduction

The Kaeo Flood Risk Reduction Scheme shall be designed and maintained to provide river flood risk reduction to a 1% AEP flood design standard.

5 DEMAND MANAGEMENT

5.1 Historic Demand

Historically, demand on the scheme increased as development within the township areas increased, and following damaging flood events that resulted in scheme improvements being undertaken.

5.2 Current Demand

Current demand of the scheme is based on Kaeo Township Area.

The demand for Kaeo Township is based on reducing high velocity of flood water to an assumed 100 Year ARI flood event.

The primary demand drivers are the reduction in risk of damage from flooding that may affect assets, safety of people, infrastructure and the production of land.

5.3 Future Demand

No specific growth is identified as having the potential to influence the demand of the Stage 1 flood scheme even more notably when Stage 2 of scheme proceeds as this may influence the township relocation.

5.4 Demand Management Plan

5.4.1 Non-Asset Solutions

A range of non-asset solutions are available as alternatives to asset-based solutions.

A number of these are currently used to supplement asset solutions and offset the risk and cost, but not necessarily limit opportunities, of demand to the scheme stakeholders. These include:

- Land use planning – Done through the NRC and FNDC RMA planning documents to reduce development that may increase flood risk on areas that are prone to flooding
- Flood hazard mapping – Links in with planning documents to provide basis for risk assessment and planning framework for hazard mitigation
- Insurance – Scheme assets are insured to cover the risk associated with large flood events
- Flood warnings/CDEM planning – CDEM provide warning and response to flood events, along with pre-event community response planning
- Hydrometric Network. NRC monitoring stations have been located to provide region-wide coverage.
- Kaeo River Webcam – the camera is looking at the Kaeo River. The river flows away from the camera towards SH 10. Images are taken by the camera and uploaded to NRC webpage designed intervals.
- Maintenance of non-financial assets – River channels are cleaned to maintain chann el capacity to convey flood waters

5.4.2 New Work Programmes and Cost

Proposed new works programmes and associated costs are defined in Section 10.

6 LIFECYCLE MANAGEMENT PLAN

In this section the relevant components associated with the management of the flood scheme are broken down into the following categories;

- Channels, Rivers and Storage Areas (Non-financial Assets)
- Stopbanks (Assets)
- Floodwalls (Assets)

- Floodgates (Assets)
- Spillway (Assets)

The lifecycle management for each component is discussed separately in an individual lifecycle management plan for each category of asset.

6.1 Channels (Non-financial Assets)

6.1.1 Physical Parameters

The scheme is comprised of a number of natural river channels and constructed overflow or drainage channels.

The channels are not assigned with a financial value as an infrastructural asset, however they are a key component of the flood scheme and are maintained as part of the flood scheme in delivering the schemes primary objective of reducing flood risk.

The river maintenance comprises of:

- Gravel Extraction and Channel Maintenance
- River Bank Erosion Protection
- Vegetation and debris removal

6.1.2 Asset Capacity/Performance

The channel dimensions, level of stopbanks, riverbed gradients, and established roughness influence the ability of the river channel to carry the flood flow.

Obstructions such as fallen debris, overgrown trees, accumulated sediments and gravels that prevent rivers and channels to carry the design capacity require management.

6.1.3 Asset Condition

River channels have its regular annual maintenance programme to mitigate any condition that cause issue in the river scheme.

6.2 Stopbank/Floodwall

6.2.1 Physical Parameters

Stopbanks are compacted earth structures, which provide protection to Kaeo Township properties from high velocity floodwaters. All the stopbanks within the township are controlled and maintained by the Regional Council.

A summary of stopbank asset information is contained in Table 4 - Table 8. The stopbank asset locations are provided in Figure 2. The figures below from Figure 3 to Figure 6 show the longitudinal section of the stopbank. Figure 7 shows the longitudinal section of the floodwall. The following below is the summary of the calculated volume of the each of the sections of the stopbanks.

Stopbank Section	Volume	
Section 2 Area E	19,408.76	m^3
Section 2 Area F	602.20	m^3
Section 2 Area G	4,463.47	m^3
Section 4 Area C	3,969.07	m^3

Section 4 Area D	2,018.79	m^3

Information on the stopbank assets is held in the NRC IRIS database.

The floodwall is located at Kaeo Primary School which is composed of 235 175SED driven piles at 1 m cc, 2.0 m embedment. Figure 1 shows the location of the floodwall and sits on area H, I and Ia in Figure 2.

6.2.2 Asset Capacity/Performance

The design standard is equivalent to a capacity of reducing the high velocity flood water brought by a 100 Year ARI flood plus climate change. Freeboard data of the design flood is shown in Table 4 to Table 8.

6.2.3 Asset Condition

Asset condition is monitored by 5 yearly survey of crest levels and annual inspection of banks during routine maintenance works. Inspection details are recorded in the asset database and summarised in the Kaeo Asset Condition Assessment Report.

6.2.4 Asset Valuations

The Council complies with Generally Accepted Accounting Practices (GAAP) for capitalisation, depreciation, and valuation of assets as promulgated by the Institute of Chartered Accountants of New Zealand.

The principle Reporting Standard is the New Zealand equivalent to International Accounting Standard 16 Property, Plant and Equipment (NZ IAS 16).

NZ IAS 16 requires that where a revaluation takes place, assets are to be revalued to a fair value, and in the case of specialised infrastructural assets, fair value is the depreciated replacement cost.

Freeboard varies for different sections of the river. It ranges from 0 to 0.98 m. The reconstruction can be required when the section reduces 75% of its freeboard or from any significant findings. An annual depreciation rate of 1.50% has been used for initial years of soil settling.

The replacement cost of the assets is broke down according to the actual cost of constructing the assets.

Figure 8 illustrates the depreciation.

The valuation has two components, a direct cost per m^3 and ancillary costs per lineal metre.

Direct costs (at a rate of \$7.19/m^3) include:

- Earthworks contract
- Staff salaries to prepare, supervise and administer contract
- Vehicle costs

Ancillary Costs include:

- Diversions
- Establishment
- Clearing
- Silt Control
- Drainage and Services

The valuation of the stopbank assets is:

- Total Replacement Value $467,881.00
- Total Depreciated Value $467,881.00
- Depreciation $0.00
- Annualised Cost $7,018.

6.3 Floodgates/Drainage

6.3.1 Physical Parameters

Floodgates are located throughout the scheme stopbank network to enable drainage of internal waters whilst preventing backflow of flood. The floodgates are typically comprised of a pipe, headwalls, gate and outlet channel.

Figure 1 shows the location of the culverts installed in the scheme.

Table 12 shows the culvert, headwall and floodgate asset information. Information on the floodgate assets is held in the NRC IRIS database.

6.3.2 Asset Capacity/Performance

The floodgate asset capacity is according to the design standard based on the engineering design of Kaeo Flood Risk Reduction Scheme.

6.3.3 Asset Condition

The culverts, floodgates, and headwalls are currently newly installed with excellent condition.

6.3.4 Asset Valuations

The floodgates have useful life of 30 years. The culverts have useful life of 90 years. The headwalls have useful life of 50 years. The knowledge of the age of each structure enables the “depreciated replacement cost” (DRC) costs to be calculated (DRC = Replacement Cost x (1-Age/Life)). Table 11 shows a summary of the asset valuations.

6.4 Spillway

6.4.1 Physical Parameters

The bypass spillway comprising of 21,100 m3 bulk excavation detours the water before river channel bends to south which subsequently reduce flow in the bend that creates flood hazards especially to the school area adjacent to the river just after the bend.

6.4.2 Asset Capacity/Performance

The design standard has anecdotally been suggested to be equivalent to a capacity of reducing the high velocity flood water brought by a 100 Year ARI flood.

6.4.3 Asset Condition

The spillway currently newly constructed with excellent condition.

6.4.4 Asset Valuation

The spillway has useful life of perpetuity. Table 13 shows the summary of the spillway valuation. An annualised cost is set to 0.42 % of the replacement cost.

6.5 Summary of Future Costs

The Ten-Year expenditure plan for Kaeo Flood Risk Reduction Scheme is summarised in Table 18. The average annual expenditure for 10 years is around $112,344.00.

6.5.1 Creation/Acquisition/Augmentation Plan

The existing asset that is currently managed is the Stage 1 Flood Risk Reduction Scheme. The complete scheme would be the implementation of the Stage 2 the schedule of which is subject to the assessment of the performance of the Stage 1.

6.5.2 Disposal Plan

No disposal of channel, river or storage area assets is proposed.

6.6 Routine Maintenance Plan

6.6.1 Operations Maintenance

The forecast planned and unplanned maintenance costs associated with the channels and rivers is provided in Table 14. .It is anticipated that this schedule will largely be repeated on a yearly cycle; although elements will change over time the actual expenditure is projected to remain constant at around an average annual cost of $66,859. Unplanned maintenance works are provided for in the contingency sums that are assigned to the forecast expenditure.

