



Contact Energy Limited

Lake Hawea

Erosion Management Plan



Version 3 – for Consultation
2021

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Erosion Management Plan

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1. INTRODUCTION

Condition 12 of the Hawea Water Permit to Dam No.2001.383 requires Contact to develop and implement an Erosion Management Plan.

The first Erosion Management Plan was prepared and approved by the Otago Regional Council (ORC) in 2009, reassessed in 2014, consultation with stakeholders in 2015, and approved in February 2016.

The consent condition also requires Contact to reassess the plan every five years after approval and submit any revised plan to the ORC,

[Contact reassessed the plan in 2020/2021 and consulted with the Crown, QLDC and the HCA during 2021. Comments from these parties have been incorporated into this 'Version 3' of the plan (To be included post consultation).]

The Erosion Management Plan sets in place a systematic process of inspections, monitoring, assessments, consultation and actions.

2. RELATED MANAGEMENT PLANS

Contact is required by consent conditions to prepare three other management plans relating to Hawea:

- Lake Margins Monitoring Management Plan – Condition 10 of consent 2001.383
- Foreshore Landscape Management Plan – Condition 11 of consent 2001.383
- Clutha Catchment Public Safety Signage Plan – Condition 15 of consent 2001.383

When implementing the Erosion Management Plan all assessments and remedial actions must consider the requirements of these other plans. The Clutha Catchment Public Safety Signage Plan is also required to warn the public of the shoreline erosion risk.

While monitoring is an important part of erosion management the Erosion Management Plan only outlines general monitoring requirements. The detailed monitoring specifications have been included in the Lake Hawea Lake Margins Monitoring Management Plan.

The Foreshore Landscape Management Plan was recently reassessed and there were no specific monitoring requirements.

The Clutha Catchment Public Safety Signage Plan is required to warn the public of shoreline erosion risk. The Signage Plan was recently reassessed and submitted to Regional Council. After reassessment, additional signage was placed and altered to be more effective.

3. CONSENT REQUIREMENT

The Erosion Management Plan consent condition is:

Erosion Management Plan

Within two years of the commencement of this consent, the consent holder shall submit to the Otago Regional Council for approval an Erosion Management Plan, developed in consultation with the Crown, the Queenstown Lakes District Council and the Hawea Community Association Incorporated. The Erosion Management Plan shall have the objective of avoiding, remedying or mitigating adverse erosion effects caused by or contributed to by the consent holder's activities, address lakeshore stability issues and include a programme of implementation actions, methods and timelines for required actions.

The consent holder shall, be responsible for ensuring implementation of the Erosion Management Plan, including approved revisions of that Plan.

The consent holder shall, in consultation with the Crown, Queenstown Lakes District Council and Hawea Community Association Incorporated, reassess the Erosion Management Plan every five years after approval of the first Erosion Management Plan and shall submit any revised Plan to the Otago Regional Council for approval within six months of the reassessment.

d) In preparing and implementing the Erosion Management Plan, and any revision of it, priority shall be given to:

(i) actions to avoid remedy or mitigate actual or potential erosion effects on the lake margins and adjacent land adjoining Lake Hawea township;

(ii) actions to avoid remedy or mitigate erosion of lake margin or adjacent land at any point around the balance of Lake Hawea which affects public roads and private land, or which causes a risk to public safety.

Discussion

The wording of the consent condition ensures a number of important outcomes.

Sub-condition a) requires Contact to prepare the Plan in consultation with the Crown, the Queenstown Lakes District Council and the Hawea Community Association and submit it to the Otago Regional Council for approval. This ensures that all these parties have an opportunity to provide input to the plan.

Sub-condition c) requires the Plan to be reassessed every five years. This will ensure that the Plan is updated and can incorporate the results from inspections, monitoring, assessments and any remedial works undertaken.

Sub-condition d) gives priority to the lake margin adjoining Lake Hawea Township and requires actions to avoid, remedy or mitigate actual or potential erosion whereas around the remainder of the lake margin actions are required where erosion affects public roads, private land or which causes a risk to public safety.

4. LAND OWNERSHIP

It is important to note that the Crown owns the lakebed and foreshore around Lake Hawea and Land Information New Zealand (LINZ) administers the land on behalf of the Crown. Contact Energy has an operating easement over this land which provides for the operation of the Hawea Dam, but Contact must still seek the agreement of LINZ for any actions it may wish to take on the land.

A Memorandum of Understanding (MOU) between Contact and LINZ to prescribes each parties responsibility under the operating easement.

