

Form 1 – Application for Resource Consent

This application is made under Section 88 of the Resource Management Act 1991 (RMA).

The purpose of this Form 1 and the relevant activity form(s) is to provide applications with guidance on information that is required under the Resource Management Act 1991. Please note that these forms are to act as a guide only, and Otago Regional Council reserves the right to request additional information or to reject the application as incomplete under Section 88 of the RMA if the provisions of the fourth schedule of the RMA are not provided (refer to page 6 of this form, which details these requirements).

PLEASE NOTE: You must have Adobe Acrobat Reader installed onto your computer to use this editable version, which you can download for free from the Adobe website. This form cannot be filled in on your internet browser. **REMEMBER** to save the form to your computer after completing then attach and send via email along with the other relevant application forms/information to consents.applications@orc.govt.nz. The form can also be printed and completed manually.

1(a). Applicant's details:

- The full names or Company name or Trust (including full names of all Trustees) of the consent holder who will be responsible for the consent and any associated costs.
- A resource consent can only be held by a legal organisation or fully named individual(s). A legal organisation includes a registered limited company, incorporated or unincorporated group or registered trust. If the application is for a Trust, the full names of all Trustees are required. If the application is not for a limited company, incorporated or unincorporated group or Trust, then you must use fully named individual(s).
- All invoices will be made out to and sent to the applicant.

Full name(s): _____

OR

Registered company: _____

Cold Gold Clutha Limited

OR

Trust/Group (include all
Trustees full names
where applicable) _____

Postal address: _____

1/ Peter Hall, 30 Hunt Street, Andersons Bay
Dunedin

Post code: _____

9013

and

Physical address:
(not a PO Box number) _____

Post code: _____

Phone number: _____

Business: _____

021 2075164

Private: _____

Mobile: _____

Email address: _____

peterhall@live.ie

Please provide a valid and clear email address. Otago Regional Council has adopted a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

Please tick if you do not prefer contact by electronic means

1(b). Key contact for applicant details (if applicable):

Only complete if the applicant consists of multiple parties (e.g. multiple consent holders, Trust etc). Please outline who the key contact for the consent will be, if granted:

Full name: _____
Phone number: Business: _____ Private: _____
Mobile: _____
Email address: _____

2. Consultant details (if applicable):

Contact person: Darryl Sycamore
Company: Terramark Limited
Phone number: Mobile: _____ Business: 03 4774783
Email address: darryl @ terramark-co.nz

3. Consents required in relation to this proposal:

Water

Take surface water Divert
 Take groundwater Dam

Discharge onto or into:

Land Water Air

Land use:

Bore construction Activities in or on beds of lakes or rivers or floodbanks
 Bore alteration Disturbance of contaminated land

Coastal

Activities in the coastal marine area (i.e. below mean high water spring tide)

Where you have indicated the type of consent that is required, you must complete the appropriate application form before your application can be processed. Application forms can be found on the Council's website: www.orc.govt.nz/consents/ready-to-apply-for-a-consent

4. For what purpose is/are the consent(s) required (e.g. gravel extraction, water for irrigation etc):

Gold mining

5. Location of proposed activity:

Address: Clutha River bed

Legal description(s): See AEE

Map reference(s) (NZTM 2000): E _____ N _____

Please include location details on separate documentation if there are multiple sites or activities.

Note: Certificate(s) of Title less than three months old for the site to which this application relates are required.

6. Are there any current or expired Resource Consents relating to this proposal:

Yes No

If yes, give consent number(s), description and expiry date(s):

there are live consents in the mid-reaches of the river, that are not related to the new site

(a) Do you agree to your current consent automatically being surrendered should a replacement consent be issued?

~~Yes No~~

(b) Has there been a previous application for this activity that was returned as incomplete?

~~Yes No~~

(c) Have you lodged a pre-application with Council for this activity?

Yes No

(d) Have you spoken to a Council staff member about this application prior to lodging this application?

Yes No

If yes, please state name of staff member: _____

7. What is the term of consent you are seeking and reason for this term:

expiring 25 Feb 2031 consistent with the mining permit

8. Territorial Local Authority in which activity is situated:

- Dunedin City Council
- Clutha District Council
- Central Otago District Council
- Queenstown Lakes District Council
- Waitaki District Council

9. Do you require any other resource consent from any local authority for this activity:

Yes No

If yes, please give the date applied for or issued: 13 May 2021 (lodged)

10. For the land on which the activity occurs, is the applicant (tick one):

If the applicant does not own the land to which this application relates, unconditional written approval from the land owner/affected party will be required.

- The owner
- The lease holder
- The occupier
- Prospective purchaser

If the applicant is not the land owner, who is the owner of the land on which the activity occurs/is to occur:

Name of land owner: The Crown
Phone number: Mobile: _____ Business: _____
Email address: _____

11. Site visit from the Consents Team:

Consents staff are able to meet with you, visit your site and see what you are proposing to do. We find that this is beneficial to everyone involved. The cost of the visit will be included in the total cost of processing your consent. However, we find that applications that have an on-site visit are processed with less congestion and at a similar or lesser overall cost. Please let us know below if you would like us to come and see your site.

I would like a member of the Consents Team to visit my site:

- Yes
- No

12. Processing Officer:

Due to high workloads or the complex nature of your application, it could be assigned to a consultant processing officer. Having your application assigned to an external officer should not greatly affect the processing costs. However, if you would like your application to be assigned to an internal officer then please advise. This may mean that your application enters a waiting line to be allocated and may not be processed straight away. If this is the case we will ask for a timeframe extension to cover the waiting time. There may be situations where we cannot accommodate this request but will let you know why this is.

I would like my application to only be processed by an internal staff member:

- Yes
- No

13. **How to pay:**

A deposit **must** accompany this application (see **page 9** for amounts and ways to pay). The applicant will be invoiced for all costs incurred in processing this application that exceed the deposit.

If the required deposit does not accompany your application, staff will contact you on the email address provided on this form to request payment, and after 5 working days your application will be returned as incomplete if no payment is made for the required deposit.

When paying online, please use the word **'Consent'** followed by the name of the applicant as a reference.

Method of payment:

<input checked="" type="checkbox"/> Online bank transfer	<input type="checkbox"/> Cheque
<input type="checkbox"/> Credit card	<input type="checkbox"/> In person

please invoice

Date of payment: _____

Amount paid: _____

Payment reference: _____

Please note: Your deposit may not cover the entire cost of processing your application. At the end of the application process you will be invoiced for any costs that exceed the deposit. Interim invoices may be sent out for applications, where appropriate. If you would like this, then please let us know and we can see if this is an option for you.

If your application is returned to you, you will still be charged for the cost of processing the application up to the point it was returned or withdrawn. Therefore, it is recommended that you have your application checked before it is lodged. This is a free service.

Information regarding the average costs in processing various types of single non-notified consent applications can be found via the following link, scrolling down to "Costs to process the application": www.orc.govt.nz/consents/ready-to-apply-for-a-consent/fees-and-charges

Consultation

(consultation is not compulsory, but it can make a process easier and reduce costs)

Under Section 95E of the Resource Management Act 1991 (the Act), the Council will identify affected parties to an application and if the application is to be processed on a non-notified basis the unconditional written approval of affected parties will be required. Consultation with potentially affected parties and interested parties can be commenced prior to lodging the application.

Consultation may be required with the appropriate Tangata Whenua for the area. The address of the local Iwi office is: Aukaha, 258 Stuart Street, P O Box 446, Dunedin, Fax (03) 477-0072, Phone (03) 477-0071, Email info@aukaha.co.nz. If you are in the Clutha River area you may need to talk to Te Ao Marama Inc, Phone (03) 931 1242. If you require further advice, please contact the Otago Regional Council.

Good consultation practices include:

- Giving people sufficient information to understand your proposal and the likely effects it may have on them
- Allowing sufficient time for them to assess and respond to the information
- Considering and taking into account their responses

Written approval forms are available on Council's website.

Information Requirements

In order for any consent application to be processed efficiently in the minimum time and at minimum cost, it is critical that as much relevant information as possible is included with the application.

Resource Management Act 1991

FOURTH SCHEDULE – ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

(Below are the provisions of the fourth schedule of the Act, which describes what must be in an application for resource consent, as amended in 2015)

1. Information must be specified in sufficient detail

Any information required by this schedule, including an assessment under clause 2(1)(f) or (g), must be specified in sufficient detail to satisfy the purpose for which it is required.

2. Information required in all applications

- (1) An application for a resource consent for an activity (the **activity**) must include the following:
 - (a) a description of the activity; and
 - (b) a description of the site at which the activity is to occur; and
 - (c) the full name and address of each owner or occupier of the site; and
 - (d) a description of any other activities that are part of the proposal to which the application relates; and
 - (e) a description of any other resource consents required for the proposal to which the application relates; and
 - (f) an assessment of the activity against the matters set out in Part 2; and
 - (g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b) (*"document" includes regional and district plans, regulations, national policy statements, iwi plans*).
- (2) The assessment under subclause (1)(g) must include an assessment of the activity against:
 - (a) any relevant objectives, policies, or rules in a document; and
 - (b) any relevant requirements, conditions, or permissions in any rules in a document; and
 - (c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).
- (3) An application must also include an assessment of the activity's effects on the environment that:
 - (a) includes the information required by clause 6; and
 - (b) addresses the matters specified in clause 7; and
 - (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

3. Additional information required in some applications

An application must also include any of the following that apply:

- (1) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1))

- (2) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A))
- (3) if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B)).

4. **(relates to subdivisions – not included here as subdivisions are not within ORC's jurisdiction)**

5. Additional information required in application for reclamation

An application for a resource consent for reclamation must also include information to show the area to be reclaimed, including the following:

- (1) the location of the area; and
- (2) if practicable, the position of all new boundaries; and
- (3) any part of the area to be set aside as an esplanade reserve or esplanade strip.

Assessment of environmental effects

6. Information required in assessment of environmental effects

- (1) An assessment of the activity's effects on the environment must include the following information:
 - (a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity
 - (b) an assessment of the actual or potential effect on the environment of the activity
 - (c) if the activity includes the use of hazardous substances and installations, an assessment of any risks to the environment that are likely to arise from such use
 - (d) if the activity includes the discharge of any contaminant, a description of:
 - (i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
 - (ii) any possible alternative methods of discharge, including discharge into any other receiving environment.
 - (e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect
 - (f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted
 - (g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved
 - (h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).
- (2) A requirement to include information in the assessment of environmental effects is subject to the provisions of any policy statement or plan
- (3) To avoid doubt, subclause (1)(f) obliges an applicant to report as to the persons identified as being affected by the proposal, but does not:
 - (a) oblige the applicant to consult any person; or
 - (b) create any ground for expecting that the applicant will consult any person.

7. Matters that must be addressed by assessment of environmental effects

- (1) An assessment of the activity's effects on the environment must address the following matters:
 - (a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects
 - (b) any physical effect on the locality, including any landscape and visual effects
 - (c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity
 - (d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations
 - (e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants
 - (f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations.
- (2) The requirement to address a matter in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

Set out below are details of the amounts payable for those activities to be funded by fees and charges, as authorised by s36(1) of the Resource Management Act 1991.

Resource Consent Application Fees (from 1 July 2020)

Note that the fees shown below are a **deposit** to be paid on lodgement of a consent application and applications for exemptions in respect of water metering devices. This deposit will not usually cover the full cost of processing the application, and further costs are incurred at the rate shown in the scale of charges. GST is included in all fees and charges.

If you wish to make a payment via internet banking, or online, the details are below. Please note the applicants name and 'consent application' should be used as reference when paying the deposit.

For ways to pay, visit: www.orc.govt.nz/consents/ready-to-apply-for-a-consent

Pre-Application Work

Fees payable for pre-application work carried out before a consent application is lodged with Council will be incurred at the rates shown in the scale of charges.

Publicly Notified Applications: ³

First application	\$ 5,000.00
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Non-Notified Applications and Limited Notification Applications: ³

First application (except those below)	\$ 1,750
Multiple Applications ¹	2,300
Variation to Conditions – s127	1,750
Administrative Variation – s127	1,750

Fixed Fees

Exemptions from water metering regulations	\$ 400
Bores	600

Hearings

Payment for Commissioner request – s100A	Per Note 2 below Per Note 4 below
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Objections

Payment for Commissioner request – s357AB	Per Note 4 below
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Transfer of Consent Holder and Certificates Deposits:

Transfer of permits and consents	\$ 200
Priority Table	200
Section 417 Certificate	500
Certificate of Compliance	1,750
All Other Costs As per Scale of Charges	

Scale of Charges:

Staff time per hour:	\$
• Management	190
• Team Leader/Principle	170
• Senior Technical	135
• Technical	115
• Field staff	115
• Administration	85

Disbursements	Actual
Additional site notice	Actual
Advertisements	Actual
Vehicle use per kilometre	0.70
Travel and accommodation	Actual
Testing charges	Actual
Consultants	Actual
Commissioners	Actual
Photocopying and printing	Actual

Councillor Hearing fees per hour:	\$
• Chairperson	\$100
• Member	\$80
• Expenses	Actual

Notes:

1. For additional permits in respect of the same site, activity, applicant, time of application, and closely related effect as the first application.
2. The deposit payable shall be 90% of the cost of a hearing as calculated by Council in accordance with information contained in the application file and using the scale of charges. The amount payable will be due at least 10 working days before the commencement of the hearing. If the amount is not paid by the due date, then the Council reserves the right under S36(7) of the Resource Management Act to stop processing the application. This may include cancellation of the hearing.

Should a hearing be cancelled or postponed due to the non-payment of the charge, the applicant will be invoiced for any costs that arise from that cancellation or postponement.

Following completion of the hearing process, any shortfall in the recovery of hearing costs will be invoiced, or any over recovery will be refunded to the applicant.

3. Where actual and reasonable costs are less than the deposit paid, a refund will be given.
4. Where an applicant requests under s100A (for a consent hearing) or under s357AB (for the hearing of an objection) an independent commissioner(s); the applicant will be required to pay any increase in cost of having the commissioner(s).

Where a submitter(s) requests under s100A an independent commissioner(s) any increase in cost that is in addition to what the applicant would have paid shall be paid by the submitter. If there is more than one submitter who has made such request the costs shall be evenly shared.

Review of consent conditions

Following the granting of a consent, a subsequent review of consent conditions may be carried out at either the request of the consent holder, or as authorised under Section 128, as a requirement of Council. Costs incurred in undertaking reviews requested by the consent holder will be payable by the consent holder at the rates shown in the Scale of Charges above.

Reviews initiated by Council will not be charged to consent holders.

Compliance Monitoring Charges

Compliance charges may also be applied to any granted consent(s). These can be found via Council's website at: https://www.orc.govt.nz/media/8679/annual-plan-2020-21_digital.pdf

*Application for Resource Consent in accordance
with Schedule 4 of the Resource Management
Act 1991*

Cold Gold Clutha Limited



For land use consents, the take and use of water and discharge permits for the purpose of extraction and operating the Clutha River Dredge in the Clutha River/ Mata-Au

Surveying, Planning and Engineering Consultants

DUNEDIN
03 477 4783

dunedin@terramark.co.nz

MOSGIEL
03 489 7107

mosgiel@terramark.co.nz

BALCLUTHA
03 418 0470

balclutha@terramark.co.nz

MEMBER OF SURVEY AND SPATIAL NZ (S+SNZ) AND THE CONSULTING SURVEYORS OF NZ (CSNZ)

Terramark.co.nz

14 May 2021

Otago Regional Council
70 Stafford Street,
Private Bag 1954,
Dunedin 9054

Attention: Joanna Gilroy - Consents Manager

Dear Joanna

RE: NOTIFIED RESOURCE CONSENT APPLICATION FOR COLD GOLD CLUTHA LIMITED

On behalf of Cold Gold Clutha Limited, we submit for consideration by your Council a revised application to carry out suction dredge gold mining within both the Central Otago and Queenstown Lakes District, and to disturb the bed of the Clutha River and the associated discharge for the purpose of creating two slipways within both the Central Otago and Clutha Districts.

We request this application be heard as a joint hearing with the Central Otago District Council, Queenstown Lakes District Council and the Otago Regional Council. Cold Gold seeks an independent commissioner either as a sole commissioner or as part of the joint hearings panel.

Please find enclosed the following documents:

1. Form 1 - Application
2. Forms 7 & 10A
3. Assessment of Environmental Effects
4. Flood Sense Limited - Clutha River Hydraulic Assessment (Rongahere Road site)
5. E3 Scientific Limited - Ecological Assessment
6. A Noise Assessment by the applicant
7. A MP4 file showing the operation of the dredge and the sediment plume
8. Hills Laboratory water sampling results
9. Maritime Transport Operator Plan

For reference, the applicant's details are:

Cold Gold Clutha Limited
30 Hunt Street
Andersons Bay
Dunedin 9013

A copy of this application in full has been submitted to the Central Otago District Council.