- Stopbank Survey

  Resurvey of stopbank cross-sections every 5 years.

- River Clearance Works

  Channel Maintenance/Widening is to put back the channel in shape to improve its hydraulic efficiency. Gravel and sediment extraction at specified locations as specified in the Scheme Resource Consent. Removal of sediment, trees and other vegetation in watercourse channels in order to restore or maintain capacity

6.6.2 Depreciation Plan

The depreciation valuation for the scheme is provided in Table 15. The schedule will be repeated in a yearly cycle. The actual reserve is projected to remain constant at around an average annual cost of $21,861.00. .

7 RISK MANAGEMENT

7.1 Risk Framework

The primary objective of the Kaeo Flood Risk Reduction Scheme is to reduce flood risk to the Kaeo Township by reducing velocity of flooding through Kaeo Township.

The management strategies for these assets to minimise the risk associated with the noted failure modes, based on risk and criticality, is summarised in Table 17.

7.2 Other Risk Management Mechanism

7.2.1 Insurance Policy

NRC has insured the Kaeo Flood Risk Reduction Scheme assets under a Civil Engineering Completed Risks insurance policy. This policy has an existing sum insured for the insured assets (stopbanks, pipes, outlets etc.) and demolition and removal of debris to a sum insured of $ 905,298.00and a minimum $100,000 excess applies. The Insurer is Vero Insurance NZ Ltd. The annual premium is $4260.00 (excl. GST).

The Civil Engineering Completed Risks policy with Insurance Company provides cover for:

"Damage" means sudden and unforeseen physical loss or damage necessitating repair or replacement caused by:

- fire, lightning, explosion, impact of land borne vehicles or waterborne vessels;
- impact of aircraft and other aerial devices or articles dropped therefrom;
- earthquake, hydrothermal activity or volcanic eruption;
- storm (air movements stronger than grade 8 on the Beaufort Scale);
- flood or inundation, wave action or water;
- subsidence, landslide, rockslide or any other earth movement;
- frost, avalanche, ice; or
- Vandalism of single persons.

8 FINANCIAL SUMMARY

Table 18 details the Kaeo Flood Risk Reduction Scheme 10-year expenditure.

An average maintenance expenditure of $112,344.00 per annum over the first 10 years of the plan.

8.1 Funding Strategy

A targeted Kaeo–Whangaroa Rivers Management Rate set on a uniform basis across all properties within the former Whangaroa Ward (rating rolls 100–199). Based on the Long Term Plan, the targeted Kaeo-Whangaroa Rivers Management Rate is 64.81 excl GST.

8.2 Valuation Forecasts

The forecast future value of assets based on depreciation of Stage 1 assets is summarised in Table 19.

Depreciation of the scheme assets in the future will continue to be based on the methodology applied in Section 6.

8.3 Key Assumptions in Financial Forecasts

Table 20 lists the assumptions in planning of the financial forecasts.

9 ASSET MANAGEMENT PRACTICE

9.1 Accounting/Accounting Financial System

A detailed description of the Council accounting system is contained within both the Councils Annual Plan and Long Term Planning documents, including detail of the standards and policies that are to be complied with.

9.1.1 Asset Maintenance, Renewal and Capital Works Expenditure

Expenditure on infrastructure assets will fall into one of three categories, being either maintenance, renewal or capital works. The differences between these are defined in the following.

9.1.2 Routine Maintenance Expenditure

Routine maintenance expenditure displays the following characteristics:

- Regular and ongoing annual expenditure necessary to keep the assets operating at the required level of service, e.g. inspections; management; liaison with ratepayers etc.
- Day to day and/or general upkeep works designed to keep the assets operating, e.g. insurance, power costs.
- Works which provide for the normal care and attention of the asset including repairs and minor replacements.
- Minor response type remedial works i.e. isolated instances where portions or sections of a unit of an asset fail and need immediate repair to make the asset operational again.

9.1.3 Capital and Renewal Expenditure

Renewal Expenditure can become Capital Expenditure on the basis of the growing demand of the usefulness of the asset which steers the upgrade of the asset.

A. Renewal Expenditure

Work displaying one or more of the following attributes can be classified as renewal expenditure:

- Works which do not increase the capacity of the asset, i.e. works which improve and enhance the assets restoring them to (or below) their original size, condition, capacity, etc.
- The replacement component of augmentation works which does not increase the capacity of the asset, i.e. that portion of the work which restores the assets to their original size, condition capacity, etc.
- The replacement component of a capital work which replaces the redundant element of an existing asset.
- Reconstruction or rehabilitation works involving improvements, realignment etc.

- Renewal and/or renovation of existing assets, i.e. restoring the assets to a new or fresh condition.

B. Capital Expenditure

Capital expenditure projects are those displaying one or more of the following characteristics:

- Construction works which create a new asset that did not previously exist in any shape or form.
- Expenditure which purchases or creates a new asset (not a replacement) or in any way improves an asset beyond its original design capacity.
- Upgrade works that increase the capacity of the asset.

9.2 Asset Management System

9.2.1 Asset Management Responsibilities and Roles

The principal role and responsibility for asset management resides with the River Team of the Northland Regional Council. The Team is responsible for day to day management of the River Scheme and in the preparation, monitoring and revision of the Asset Management Plan and for monitoring the plan and the performance of the scheme.

Consultation with external parties, in particular the Liaison Committee and scheme ratepayers will occur in the preparation and revision of the plan. External parties have also provided feedback about the scheme performance in the past, and the external monitoring role they undertake is expected to continue.

9.2.2 Data Management

Northland Regional Council utilises a number of tools for the management of its assets.

Information systems including GIS (geographical information systems), spreadsheets, IRIS Database Information System, and financial accounting systems assist the asset managers in general management, maintenance, operations and long term planning.

The asset register constitutes the heart of the asset management system. It provides a definition of assets (description, location), details of physical dimensions and capacity. It also details age and replacement costs. It is incorporated in IRIS Information System.

9.2.3 Data Management System

Management of data related to the scheme done through the application of the data management systems listed in Table 21.

10 CAPITAL PROJECTS – STAGE 2 WORKS PROPOSAL

10.1 Determination of Capital Projects

Capital projects have been determined in consultation with the Scheme Liaison Committee and through an issues and options pre-feasibility analysis and short listing and refinement process.

This process had identified several capital improvements that are proposed for further refinement and consultation via the LGA special consultative procedure.

10.2 Proposed Capital projects

Construction of Stage 2 of the Kaeo flood scheme, which also includes improvements to Waikara Creek, was previously scheduled for 2015/16. The revised costs for the Stage 2 works are estimated to be in the vicinity of $1.55M, which is significantly higher than earlier estimates provided in the Long Term Plan 2012- 2022. Based on this information, and in consideration of the benefits and costs of the Stage 2 works, the Kaeo-Whangaroa River Liaison Committee at its meeting of June 2013 recommended to Council to 'Hold Stage 2 and monitor performance of Stage 1 in order to make a more informed decision on Stage 2 options and prevent over capitalising'. On this basis it is intended that the performance of the Stage 1 works will be evaluated following a significant flood before progressing with the Stage 2 works.

11 PLAN IMPROVEMENT AND MONITORING

11.1 Monitoring and Review Procedures

A yearly gap-analysis of the Asset Management Plan to identify areas for improvement and update the Improvement Plan Programme is scheduled for April of each year.

The Asset Management Plan will be subject to a full review on a three yearly basis. The timing of the full review is scheduled to be consistent with the three yearly Long Term Plan cycle. It is noted that the next full review is scheduled for the period from of June – October 2017, with completion of the review and updated plan required by December 2017 as to inform the Long Term Planning process. .

External Audit of the revised plan is recommended during October 2017 to identify any significant issues in order to programme improvements to the plan prior to any assessment by Audit NZ during the audit process associated with the Long Term Plan process.

12 REFERENCE

Kaeo Stopbanks Environmental Management Plan for Northland Regional Council, Haigh Workman, August 2011, 27p.