5. HAWEA DAM GRAVEL MANAGEMENT

Longshore drift transports sand and gravel along the southern shore of Lake Hawea and onto the Hawea Dam. The accumulated material could overload the sluice headwalls and has necessitated its removal in 1993, 2003, 2012 and 2018.

Kirk (1996) emphasised the importance of sediment conservation and recommended that any sediment removed from the dam be recycled back to up drift locations to sustain the beach volume.

Contact understands this recommendation and in 2003 when material was removed from the dam it was re-deposited back to the shoreline in front of the Skinner Crescent remedial works and the Flora Dora cliffs. In 2012, the material was placed in front of the Muir Road cliffs and at the Camping Ground beaches. In 2018, it was placed at Gladstone Gap

The practice of re-cycling the sediments will continue. On each occasion, Contact will consult with LINZ and the HCA on the intended deposition sites.

Records shall be kept of the accumulated volumes and quantities recycled as these can be related to expected longshore drift rates.

6. INSPECTIONS AND MONITORING

6.1 Annual Inspection

An Annual Inspection shall be carried out by suitably experienced personnel.

The purpose of the Annual Inspection is to:

- Inspect the entire shoreline including the list of specific inspection sites.
- Note any areas of fresh erosion.
- Note the change in condition of previous areas identified for specific assessment.
- Identify any new areas that are considered to require specific assessment.
- Note the condition of previous remedial works.

An Inspection Report shall be prepared.

Any new areas of concern identified during the inspection shall be added to the list of areas requiring specific assessment in Section 7.

Figure 1 is a Lake Hawea Layout Plan that shows the current inspection sites and survey profile locations.

6.2 Post Event Inspection

A Post Event Inspection, similar to an Annual Inspection, shall be carried out by suitably experienced personnel after a flood event causes the lake level to exceed the normal maximum control level (MCL) of 346.00m.

An Inspection Report shall be prepared.

Any new areas of concern identified during the inspection shall be added to the list of areas requiring specific assessment in Section 7.

6.3 Profile Monitoring

A series of survey profiles have already been established around the southern and western shorelines. 12 profiles were established along the southern shoreline in 1996 and have had a number of repeat surveys. 18 profiles were established along the western shoreline in 2002 and repeat surveys have been undertaken in 2004, 2007, 2010, 2013 and 2018.

Surveys be repeated at selected locations as required. The annual or post event inspections will determine survey requirements.

The profile monitoring provides useful information on erosion rates. In addition, indicative projections of potential erosion limits can be made and compared to land boundary positions to help identify areas requiring specific assessment.

The following actions shall be undertaken:

- The profiles shall be surveyed in accordance with the frequency and technical requirements specified in the Lake Margins Monitoring Management Plan. The

results shall be included in a suitable report comparing changes from previous surveys.

- The survey results shall be assessed to determine if projections indicate that erosion may potentially extend beyond the lake boundary or if any potential effects on infrastructure are indicated. Any such locations identified shall be added to the list of areas requiring specific assessment in Section 7.

6.4 Related Parameter Monitoring

Contact shall monitor the following parameters, at Lake Hawea, which are relevant to erosion assessments and management:

- Lake level.
- Wind speed and wind direction.
- Rainfall.