Yours faithfully
Terramark Ltd



Darryl Sycamore
Resource Management Planner

Introduction

This report is intended to provide the information necessary for a full understanding of the proposal and any actual or potential effects the proposal may have on the environment.

Resource consent was submitted in May 2021 to relocate and operate the Clutha River Dredge in these areas. Those **applications were subsequently placed on 'hold' whilst the** applicants negotiated the purchase an additional permit 60299 being immediately upstream of the existing permits. This amended application now seeks to include that permit as part of the overall mining operation.

Consent is sought from the Otago Regional Council for the mining activity and construction of the slipways to extract the dredge from downstream of Beaumont and introduce the dredge back into the river near Queensbury. An additional consent will be sought from the Clutha District Council for the construction of a slipway to extract the dredge which will be a non-notified consent and occur independently to these applications. Cold Gold Clutha Limited (Cold Gold) respectfully seeks the application be considered with public notification to enable any interested parties the ability to fairly engage in the process.

The proposal by Cold Gold Limited has the benefit of having operated for the previous ten years on the Clutha River between Roxburgh Dam and Tuapeka Mouth. These consents were recently re-consented and will expire in 2035, authorising mining within over 900 hectares of the riverbed.

Despite the perception of the activity being large-scale, a significant proportion of the Millers Flat and Roxburgh **community do not even know of the dredge's presence. The understated way Cold Gold Clutha carries out their** business, in conjunction with a clean record of compliance offers an insight to the effects of the activity on the community and receiving environment.

Existing Consents

Cold Gold has a number of existing consents to operate the Clutha River Dredge. These relate to mining permit 53215 which extends over 66 kilometres of the riverbed from Tuapeka Mouth and upstream to immediately before the Roxburgh Dam, The permit comprises 900.7ha and expires on 6 June 2031.

With respect to the Otago Regional Council, the live consents are

- RM20.087.01 (discharge permit), RM20.087.02 (land use) and RM20.087.03 (water permit) for the use of the Clutha River Dredge in the Clutha River¹, and
- RM20.325 Land use consent to disturb the bank of the Clutha River for the purpose of creating a slipway. This was a one-off decision granted in 2020.

Land use consent (RC 130219) from the Central Otago District Council authorises the operation of the dredge, being a commercial vessel in the waterbody, to operate a vessel on the water surface which exceeds the noise thresholds, earthworks and vegetation clearance associated with the construction of a slipway.

The applicant also has a concession to construct slipways within the marginal strip from the Department of Conservation for the purpose of extracting the dredge from the river for transport, maintenance or maritime survey.

Of relevance to any offsetting considerations, should the dredge relocate and operate in the Upper Clutha catchment- there will be no mining or effects associated with the operation of the dredge in the 66km of mid-reaches.

¹ These consents are renewals of earlier consents (water permit) 2007.093, (discharge permit) 2007 094 and (land use consent) 2007.095 which all expired on 14 August 2020.

The Proposal

Resource consents are sought from both the Otago Regional Council (ORC), Central Otago District Council (CODC) and Queenstown Lakes District Council (QLDC) to carry out suction dredge mining by a maritime vessel in the upper Clutha River.

Consents from the ORC will relate to

- The disturbance of the bed of the river for the mining activity
- The disturbance of the bed of the river for the construction of slipways
- The take of water, and
- The discharge of sediment to water

Consents from CODC will relate to

- The use of a maritime vessel for commercial use
- Earthworks and vegetation clearance within 10m of the margin of a waterbody
- Earthworks exceeding 20m³, and
- To enable more than three persons to operate a commercial activity.

Consents from Queenstown Lakes District Council will relate to

- Mineral extraction within a watercourse

Authorities from both the Department of Conservation and Land Information New Zealand will also be required in terms of the use of the land and the river margins and the creation of slipways in the marginal strip.

Authorisations may also be required for the transportation of the dredge within the roading network, including within a State Highway and from Contact Energy.

The Mining Activity

The dredge is a suction type dredge utilising hydraulically driven high-pressure water pumps to generate water flow/suction in the main pipe via venturi induction jets. The main suction pipe has an internal diameter of 350mm and is controlled by an operator located in the wheelhouse. The pipe is lowered to the river bottom by hydraulically driven winches and river gravels are entrained into the main pipe as a slurry. The gravels are discharged onto a classification screen at the rear of the dredge where all oversize material and excess water is discharged immediately back into the river. Classified material is pumped on board and fed through gold recovery systems comprising standard gold riffle tables and all fines and water are again discharged into the river. It should be noted that no chemical processes are used.

Areas are 'spot mined' where a site is identified that is favourable for gold accumulation, and then worked. In this context parts of the riverbed are discretely mined rather than blanket mining the entire riverbed throughout the entire mining permit area. As the dredge moves forward, any depressions are progressively reinstated by gravels returned to the watercourse.

The existing consents for the mid-reaches of the Clutha includes a 20m exclusion zone around any tributary confluence greater than 1m in width. This exclusion should be carried into any new consent conditions as the confluence of lower order streams are often important ecological habitat.

Cold Gold Clutha Limited has found that gold in the mid-reaches of the Clutha does not lie uniformly in the gravels bank to bank across the river, rather in narrow non-contiguous longitudinal bands. These areas are found by spot dredging until an economic band is found and then mined.

The proposed dredging activity will be carried out much the same as that of the previous nine years mining in the mid-reaches of the Clutha where only portions of the riverbed will be mined. It is considered no more than a hectare would be mined anywhere within the permit in any given month. Over any calendar year this is not likely to exceed more than 10ha.

The rate of mining is self-limiting, and in some months, this will be somewhat less. Maximum depths will depend on the depth to bedrock where the gold either sits on the basement or is contained within crevasses or depressions, however for some guidance this will range from 2m to 15m in depth. Areas will not be re-worked, because there will be minimal gold within them.

Surface water will be taken at a maximum rate of 400 litres per second, with a daily maximum take of 18,720 cubic metres (m³) based on a maximum 13-hour working day. It should be noted this take represents the maximum rate and it is unusual to operate the dredge at full speed as it greatly reduces the chances of retaining the gold in the riffles.

All water will be returned directly to the watercourse at the point of take and as such, is considered non-consumptive, and therefore not subject to assessment to allocation, metering, minimum flow or and efficiency assessment.

Cold Gold promotes as Appendix 1, a suite of draft consent conditions which reflect those of the consent **conditions to the 'live' consent in the mid-reaches** of the Clutha River/Mata-Au.

This is not a new activity to the area, and the Clutha has an enduring history of mining. To illustrate, the image below was taken in the 1890's and shows an area several kilometres above Cromwell being heavily worked by coal powered dredges. The river was heavily modified in the past with little consideration for the receiving environment, and yet today the Clutha is regarded as one of New Zealand's most scenic rivers.



Figure 1 – Historic approach to mining in the Clutha near Cromwell

Mining Site Location

Mining will be limited to the exclusive area as specified on Crown Minerals Mining Permit 60515, 60593 plus permit 60299 which relates to the amended proposal (or any subsequent consolidation or alteration of these permits) and associated maps.

The upper extent of permit MP60299 commences just downstream of the Luggate Bridge² and then continues downstream to the confluence³ with Lake Dunstan as shown in the figure below.

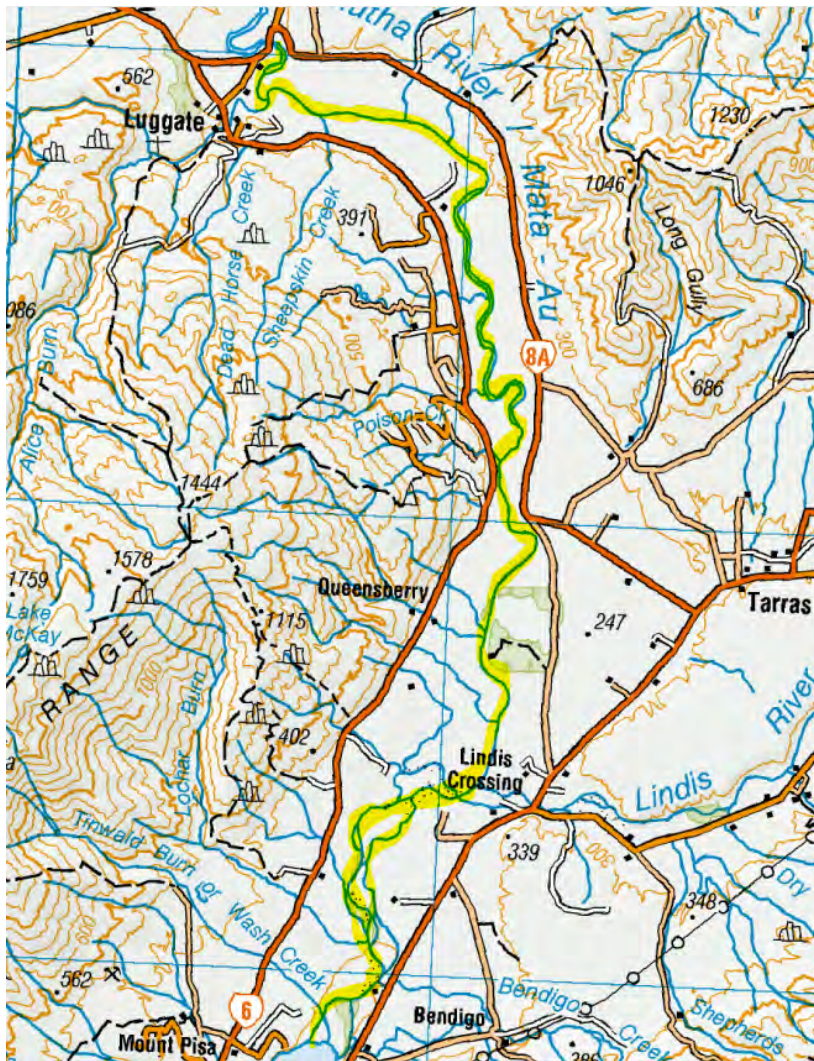


Figure 1 – Combined Area of Mining Permits

Parts of the permit will be excluded from mining on the basis that advice suggests they are ecologically sensitive where the effects of mining may result in adverse effects. These are limited to two locations and are shown in Appendix 2, being

1. From 100m upstream of the confluence of Luggate Creek with the Clutha River and for a distance of 350m downstream terminating at the downstream extent of the island within Devils Nook, and
2. The delta portion of the river from the confluence with Lake Dunstan and then upstream terminating at the confluence with the Lindis River.

The Dredge

The dredge is Maritime NZ registered vessel No MNZ 134266. Vessel name "CGC1". As a self-powered commercial vessel, the gold dredge is designed, built & surveyed in accordance with Maritime Transport Operating Rules, has a valid Maritime Transport Operator Certificate (MTOC) and a comprehensive and audited Maritime Transport Operator Plan (MTOPlan).

² at 1,305,656 – 5,040,183

³ at 1,307,842 - 5,018,519

The MTOP is a live document specific to the dredge which is audited and approved by Maritime NZ. The MTOP outlines all aspects of the vessel including management, operational procedures, crew, crew training, reporting, safety systems and procedures, maintenance plans and procedures, safety & environmental risk assessment and management.

The dredge is a self-powered commercial vessel being a steel pontoon catamaran 23.9 metres in length and with a beam of 6.6 metres. Propulsion is via twin 550hp Detroit Diesel engines driving Ultrajet 375 waterjets. Dredging power is hydraulic, powered by an Isuzu 600hp 6WG1TC marine diesel engine.

The main propulsion engines are used to manoeuvre the dredge about the river to position for dredging, re-fuelling and for retreat during flood events. The applicant advises that such manoeuvring occurs a maximum of once a week for refuelling and otherwise only very occasionally. The dredge is normally static for dredging operations.

The dredge is moored utilising 2 x 500kg main mooring anchors to position itself in the river. The dredge also utilises 2 x 150kg stern anchors and side lines as necessary for stability.

Dredge Specifications

The basic dredge specifications are:

Hull type:	Steel pontoon catamaran
Length:	23.9m
Beam:	6.6m
Hull depth:	1.45m
Draft:	0.8m
Displacement:	75t
Operational Area:	Inland Waterway
Propulsion:	Twin 550hp Detroit Diesel engines driving Ultrajet 375 water jets.
Type of dredge:	Suction
Diameter of dredge pipe:	350mm
Throughput:	Max 20cbm/hr
Recovery systems:	Riffle table
Dredging engine:	Isuzu 600hp 6WG1TC marine diesel engine.
Dredging power:	Hydraulic driven water pumps.

Two steel pontoon hulls each comprise five separate compartments – bow ballast tank, void space, a fuel compartment, aft ballast tank and propulsion engine room. The engines have wet exhaust systems to reduce noise and engine room walls are fitted with noise reduction linings.

The superstructure is made from 100mm thick steel/polystyrene panel which encloses the wheelhouse, hydraulic engine room and gold recovery room. The hydraulic engine is fitted with top end exhaust silencers and the room has noise reduction linings.

Manoeuvring

The dredge is self-powered at which time the main propulsion engines are used to manoeuvre about the river to position for dredging, refuelling and for retreat during flood events. Manoeuvring occurs a maximum of once a week and otherwise only very occasionally. The dredge is generally static for normal dredging operations.

Anchoring/Mooring

The dredge utilises two 500kg main mooring anchors to position itself in the river. These anchors are located within the river wet bed with the anchor warps crossed over for stability. This means that the anchor warps are immediately in front of the dredge (not out to the sides) and typically submerge within 10-20m. To minimise the risk of anchor failure (slippage), the anchors themselves are also tied back with wire rope to the riverbank

where possible usually to a large willow tree or rock protrusion. There is no impediment to river users and minimum risk to other vessels.

Due to the size of the Clutha River and the bespoke anchoring system, substantial clear passage is provided down at least one side and normally both sides for other river users to pass. On occasion where side lines are utilised, typically when moored against the riverbank during a flood event or for maintenance, these are highlighted with marking tape and/or marker buoys.

The dredge also occasionally requires two 150kg stern anchors where necessary for stability.

Daily Access

Crew access to the dredge is by way of a service tender. This craft is a 200hp 5.5m RIB jet boat which falls within Maritime NZ survey and operational requirements for the dredge. The tender is launched and retrieved at either public boat access points or via private property with landowner permission. The tender is typically moored just off the riverbank at night. When on board, the tender is tethered alongside the dredge. Safe operation and maintenance of the tender is included in the Maritime Transport Operating Plan. Cold Gold maintains easement concessions with LINZ & DOC where relevant.

Refuelling

The applicant advises that a self-bunded fuel storage tank owned and supplied by South Fuels will be located well above maximum flow levels on private property adjacent to the river. The location is not yet confirmed and is likely to move between a number of properties as the dredge moves within the river.

Weekly refuelling of up to 5,000L of diesel fuel is a strictly monitored procedure to avoid any spillage. Refuelling will be direct shore to ship. Cold Gold maintains (or will seek any additional) easement concessions with LINZ & DOC where relevant with respect to landing and refuelling.

Management of Hazardous Substances

The hydraulic process involves the use of hydraulic oils. These are contained within the dredge by tray bunds in the event a line was to burst. Continuous maintenance is carried out on the plant to ensure no pipes or connections are compromised to limit the risk of failure.

In-water hydraulic systems are separate from on-board systems in that they utilise biodegradable-oil which, in the event of a leak or spillage, break down far faster than mineral oils and are non-toxic. The risk of failure for the in-water system has been assessed as low.

The Maritime Transport Operator Plan (MTOP) specifies all procedures for the safe operation, maintenance and management of potential contaminants along with all other aspects of the vessel and its operation. A copy of CGC1 MTOP is provided. Maritime NZ assessed and considered the dredging **operation "has a low-risk profile" and "continues to hold a risk rating of Low"**.

Vessel Slipping

Under Maritime NZ rules, the dredge is required to be slipped for maritime survey along with any repairs or alterations, as necessary.

As part of this proposal, resource consent is sought from the ORC to slip the dredge under the same conditions and location as the recent consent RM20.325. A further concession from the Department of Conservation will be required for the creation of a new slipway from the river downstream of the Beaumont bridge. Consent will be sought from Clutha District Council independently to this application as it is likely to be a simple non-notified process.

An assessment on the hydraulic capacity and flow characteristics of the Clutha River was commissioned by Neil Johnstone of Flood Sense Limited (FSL) on behalf of the applicant as part of the one-off 2020 dredge slipping consent RM20-325 downstream of Beaumont. This assessment is appended to the application.]