Draft Annual Plan 2014-15

Final Long Term Plan, 2014

Appendix 1. TABLE

Table 1 Easements Over Affected Properties

Identifier	Area	Legal Description	Proprietors	Interest
NA35B/601	3.827 ha	Lot 7-8 Deposited Plan 80257 and Part Allotment 1 Deposited Plan 21540	Leslie Kelman Jackson & Jeanette Yvonne Jackson	Subject to a right (in gross) to flood (flow path) over part marked O, P and Q on SO 459897 in favour of Northland Regional Council
NA499/4	20.0496 ha	Deposited Plan 22216	Pinegrove Properties Limited	Subject to a right (in gross) to flood (flow path) over part marked K and stop bank over part marked D and E on SO 459897 in favour of Northland Regional Council
NA2087/22	6804 m^2	Part Snowdens Grant	Leslie Kelman Jackson & Jeanette Yvonne Jackson	Subject to a right (in gross) to flood (flow path) over part marked L on SO 459897 in favour of Northland Regional Council
NA1089/79	2.2915 ha	Part Snowdens Grant	Leslie Kelman Jackson & Jeanette Yvonne Jackson	Subject to a right (in gross) to flood (flow path) over part marked M and stopbank (flow path) over part marked C on SO 459897 in favour of Northland Regional Council
NA502/92	83.7699 ha	Part Allotment 1 Parish of Kaeo	Leslie Kelman Jackson & Jeanette Yvonne Jackson	Subject to a right (in gross) to flood (flow path) over part marked R on SO 459897 in favour of Northland Regional Council
NA62B/299	1475 m^2	Lot 1 Deposited Plan 1 10461	Neville Leonard Hunt	Subject to a right (in gross) of way and a stop bank easement over part marked F on SO 459897 in favour of Northland Regional Council
638044	10.3038 ha	Part Snowdens Grant	Her Majesty the Queen (School)	Part Snowdens Grant comprised in Proc 049005 is Limited as to Parcels

Table 2 Legislation linked to the management of the flood scheme

Legislation	Linkage
Resource Management Act 1991	Section 30, RMA 1991 – the avoidance or mitigation of natural hazards
Soil Conservation and Rivers Control Act 1941	Section 126 SC&RC Act 1941, minimise damage by flooding and erosion
Civil Defence Emergency Management Act 2002	Duty to reduce risk.
Local Government Act 2002	Duty to consult residents, who have identified the reduction of flood risk as a primary responsibility of the Council
Local Government Rating Act 2002	Required to, wherever practical, implement a funding mechanism that recognises who benefits from or contributes to the need for the service
Land Drainage Act 1908	Section 62 requires council to take action to remove obstructions to the free flow of water in watercourses

Table 3 Council policy/strategy linked to the management of the flood scheme

Council Policy/Strategy Name	Linkage
Regional Coastal Plan	RMA compliance
Regional Air Quality Plan	RMA compliance
Regional Water & Soil Plan	RMA compliance
Regional Policy Statement	Section 21 Natural Hazards, Hazard Protection Works
Civil Defence Emergency Management	Duty to minimise risk from identified hazards - flooding and erosion
River Management Plans	Implementation and maintenance of flood Risk Reduction schemes i.e. Kaeo River Flood Management Plan
Long Term Council Community Plan	Implement flood risk reduction schemes as a priority identified by residents
Northland River Management Policy	Comply with Policy build and maintain flood Risk Reduction measures
National Strategy Name	Requirement to be met
Managing Flood Risk – A Process Standard NZS 9401:2008	Provides a framework for assessing and treating the risks associated with flooding

Table 4 Section 2 Area E

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
0.00	7.40	7.40	0.00	3.00	3.00	0.00	0.00	6.82	0.58
20.00	7.44	4.40	3.04	3.00	27.32	46.09	460.86	6.81	0.63
40.00	7.48	4.26	3.22	3.00	28.76	51.13	972.20	6.82	0.66
60.00	7.52	4.15	3.37	3.00	29.96	55.54	1066.71	6.92	0.60
80.00	7.55	4.09	3.46	3.00	30.68	58.27	1138.04	6.94	0.61
100.00	7.59	4.08	3.51	3.00	31.08	59.81	1180.77	6.92	0.67
120.00	7.63	4.11	3.52	3.00	31.16	60.12	1199.32	7.24	0.39
140.00	7.67	4.08	3.59	3.00	31.72	62.32	1224.44	7.19	0.48
160.00	7.71	4.22	3.49	3.00	30.92	59.19	1215.13	7.16	0.55
180.00	7.75	4.39	3.36	3.00	29.88	55.24	1144.29	7.31	0.44
200.00	7.78	4.59	3.19	3.00	28.52	50.27	1055.13	7.17	0.61
220.00	7.82	4.91	2.91	3.00	26.28	42.60	928.77	7.38	0.44
240.00	7.86	5.18	2.68	3.00	24.44	36.77	793.72	7.17	0.69
260.00	7.90	5.36	2.54	3.00	23.32	33.43	701.96	7.35	0.55
280.00	7.94	5.53	2.41	3.00	22.28	30.46	638.89	7.23	0.71
300.00	7.98	5.65	2.33	3.00	21.64	28.71	591.68	7.28	0.70
320.00	8.02	5.69	2.33	3.00	21.64	28.71	574.11	7.30	0.72
340.00	8.05	5.72	2.33	3.00	21.64	28.71	574.11	7.26	0.79
360.00	8.09	5.65	2.44	3.00	22.52	31.13	598.40	7.30	0.79
380.00	8.13	5.64	2.49	3.00	22.92	32.27	634.05	7.29	0.84
400.00	8.17	5.56	2.61	3.00	23.88	35.08	673.49	7.27	0.90
420.00	8.21	5.58	2.63	3.00	24.04	35.56	706.36	7.23	0.98
440.00	8.25	5.67	2.58	3.00	23.64	34.37	699.23	7.40	0.85

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
447.78	8.26	5.77	2.49	3.00	22.92	32.27	259.21	7.44	0.82
460.00	8.28	5.91	2.37	3.00	21.96	29.58	377.89	7.49	0.79
					TOTAL		**19408.76**		

Table 5 Section 2 Area F

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
473.96	8.31	5.91	2.40	3.00	22.20	30.24	417.53	7.55	0.76
480.00	8.32	5.89	2.43	3.00	22.44	30.91	184.67	7.57	0.75
					TOTAL		**602.20**		

Table 6 Section 2 Area G

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
500.00	8.36	5.94	2.42	3.00	22.36	30.69	615.95	7.65	0.71
500.14	8.36	5.94	2.42	3.00	22.36	30.69	4.30	7.66	0.70
520.00	8.40	6.07	2.33	3.00	21.64	28.71	589.75	7.74	0.66
540.00	8.44	6.19	2.25	3.00	21.00	27.00	557.06	7.82	0.62
560.00	8.48	6.33	2.15	3.00	20.20	24.94	519.40	7.91	0.57
571.16	8.50	6.46	2.04	3.00	19.32	22.77	266.20	7.95	0.55
580.00	8.52	6.48	2.04	3.00	19.32	22.77	201.25	7.99	0.53
591.23	8.54	6.51	2.03	3.00	19.24	22.57	254.58	8.04	0.50
600.00	8.55	6.59	1.96	3.00	18.68	21.25	192.15	8.07	0.48
611.31	8.58	6.73	1.85	3.00	17.80	19.24	228.95	8.18	0.40
620.00	8.59	6.84	1.75	3.00	17.00	17.50	159.64	8.19	0.40

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
631.83	8.62	6.74	1.88	3.00	18.04	19.78	220.50	8.18	0.44
640.00	8.63	6.88	1.75	3.00	17.00	17.50	152.28	8.14	0.49
648.89	8.65	6.87	1.78	3.00	17.24	18.01	157.86	8.11	0.54
660.00	8.67	7.37	1.30	3.00	13.40	10.66	159.28	8.11	0.56
665.55	8.68	7.12	1.56	3.00	15.48	14.41	69.58	8.11	0.57
670.59	8.69	7.11	1.58	3.00	15.64	14.73	73.43	8.11	0.58
676.20	7.29	7.29	0.00	3.00	3.00	0.00	41.31	8.11	0.00
					TOTAL		**4463.47**		

Table 7 Section 4 Area C

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
0.00	3.77	3.77	0.00	3.00	3.00	0.00		6.41	0.00
5.14	5.06	3.70	1.36	3.00	13.88	11.48	29.50	6.40	0.00
11.59	6.67	3.94	2.73	3.00	24.84	38.00	159.57	6.36	0.31
20.00	6.67	3.70	2.97	3.00	26.76	44.19	345.63	6.37	0.30
21.15	6.67	3.68	2.99	3.00	26.92	44.73	51.13	6.38	0.29
31.25	6.67	3.53	3.14	3.00	28.12	48.86	472.62	6.38	0.29
37.17	6.68	3.60	3.08	3.00	27.64	47.19	284.29	6.38	0.30
40.00	6.68	3.68	3.00	3.00	27.00	45.00	130.44	6.37	0.31
52.68	6.70	3.81	2.89	3.00	26.12	42.08	552.08	6.36	0.34
60.00	6.71	3.56	3.15	3.00	28.20	49.14	333.86	6.36	0.35
66.07	6.72	3.60	3.12	3.00	27.96	48.30	295.72	6.36	0.36
66.37	6.72	3.61	3.11	3.00	27.88	48.02	14.45	6.36	0.36
80.00	6.80	4.12	2.68	3.00	24.44	36.77	577.83	6.37	0.43

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
80.06	6.80	4.12	2.68	3.00	24.44	36.77	2.21	6.38	0.42
98.56	6.90	4.05	2.85	3.00	25.80	41.04	719.74	6.44	0.46
					TOTAL		**3969.07**		