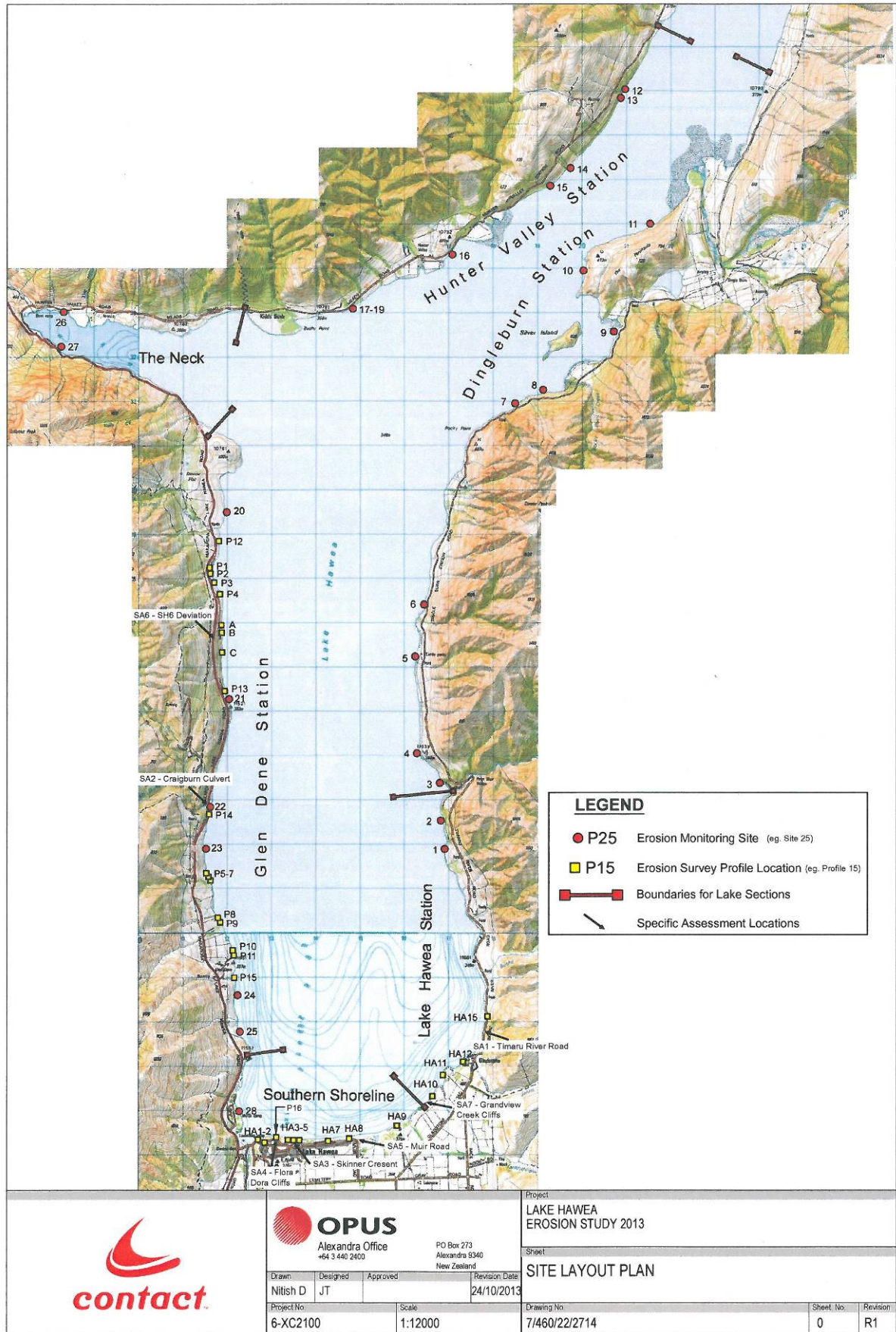


Figure 1. Lake Hawea Site Layout Plan

7. SPECIFIC ASSESSMENT AREAS

When an area of erosion, or potential erosion, is identified and defined as requiring specific assessment it is necessary to first investigate the area and assess appropriate remedial options.

The investigation may require any or all of the following actions:

- Visual Assessment and comparison to previous years if applicable
- Topographical survey.
- Land boundary/ownership confirmation.
- Geotechnical investigation.

Contact is to arrange the investigation and prepare an Specific Assessment Report. After the 2019 and 2020 high lake levels, an additional area, SA 8 Campground, was added to the Specific Assessment Sites.

The Assessment Report will vary depending on the specific location but should consider:

- The actual and potential effects of the erosion.
- Property boundaries.
- Proximity to roads, pipelines, tracks or other infrastructure.
- Options for remedial actions.
- The fit of the remedial options with the overall shoreline processes.
- Public Safety Signage

In preparing the assessment Contact shall consult with LINZ and where appropriate QLDC, HCA and NZTA (New Zealand Transport Agency).

If the assessment recommends remedial actions the area shall then be added to the list of areas requiring remedial actions in Section 8.

Table 1 below briefly discusses the status of the Specific Assessment Areas after the March 2020 Lakeshore Inspection. Table 2 briefly discusses the areas requiring an update to their Specific Assessment.

Table 1. Status of Specific Erosion Assessment Sites from the March 2020 Lakeshore Inspection

Site	Name	Status of Assessment
SA1	Timaru Creek Road North of bluffs.	In 2010, Contact and QLDC agreed that protective works were not warranted. A cost sharing arrangement was agreed if remedial works are required. <i>Additional Specific Assessment recommended, as there is additional erosion outside the area of the 2010 specific assessment.</i> Discussion with QLDC roading manager in late 2020/early 2021.
SA2	SH 6 at Craig Burn Culvert	Assessment completed Jan 2011. Some correspondence and discussions regarding risk level and remediation options were held with NZTA and Opus as their representative. They consider that there is no immediate