Overall FSL concluded the effects on hydraulic capacity and flow characteristics of the Clutha River/Mata-Au when slipping the dredge will be less than minor and consent was approved on that basis.

Construction of Slipways

Two slipways will be constructed as part of the project, being

- Immediately downstream of the Beaumont Bridge, on Rongahere Road for the extraction of the dredge. The river margin will then be immediately reinstated, and
- Near Queensbury for slipping in of the dredge back into the river, which will remain available for use during the life of the project.

We seek consent from the ORC for both these activities. Consent is sought for the construction of the new slipway within CODC jurisdiction.

Rongahere Road Slipway

The dredge is currently operating downstream of the Beaumont Bridge and will require the construction of a slipway to enable the extraction of the dredge and then onto the transporter. Consent will be sought for the construction of the slipway from Clutha District Council independently to these applications.

The Rongahere Road slipway has been established and remediated as part of a recent maritime survey and maintenance programme where the dredge was in dry-dock. The same location will be used again and is within the jurisdiction of the Clutha District Council. The NZTM coordinates are E1329505-N4917655.

Extraction will occur within marginal strip adjoining private land. That property is accessed from Rongahere Road, downstream of the Beaumont Bridge. The land is legally described as Clutha River adjacent to Section 59 Block I Crookston Survey District, held in Record of Title OT14C/643. Extraction will only be carried out when the weather and river flow levels are appropriate including live updates from ORC/NIWA and Contact **Energy's high level alert system (>850cumecs)**.

As part of the extraction, a slipway will be required which will require a concession from the Department of Conservation as the river margin is held in marginal strip. A one-off concession (and ORC consent) was issued to applicant for the formation of a slipway in this location however this was only authorised for the extraction of the dredge to enable maintenance and a maritime survey. The dredge was then returned to the watercourse and the slipway fully reinstated to resume operation whilst this application is considered.

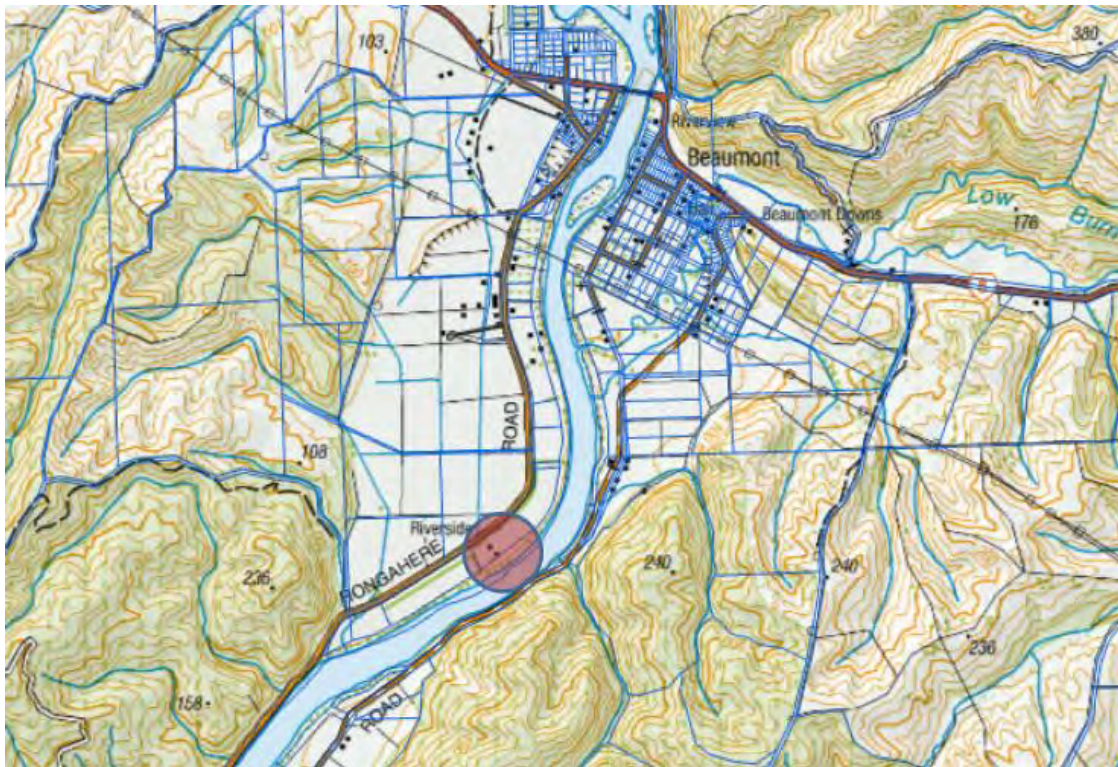
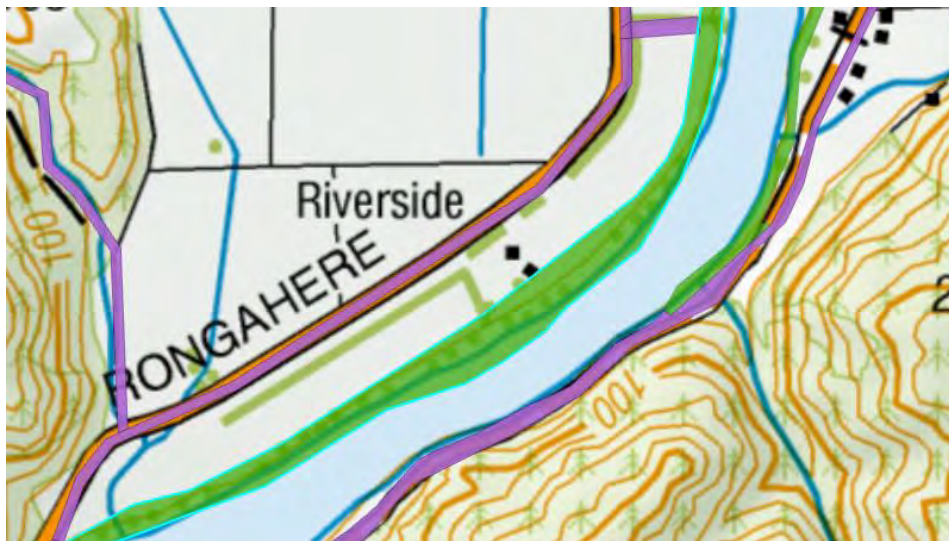


Figure 2 – The proposed extraction location

The slip site will be accessed via private property and will be located within marginal strip administered under s24 of the Conservation Act.



DOC Public Conservation: Marginal Strip - Clutha River/Mata-Au

NaPALIS_ID	2800330
Type	MARGINAL_STRIP
Name	Marginal Strip - Clutha River/Mata-Au
Legislatio	CONSERVATION_ACT
Section	S24_3_FIXED_MARGINAL_STRIP
Local_Purp	
Government	
Vested	No
Control_Ma	No
Recorded_A	19.76
Overlays	No
Private_Ow	No
Shape_Are	197,708.07
Shape_Len	8,017.27

Figure 3 – Marginal strip on river

The extraction point will be in the same location as the previously approved slipway. No evidence was found of any heritage or archaeological feature during the previous extraction event. This aligns with the NZ Archaeological Association GIS which has no record of any archaeological features in this location.

The slipway will be constructed such that a gently inclining slope will be cut into the riverbank to allow the dredge to be extracted in much the same manner as the one-off consent issued by the ORC in 2020. The bank material is river gravel covered with pastoral grass and the cut will be battered to a gradient no steeper than 2.5V:1H such that it does not naturally erode.

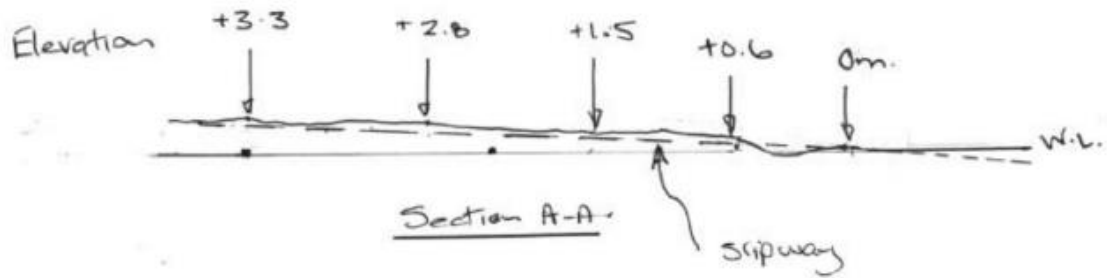


Figure 4 – Gradient of slipway construction downstream of Beaumont

The ramp will be excavated using a 20 tonne (T) excavator. The slipway will be approximately 10 metres (m) wide and extend from the wet bed to an area where the dredge can be rolled on airbags as shown in Figure 5 below, to where it will be loaded onto a flatbed transporter.



Figure 5 – Photo of dredge being extracted at Ettrick in 2016 for a maritime survey

After the dredge is removed the riverbank will be reinstated to match the existing bank profile. A forward-looking review of the weather in the headwaters (with linkage to the Contact Energy Flood Alert Scheme) will be done to ensure there is no flood risk during the period of dredge removal and reinstatement of the riverbank.

The Queensbury Slipway

Once extracted, the dredge will be transported to Queensbury. A location has been identified (see Figure 6) where a new slipway will be constructed using a 20T excavator. The proposed location for the slipping in comprises a low gradient river margin where earthworks will be a minimal volume. Material will be retained in a manner that it can be re-used for remediation of the slipway when it is no longer required.

During construction, some sediment will likely be lost to the water. Given the short duration of excavation activity required, it is assumed the sediment loss will be minimal and not discernible following reasonable mixing. In terms of disturbance to vegetation, Otago Regional Council rules 13.6.1-13.6.3 do not apply as there

will be no planting of the identified species and rules 13.7.1-13.7.3 do not apply as there will be no removal of those species.

The dredge will be taken off the transporter, onto the air-filled bags where it will be rolled over the slip and into the watercourse.

With respect to the new location for slipping the dredge into the Upper Clutha the NZAA GIS identifies a number of heritage records in the local area. The GIS does not allow for a refined assessment of where those records are located, however given the small area of disturbance to create a suitable incline to slip the dredge back into the river, it is unlikely any heritage site will be affected given the relatively small area of alteration.

All excavation work into the bank will be carried out progressively to assess whether any evidence of human activity is exposed. An accidental discovery protocol will apply and all staff on the site fully informed of its requirements. Should any evidence of **Māori** activity be exposed work will cease immediately and the protocols followed.



Figure 6 – Proposed location and access route for slipping the dredge into the Upper Clutha River/ Mata-Au

When accounting for a robust accidental discovery protocol, it is considered any risk to the archaeological record will be less than minor.



Figure 7 – Dredge launch location

For the new slip location no vegetation survey has been undertaken on the basis the vegetation within the slipway area comprises exotic grasses and willow.

No known bird nests occur in the area of the slipway as the area comprises part of a farming operation. In terms of the bird colonies that are on some banks or islands along the Clutha, these tend to be more towards and south of Roxburgh, and none are known in the mining permit area. We submit that a 100m exclusion is appropriate for nesting colonies and volunteer that revised setback.

The process of slipping will occur over a single day after which, the total period dry docked will be no more than several days every 2-3 years for MaritimeNZ survey and hull maintenance. Anything beyond these timeframes would be for unanticipated maintenance or repairs which has not occurred so far in the life of the dredge.

With respect to effects on public access, the likely area of public exclusion will be less than 100m of the riverbank for a couple of hours at most whilst the dredge is being slipped in. Whilst the land subject to the slipping activity is marginal strip, few members of the public are ever seen using the area. The lack of connection to the river means it is unusual to see a single person walking along that reach of riverbank. Should a member of public be in the area at that time, they will be asked to step around the active area during the slipping process which is not likely to be a great imposition. For the recent slip/work site near Beaumont, the area was taped off with site warning tape and worksite notices posted.

In terms of public safety during the slipping process, the slipway location is not a place one would expect a townie to bumble into an active worksite and become confused. Any member of the public who does recreate along this area of the river was smart enough to get to this location in the first instance and will most likely be smart enough to form their own judgement in terms of risk and will simply walk unhindered around the taped off work area. The activity will not impinge on s6(d).

Transportation of the Dredge and Slipping into the Upper Clutha

Once extracted from the Clutha River below Beaumont, transportation of the dredge will be managed by **Scobie's Transport Limited**. Based on initial discussions with Contact Energy, the anticipated route will be from

Rongahere Road to SH8. Prior to Alexandra, the transporter will turn onto Earnscleugh Road where it will travel to, and over the Clyde Dam. Once over the dam, the transporter will continue along the SH8 towards Queensbury where it will be unloaded within private property and slipped into the river over marginal strip.

That river margin is administered by DoC as a fixed marginal strip under s24(3) of the Conservation Act and it is expected an additional concession for the construction of a slipway will be required.

Planning Framework

Both the Regional Plan: Water for Otago (RP:W) including the relevant objectives and policies of Plan Change 7 apply.

Otago Regional Council

In this case, the planning framework of the RP:W has not contemplated the operation of a dredge within a waterbody that is considered a maritime vessel.

A number of rules are breached by the proposal. These relate to

- The alteration of the bed of the river for the purpose of operating a suction dredge
- The alteration of the bed of the river for the purpose of constructing a slipway to both extract and slip the dredge in the river
- The take and use of water for the purpose of operating a suction dredge
- The discharge of sediments associated with the use of the dredge and also the construction of slipways in the banks of the river.

With respect to the alteration of the bed of the river Rule 13.5.3.1 applies which states:

Except as provided for by Rules 13.5.1.1 to 13.5.2.1 the alteration of the bed of any lake or river is a discretionary activity.

Land use consent is sought to disturb the bed of the Clutha River / Mata-Au for the purpose of operating a suction dredge and to construct slipways in the banks of the river.

For the water take, Rule 12.1.5.1 applies which states:

Except as provided for by Rules 12.1.1.1 to 12.1.4.7, the taking and use of surface water is a discretionary activity.

There remains a lack of certainty as to whether a consumptive water take that is returned directly to the waterbody is in fact a take. For the avoidance of doubt, resource consent is sought at a maximum rate of 400 l/sec, for an average of 12 hours per day.

In a similar situation as a non-consumptive water take being considered a take under the Plan, there remains uncertainty in relation to whether the remobilisation of river sediments to water is a discharge of contaminants. The Plan framework does not provide for the discharge of sediment from a suction dredge, and therefore Rule 12C.C.3.2 applies, which states:

The discharge of water or any contaminant:

- (i) To water; or*
- (ii) Onto or into land in circumstances which may result in a contaminant entering water is a discretionary activity, unless it is:*
 - (a) Prohibited by a rule in 12.C.0; or*
 - (b) Permitted by a rule in 12.C.1; or*
 - (c) Provided for by a rule in 12.C.2.*

Policy 6.4.2 of the RPW states that surface water takes that immediately return all of the water taken to the source water body are not factored in calculating primary allocation. The definition of a non-consumptive take

within the RPW is “A take is non-consumptive when: (1) The same amount of water is returned to the same water body at or near the location from which it was taken; and (2) There is no significant delay between the taking and the returning of the water”. The proposed take is considered to be non-consumptive as it meets these requirements and is a *discretionary* activity pursuant to Rule 12.1.5.1 of the RPW.

With respect to the slipway construction in the bank, Rule 13.5.3.1 states *‘except as provided for by Rules 13.5.1.1 to 13.5.2.1 the alteration of the bed of any lake or river is a discretionary activity’*.

For the discharge of sediments into the watercourse during the formation of the slipway and during the slipping of the dredge onto land, Rule 13.5.A.1 applies. Rule 13.5.A.1 is the general rule for section 13.5 which states the discharge of bed material resulting from the alteration of the bed of a river are addressed only through rules in section 13.5.

Overall, the proposal within the Otago Regional Council provisions shall be assessed as a discretionary activity.

Plan Change 7

The Environment Court released its interim decision on the Water Permits Plan Change (PC7) on 22 October 2021 and on 17 November 2021 the Environment Court released its final decision on PC7.

The Court’s decisions were not appealed and Plan Change 7 was made operative on 5 March 2022. PC7 provides an interim regulatory framework for the assessment of applications to ‘renew’ deemed permits expiring in 2021, and any other water permits expiring prior to 31 December 2025. It also establishes a requirement for short duration consents for all new water permits.

No rules from PC7 are applicable to this application as it is not a currently authorised water permit. An assessment against the policies in PC7 will be required as part of the s104 assessment.