Table 8 Section 4 Area D

Chainage	Design Centre Line	Existing Surface	Fill	Top Width	Bottom width	Area	Volume	100YrCCFL	Freeboard
100.00	6.90	4.03	2.87	3.00	25.96	41.56	59.47	6.44	0.46
120.00	6.94	4.25	2.69	3.00	24.52	37.01	785.72	6.45	0.49
121.68	6.94	4.23	2.71	3.00	24.68	37.51	62.60	6.45	0.49
127.27	6.95	4.23	2.72	3.00	24.76	37.75	210.35	6.46	0.49
132.87	6.96	4.28	2.68	3.00	24.44	36.77	208.66	6.47	0.49
140.00	6.97	4.21	2.76	3.00	25.08	38.75	269.23	6.48	0.49
160.00	7.01	6.47	0.54	3.00	7.32	2.79	415.37	6.48	0.53
165.30	7.01	7.12	0.00	3.00	3.00	0.00	7.38	6.48	0.53
					TOTAL		**2018.79**		

Table 9 Stopbank Valuation

Stopbank	Replacement Cost	Year Installed	Perpetuity (with settlement)	Age	Annualised Cost	DRC
Deflection Stop Bank 4, Area C	60962.39	2014	NA	0.00	914.44	60962.39
Deflection Stop Bank 4, Area D	31007.23	2014	NA	0.00	465.11	31007.23
Main Stop Bank 2, Area E	298105.98	2014	NA	0.00	4471.59	298105.98
Main Stop Bank 2, Area F	9249.38	2014	NA	0.00	138.74	9249.38
Main Stop Bank 2, Area G	68556.02	2014	NA	0.00	1028.34	68556.02
			TOTAL		**7018.22**	**467881.00**

Table 10 Floodwall Valuation

Floodwall						
175SED driven piles @ 1m cc, 2.0m embedment	41184.55	2014	20.00	0.00	2059.23	41184.55

Table 11 Summary of Culvert, Floodgate and Headwall Valuation

Description	Replacement Cost	Year Installed	Life	Age	Annualised Cost	DRC
Culverts	56505.48	2014	90	0	627.84	56505.48
Headwall - Inlets/inlet basin/outlets, rock spalls in mortar	7174.81	2014	50	0	143.50	7174.81
Outlet gates (Floodgate)	8470.32	2014	30	0	282.34	8470.32
TOTAL	72150.61				1053.68	72150.61

Table 12 Culvert, Headwall, Floodgate Asset Information

Description	Unit	Quantity	Diameter, mm
Culvert:			
Install 375mm dia class z RCRRJ HS2 bedding	m	58.9	375
Install 600mm dia class z RCRRJ HS2 bedding	m	31.7	600
Headwall			
375 dia	Each	4	375
Floodgate			
Wingwall with stiffened outlet flap 375 dia	ea	3	375
Stiffened outlet flap 600 dia	ea	1	600

Table 13 Summary of Spillway Valuation

Description	Replacement Cost	Year Installed	Life	Age	Annualised Cost	DRC
Spillway	324082.31	2014	NA	0.00	1374.28	324082.31

Table 14 Operations Valuation

OPERATIONS	Total Annualized
2005 - Advertising - Statutory Notices	612.70
2047 - Consultants	0.00
2219 - Sundry Supplies	666.72
2253 - Vehicles	0.00
3639 - River Clearance / Works	35426.00
4290 - Stop Banks & River Schemes	11495.23
5228 - Commission - TLAS	10994.10
5840 - Insurance	4896.97
5942 - Depreciation - Infrastructural Assets	21286.10

7946 - Labour Charge	23658.00
Internal Interest	3308.46
Total Operating Costs	**112344.28**

Table 15 Renewal Valuation

Stage 1 RENEWALS	Estimated Cost	Cycle	Total Annualised
Stopbanks			
Miscellaneous Maintenance and Reconstruction (Reserve)	467881.00	Perpetuity (with settlement)	7018.22
Culverts			
Miscellaneous Maintenance and Reconstruction (Reserve)	56505.48	90.00	627.84
Headwalls			
Miscellaneous Maintenance and Reconstruction (Reserve)	7174.81	50.00	143.50
Floodgates			
Miscellaneous Maintenance and Reconstruction (Reserve)	8470.32	30.00	282.34
Spillway			
Miscellaneous Maintenance and Replacements (Reserve)	324082.31	Perpetuity (with settlement)	1374.28

Retaining Wall			
Miscellaneous Maintenance and Replacements (Reserve)	41184.55	20.00	2059.23
Subtotal	**905298.47**		**11505.40**

Table 16 Risk associated with the assets

Asset	Failure Modes	Consequence	Likelihood	Criticality	Risk
Main and Deflection Stopbank	Breach	High – extensive flooding of assets and properties	Low –moderates during large flood events	High	High
Floodwall	Breach	High – extensive flooding of assets and properties	Low –moderates during large flood events	High	High
Spillway	Breach	High – extensive flooding of assets and properties	Low –moderates during large flood events	High	High
Floodgate, culvert, Headwall	Breach	Low – ingress of floodwaters increasing flood volumes, short term pasture damage	Low – gates regularly inspected and maintenance undertaken	Low	Low

Table 17 Risk Management Strategies

Asset	Failure Modes	Preventative Maintenance	Failure Response
Main & Deflection Stopbank	Breach	Visual condition survey of stopbanks to identify those requiring maintenance	Patch banks if possible, and effect permanent repair as soon as practicable
Floodwall	Breach	Visual condition survey of stopbanks to identify those requiring maintenance	Patch banks if possible, and effect permanent repair as soon as practicable
Spillway	Breach	Visual condition survey of floodwall to identify those requiring maintenance	Patch banks if possible, and effect permanent repair as soon as practicable
Floodgate, Culvert, Headwall	Failure of headwall, pipe or floodgates	Annual inspection and condition assessment, basic annual preventative maintenance. Prioritised replacement programme based on asset condition.	Block outlet to prevent ingress, effect permanent repair as soon as practicable

Table 18 Kaeo Flood Risk Reduction Scheme 10-Year Expenditure

OPERATIONS	Year 15-16	Year 16-17	Year 17-18	Year 18-19	Year 19-20	Year 20-21	Year 21-22	Year 22-23	Year 23-24	Year 24-25
2005 - Advertising - Statutory Notices	533.00	547.39	563.27	580.16	598.15	617.29	637.66	659.98	683.08	706.98
2047 - Consultants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2219 - Sundry Supplies	580.00	595.66	612.93	631.32	650.89	671.72	693.89	718.17	743.31	769.33
2253 - Vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3639 - River Clearance / Works	20000.00	42415.10	21135.66	44954.49	22444.59	47831.22	23927.19	51138.99	25631.41	54781.36
4290 - Stop Banks & River Schemes	10000.00	10270.00	10567.83	10884.86	11222.30	11581.41	11963.60	12382.32	12815.70	13264.25
5228 - Commission - TLAS	5711.00	5868.00	6030.00	12305.00	12644.00	12751.00	13104.00	13467.00	13839.00	14222.00
5840 - Insurance	4260.00	4375.02	4501.90	4636.95	4780.70	4933.68	5096.49	5274.87	5459.49	5650.57
5942 - Depreciation - Infrastructural Assets	19232.00	19232.00	20195.00	20195.00	20195.00	21900.00	21900.00	21900.00	24056.00	24056.00
7946 - Labour Charge	21438.00	21846.00	22284.00	22752.00	23252.00	23787.00	24358.00	24967.00	25615.00	26281.00
Internal Interest	10380.27	8253.17	6121.94	4254.20	2602.11	1084.06	388.82	0.02	0.02	0.02
Total Operating Costs	**92134.27**	**113402.34**	**92012.52**	**121193.99**	**98389.74**	**125157.38**	**102069.65**	**130508.35**	**108843.01**	**139731.52**
Depreciation										
	Year 15-16	**Year 16-17**	**Year 17-18**	**Year 18-19**	**Year 19-20**	**Year 20-21**	**Year 21-22**	**Year 22-23**	**Year 23-24**	**Year 24-25**

Original Kaeo	**10242.00**	**10242.00**	**10755.00**	**10755.00**	**10755.00**	**11663.00**	**11663.00**	**11663.00**	**12811.00**	**12811.00**
Capex	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Original Whangaroa	8990.00	8990.00	9440.00	9440.00	9440.00	10237.00	10237.00	10237.00	11245.00	11245.00
Revised depreciation total	**19232.00**	**19232.00**	**20195.00**	**20195.00**	**20195.00**	**21900.00**	**21900.00**	**21900.00**	**24056.00**	**24056.00**