		<p>risk. No agreement was reached on the need or type of remediation works.</p> <p>No activity observed in 2020</p>
SA3	Skinner Crescent.	<p>Protection works were constructed in 1996.</p> <p>Erosion projections do not threaten the adjacent sewer line or private property.</p> <p>No Activity observed in 2020</p>
SA4	Flora Dora Cliffs	<p>Long term erosion projections indicate a further 20+m of retreat of the cliffs is potentially possible. However no infrastructure or private land is at threat.</p> <p>HCA consulted in 2020</p> <p>Additional survey profiles were installed in Aug 2016 and resurveyed in 2018. No significant changes to beach profiles at 2018 survey. Some changes to cliff edge.</p> <p>The assessment was originally to be reviewed in 2019 but given the low lake levels from 2015 through to 2019 and the 2018 profile survey results it is suggested the review is undertaken after the profiles are re-surveyed again in 2021.</p> <p><i>Active erosion from 2020 high lake event. Survey sections in 2021. Review specific assessment after survey.</i></p> <p><i>Review signage warning public.</i></p>
SA5	Muir Road Cliffs.	<p>Assessment completed Feb 2014.</p> <p>Some further erosion of the cliffs can be expected during significant flood events. None witnessed during 2020 event.</p> <p>Long term erosion projections indicate a further 15m of retreat of the cliffs is potentially possible.</p> <p>No infrastructure or private land is at threat.</p> <p>No activity noted in 2020 inspection</p>
SA6	SH6 Deviation	<p>Assessment completed October 2014.</p> <p>Erosion and weathering of the cliffs is ongoing.</p> <p>Survey completed in 2014 of old survey marks confirmed that there are no instability issues with the new highway alignment.</p> <p>Land acquisitions have been completed to extend the buffer land up to the new highway alignment.</p> <p>No infrastructure or private land is at threat.</p> <p>Additional annual inspection instigated.</p> <p>Continue to inspect and monitor.</p> <p>No activity observed in 2020 inspection</p>
SA7	Grandview Creek Cliffs	<p>Assessment completed Oct 2013.</p> <p>Survey in 2010 confirmed erosion has already retreated the cliffs by up to 4m into private property over a 110m long section.</p> <p>Long term erosion projections indicate further private land is at threat.</p> <p>Preferred mitigation measure is land purchase or easements.</p> <p>Awaiting a budget provision before discussions are held with landowners.</p>

		<i>Active erosion. In the short term do not foresee public risk at above walking track due to distance from track. Review signage for beach users due to increased activity in 2020. Waratah fence may need to be shifted in the medium-term future.</i>
SA8	Campground	<p>Area composed of fill material. Exposed to Northwest wind induced waves. Erosion to fill material during summer 2020 and now some self-armouring at lower levels has occurred. May require fencing and or periodic removal of cornices to protect public.</p> <p><i>It is recommended this area is a new Specific Assessment location.</i></p>

Table 2: Areas Requiring Specific Assessment

Ref No.	Area	Timeline
SA 4	<p>Flora Dora Resurvey profiles 2021 Review Specific Assessment in 2022 Consult with HCA annually and after re assessment.</p>	2022

8. REMEDIAL ACTION AREAS

Once the remedial actions for a specific area have been determined, Contact shall implement the actions. Areas can be added to the list at any time after they are identified, and assessments completed.

Table 3 below lists the areas that are currently identified as requiring remedial actions:

Table 3. Remedial Action Areas

Ref No.	Area / Actions	Timeline for Implementation
SA 1	Timaru Creek Road immediately north of the bluffs. As agreed with QLDC, undertake remedial works in conjunction with QLDC, as and when required. QLDC informed of recent changes to the shoreline in this area December 2020. Met with QLDC onsite February 2021. QLDC informed Contact works will be carried out to address surface water issues.	As required.
SA 5	Muir Road cliffs. Undertake post flood remedial works when required.	As required.
SA 7	Grandview Cliffs Acquire further land or easements to provide for projected erosion extent.	Under action
SA 8	Campground Remedial works completed in 2020. Continue to monitor repaired erosion scarp	Annually

Once the remedial actions are completed the area can be removed from the Remedial Actions list and included as an ongoing Inspection Site in the Annual Inspection.

9. PLAN REASSESSMENT

As required by the consent condition Contact shall reassess the Erosion Management Plan in consultation with the Crown, Queenstown Lakes District Council and Hawea Community Association Incorporated every five years after approval of the first Plan.

Any revised Plan shall be submitted to the Otago Regional Council for approval within six months of the reassessment.