National Standards

The National Policy Statement for Freshwater Management 2020 (NPSFM) recognises Te Mana o te Wai as an **integral part of freshwater management stating that “the health and wellbeing of our freshwater bodies is vital for the health and well-being of our land, our resource (including fisheries, flora and fauna and our communities.” This philosophy directs the focus of the NPSFM.**

Objective 1 refers to both quality and quantity with ‘health and well-being of water bodies and freshwater ecosystems’, and places it as higher priority than human health needs and provision for social, economic and cultural well-being.

Part 1.3 Policy 1 of the NPSFM2020 raises the status of Te Mana o te Wai from ‘consider and recognise’ to ‘give effect to’.

Policy 2 specifically addresses tangata whenua involvement although the concept applies throughout the NPSFM 2020.

The six principles of Te Mana o te Wai inform how the NSPFM is to be implemented.

- Mana whakahaere: the power, authority, and obligations of tangata whenua to make decisions that maintain, protect, and sustain the health and well-being of, and their relationship with, freshwater.
- Kaitiakitanga: the obligation of tangata whenua to preserve, restore, enhance, and sustainably use freshwater for the benefit of present and future generations.
- Manaakitanga: the process by which tangata whenua show respect, generosity, and care for freshwater and for others.
- Governance: the responsibility of those with authority for making decisions about freshwater to do so in a way that prioritises the health and well-being of freshwater now and into the future.

- Stewardship: the obligation of all New Zealanders to manage freshwater in a way that ensures it sustains present and future generations.
- Care and respect: the responsibility of all New Zealanders to care for freshwater in providing for the health of the nation.

Any resource consent application must demonstrate how it will ensure that freshwater is managed in a way that gives effect to the hierarchy of obligations, which in this order is shown below:

- the health and well-being of water,
- the health needs of people,
- the ability of people and communities to provide for their social, economic and cultural well-being.

In respect of water quality (Policies 5-8), it is noted that the discharge comprises solely the remobilisation of river sediments and no additional contaminants will be lost to the waterbody. Policy 15 recognises the social, economic and cultural wellbeing in relation to effects on water quality (rather than just economic under the NPSFM2014). Sediment loads are identified as naturally high at this location during modest rain events and no adverse effects from sedimentation associated with the proposed activity have been identified. Given the scale of the environment, it is considered a visually conspicuous plume in the waterbody will not appear out of context.

The proposed mining activity within the upper Clutha River/Mata-Au will enable the applicant, and by inference the community, to provide for its economic and social well-being with no discernible adverse effect on water quality beyond the zone of reasonable mixing. In terms of the cultural well-being, the proposed mining operation will be a continuation of the rich history of gold dredges operating on the Clutha River. The proposal is not considered to impose on any manawhenua values.

A cultural impact assessment (CIA) was not commissioned by the applicant. They relied on past experience in the Clutha River where Runaka provided their written approval for the consent renewal of the dredge without seeking a CIA in early 2021 as a non-notified consent. **Rūnaka** also did not seek an impact assessment for the initial consent to operate the dredge over 900ha of the Clutha approximately 12 years ago. It was the applicants understanding of ki uta ki tai that informed the decision to not seek a CIA in the upper reaches based on the previous consents given the river system is intrinsically connected.

Following initial feedback from Council, we sought feedback from Aukaha on behalf of Runaka where they were invited to assess the application and provide any feedback on the proposal including whether a cultural impact assessment is useful in the context of the application given the Clutha is a statutory acknowledgement river. No CIA was requested. Whilst a number of Runaka have an interest in this area, feedback was only received from Hokonui Runaka who advise in the first instance they will oppose all instream gold dredging applications. Despite the objection to the activity neither Hokonui nor Aukaha requested a cultural impact assessment be carried out.

Overall, it is considered the proposal is considered consistent with the water quality objectives of the NPSFM 2020. There are no other relevant National Environmental Standards.

Statutory Considerations

This application must be considered in terms of Section 104 of the RMA. Subject to Part 2 of the RMA, Section 104 sets out those matters to be considered by the consent authority when considering a resource consent application. Considerations of relevance to this application are:

- (a) any actual and potential effects on the environment of allowing the activity; and
- (ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and
- (b) any relevant provisions of:
 - (i) A national environmental standard;
 - (ii) Other regulations;

- (iii) a national policy statement
 - (iv) a New Zealand coastal policy statement
 - (v) a regional policy statement or proposed regional policy statement
 - (vi) a plan or proposed plan; and
- (c) any other matters the consent authority considers relevant and reasonably necessary to determine the application.

Effects on the Environment

Section 88 of the Resource Management Act 1991 (RMA) requires that all applications include an assessment of any actual or potential effects that a proposed activity may have on the environment and the ways in which any adverse effects may be avoided, remedied or mitigated. The scale and significance of the actual and potential effects that the activity may have on the environment should correspond with the level of detail provided in accordance with Section 88.

Permitted Baseline and Existing Environment

The permitted activity rule in the RP:W is a legacy respecting the several hundred people that dredge for gold in a hobby capacity without consent over any spring/ summer period in Otago. Under sections 95D(b) and 104(2) of the Resource Management Act 1991, the Consent authority may disregard an adverse effect of the activity on the environment if the district or regional plan or a national environmental standard permits an activity with that effect.

In this case, the permitted baseline can in part be applied to suction dredge mining permitted under RP:W rule 13.5.1.7 which states:

Suction dredge mining within the bed of a river is a permitted activity providing:

- (a) The internal diameter of the nozzle does not exceed 150 mm; and*
- (b) The mining activity does not occur in those rivers, or parts of rivers, listed in Schedule 7 during any identified time period; and*
- (c) The mining activity is not carried out within 20 metres of any structure which has foundations in the riverbed, or any ford or pipeline; and*
- (d) The activity does not cause any flooding or erosion; and*
- (e) No refuelling is carried out while the dredge is within the wet bed of the river unless an effective spill tray has been installed; and*
- (f) The area dredged lies within the wet bed of the river, and no material is removed from within or under the banks of the river; and*
- (g) No suction dredge is operated within 500 metres of another dredge; and*
- (h) No explosives or earthmoving machinery apart from the dredge is used to move material in the river bed; and*
- (i) Any rocks moved to allow suction dredging to occur are returned as close as possible to the site from which they were removed; and*
- (j) There is no conspicuous change in the colour or visual clarity of the water body beyond a distance of 100 metres downstream of the point of discharge of the dredge; and*
- (k) No lawful take of water is adversely affected as a result of the bed disturbance.*

In the most part, the proposal is consistent with the above permitted activity rule, specifically limbs (b), (c), (d), (f), (g), (h), (i) and (k). For limb (a), the internal nozzle exceeds the permitted activity threshold. With respect to (e), the dredge and refuelling system are designed to ensure no fuel is lost to the water and although **the arrangement is not a 'spill-tray' per se, it can be taken that the intent of (e)** is met.

Permitted activity limb (j) allows for a conspicuous change in colour or visual clarity of the waterbody up to 100m beyond a dredge discharge. Testing confirms this performance standard will be achieved.

With respect to the CODC baseline, the proposal may operate in a manner which extends up to, but not exceeding the noise thresholds, and be a vessel not exceeding 6m in length with no more than three persons engaged in the activity. Within the CODC portion of the proposed mining area the permitted baseline provides

for 55 separate dredges each with a maximum internal nozzle of 150mm operating within the mining permit area. Of course, it is fanciful to consider the permitted area would include 55 dredges equally spaced 500m apart; however this provides an indication of what activity and effects arising from that activity could by right occur without consent. In terms of effects associated with the baseline, a 6-inch dredge can operate in only 30cm of water and could mine the shallower reaches (i.e less than 1m deep) including confluences with tributaries that are considered more ecologically sensitive where the applicant's dredge could not.

The permitted baseline also provides for mining within the portion of the river the applicants propose to exclude between Lake Dunstan and the confluence with the Lindis River. This area is considered ecologically sensitive and as it extends for over 2.5km, the baseline provides for up to five 6-inch dredges operating in it with no additional controls protecting the sensitive margins.

For Queenstown Lakes, the baseline provides for suction dredge mining in a watercourse as a permitted activity provided the total motor power of any dredge does not exceed 10 horsepower (7.5 kilowatt). The permitted activity rule does not specify a maximum number of dredges. As the permit within the QLDC jurisdiction is approximately 7.1km long, the permitted baseline would enable 14 six-inch dredges to operate as of right. This would include mining within the Devils Nook and Luggate Creek confluence area considered to be ecologically sensitive.

In reality, there are areas of river where three or four dredges have personally been observed operating under the permitted activity rule 13.5.1.7. Putting aside the quanta, it is apparent numerous dredges could operate each disturbing the riverbed and aquatic habitat and resulting in noise emissions as of right that is non-fanciful. We consider a credible baseline of say a single 6-inch dredge every 5km of mining permit should be applied to this application and only those effects beyond that be considered in any assessment of effects.

The permitted baseline also provides for Cold Gold Clutha and the dredges continued operation within the Clutha River from the Roxburgh Dam downstream to Tuapeka Mouth over 900 hectares of riverbed. This consent was renewed on 10 July 2020 and granted for a further 15 years. The matter of the offsetting is also relevant in this situation whereby should the dredge obtain consent to operate in the Upper Clutha albeit with some effects, the dredge will by default not operate in the mid-reaches where those effects that are authorised will not occur.

Overall, when considering the number of dredges that could mine (and have previously done so) along the full extent of the permit with no controls on ecologically sensitive habitat, it is my opinion the effects of the proposed single larger dredge on the receiving environment will be less than the credible permitted baseline proposed. We submit there are few if any effects beyond the permitted baseline.

Abstraction of Water

The abstraction of water, whether for consumptive or non-consumptive purposes, is considered to be a 'take' of water. Rule 12.1.2.2(a) provides for a take of 100L/s with a maximum take of 1,000,000 L/d. The maximum proposed take is up to 400l/s and up to 18,720m³ per day. Effectively the take is four times the rate and 18.7 times the volume. The proposal therefore does not comply with Rule 12.1.2.2.

However, the take is non-consumptive and should be measured with any relevance against this standard as it is intended for takes that are extracted from the river i.e for irrigation, rather than returned immediately to it. This approach is supported by the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 and Amendment Regulations 2020 where the regulations do not apply to non-consumptive takes where the water is immediately returned to the waterbody.

Allocation Status of the Water Take

Water taken for mining will be immediately returned to the watercourse and therefore the take is not considered to be part of the allocation block for the catchment. As the take is non-consumptive, and not part of the primary allocation of the watercourse, it is not subject to any minimum flow or residual flows.

Water Metering

As part of the pre-application discussions with Council's consultant they sought clarification as to why no water meter is promoted as part of the intake. Resource Management (Measurement and Reporting of Water Takes)

Regulations 2010 and Amendment Regulations 2020. The 2020 amendments introduce additional measuring and reporting requirements in stages starting with takes of more than 20 L/s on 3 September 2022.

There are three main types of water meters—mechanical, electromagnetic, and ultrasonic. Each uses a different mechanism to determine the volume of water that is used.

- Most mechanical meters have an impeller that is rotated by water passing through the meter. The amount of turns is translated to a volumetric reading.
- Electromagnetic water meters use voltage to determine the flow rate. As water passes through a pipe **surrounded by magnetic fields and electrodes, it generates voltage. The water's velocity determines how much voltage it creates, so the meter can translate voltage to flow rate.**
- Ultrasonic water meters send a sound wave through the water to determine flow rate. It measures the transit **time of the signal (how long it takes to get from one point to another) or "doppler shift" (the difference in the signal's frequency) to measure volume.**

All three types of water meters do not like, or measure rocks and gravels and therefore a water metre is not an option. As the Water Measuring Regulations do not apply to non-consumptive takes where the water is immediately returned to the waterbody metering is not required.

For a typical irrigation take, a fish screen is adopted to avoid fish or larval species being drawn into the impellor and potentially damaged. A dredge comprises two water intakes. One is for the intake to the pump and will have a screen that draws water into the venturi to create the high pressure environment which creates a vacuum on the nozzle. The second intake is at the nozzle, which does not have a screen as rocks, gravels or gold would not be able to be drawn into the dredge.

Based on personal experience using a dredge underwater and observing what is drawn into the dredge, the likelihood is low any fish will ever be entrained. In the rare likelihood this did occur, there is however every chance the fish will be unharmed. It is also relevant that the dredge nozzle is positioned near the gravels and then drives into the gravels through the gravel-water interface where fish may reside, in effect a large percentage of the time the dredge is operating is not in the typical fish habitat, but within the gravel column.

Assessment of Environmental Effects

There are a number of potential effects that require consideration. As discussed above, the permitted baseline provides for a range of effects using multiple dredges across the entire permit area.

Effects on Water Quality - Discolouration

Suction dredge mining involves both the discharge of water and sediment to water. The sediment discharged will be naturally occurring silts, sand and gravels that can be sucked through the nozzle of the suction dredge. This material is passed through the dredge with a considerable amount of water and as it re-joins the water in the river it mixes quickly so typically no discolouration will not be evident 50m beyond the point of discharge.

In terms of effects, any conspicuous discolouration will be managed to ensure no visual plume occurs beyond 100m. Should any discolouration occur beyond 100m then the activity will be limited until such time the discolouration has reduced before proceeding on. Consent is however sought to enable any visible discolouration to apply up to 200m beyond the discharge point as a precautionary approach should any unforeseen pulses of clays or finer sediments be released that do not drop out of the water column quickly to ensure the dredge does not fall into non-compliance. This is a cautious approach to retain a good compliance record and is not likely to occur and has support in terms of how the zone of reasonable mixing is defined. It is submitted, this adaptive management model is an acceptable and responsive way of mitigating the effects of the sediment on the water quality given the scale of the receiving environment when tested against the range of methods various Councils adopt to determine the zone of reasonable mixing.

Every river and the discharge from a dredge within it differs in terms of how rapid the sediment plume falls out of the water column. Water sediment sampling by Hills Laboratories (attached) and video footage of the

sediment plume within the Clutha River mid-reaches whilst the dredge was operating provides some context to the plume decay rate and extent of the sediment discharge. This is further evidenced in the Google Earth image below that shows a minimal plume. Of relevance to this image is the fact the dredge is operating and the dredge operators had forewarning of the timing of the image and therefore there is no scope to artificially manipulate the flow rates and subsequent plume.



Figure 8 - The dredge operating in the Clutha River near Millers Flat.

There are few practical mitigation measures than can be applied for managing the discharge, nor is there any need. The majority of sediment will fall out of the water column within 25m of the discharge point⁴, with the balance decaying at a rate relative to the grain size. The effects of this discharge are many orders of magnitude less than a flood event or the cumulative effects of that provided under the permitted baseline.

It should also be noted that over the last nine years of operating this dredge within the mid-reaches between Roxburgh Dam and Tuapeka Mouth, not one person has complained to Council about the effects of the dredge on the waterbody or ecology. This speaks to how the public view the effects of the activity and the integrity of the operation.

Proposed Setback

Initial feedback from Council staff sought justification as to why a 200m zone of reasonable mixing is appropriate.

The discharge does not contravene s15 after reasonable mixing. It is my understanding s15 states no person may discharge to a contaminant to water unless the discharge is expressly allowed by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent. In this case we seek resource consent to discharge a contaminant to water, namely sediment from the river to the river. Of course the restriction on the grant under s107 comes into play.

⁴ As supported by the water sampling analysis by Hills Laboratory

The 'contaminant' is not being introduced to the watercourse and is a pre-existing natural part of the river composition. It is also remobilised during high velocity events. Crucially, remobilised sediments fall out of the water column rather than remain dissolved and physically altering the character of the water, such as with stock nutrient runoff as a contaminant.

We promote a condition of no visually conspicuous sediment plume beyond 200m downstream of the discharge point – being the defined zone of reasonable mixing which is consistent with the effects set out under s107(1)(c-g). At the proposed zone of reasonable mixing, the sediment plume will not be visually conspicuous and defines a point sampling where can be taken for compliance purposes.

The ORC does not prescribe the zone of reasonable mixing and relies on the following definition which is not particularly helpful or relevant in this situation. Their definition reads:

The process where undiluted effluent disperses through receiving waters. Mixing results in a mixing zone where the concentration of contaminants varies from that in the effluent to that of the fully mixed receiving water. Reasonable mixing may be said to have occurred at some point between the point of discharge and the point at which the effluent is completely mixed with the receiving water. Beyond the reasonable mixing zone, the effluent and water mix complies with any water quality standards for the water body.

In this case, the contaminant in question is simply the remobilisation of sediments within the waterbody, rather than the introduction of a new contaminant. The definition has a focus of effluent which is of little comparative use given sediment is naturally occurring within the waterbody and drops out, whereas effluent and the nutrients within the effluent (except for suspended solids) remain in situ and leads to a cascade of environmental outcomes.