Table 19 Forecast values of scheme assets

ITEM	DESCRIPTION	2015/2016	2016/2017	2017/18	2018/19	2019/20
1	Stopbank	460862.79	453844.57	446826.36	439808.14	432789.93
2	Spillway	274127.44	272960.04	271792.65	270625.26	269457.87
3	Culverts	55877.64	55249.80	54621.97	53994.13	53366.29
4	Headwall -	7031.32	6887.82	6744.32	6600.83	6457.33
5	Floodgate	8187.98	7905.63	7623.29	7340.94	7058.60
6	Floodwall	39125.32	37066.10	35006.87	32947.64	30888.41
	TOTAL (GST EX)	893793.07	882287.68	870782.28	859276.88	847771.48
ITEM	**DESCRIPTION**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**
1	Stopbank	425771.71	418753.50	411735.28	404717.07	397698.85
2	Spillway	268290.48	267123.08	265955.69	264788.30	263620.91
3	Culverts	52738.45	52110.61	51482.77	50854.93	50227.09
4	Headwall -	6313.83	6170.34	6026.84	5883.35	5739.85
5	Floodgate	6776.26	6493.91	6211.57	5929.22	5646.88
6	Floodwall	28829.19	26769.96	24710.73	22651.50	20592.28
	TOTAL (GST EX)	836266.09	824760.69	813255.29	801749.89	790244.49

Table 20 Forecasting assumptions relating to the financial planning

Assumption	Impact of assumption	Risk	Level of uncertainty of risk		Impact of risk
			Likelihood Low/medium/high	Financial impact	
Climate change impacts Climate change will match the Ministry for Environment's climate change predictions, which are based on recommendations from the International Panel on Climate Change (IPCC).	Capital works budgets within this plan include an allowance to accommodate climate change impacts.	Climate change impacts are under assessed.	Medium	Low	Variations to long term budget forecasts and levels of service will be required and will be addressed by subsequent long term plans. There may be additional demand for protection works.
Land use will not change significantly over the period of the plan.	No additional expenditure has been provided for effects of land use change.	Land use in the rural areas will see a significant change from beef/sheep farming to forestry to suit climate and economic conditions.	Low	Low	Marginal beef/sheep farmers may choose to diversify into forestry which is less labour intensive and copes better with changing climatic conditions. Forestry can reduce the flow of streams which could impact on water allocations and reduce the demand for flood control measures.
Inflation Council has adjusted base financial projections to reflect the estimated impact of inflation over the life of the 2012-2022 Long Term plan (LTP). **Inflation rates applied - expenditure** Inflation rates have been estimated using the Business and Economic Research Limited (BERL) "Forecasts of Price Level change adjustors to 2022". The price level change adjustor rates displayed below (at a per annum change) have been applied to all expenditure items subject to inflation with the exception of salaries, and electricity:	Council's costs and income required to fund those costs will increase by the rate of inflation unless efficiency gains can be made.	The actual rate of inflation will vary from the assumed rate of inflation.	Years 1-3: Low to moderate Years 4-10: Moderate - high	Low to moderate 1% increase in inflation over and above the BERL rates will increase Council's total operating expenditure	Inflation is affected by external factors, most of which are outside of Council's control and influence. Actual individual indices will at times vary from what has

Assumption	Impact of assumption	Risk	Level of uncertainty of risk		Impact of risk
			Likelihood Low/medium/high	Financial impact	
Yr01 2.60% Yr02 2.70% Yr03 2.90% Yr04 3.00% Yr05 3.10% Yr06 3.20% Yr07 3.30% Yr08 3.50% Yr09 3.50% Yr10 3.50%					been assumed in the Long Term Plan. The council has relied on the Reserve Bank's use of monetary controls to keep inflation within the 1% to 3% range.
New Assets Council is aware of all new asset requirements and has factored these requirements into the Long Term Plan's capital expenditure programme.	The impact of funding known new assets is reflected in the rates projections within this document.	New assets are required that are not included within the life of this AMP	Moderate	Medium	Consultation will be undertaken with the affected communities of additional capital works and a targeted rate will be levied via an Annual Plan or subsequent Long Term Plan to fund any new works.
Useful lives of significant assets It is assumed that no significant assets will fail before the end of their useful lives Council is aware of all planned asset acquisitions and all asset acquisitions (as per the capital expenditure program) shall be depreciated on the same basis as existing assets.		That Council assets wear out earlier or later than estimated. That Council changes activities resulting in decisions not to replace certain existing assets.	Low	Low The financial effect of the uncertainty surrounding useful lives of assets is likely to be immaterial.	As part of its Asset Management Planning process council identifies the capacity and condition of such assets, and plans its replacement programme accordingly. Depreciation and interest costs (if borrowing was required) would increase if capital expenditure was required earlier than anticipated, and any earlier replacement may result in the deferral of other discretionary capital

<table>
<tr><th rowspan="2">Assumption</th><th rowspan="2">Impact of assumption</th><th rowspan="2">Risk</th><th colspan="2">Level of uncertainty of risk</th><th rowspan="2">Impact of risk</th></tr>
<tr><th>Likelihood
Low/medium/high</th><th>Financial impact</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>projects.
Where a decision is made not to replace an asset this will be factored into the capital expenditure projections.</td></tr>
<tr><td>Borrowing costs
The borrowing costs for qualifying assets is calculated assuming the following average interest rates
<table><tr><th>Yr 1</th><th>%</th></tr><tr><td>Yr 2 – 3</td><td>7%</td></tr><tr><td>Yr 4 – 10</td><td>7%</td></tr></table>Any internal interest expense applicable to internal borrowings is allocated directly to the activity to which the loan relates.</td><td></td><td>That the prevailing interest rate will vary from those assumed.</td><td>Moderate</td><td>Low</td><td>Council is not forecasting any external borrowing over the 10 year life of the Long Term Plan. If any actual borrowing should eventuate, an unbudgeted interest expense will also eventuate and this may affect the level of rating income increase required to fund such expenditure.

Interest expense and interest income associated with Internal borrowing offset each other in the Financial Forecasts.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Table 21 Data Management Systems

Data	Management System	Notes
Asset Inventory	IRIS Database System	Full data on the asset and maintenance history.
Asset Plans	Objective Information System	Data to be labelled and migrated to Objective to improve archival quality
Operations Data	Smart stream Financial System	Captures historical cost elements associated with the scheme
Customer Enquiries	IRIS Database System	Individual enquires recorded in database
Asset valuations	IRIS Database System	Valuations reconciled to asset database.
Financials	Council financial systems	