Other Councils adopt differing methods to determine the zone of reasonable mixing which is more prescriptive and provide some useful guidance to support the proposed 200m setback approach for compliance monitoring purposes. For example, the Hawkes Bay Resource Management Plan defines the zone of reasonable mixing as:

In relation to flowing surface water bodies, for the purposes of rules in this Plan, means the mixing of contaminants in surface water at whichever of the following is the least:

- (i) a distance 200 metres downstream of the point of discharge, or*
- (ii) a distance equal to seven times the bed width of the surface water body, but which shall not be less than 50 metres, or*
- (iii) the distance downstream at which mixing of contaminants has occurred across the full width of the surface water body, but which shall not be less than 50 metres.*

Given the wet bed in this area is approximately 75-80m wide, under this definition limb (i) adopting a point 200m downstream of the discharge is the least distance and would apply. Limb (ii) would provide for a 560m zone of reasonable mixing, and given the nature of the contaminant, limb (iii) simply cannot occur.

For the Horizons One Plan, reasonable mixing is also prescribed and states:

In relation to the discharge of contaminants into surface water, means either: (a) a distance downstream of the discharge that is the least of:

- (i) the distance that equals seven times the width of the river at the point of discharge when the flow is at half the median flow, or*
- (ii) 200 metres from the point of discharge or, for discharges to artificial watercourses including farm drainage canals, 200 metres from the point of discharge or the property boundary, whichever is the greater, or*
- (iii) the point at which mixing of the particular contaminant concerned has occurred across the full width of the body of water in the river*

Again using this prescribed definition of reasonable mixing a 200m setback would apply.

For the Taranaki Freshwater Plan, reasonable mixing is defined as seven times the width of the channel at the point of discharge. Under this definition the zone of reasonable mixing would fall between 525m and 560m.

As the ORC does not define the zone of reasonable mixing, we defer to other Council plans which provide some useful guidance. Whilst Cold Gold are confident any discharge plume will not be visible 100m downstream from the discharge, we promote a 200m setback from the point of discharge is both reasonable and appropriate given the nature of the contaminant and consistent with other Councils policies which define reasonable mixing.

Effects on Aquatic Ecosystems

Gold recovery, using a venturi-type dredge, can potentially degrade aquatic habitat in the operation area and immediately downstream. In a river the scale of the Clutha / Mata-Au any effects are considered to be negligible, localised and temporary. The primary issues of concern relate to any effects on fish, tuna or kanakana and their habitat, where sedimentation and turbidity as a result of the suction dredge operation can be a nuisance.

An ecological assessment by E3 Scientific has been carried out to assess the effects of the dredge on the freshwater ecology. The report is appended to this application.

In terms of how the dredge operates, fine sediments returned to the watercourse will remain suspended in the water column dependant on depth, flow and the composition of those sediments. Sediments typically fall out of the water column within 20m downstream of the dredge. Benthic macro-invertebrates and fish habitat will be disturbed during the operating of the dredge; however, this will be isolated and temporary in nature.

Any impacts on the ecology from sediments will be negligible compared to the effects of even a modest rain event in the catchment. This is because the effects are highly localised. Anecdotal evidence suggests that suction dredging is at times beneficial to the fish community, as they have been seen to congregate immediately downstream of the discharge point, consuming the invertebrates as wash water is returned to the river.

The river does contain juvenile elvers and Cold Gold Clutha advises they are not aware of any elvers being entrained by suction dredging. This is aligned with personal experience dredging within a number of Otago rivers where all material that is taken into the dredge is monitored by the dredge operator (to the degree individual gold flakes are observed being drawn up from the gravels/bedrock and into the dredge nozzle).

In the unlikely event that an elver or mature eel will be drawn through the dredge there is a fair possibility they would survive unharmed. Whilst it is accepted injury to an eel cannot be definitely excluded, the likelihood is extremely low. Should this occur, it would be to very few individuals over the life of the dredging operation and the impact on the eel population will be inconsequential⁵. The effects (if any) on several individuals is of little actual implication when 726 tons of eel are harvested each year under the Quota Management System. Whilst some will advocate this activity is unrelated to the RMA, the annual take is very much related to the eel population where the Ministry considers the annual take sustainable.

Given there is no real likelihood of interaction with elvers, it is considered no specific management steps are required for eel.

For aquatic vegetation, specifically macrophytes these are limited within the catchment. The relatively mobile bed in conjunction with frequent flood flows, makes the establishment of some aquatic vegetation challenging.

We defer and accept the findings of E3 Scientific and their ecological report. Overall, it is my opinion the effects on the aquatic ecosystem are no more than minor given the findings of the E3 assessment.

⁵ Noting the dredge is already consented to operate for a further 15 years in the Clutha downstream of the subject site, which included an assessment on the effects on eel. Should consent be issued for the Upper Clutha permit, any effects on the ecology from mining in the mid-reaches will cease, in effect an offset to that already approved.

Effects on Waterfowl

It is accepted the dredge could interact indigenous waterfowl by virtue of its presence and activity. **The Council's** Science Unit did not raise any concerns about the previous consent including the recent renewal in the mid-reaches of the Clutha River.

Many activities can affect indigenous waterfowl, including the permitted baseline for suction dredge gold mining as set out in Rule 13.5.1.7. Equally fisherman, jet-boats and kayakers that are permitted will have an impact on waterfowl. It is submitted that whilst the Clutha River Dredge may frustrate waterfowl, any effects will certainly be multiples less than that permitted as of right.

Anecdotally, Cold Gold Clutha advises they usually observe waterfowl adjacent to the dredge seeming unflustered by its operation. It is a constant and is therefore perhaps perceived as a non-threatening activity. The same lack of concern has also been observed with deer observing suction dredging from the forest margins. The applicant has previously observed blue duck resting on a running suction dredge on the West Coast, with little concern.

On that basis and when accounting for the permitted baseline, it is assessed that the dredge will introduce few if any adverse effects on indigenous waterfowl.

Effects on Existing Water Takes

Points of take (both consented or as a permitted activity) on the Clutha are typically highly visible due to the presence of a submersible pump, piping or other infrastructure which extends out of the water and up the riverbank.

A safe separation distance will applied to any takes as the dredge cannot access the shallower areas and the dredge skipper will continuously manage the dredge location within the riverbed. In terms of the sediment plume from the dredge, this can easily be directed away from the water take such that there is no turbidity issues should a take be identified. This approach works well and has done so since early 2012, with no concerns or complaints raised by the community. This is why you will not find any photographic record or complaints of the dredge and any discharge plume in conventional media or social media platforms.

Existing ORC consents restrict operation within 20m of consented water takes for the activity in the mid-reach of the Clutha River and we consider this is also appropriate in the upper Clutha catchment.

Effects on Other Water Users

While it is expected that recreational water users will observe the operation, and at times other river users will need to manoeuvre around the dredge any adverse impact will be no more than minor.

The dredge has operated over the last ten years with no issues to other water users. With respect to safe passage within the river, the dredge operates with a series of sub-surface anchors rather than wires fixed to the bank, this allows other users to travel unimpeded around the dredge. Whilst the Upper Clutha is a body of water better suited for recreation activity than that of the Beaumont area, there is no expectation the dredge will have any effects on recreational river users.

Other river users including fisherman, recreational boaters, kayakers & rafters are present at any time of the year and are transitory. Cold Gold promotes a condition of consent to address sensitive periods of the year and locations, to read:

"No works shall take place within 150m designated camping or recreation areas between 24 December and 03 January or the Easter weekend".

Following advice from E3 Scientific, the applicant has also offered an exclusion area around the confluence with Luggate Creek and downstream encompassing the island and area known as the Devils Nook as it is considered ecologically sensitive.

This is shown in the red area in the figure below where no mining will be permitted although the dredge will still transit through the area.



Figure 9 – Exclusion area where no dredging is permitted in red

With respect to any future slipway areas and associated work sites on or near the river margins, any activity will be temporary and will have minimal impact on other river users. When the dredge is moored or at anchor in the river, then the usual maritime rules apply regarding other vessels such as passage, navigation lights and markings along with any other conditions stipulated in the relevant consents.

Effects on Natural Character and Amenity Values

The Clutha River/ Mata-Au is considered to contain significant natural character and visual amenity values. The river and catchment are vast and expansive and capable of including a floating dredge with no adverse impact on those values. Unlike a new development, visual effects arising from the dredge in a location are temporary. As it progresses within any paystreak, it will continuously move and any visual effects on any given day may well not be there following day or week. It is accepted the landscape objectives and policies and performance standards relate to a development, where no standards apply for a maritime vessel.

Depending on location the dredge may be visible through trees from State Highway 8 or any other road running **parallel to the river. The dredge's external superstructure and pontoons are painted a sympathetic shade of green** to blend in with the river and adjacent surrounds and is not likely to offend the natural character of the area. In our understanding, no complaints have been received by either Council in relation to the visual effects or amenity of the present operation in the mid-reaches over the last ten years.

The dredge operates during the hours of darkness and uses deck flood lights for crew safety as well as the requisite navigation lights. Whilst light spill is minimal, operating lights may or may not be visible from adjacent roadways or properties but are generally shrouded by riverbank foliage and river terraces.

Effects Arising From Noise

Existing ORC consented operating hours are between 7am and 10pm seven days a week with some restrictions over the Christmas-New Year and Easter periods. Cold Gold promotes exclusions over key holiday periods to limit effects on recreationalists and as a responsible employer.

Noise testing was undertaken in 2013 to assess environmental noise effects and determine a distance boundary from the dredge at which the noise limit of 55dBA is achieved as specified in Rule 5.7.6E of the Central Otago District Plan. The minimum distance will be maintained when dredging from the dredge to the notional boundary

of any residential dwelling. The noise testing report and methodology carried out by Cold Gold is appended to this application.

No noise testing was carried out over the proposed area as the dredge needs to be in that location and to operate, the activity first requires consent. The noise assessment previously carried out is however relevant to the subject site because the Millers Flat and Etrick area is a rural, lifestyle and residential area that is not significantly unlike the subject area. The proposed area for mining is probably likely to introduce lessened noise effects on the basis that there are fewer residential and community areas in the site and also the riverbed is characterised as being more incised to that of the Millers Flat area. As a consequence, the noise will be buffered to some degree as the incised cut of the riverbed in the area will attenuate some of the noise pressure.

The noise assessment of Millers Flat is also relevant to the extent that the noise of the actual dredge and its operation has been tested where all components are operating and gravels are being drawn through the system **and being sorted. Whilst not exact, the noise assessment provides a useful indicator in 'real terms' especially** considering the receiving environment in the proposed area is less sensitive by virtue of less residential properties, communities and the area and the river form.

Cold Gold Clutha did not seek a consent to breach noise limits with the current operation on the 900ha permit downstream of the Roxburgh Dam. The mining activity is a rural activity and Cold Gold Clutha believe they will remain within rural noise limits with regard to the notional boundary associated with any dwellings. Some nearby residents may be able to hear it but it will not breach limits. As noted previously, it remains surprising how few locals are aware of the dredges presence which is a testament to the operation. Cold Gold has since additional baffling to the dredge to provide further attenuation.

Landforms differ within the permit from incised riverbeds with steep banks to areas where the river widens out and noise will also behave differently depending on those landforms. Of relevance is the limited number of residential units or communities within the mining permit area, which is markedly different to that of the currently authorised area which includes the townships of Roxburgh, Millers Flat, Etrick and Beaumont.

There are many areas within the permitted mining area where there are no residential units for 500m to over 1.0km. When considering the inverse square law where, for the doubling of the distance from the noise source (in a free field situation), the sound intensity will diminish by 6dBA and on that basis the likelihood of any breach for many of the residential sites is low. Given the noise source is within an incised river bed, the sound pressure is assumed to be further diminished given sound will deflect or be attenuated in part. Had there been a noise issue, it is assumed the previous 10+ years of operation near Millers Flat or Millers Flat would have attracted some community concern or individual complaints. There were however none.

To assist with understanding the topography along the mining permit, we have prepared a number of cross-sections. The first cross-section in Figure 10 comprises the land within red line in the topographic image below extends from Etrick township over the Clutha and towards Tima Burn being within the currently permitted area. This provides some insight as to how the noise will be in part attenuated by the topography and will not function in the same manner as in a free field situation.



Figure 10 – Elevation cross-section from SH6 to Teviot Road at Etrick

The cross-sections further below show a more incised river bed and, on that basis, it is assumed the noise effects will behave similarly or better than the noise monitoring assessment. The difference of course is the density of residential activity is significantly less over the proposed mining area.

For the CODC, standards 4.7.6(E) relate specifically to activities which occur within the Rural Resource Area. It states all activities shall be conducted so as to ensure the following noise limits are not exceeded at any point within the notional boundary of any dwelling, rest-home or hospital, or at any point within any Residential Resource Area or any Rural Settlements Resource Area:

On any day	7:00am to 10:00pm	55 dBA L ₁₀
	10:00pm to 7:00am the following day	40 dBA L ₁₀
		70 dBA L _{max}

The notional boundary is defined as a line 20 metres from part of any living accommodation or the legal boundary where this is closer to the living accommodation.

It is problematic to carry out noise testing of the dredge within the mining permit without first having a resource consent to authorise the use of the dredge in the river. I understand CODC staff have carried out a noise assessment during the operating in the mid-reaches which found the dredge met the standards.

We propose a condition that limits noise from the dredge must not exceed 55 dBA L₁₀ when measured outdoors beside any residential unit. This in effect provides for noise above 55dBA at the notional boundary, accepting that any noise effects will be temporary as the dredge mines and moves elsewhere.

The rural area is a contrasting environment where rural farming activity or frequent jet boats travel up the river. It is not necessarily a quiet area, although it certainly can be very quiet too. Noise is of course anticipated in the rural zone.

With respect to illustrating how the riverbed elevations are, below are a number of cross-sections within the proposed mining area. The red line on the topographic map illustrates the extent of the cross-section, where each location has been deliberately identified to capture the State Highways as much as possible. Noise from the dredge will then radiate out in an arc from its location.

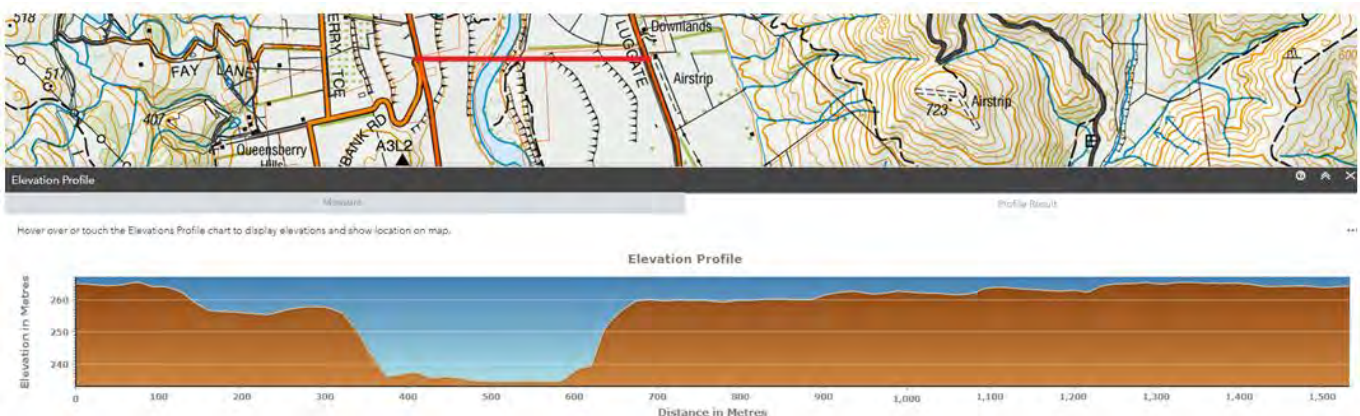


Figure 11 – Elevation cross-section from SH6 to SH8A opposite Fay Lane, Queensbury

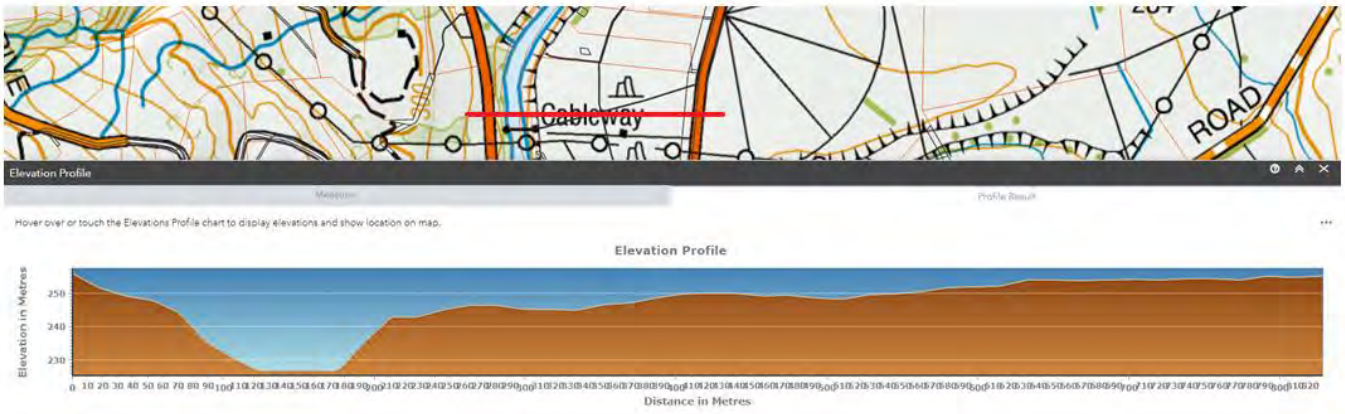


Figure 12 – Elevation cross-section from SH6 to SH8A downstream of Poison Creek, Queensberry



Figure 13 – Elevation cross-section from SH6 to SH8A opposite Albert Burn confluence

Of relevance is also the permitted baseline where a six-inch dredge could operate anywhere along the river, where most operate without a muffler to attenuate the noise, opting for a heater fitting to enable the diver to have warm water pumped into their wetsuit. A six-inch dredge without a muffler can be quite noisy and is a permitted activity. Of course, s17 always applies where every person has a duty to avoid, remedy or mitigate adverse effects on the receiving environment.

The applicant has advised they are adding additional noise attenuation to the dredge. We submit that given the noise testing by the applicant, the previous ten plus years of mining without issue and the permitted baseline that noise will not result in any adverse effects on adjoining property owners.

Effects on Heritage and Archaeology

The dredges operation will not alter the riverbank or any structures on the riverbank or spanning the river. For the 900 hectares of the Clutha where the dredge is currently authorised, a number of old dredge relics rest on the riverbed some of which are partially exposed above water. These features are obviously avoided as they present a navigation hazard but are also protected under the Heritage New Zealand Pouhere Taonga Act 2014. No effect on heritage structures or values will occur as a result of the dredges operation.

In terms of riverbank archaeology that is both known or presently undiscovered, the applicant will adopt a protocol similar to the existing consent conditions to ensure heritage interests are not impacted. Cold Gold Clutha value the history of occupation, migration along and mining within the Clutha River and wish to add to the story of chasing gold rather than damage the archaeological record.



Figure 14 – Remains of the Gold Queen dredge



Figure 15 – Remains of the Kohinoor dredge



Figure 16 – Golden Treasure dredge just prior to sinking



Figure 17 – Remains of the Jubilee dredge

No consultation with Heritage New Zealand has been carried out. We do assume they will submit as part of the publicly notified process.

With respect to any archaeological sites in the river, we are mindful that the Upper Clutha can experience significant flood events. Figure 18 below demonstrates the flow during a flood in November 1999 where the river downstream of the Cardrona confluence peaked at 1,617m³/sec⁶. In this case any heritage features within the active bed of the river are likely to be affected by the flood flows.

It is accepted some instream features such as wing-dams are enduring and can tolerate flood pressures, however we not aware of wing-dams in the main stem of the Clutha. On that basis, we consider there are few if any in-stream archaeological features that require specific attention. In addition, reverting back to the permitted baseline we are mindful that permitted activity rule 13.5.1.7 of the RP:W does not contain any specific

⁶ Flood and erosion hazard in the Clutha River/Mata-Au between Queensberry and Lake Dunstan, Otago Regional Council, October 2014.

conditions in relation to heritage. In this case, the over-arching legislation of the Heritage Act applies to all heritage features both on land and in-stream.

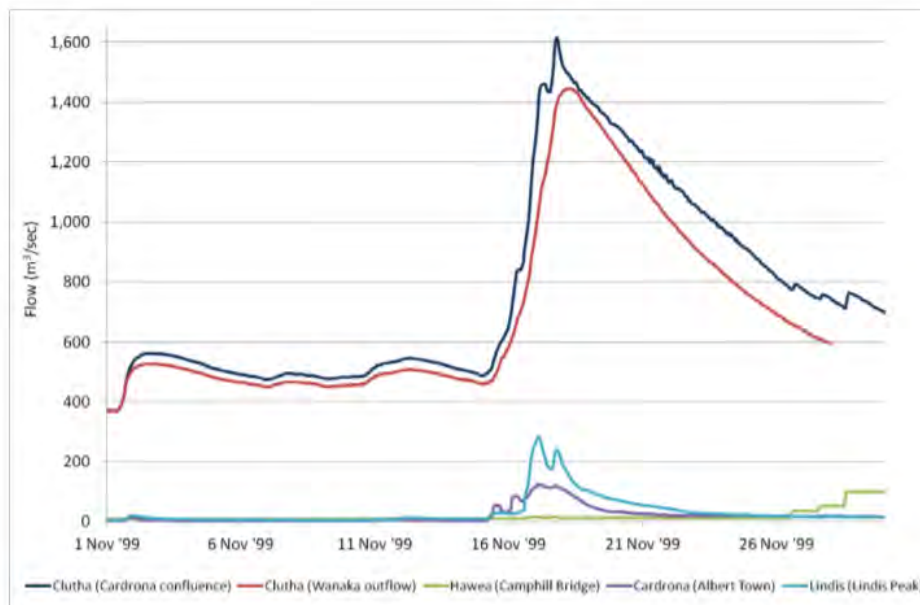


Figure 18 – Clutha River flows downstream of the Cardrona River confluence

Effects of Flooding

The pre-application feedback sought further information of flooding and how the dredge will be managed during flood events.

The skipper of the dredge is an expert in understanding river flows and pressures and visualising how the river behaves during these high flow events. Understanding how the river behaves and where safe areas are located, including timeframes to move the dredge to these safe areas is all part of the skipper's role on the dredge.

As part of the pre-application feedback Council staff sought **clarification on the "predetermined areas where the dredge is parked when retreating from flood situations and when not in use that are out of the public eye."** Prior to the dredge commencing mining in an area, the skipper will carry out an evaluation where the dredge can manoeuvre during high flow events. No photographs can be provided as these areas have not yet been assessed.

Understanding where safe areas are located, and the timeframe to move the dredge to these areas is all part of the skipper's role on the dredge. This approach has occurred for a number of years in the mid-reaches successfully. The dredge is a registered maritime vessel and has a skipper who is qualified to operate a maritime vessel.

With respect to being out of the 'public eye' when retreating from flood flows much of the river is for the most part within the incised bed, where the entire river is not visible from the public space. To illustrate, the river is 200-300m away from the State Highway in Figure 19 below but is only discernible by the thin line of vegetation along the upper edge of the bank.



Figure 19 – Clutha River along line of obscured willow within incised bed when viewed from State Highway

Putting aside the fact the river is deeply incised, for a large proportion of the area the topography and vegetation obscure the views of the Clutha River where the dredge will simply not be visible at any time. Cold Gold suggests a site visit would provide further clarity for those not familiar with the topography.

Cold Gold Clutha has a positive working relationship with Contact Energy. Contact carries out long-range hydrological modelling as part of managing the river system and the applicant is generously provided flood hazard information to inform their operation safely.

Defenses Against Water

The current consent in the 900ha mid-reaches of the Clutha River excludes mining or undercutting banks and is restricted to the river wet-bed only. We suggest this is carried into any future consent.

The applicant has operated the Clutha River Dredge in the mid-reaches for some time without issue and intends to continue to operate in a cautious manner. The dredge also lacks the capacity to mine the riverbanks as the draft is 0.8m and the intake nozzle is located centrally within the plant; which inhibits the ability to mine the riverbanks. In comparison smaller 6-inch dredges which are permitted can mine into and under structures on riverbanks.

The catchment upstream extends beyond Makarora to the Haast Pass, and comprises approximately 4,500km². The river is subject to frequent high flow events, some of which carry over 1,600m³/s where MALF is 120m³/s. It is also submitted the effects of the Clutha River Dredge on defences against water are inconsequential in comparison to the effects of these natural flood events.

Storage of Fuel and Equipment

Fuel tank locations are chosen to be near the work location of the dredge and must have vehicular access for the refuelling tanker. For security reasons, location on private property is preferred and is negotiated with the landowner(s). Tank position is also required to be above significant flood zones. Subject to general granting of consents, perhaps we suggest any proposed tank site is submitted for approval prior to locating the tank. Refuelling procedures are documented within the Maritime Transport Operator Plan appended to this report.

The bulk tank stores 5,000L of fuel. The tank is owned and maintained by Southfuels. The tank is a steel self-bunded tank (a tank within a tank), has industry compliant hoses, and fittings, manual shutoff valves and an automatic shutoff dispensing nozzle. Refuelling is a 100% monitored procedure and spill kits are maintained at the bulk tank, the tender and on board the dredge.

Summary of Adverse Effects on the Environment

Subject to the avoidance, mitigation or remediation of adverse effects, the assessment above demonstrates that the activity can be carried out, (and has historically been carried out), with no adverse effects to any Schedule 1 values, has less than minor effects on public access and amenity, will not alter the natural character of the river within this location. Heritage values will not be adversely impacted by the activity to allow the dredging activity to be carried out in the Upper Clutha River.

Overall, it is determined that the effects of the proposal on the environment and residents are no more than minor.

Offsetting or Compensation Measures

In accordance with Section 104(1)(ab) of the Resource Management Act 1991, there are no offsetting or compensation measures offered nor are any deemed necessary.

Relevant Provisions

Objectives and Policies Assessment - Otago Regional Plan:Water

In accordance with Section 104(1)(b) of the Resource Management Act 1991, the objectives and policies of the RP:W have been assessed when preparing this application.

Objectives	Supporting Policies	Assessment
<p><u>Objective 5.3.1</u> To maintain or enhance the natural and human use values, identified in Schedules 1A, 1B and 1C, that are supported by Otago's lakes and rivers.</p> <p><u>Objective 5.3.3</u> To protect the natural character of Otago's lakes and rivers and their margins from inappropriate subdivision, use or development.</p> <p><u>Objective 5.3.4</u> To maintain or enhance the amenity values associated with Otago's lakes and rivers and their margins.</p>	<p><u>Policies: 5.4.1</u> To identify the following natural and human use values supported by Otago's lakes and rivers, as expressed in Schedule 1: (a) Outstanding natural features and landscapes; (b) Areas with a high degree of naturalness; (c) Areas of significant indigenous vegetation, significant habitats of indigenous fauna, and significant habitats of trout and salmon; (d) Ecosystem values; (e) Water supply values; (f) Registered historic places; and (g) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu.</p> <p><u>Policy 5.4.2</u> In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding, in preference to remedying or mitigating: (1) Adverse effects on: (a) Natural values identified in Schedule 1A; (b) Water supply values identified in Schedule 1B; (c) Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river; (d) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D; (e) The natural character of any lake or river, or its margins; (f) Amenity values supported by any water body; and (2) Causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.</p> <p><u>Policy 5.4.8</u> To have regard to the following features of lakes and rivers, and their margins, when considering adverse effects on their natural character: (a) The topography, including the setting and bed form of the lake or river; (b) The natural flow characteristics of the river; (c) The natural water level of the lake and its fluctuation; (d) The natural water colour and clarity in the lake or river; (e) The ecology of the lake or river and its margins; and</p>	<p>The proposal has been designed to fit sympathetically within the environment. This has been applied with the consideration of :</p> <ul style="list-style-type: none"> • the colours of the external bulk of the dredge being in neutral tones • the noise baffles to attenuate noise • hours of operation • areas are excluded comprising townships and areas where camping does occur • robust controls in terms of sediment management • a clear understanding of the river and its value to the community and process where all staff are well informed of our obligations. • A secure method for refuelling to ensure no losses to the river or margin • Well-constructed slips in the appropriate locations to address bank vegetation, bank stability, sediment and disturbance to the aquatic ecology • Predetermined areas where the dredge is parked when retreating from flood situations and when not in use that are out of the public eye. • An understanding of the archaeological and cultural values associated with the river and a method that does not impact on those values. • Setbacks from significant confluences to avoid disturbance of habitat or taonga species i.e. kanakana <p>Taking into account all the above, the proposal is considered to be consistent with these objectives and policies.</p>

Objectives	Supporting Policies	Assessment
	<p>(f) The extent of use or development within the catchment, including the extent to which that use and development has influenced matters (a) to (e) above.</p> <p><u>Policy 5.4.9</u> To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values: (a) Aesthetic values associated with the lake or river; and (b) Recreational opportunities provided by the lake or river, or its margins.</p>	
<p><u>Objective 5.3.5</u> To maintain or enhance public access to and along the margins of Otago's lakes and rivers.</p>	<p><u>Policy 5.4.6</u> 5.4.6 Legal public access to and along the margins of lakes and rivers will only be restricted where necessary: (a) To protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna; (b) To protect Kai Tahu spiritual and cultural beliefs, values and uses; (c) To protect the health or safety of people and communities. (d) To ensure a level of security consistent with the purposes of a resource consent; or (e) In other exceptional circumstances sufficient to justify the restriction notwithstanding the national importance of maintaining that access.</p>	<p>Legal access will remain unhindered. Cold Gold has secured access rights for the use on the bed and margins and the formation of slipways from the relevant authorities. These rights include a suite of conditions that reflect the public interest and right.</p> <p>The proposed mining will be similar to that of the mining in the mid-reaches of the Clutha, where there was no indication of causing flooding, erosion, land instability or property damage. With respect to sedimentation, the mining operation will result in a visible sediment plume although it is expected to not be visually discernible 200m downstream of the discharge.</p> <p>The proposal is considered generally consistent with this objective and policy.</p>
<p><u>Objective 5.3.7</u> To maintain the heritage values associated with Otago's lakes and rivers, and their margins.</p>	<p><u>Policy 5.4.2</u> In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding, in preference to remedying or mitigating: (1) Adverse effects on: (a) Natural values identified in Schedule 1A; (b) Water supply values identified in Schedule 1B; (c) Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river; (d) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D; (e) The natural character of any lake or river, or its margins; (f) Amenity values supported by any water body; and (2) Causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.</p>	<p>Cold Gold are conscious of the heritage values, both archaeological and cultural of the river and its margins. All efforts have been made to avoid any effects on those values.</p> <p>The proposal is considered consistent with this objective and policy.</p>
<p><u>Objective 8.3.1</u> To maintain: (a) The stability and function of existing structures located in, on, under or over the bed or margin of any lake or river; (b) The stability of the bed and bank of any lake or river; and (c) The flood and sediment carrying</p>	<p><u>Policy 8.4.1</u> When managing activities in, on, under or over the bed or margin of any lake or river, to give priority to avoiding changes in the nature of flow and sediment processes in those water bodies, where those changes will cause adverse effects: (a) On the stability and function of existing structures located in, on, under or over the bed or margin of any lake or river; (b) Arising from associated erosion or sedimentation of the bed or margin of any lake or river, or land instability; or</p>	<p>This objective recognises that activities occurring in, on, under or over the bed or margins of lakes and rivers can exacerbate or create hazards by changing hydrological or fluvial processes. The objective seeks to avoid such hazards by ensuring activities which modify flow and sediment processes do not adversely affect the natural and physical resources of water bodies, encouraging best management practices and information gathering,</p>

Objectives	Supporting Policies	Assessment
<p>capacity of any lake or river</p>	<p>(c) Arising from any reduction in the flood carrying capacity of any lake or river</p> <p><u>Policy 8.6.2</u> To promote best management practices for activities that occur within or adjacent to the bed of lakes and rivers in order to avoid, remedy or mitigate any adverse effect.</p>	<p>and ensuring that extraction activities are sustainable.</p> <p>In this instance, the applicant has previously operated the dredge and has a clear understanding of the dynamics of the river, the gravel processes and the relationship with sediment control.</p> <p>Overall, the activity, subject to conditions of consent, is assessed as consistent with this suite of objectives and policies.</p>
<p><u>Objective 8.3.2</u> To minimise reduction in water clarity caused by bed disturbance.</p>	<p><u>Policy 8.6.1</u> In managing the disturbance of the bed or margin of any lake or river, to have regard to any adverse effect on: (a) The spawning requirements of indigenous fauna, and trout or salmon; (b) Bed and bank stability; (c) Water quality; (d) Amenity values caused by any reduction in water clarity; and (e) Downstream users.</p>	<p>Natural and human use values and other uses of water can be susceptible to the physical changes caused by disturbance of the bed.</p> <p>Previous mining demonstrates that the river is quickly able to recover from the dredging activity activities, such, that no adverse effect on water quality, downstream users and amenity values arising from water clarity have been identified.</p> <p>The activity, subject to conditions of consent, is assessed as consistent with this suite of objectives and policies.</p>
<p><u>Objective 8.3.3</u> To maintain the integrity of existing defences against water.</p>	<p><u>Policy 8.5.6</u> To manage activities that have the potential to adversely affect existing defences against water.</p>	<p>Defences against water are used extensively throughout Otago to reduce the threat of flooding and are an integral component of the community's response to flood events.</p> <p>It is important that these works are identified, and an appropriate separation distance is applied to ensure no effects occur on these works. In this case, the applicant is cognisant of any defence structures and will apply a suitable setback.</p> <p>The proposal is therefore considered consistent with this objective and relevant policies.</p>
<p><u>Objective 10A.1.1</u> Transition toward the long-term sustainable management of surface water resources in the Otago region by establishing an interim planning framework to manage new water permits, and the replacement of deemed permits and water permits to take and use surface water (including groundwater considered as surface water) where those water permits expire</p>	<p><u>Policy 10A.2.2</u> Irrespective of any other policies in this Plan concerning consent duration, only grant new resource consents for the take and use of water for a duration of no more than six years.</p>	<p>The proposal seeks a term expiring on 25 February 2031 commensurate with the expiry of mining permit 60593.</p> <p>It would be illogical to apply a 6-year term on the take whilst providing a longer expiry date for the discharge and land use component. This highlights the failure in drafting the Plan Change 7 performance standards to not accommodate non-consumptive takes in the framework.</p> <p>It is noted the relevant objective relates to the sustainable management of surface water resources in Otago. As the proposed take is non-consumptive there</p>

Objectives	Supporting Policies	Assessment
prior to 31 December 2025, until the new Land and Water Regional Plan is made operative.		is no issue in terms of ensuring sustainability. The proposal is consistent with the objective but inconsistent with the policy.