Appendix 2. FIGURES

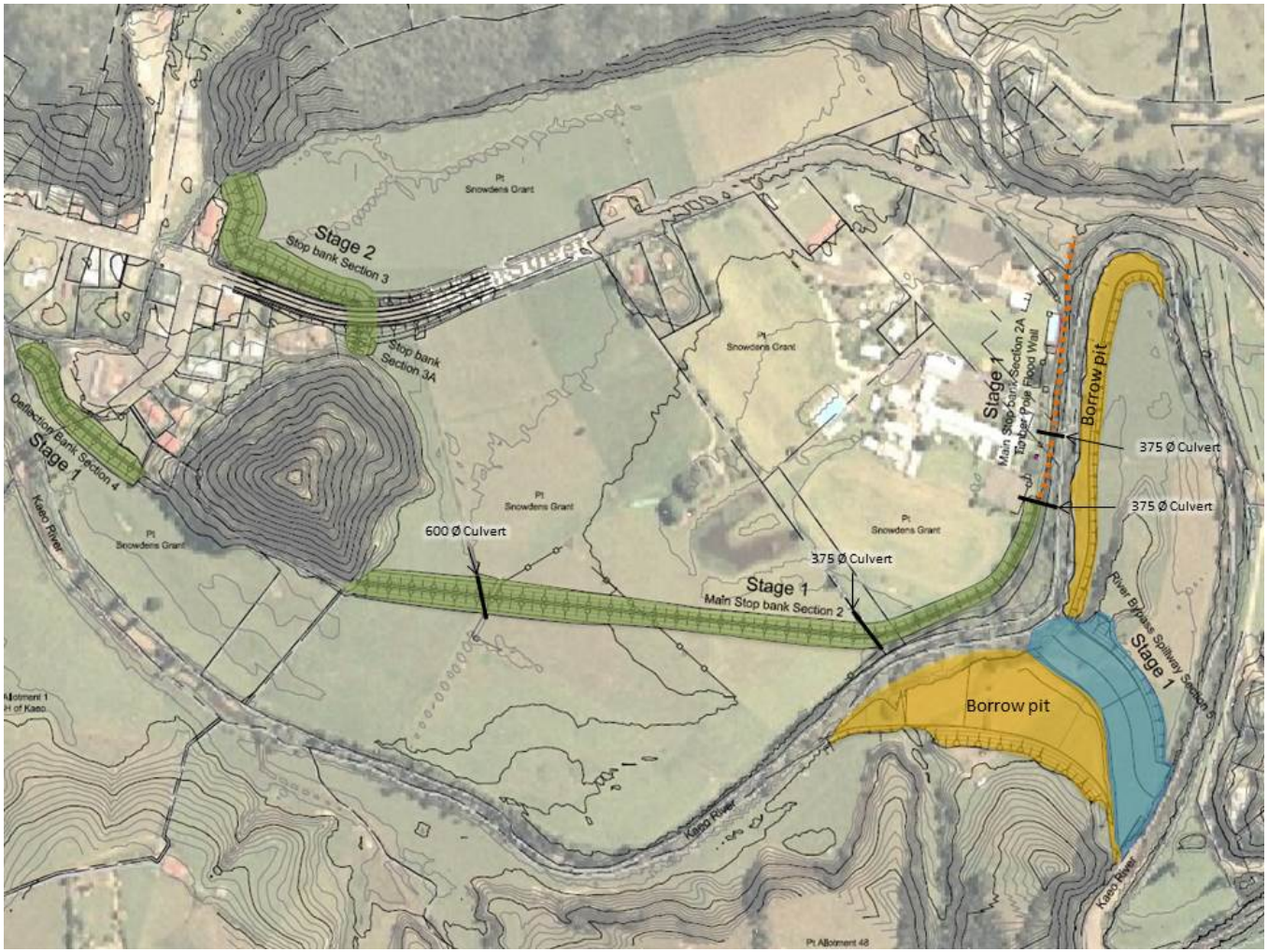

Figure 1 Kaeo Flood Risk Reduction Scheme Location Map

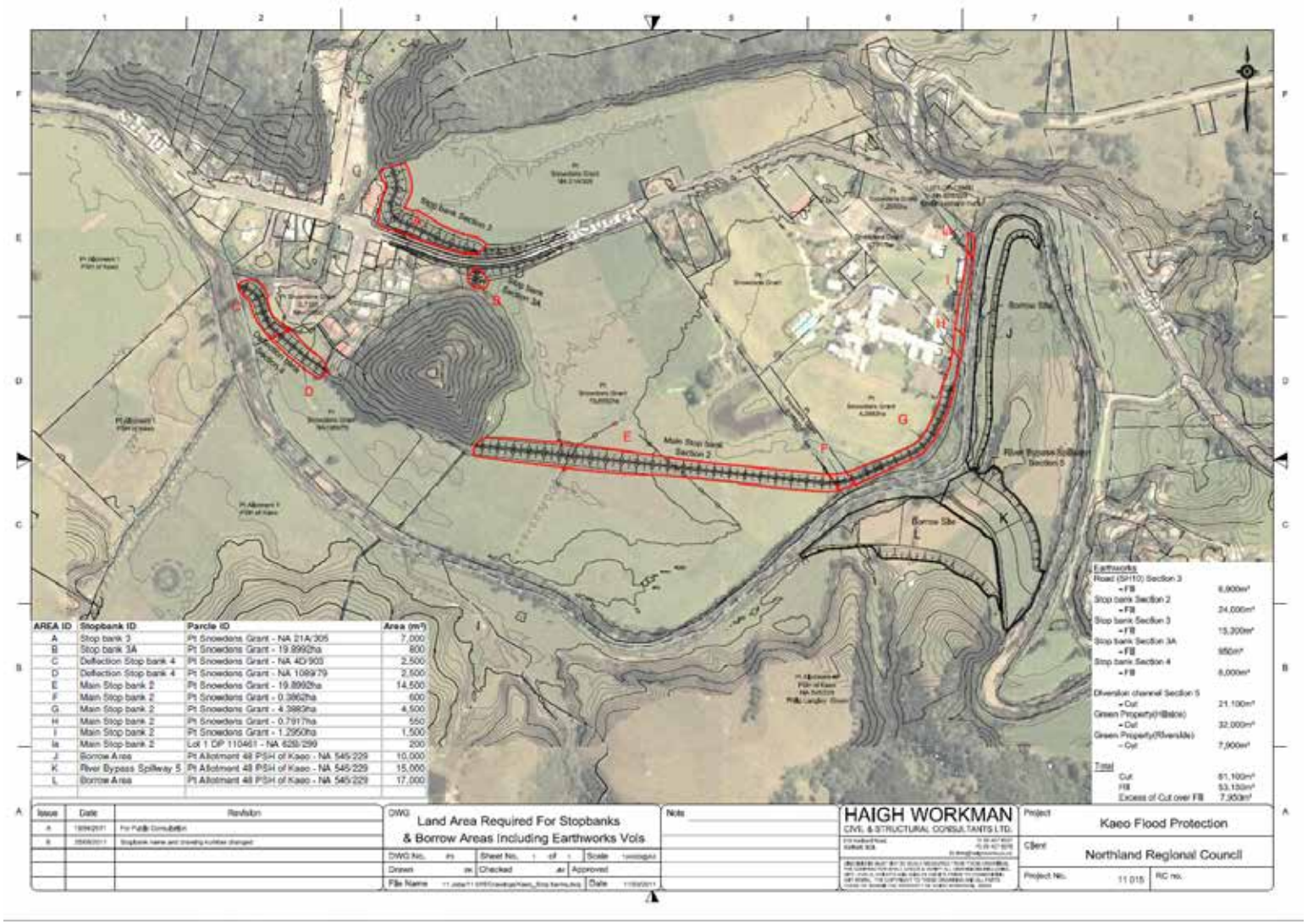

Figure 2 Land Area Required for Stopbanks and Borrow Areas

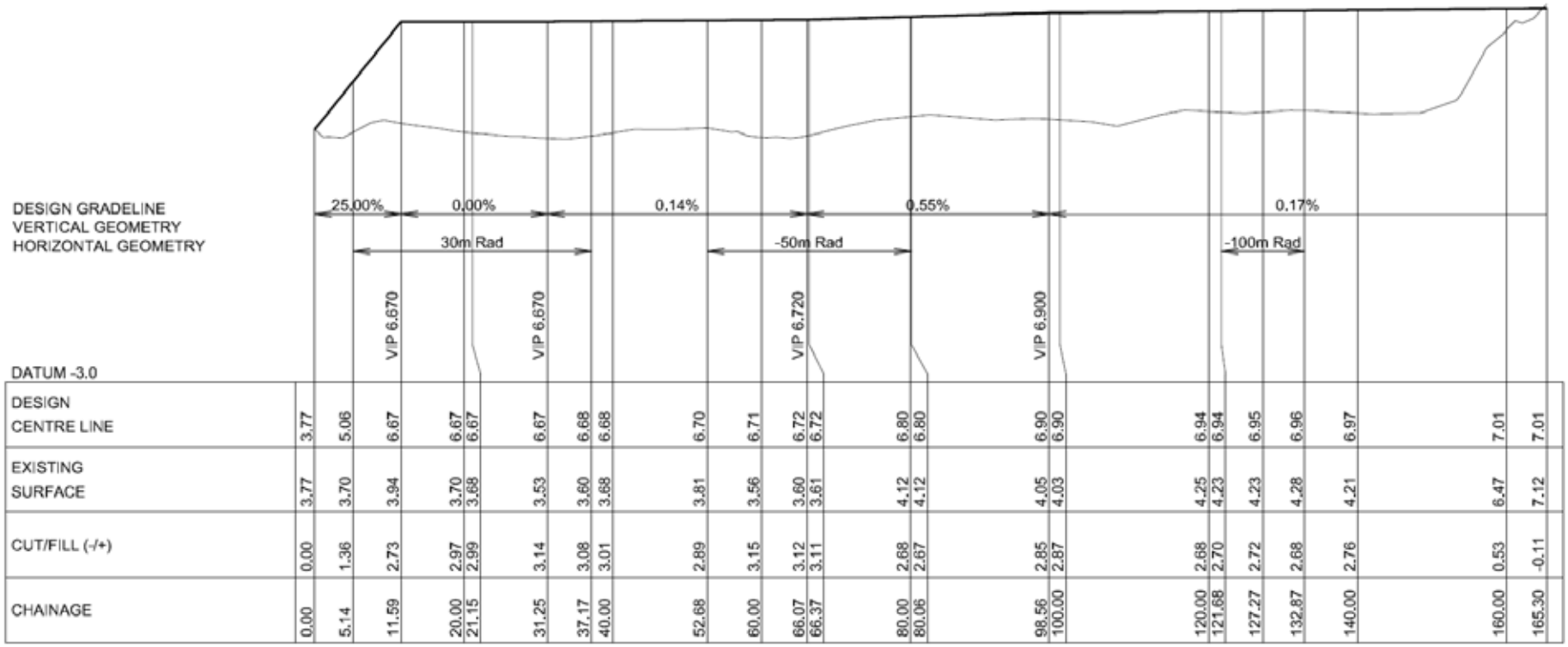