Overall, the proposal is considered to be consistent or generally consistent with the above objectives and policies. The exception relates the 6-year term promoted in the policy within Plan Change 7. Given the plan change is before the Courts, and clearly has implementation issues, we submit Council should apply limited weighting to this policy.

Assessment Against Plan Change 7

Plan Change 7 applies in terms of the objectives and policies. During the Schedule 1 process over twenty-five submissions were received by Council that sought non-consumptive takes be excluded from PC7 as it could force a consent application into a non-complying process. Councils policy staff advised that whilst the relief sought was indeed reasonable, they were however not going to accept the proposed relief and elected to rely on the Courts to make a determination. Of course, none of the twenty-five plus miners elected to take the case **to Court and as a consequence of Council's stance**, a non-consultive take remains caught by PC7.

Although the water take aspect of the application is considered non-consumptive, policy 10A.2.2 applies to the **application as it involves the take and use of water. The terms of this policy include 'only grant' which is directive** and granting a consent for longer than 6 years would be inconsistent with this policy despite its non-consumptive nature.

The objective requires to 'transition' toward long-term sustainable management of surface water. This relates to the management of surface water generally and the issues relating to large quantities of water being allocated to deemed permits or historic water permit (pre-RMA). Transition suggests a process or period of changing which through the preceding policies and rules is achieved through limiting the duration of consent and thereby reducing risk for water to be allocated for a long duration under the current framework. This objective is outcome focused. The policies look to provide procedural framework for achieving this outcome, specifically Policy 10A.2.2 which directs to reduce the duration.

Cold Gold Clutha is seeking a term of consent that is longer than six years and This requested term means the application is inconsistent with policy 10A.2.2 of PC7, although the take is non-consumptive, it is still defined as a **'new take and use of water' and therefore is encompassed in Policy 10A.2.2.**

Assessment of Regional Policy Statements

Section 104(1)(b)(v) of the Act requires that any relevant regional policy statements be taken into account. The Partially Operative Regional Policy Statement for Otago (PRPS) was made partially operative on 14 January 2019 and fully operative on 15 March 2021. Relevant to this application are the following objectives and policies:

Objectives	Supporting Policies	Assessment
<u>Objective 2.1</u> The principles of Te Tiriti o Waitangi are taken into account in resource management processes and decisions	<u>Policy 2.1.2 Treaty principles</u> Ensure that local authorities exercise their functions and powers, by: a) Recognising Kāi Tahu's status as a Treaty partner; and b) Involving Kāi Tahu in resource management processes implementation; c) Taking into account Kāi Tahu values in resource management decision-making processes and implementation; d) Recognising and providing for the relationship of Kāi Tahu's culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taoka;	The mining proposal has been cognisant of Manawhenua values and heritage both within the river body and also the river margins. Every effort has been made to ensure treaty principles are upheld. As part of the consenting process the Runaka whom have an interest in the Clutha River/ Mata-Au are able to participate and provide their commentary to the proposal.

	<p>e) Ensuring Kāi Tahu have the ability to:</p> <ul style="list-style-type: none"> i. Identify their relationship with their ancestral lands, water, sites, wāhi tapu, and other taoka; ii. Determine how best to express that relationship; <p>f) Having particular regard to the exercise of kaitiakitaka;</p> <p>g) Ensuring that district and regional plans:</p> <ul style="list-style-type: none"> i. Give effect to the Ngāi Tahu Claims Settlement Act 1998; ii. Recognise and provide for statutory acknowledgement areas in Schedule 2; iii. Provide for other areas in Otago that are recognised as significant to Kāi Tahu; <p>h) Taking into account iwi management plans.</p>	<p>The application is considered to be consistent with this objective and these policies.</p>
<p>Objective 3.1 The values (including intrinsic values) of ecosystems and natural resources are recognised and maintained or enhanced where degraded.</p>	<p><u>Policy 3.1.1 Fresh water</u> Safeguard the life-supporting capacity of fresh water and manage fresh water to:</p> <ul style="list-style-type: none"> a) Maintain good quality water and enhance water quality where it is degraded, including for: <ul style="list-style-type: none"> i. Important recreation values, including contact recreation; and, ii. Existing drinking and stock water supplies; b) Maintain or enhance aquatic: <ul style="list-style-type: none"> i. Ecosystem health; ii. Indigenous habitats; and, iii. Indigenous species and their migratory patterns. c) Avoid aquifer compaction and seawater intrusion; d) Maintain or enhance, as far as practicable: <ul style="list-style-type: none"> i. Natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers; ii. Coastal values supported by fresh water; iii. The habitat of trout and salmon unless detrimental to indigenous biological diversity; and iv. Amenity and landscape values of rivers, lakes, and wetlands; e) Control the adverse effects of pest species, prevent their introduction and reduce their spread; f) Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion; and, g) Avoid, remedy or mitigate adverse effects on existing infrastructure that is reliant on fresh water. <p><u>Policy 3.1.2 Beds of rivers, lakes, wetlands, and their margins</u> Manage the beds of rivers, lakes, wetlands, their margins, and riparian vegetation to:</p> <ul style="list-style-type: none"> a) Safeguard the life supporting capacity of fresh water; b) Maintain good quality water, or enhance it where it has been degraded; c) Maintain or enhance bank stability; d) Maintain or enhance ecosystem health and indigenous biological diversity; e) Maintain or enhance, as far as practicable: <ul style="list-style-type: none"> i. Their natural functioning and character; and ii. Amenity values; f) Control the adverse effects of pest species, prevent their introduction and reduce their spread; and, g) Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion <p><u>Policy 3.1.11</u> Natural features, landscapes, and seascapes Recognise the values of natural features, landscapes and seascapes are derived from the biophysical, sensory and associative attributes in Schedule 3.</p>	<p>Relocating the mining activity from the mid-reaches of the Clutha River to the upper reaches involves a fresh assessment of the proposal against the natural values associated with the river.</p> <p>Cold Gold has considered the proposal against these values and is of the opinion the continued mining activity is respectful of those values and can operate in a manner where the effects on the values can be either avoided or mitigated. Cold Gold also have the benefit of the previous 10 years mining in the Clutha using the same dredge, where the public and stakeholders have had the ability to evaluate how the company operates.</p> <p>The application is considered to be consistent with this objective and these policies.</p>

<p>Objective 3.2 Otago's significant and highly-valued natural resources are identified and protected, or enhanced where degraded</p>	<p><u>Policy 3.2.4 Managing outstanding natural features, landscapes and seascapes</u> Protect, enhance or restore outstanding natural features, landscapes and seascapes, by all of the following: a) In the coastal environment, avoiding adverse effects on the values (even if those values are not themselves outstanding) that contribute to the natural feature, landscape or seascape being outstanding; b) Beyond the coastal environment, maintaining the values (even if those values are not themselves outstanding) that contribute to the natural feature, landscape or seascape being outstanding; c) Avoiding, remedying or mitigating other adverse effects; d) Encouraging enhancement of those areas and values that contribute to the significance of the natural feature, landscape or seascape.</p> <p><u>Policy 3.2.6 Managing highly valued natural features, landscapes and seascapes</u> Maintain or enhance highly valued natural features, landscapes and seascapes by all of the following: a) Avoiding significant adverse effects on those values that contribute to the high value of the natural feature, landscape or seascape; b) Avoiding, remedying or mitigating other adverse effects; c) Encouraging enhancement of those values that contribute to the high value of the natural feature, landscape or seascape.</p> <p><u>Policy 3.2.14 Managing outstanding freshwater bodies</u> Protect outstanding freshwater bodies by all of the following: a) Maintaining the values that contribute to the water body being outstanding; b) Avoiding, remedying or mitigating other adverse effects on the water body; c) Controlling the adverse effects of pest species, preventing their introduction and reducing their spread; d) Encouraging enhancement of those values that contribute to the water body being outstanding.</p>	<p>As noted above, Cold Gold currently mines and enjoys resource consent to operate the dredge in the mid-reaches of the Clutha River which is considered to comprise significant and highly valued landscapes. During the previous 10 years of mining, Cold Gold has demonstrated a history of respect where there remain no visible evidence of the previous mining activity.</p> <p>Whilst the dredge may be visible or even audible to some, the operation is dynamic, moving from area to area rather than exposing any landscape to any permanent change. No parties are considered to be affected by the visual or audible effects on the landscape.</p> <p>The dredge is painted in colours typically found in the rural landscape and every effort has been made to mitigate noise effects. The previous 10-years of operation has found few are concerned or even aware of the operation of the dredge in the Clutha, and the relocation to the upper reaches is likely to be no different.</p> <p>The application is considered to be consistent with this objective and these policies.</p>
<p>Objective 5.1 Public access to areas of value to the community is maintained or enhanced.</p> <p>Objective 5.4 Adverse effects of using and enjoying Otago's natural and physical resources are minimised.</p>	<p><u>Policy 5.1.1 Public access</u> Maintain or enhance public access to the natural environment, including to the coast, lakes, rivers and their margins and where possible areas of cultural or historic significance, unless restricting access is necessary for one or more of the following: a) Protecting public health and safety; b) Protecting the natural heritage and ecosystem values of sensitive natural areas or habitats; c) Protecting identified sites and values associated with historic heritage or cultural significance to Kāi Tahu; d) Ensuring a level of security consistent with the operational requirements of a lawfully established activity.</p> <p><u>Policy 5.2.1 Recognising historic heritage</u> Recognise all the following elements as characteristic or important to Otago's historic heritage: a) Residential and commercial buildings; b) Māori cultural and historic heritage values; c) 19th and early 20th century pastoral sites; d) Early surveying, communications and transport, including roads, bridges and routes;</p>	<p>Relocating the mining activity from the mid-reaches of the Clutha River to the upper reaches will not hinder any public access or introduce any new effects that may affect one's enjoyment of the area, or on cultural or heritage values.</p> <p>The application is considered to be consistent with this objective and these policies.</p>

	e) Early industrial historic heritage, including mills and brickworks; f) Gold and other mining systems and settlements; g) Dredge and ship wrecks; h) Coastal historic heritage, particularly Kāi Tahu occupation sites and those associated with early European activity such as whaling; i) Memorials; j) Trees and vegetation.	
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The assessment of environmental effects has established that, subject to conditions, the extraction activity will not:

- have an adverse effect on water quality, aquatic ecosystems, amenity values, public access or heritage values
- will not threaten existing defences against water;
- will not have any adverse effects on the cultural or heritage values of the area,
- will not have an adverse effect on the landscape, and
- will provide for the economic well-being of the applicant and as a result the community by providing jobs.

Overall, the proposal is assessed as consistent with the provisions of the RPS.

Partially Operative Regional Policy Statement

The relevant provisions of the PORPS include:

MW-O1 – Principles of Te Tiriti o Waitangi

The principles of Te Tiriti o Waitangi are given effect in resource management processes and decisions, utilising **a partnership approach between councils and Papatipu Rūnaka to ensure that what is valued by mana whenua is actively protected in the region.**

MW-P2 – Treaty principles

Local authorities exercise their functions and powers in accordance with Treaty principles, by:

- (1) **recognising the status of Kāi Tahu and facilitating Kāi Tahu involvement in** decision making as a Treaty partner,
- (2) including Kāi Tahu in resource management processes and implementation to the extent desired by mana whenua,
- (3) **recognising and providing for Kāi Tahu values and resource management issues, as identified by mana whenua, in resource management decision-making processes and plan implementation,**
- (4) **recognising and providing for the relationship of Kāi Tahu culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taoka by ensuring that Kāi Tahu have the ability to identify these relationships and determine how best to express them,**
- (5) **ensuring that regional and district plans recognise and provide for Kāi Tahu relationships with Statutory Acknowledgement Areas, tōpuni, nohoaka and customary fisheries identified in the NTCSA 1998, including by actively protecting the mauri of these areas,**
- (6) **having particular regard to the ability of Kāi Tahu to exercise kaitiakitaka,**
- (7) actively pursuing opportunities for:
 - (a) **delegation or transfer of functions to Kāi Tahu, and**
 - (b) partnership or joint management arrangements, and
- (8) taking into account iwi management plans when making resource management decisions.

MW-P3 – Supporting Kāi Tahu well-being

The natural environment is managed to support Kāi Tahu well-being by:

- (1) protecting customary uses, Kāi Tahu values and relationships of Kāi Tahu to resources and areas of significance, and restoring these uses and values where they have been degraded by human activities,
- (2) safeguarding the mauri and life-supporting capacity of natural resources, and

(3) working with Kāi Tahu to incorporate mātauraka in resource management.

IM-O2 – Ki uta ki tai

Natural and physical resource management and decision making in Otago embraces ki uta ki tai, recognising that the environment is an interconnected system, which depends on its connections to flourish, and must be considered as an interdependent whole.

IM-P2 – Decision priorities

Unless expressly stated otherwise, all decision making under this RPS shall:

1. first, secure the long-term life-supporting capacity and mauri of the natural environment,
2. secondly, promote the health needs of people, and
3. thirdly, safeguard the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

IM-P4 – Setting a strategic approach to ecosystem health

Healthy ecosystems and ecosystem services are achieved through a planning framework that:

- (1) protects their intrinsic values,
- (2) takes a long-term strategic approach that recognises changing environments,
- (3) recognises and provides for ecosystem complexity and interconnections, and (4) anticipates, or responds swiftly to, changes in activities, pressures, and trends.

LF-WAI-O1 – Te Mana o te Wai

The mauri of Otago’s water bodies and their health and wellbeing is protected, and restored where it is degraded, and the management of land and water recognises and reflects that:

1. water is the foundation and source of all life
2. **there is an integral kinship relationship between water and Kāi Tahu whānui, and this relationship endures through time, connecting past, present and future,**
3. each water body has a unique whakapapa and characteristics,
4. water and land have a connectedness that supports and perpetuates life, and
5. **Kāi Tahu exercise rakatirataka, manaakitaka and their kaitiakitaka duty of care and attention over wai and all the life it supports.**

LF-WAI-P1 – Prioritisation

In all management of fresh water in Otago, prioritise:

- (1) first, the health and well-being of water bodies and freshwater ecosystems, te hauora te wai and te hauora o te taiao, and the exercise of mana whenua to uphold these,
- (2) second, the health and well-being needs of people, te hauora o te tangata; interacting with water through ingestion (such as drinking water and consuming harvested resources) and immersive activities (such as harvesting resources and bathing), and
- (3) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

The application will not impact on water quantity given the non-consumptive nature of the take. The discharge component has been adequately mitigated and adverse effects on the ecology of the river will be less than minor. This application involves an activity that supports the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future. To this extent, it sits third in this priority list in LF-WAI-P1. Nevertheless, since the proposal is not likely to result in any effects on the health and well-being of the resource, nor on the health needs of people, it is considered consistent with these policies.