Figure 3 Longitudinal Section 4

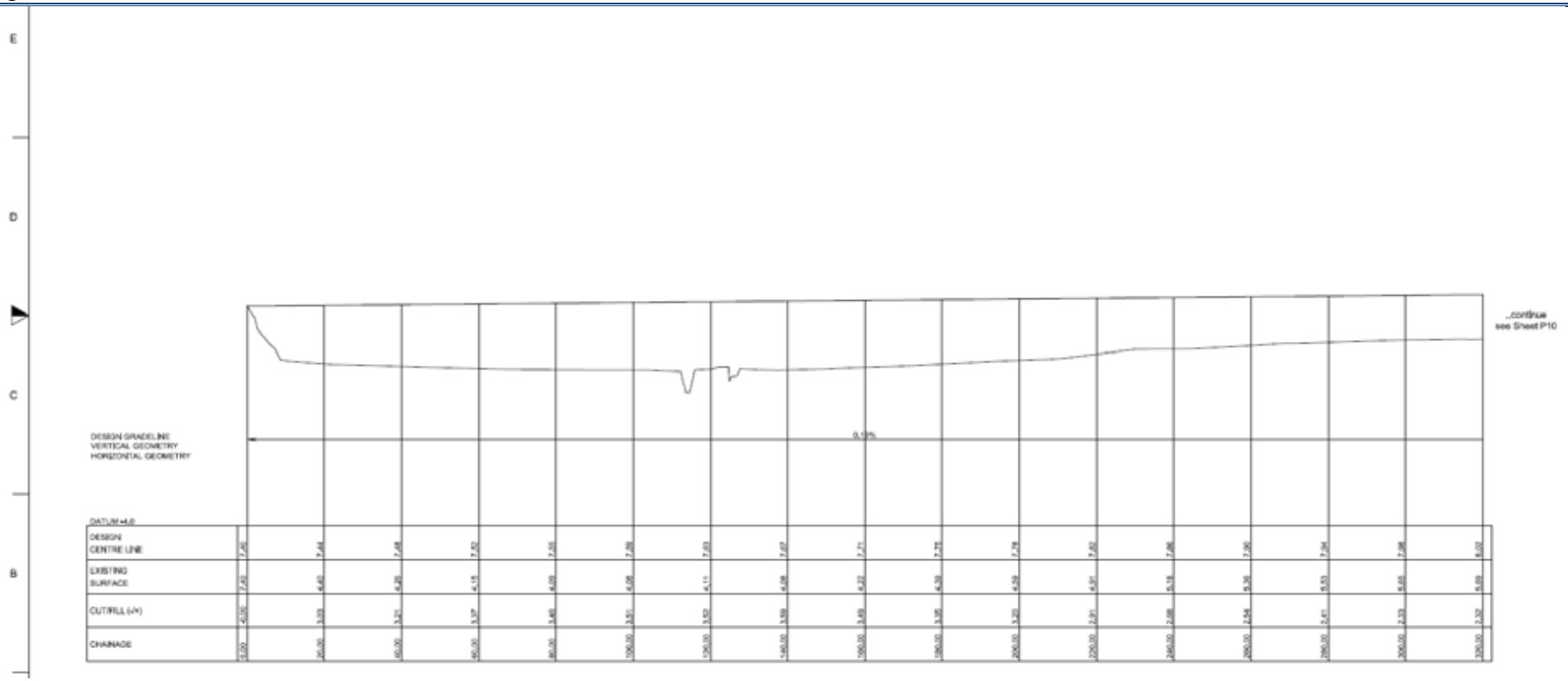

Figure 4 Longitudinal Section 2 from Ch.000 to Ch.300

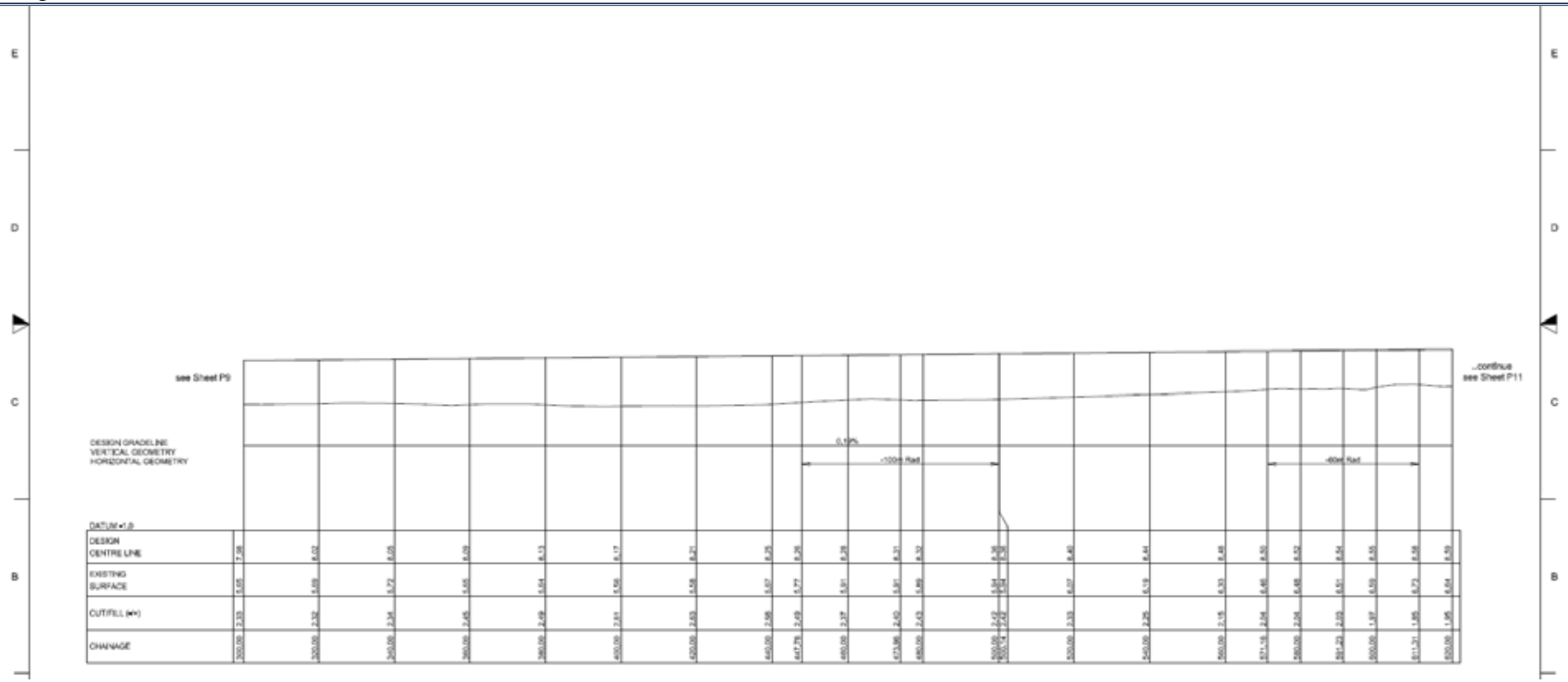

Figure 5 Longitudinal Section 2 from Ch.300 to Ch.620

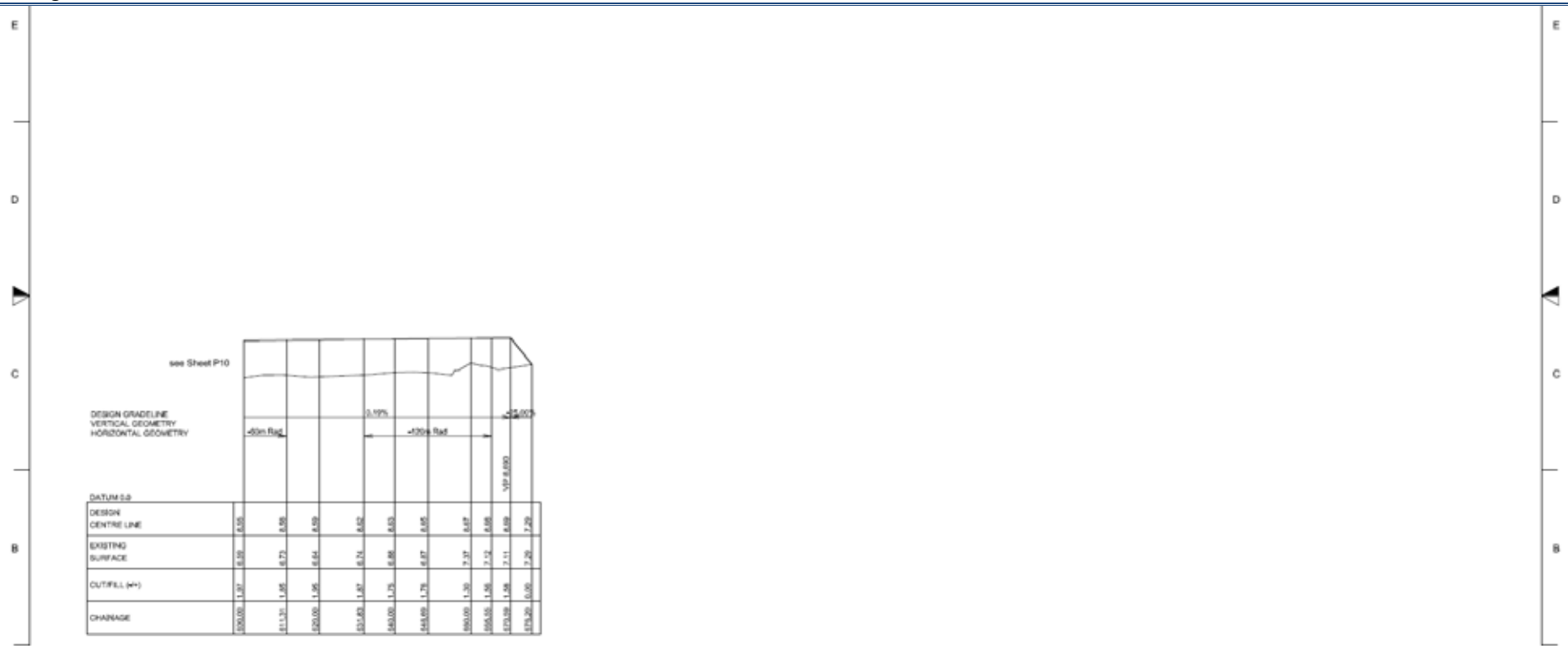

Figure 6 Longitudinal Section 2 from Ch.600 to Ch.676

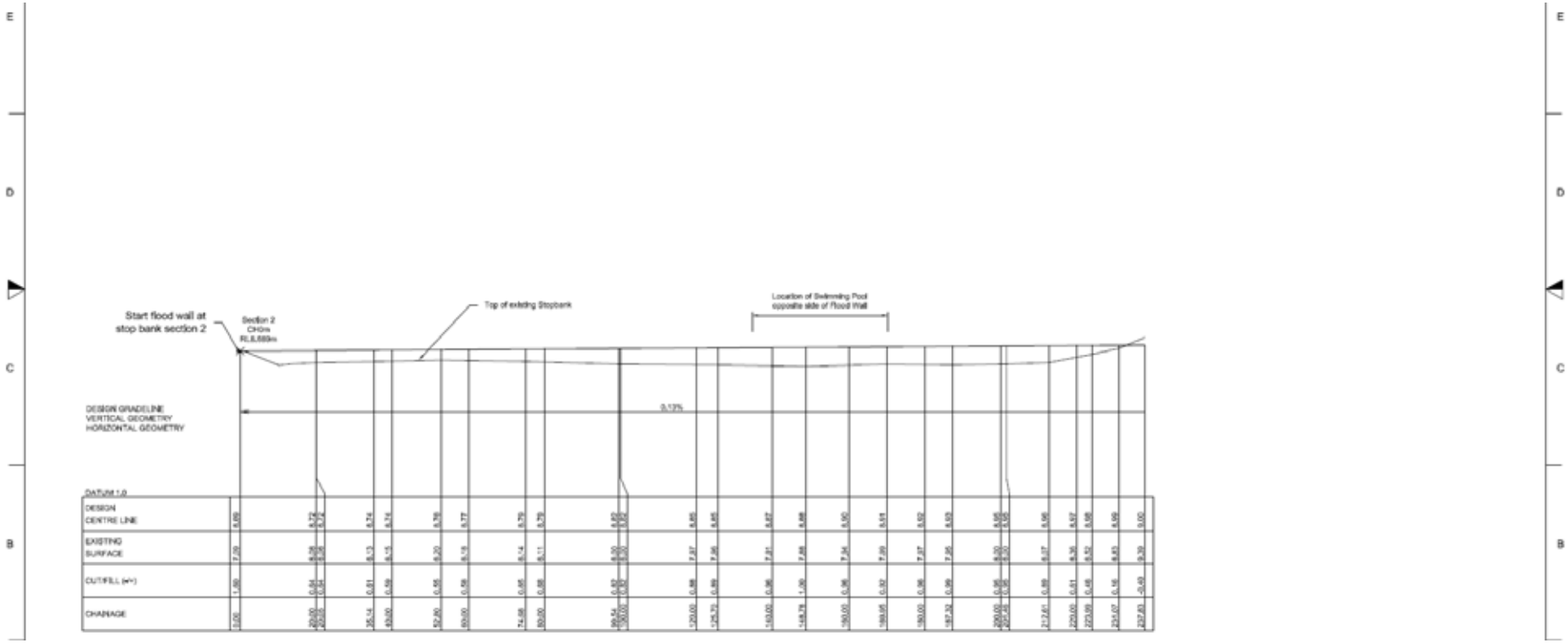

Figure 7 Longitudinal Section 2AStage 1 Timber Pole Flood Wall

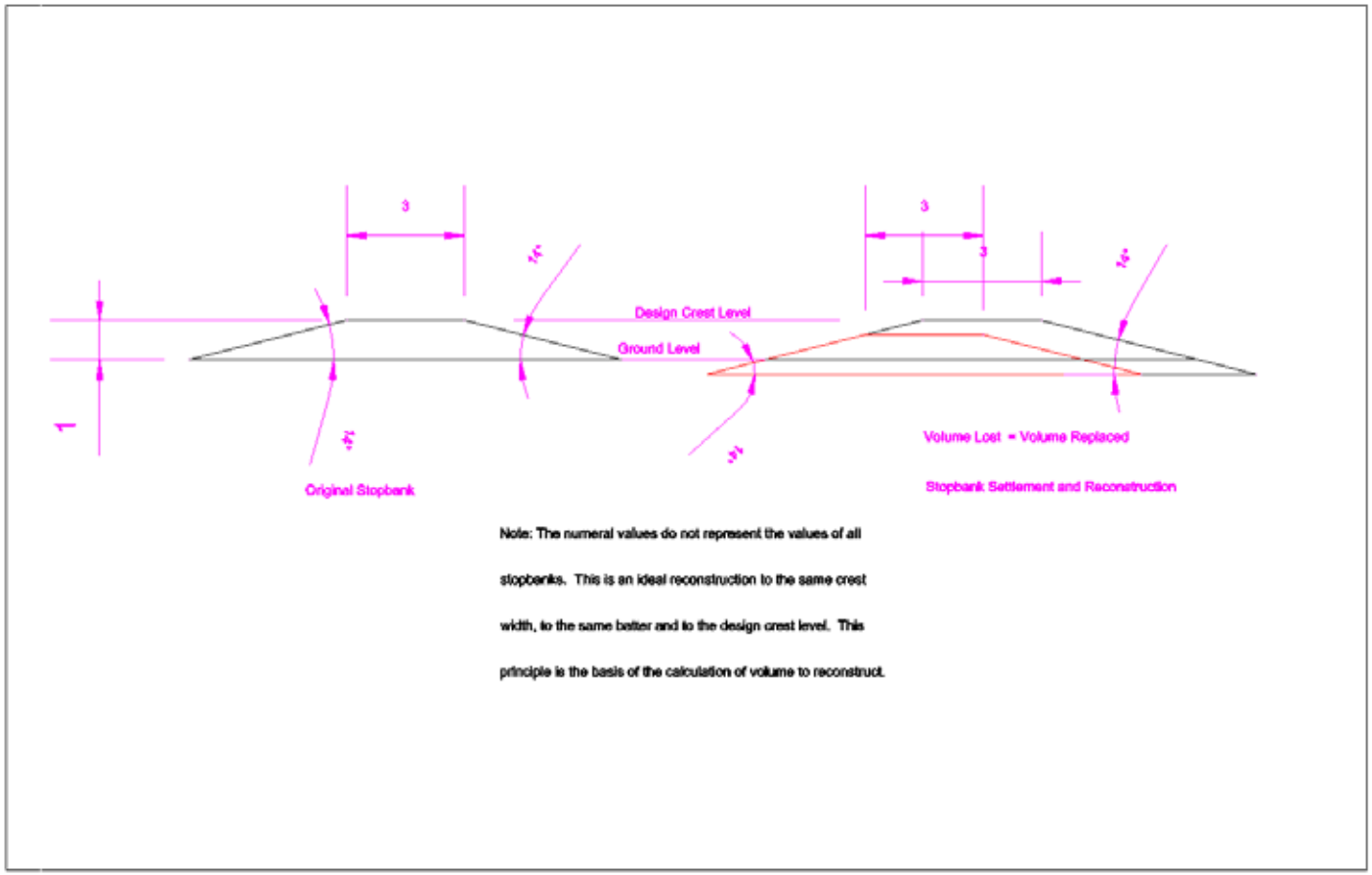

Figure 8 Typical depreciation of stopbanks based on settlement