LF-WAI-P2 – Mana whakahaere

Recognise and give practical effect to Kāi Tahu rakatirataka in respect of fresh water by:

- (1) facilitating partnership with, and the active involvement of, mana whenua in freshwater management and decision-making processes,
- (2) **sustaining the environmental, social, cultural and economic relationships of Kāi Tahu with water bodies,**
- (3) providing for a range of customary uses, including mahika kai, specific to each water body, and
- (4) **incorporating mātauraka into decision making, management and monitoring processes.**

Aukaha on behalf of the local runaka were given the opportunity to engage in the early process of this application and have done so. Therefore, we submit the proposal is consistent with the above policy.

LF-WAI-P3 – Integrated management/ki uta ki tai

Manage the use of freshwater and land in accordance with tikanga and kawa, using an integrated approach that:

1. recognises and sustains the connections and interactions between water bodies (large and small, surface and ground, fresh and coastal, permanently flowing, intermittent and ephemeral),
2. sustains and, wherever possible, restores the connections and interactions between land and water, from the mountains to the sea,
3. sustains and, wherever possible, restores the habitats of mahika kai and indigenous species, including taoka species associated with the water body,
4. manages the effects of the use and development of land to maintain or enhance the health and well-being of freshwater and coastal water,
5. encourages the coordination and sequencing of regional or urban growth to ensure it is sustainable,
6. has regard to foreseeable climate change risks, and
7. has regard to cumulative effects and the need to apply a precautionary approach where there is limited available information or uncertainty about potential adverse effects.

LF-WAI-P4 – Giving effect to Te Mana o te Wai

All persons exercising functions and powers under this regional policy statement and all persons who use, develop or protect resources to which this regional policy statement applies must recognise that LF-WAI-O1, LF-WAI-P1, LF-WAI-P2 and LF-WAI-P3 are fundamental to upholding Te Mana o te Wai, and must be given effect to when making decisions affecting freshwater, including when interpreting and applying the provisions of the LF chapter.

This application involves an activity that supports the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future. To this extent, it sits third in this priority list. Nevertheless, since the proposal is not likely to result in any effects on the health and well-being of the resource, nor on the health needs of people, it is considered consistent with this policy. The proposed activity involves a non-consumptive take therefore, water will be used efficiently and sustainably. The disturbance is limited to a small and confined daily area which will ensure that the health and wellbeing of the Clutha is not degraded by the proposed activity. The application is considered to be generally consistent with LF-WAI-P3 and LF-WAI-P4.

LF-VM-O2 – Clutha Mata-au FMU vision

In the Clutha Mata-au FMU:

- (1) management of the FMU recognises that:
 - (a) the Clutha River / Mata-au is a single connected system ki uta ki tai, and
 - (b) the source of the wai is pure, coming directly from Tawhirimatea to the top of the mauka and into the awa,
- (2) freshwater is managed in accordance with the LF-WAI objectives and policies,
- (3) **the ongoing relationship of Kāi Tahu with wāhi tūpuna is sustained,**
- (4) **water bodies support thriving mahika kai and Kāi Tahu whānui have access to mahika kai,**
- (5) indigenous species migrate easily and as naturally as possible along and within the river system,
- (6) the national significance of the Clutha hydro-electricity generation scheme is recognised,
- (7) in addition to (1) to (6) above:
 - (a) in the Upper Lakes rohe, the high quality waters of the lakes and their tributaries are protected, **recognising the significance of the purity of these waters to Kāi Tahu** and to the wider community,
 - (b) in the Dunstan, Manuherekia and Roxburgh rohe:
 - (i) flows in water bodies sustain and, wherever possible, restore the natural form and **function of main stems and tributaries to support Kāi Tahu values and practices, and**
 - (ii) innovative and sustainable land and water management practices support food production in the area and reduce discharges of nutrients and other contaminants to water bodies so that they are safe for human contact, and
 - (iii) sustainable abstraction occurs from main stems or groundwater in preference to tributaries,
 - (c) in the Lower Clutha rohe:

- (i) there is no further modification of the shape and behaviour of the water bodies and opportunities to restore the natural form and function of water bodies are promoted wherever possible,
 - (ii) the ecosystem connections between freshwater, wetlands and the coastal environment are preserved and, wherever possible, restored,
 - (iii) land management practices reduce discharges of nutrients and other contaminants to water bodies so that they are safe for human contact, and
 - (iv) there are no direct discharges of wastewater to water bodies, and
- (8) the outcomes sought in (7) are to be achieved within the following timeframes:
- (a) by 2030 in the Upper Lakes rohe,
 - (b) by 2045 in the Dunstan, Roxburgh and Lower Clutha rohe, and (c) by 2050 in the Manuherekia rohe.

The Applicant has engaged with Aukaha on behalf of runaka through the application drafting process, and Aukaha submitted on the application on behalf of Hokonui **Rūnaka**. Their input was provided to E3 Scientific to incorporate into their ecological assessment of the dredging activity. It was assessed that any ecological adverse effects on the waterbody will be less than minor due to the proposed mitigation measures and consent conditions. The application is generally consistent with this policy.

LF-VM-07 – Integrated management

Land and water management apply the ethic of ki uta ki tai and are managed as integrated natural resources, recognising the connections and interactions between freshwater, land and the coastal environment, and between surface water, groundwater and coastal water.

LF-FW-08 – Freshwater

In Otago’s water bodies and their catchments:

- (1) the health of the wai supports the health of the people and thriving mahika kai,
- (2) water flow is continuous throughout the whole system,
- (3) the interconnection of freshwater (including groundwater) and coastal waters is recognised,
- (4) native fish can migrate easily and as naturally as possible and taoka species and their habitats are protected, and
- (5) **the significant and outstanding values of Otago’s outstanding** water bodies are identified and protected.

LF-FW-010 – Natural character

The natural character of wetlands, lakes and rivers and their margins is preserved and protected from inappropriate subdivision, use and development.

The natural character of the Clutha and the surrounding area will not be affected from the proposed activity as the water take is non-consumptive and only gold will be taken from the river. The disturbance to the riverbed will be limited as the activity is discrete due to the method of mining and small maximum area of disturbance. The discharge of sediment will have limited effects on the natural character of the river as assessed by E3 Scientific given appropriate mitigation measures have been proposed by the applicant. These mitigation measures will ensure that the surrounding environment of the proposed activity will retain its natural character as well as the area of the proposed works and therefore will be consistent with this policy.

LF-FW-P12 – Protecting outstanding water bodies

The significant and outstanding values of outstanding water bodies are:

- (1) identified in the relevant regional and district plans, and
- (2) protected by avoiding adverse effects on those values.

The Clutha River contains many values. Based on the limited area of disturbance and the mitigation measures proposed, all significant effects will be avoided. The application is generally consistent with this policy.

LF-FW-P13 – Preserving natural character

Preserve the natural character of lakes and rivers and their beds and margins by:

- (1) avoiding the loss of values or extent of a river, unless:
 - (a) there is a functional need for the activity in that location, and

- (b) the effects of the activity are managed by applying:
 - (i) for effects on indigenous biodiversity, either ECO-P3 or ECO-P6 (whichever is applicable), and
 - (ii) for other effects, the effects management hierarchy,
- (2) not granting resource consent for activities in (1) unless Otago Regional Council is satisfied that:
 - (a) the application demonstrates how each step of the effects management hierarchies in (1)(b) will be applied to the loss of values or extent of the river, and
 - (b) any consent is granted subject to conditions that apply the effects management hierarchies in (1)(b),
- (3) establishing environmental flow and level regimes and water quality standards that support the health and well-being of the water body,
- (4) wherever possible, sustaining the form and function of a water body that reflects its natural behaviours,
- (5) recognising and implementing the restrictions in Water Conservation Orders,
- (6) preventing the impounding or control of the level of Lake Wanaka,
- (7) preventing modification that would reduce the braided character of a river, and
- (8) controlling the use of water and land that would adversely affect the natural character of the water body.

LF-FW-P14 – Restoring natural character

Where the natural character of lakes and rivers and their margins has been reduced or lost, promote actions that:

- (1) restore a form and function that reflect the natural behaviours of the water body,
- (2) improve water quality or quantity where it is degraded,
- (3) increase the presence, resilience and abundance of indigenous flora and fauna, including by providing for fish passage within river systems,
- (4) improve water body margins by naturalising bank contours and establishing indigenous vegetation and habitat, and
- (5) restore water pathways and natural connectivity between water systems.

Any adverse effects on the waterbody have been assessed as less than minor provided the recommended consent conditions are adhered to. Although the proposed activity will alter the natural character of the Clutha River when the suction dredge is in use, effects will be temporary and less than minor and natural character will be retained overall. On that basis, the application is not inconsistent with this policy.

Overall, the proposed activities associated with the mining including the water take, disturbance to the river, and discharge to water, are generally consistent with the policies within the Proposed Otago Regional Policy Statement. This is also due to the proposed activity being on a relatively small scale and the mitigation measures, particularly in terms of limiting timing and amount of works and requiring appropriate sediment control measures to reduce effects from the discharge which are considered appropriate. In addition, the applicant has a record of carrying out mining in the Clutha River using the dredge with no issues identified either by either Council or complaints by the public.

Other Planning Instruments

Kai Tahu Ki Otago Natural Resource Management Plan 2005

The Natural Resource Management Plan 2005 has been reviewed in respect of this application. The following relevant issues in respect of proposal are identified:

- Cumulative effects of extraction activities in the Clutha/Mata-au.
- Effects on aquatic ecosystems.

The above issues are sought to be managed through the following policies:

To require applications to include information on the following:

- cumulative effects
- effects on aquatic ecosystems
- effects on indigenous fisheries
- proposed timing of works, and

- effects on cultural values of Kā Papatipu Rūnaka

In this instance, it is respectfully assessed that:

- There are will be reduced mining activities presently in the Clutha River/ Mata-Au as a consequence of the permits held by Cold Gold Clutha, and, as such cumulative effects are assessed as no more than minor;
- With the exception of the slipway formation, the works will be within the wetbed meaning the form of the river and surrounding land are not impacted by the activity;
- The nature of the Clutha River/ Mata-Au in this area means the effects on aquatic ecosystems and indigenous fisheries are assessed as no more than minor. Any effect on kanakana or their habitat are managed by way of conditions;
- The activity is considered to have little impact of spawning, and
- The applicant is unaware of any identified areas of cultural significance at this location and will manage the gold mining activity with as little disturbance and discharge of sediment as possible.

Whilst runaka are best placed to determine if an activity is consistent with the policies of their plan, it is the **applicant's intention that they be as consistent with the plan as possible and are willing to discuss any additional matters of concern with the runaka.**

Other Matters

Section 104(1)(c) of the Resource Management Act 1991 requires that regard be given to any other matters considered relevant and reasonably necessary to determine the application. It is considered that there are no other matters relevant to this proposal.

Part 2 Assessment

Section 104(1) of the Act states that resource consent applications are subject to Part 2 of the Act. Based on the findings of the lower order planning instruments, it is assessed that the proposal satisfies Part 2 of the Act. Specifically, the assessment of the environmental effects and those of the lower order planning instruments found that the proposal will meet Part 2.

Section 6

Recognise and provide for:

- a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.

The proposed gold mining activity is largely anticipated by the RPW and is not considered an inappropriate use. The applicant has a demonstrated history of activity in the area and this application seeks consent to carry out the same activity using the same equipment in the Upper Clutha reach. The river has an enduring history of modification by mining at this location and the ongoing activity with appropriate conditions of consent will not adversely affect the natural character which remains.

- b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development.

The dredge has operated since 2010 with no known complaints from the public or any impact on the natural features or landscapes in the area. Cold Gold has a demonstrated history and commitment to the region, and it is anticipated any future mining in the Upper Clutha will be carried out in much the same manner.

- c) Protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.

No adverse effects on significant indigenous vegetation and significant habitats of indigenous fauna have been identified.

- d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

No extended restriction to public access is proposed as a result of the replacement consents. The dredge is a registered marine vessel and must comply with the relevant maritime legislation including the shared use of a navigable riverbody. With the exception of those single days where the dredge is being extracted or slipped into the river, the proposal will not affect pedestrian public access in any way. During slipping events, the public access will only extend over no more than 100m of the riverbank and will be easily avoided.

- e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.

The proposal will not impact on the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga. Both runaka and Te **Rūnaka** o Ngai Tahu (TRONT) will be notified and enabled to participate as part of the application.

- f) the protection of historic heritage from inappropriate subdivision, use, and development.

The riverbed proper is not identified as a heritage site; however the river is a statutory acknowledgement area for Ngai Tahu. The river has an extensive history of gold mining and the proposed application will provide for this activity to continue. The accidental discovery protocol will ensure any historic heritage uncovered during the creation of the slipways or during the normal course of mining will be protected.

- g) the protection of protected customary rights.

No customary rights have been identified, although the river is a Statutory Acknowledgement area and we welcome feedback from runaka on their interests.

- h) the management of significant risks from natural hazards.

The previous ten years of mining by the applicant in the mid-reaches has demonstrated that the activity will not increase any risks from natural hazards. No threat to the defences of water have been identified as separation distances ensure no interaction with flood protection infrastructure. On-going monitoring will ensure that no additional risks will arise from this proposal.

Section 7

Have particular regard to:

- (a) kaitiakitanga
 - (aa) the ethic of stewardship
 - (b) the efficient use and development of natural and physical resources
 - (ba) the efficiency of the end use of energy
 - (c) the maintenance and enhancement of amenity values
 - (d) intrinsic values of ecosystems
 - (f) maintenance and enhancement of the quality of the environment
 - (g) any finite characteristics of natural and physical resources
 - (h) the protection of the habitat of trout and salmon
 - (i) the effects of climate change:
 - (j) the benefits to be derived from the use and development of renewable energy.

The applicant has been mining within this portion of the riverbed for ten years. Prior to that, the Clutha River/Mata-Au featured at times over 100 floating coal-powered dredges working the riverbed. The applicant exercises great care of the river and its values and has demonstrated this over the past 10 years of mining.

The assessment of the effects has demonstrated that the continued activity is sustainable and is in keeping with the history of the Otago region. The timing restrictions and nature of the works will maintain the existing amenity values and quality of the environment at this location. The works will not impact on trout or salmon

spawning or habitat given the nature of the bed profile and flow of the river. The extraction activity will not threaten the flood protection works and will not contribute to any adverse effects of climate change. The proposal does not relate to renewable energy or the use of energy.

Section 8

The assessment above has taken into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

The applicant has considered the relevant Iwi Management Plan. It is anticipated the application will be forwarded to both runaka and Te **Rūnaka** o Ngai Tahu as part of the notification process.

Overall it is considered that the proposal achieves the purpose of the Act and meets the test of sustainable management as set out at Section 5.

Notification

Cold Gold requests the proposal be considered via the full notification pathway. As noted above, Cold Gold seeks an independent commissioner either as a sole commissioner or as part of the hearings panel.

Conclusion

Cold Gold has consent to mine in the mid-reaches of the Clutha River/ Mata-Au and has done so for the past 10 years. They now seek consent to relocate the operation to the Upper Clutha.

An assessment against the Regional Plan:Water, the District Plan and the Regional Policy Statement concludes the activity is consistent with the relevant objectives and policies, and inconsistent with those of Plan Change 7. The proposal is considered to be consistent with the National Policy Statement for Freshwater Management 2020 and the hierarchy of obligations under Te Mana o te Wai.

Gold mining created Otago's wealth and has contributed to the history of the Clutha River/ Mata-Au for over 100 years. The assessment of effects has determined that, subject to compliance with conditions the same as, or similar to the current permits, the effects of the activity will be no more than minor.

Appendix 1 - Promoted Conditions of Consent

Land Use

1. The use of the bed of the Clutha River/ Mata-Au for suction dredge mining must be carried out in accordance with the plans and all information submitted with the application. If there are any inconsistencies between the above information and the conditions of this consent, the conditions of this consent will prevail.
2. No more than 1,500 metres length of the wet bed and 9,000 square metres area must be disturbed and worked at one time.
3. Between the periods of 1 September to 31 January the consent holder must only operate in two of the 1,500 metre sections of the Clutha River/ Mata-Au (from bank to bank) identified in the current annual work program and prepared in conjunction with the Department of Conservation.
4. Between the periods of 1 April and 31 October (the sports fish spawning season) the consent holder may only operate in a single 1,500 metre section of the Clutha River/ Mata-Au as provided for in a current and approved annual work program.
5. Upon completion of mining each 1,500 metre section of riverbed, the consent holder must ensure that the riverbed is remediated as near as is practicable to its natural bed form, consistent with the adjacent areas.
6. No beaches above the normal upper flow level must be disturbed or mined. For the purpose of this consent the level is defined as 400 cubic metres per second.
7. Heavy machinery must not be used within 50 metres of nesting and roosting areas of Black Fronted Tern, Black Billed Gull and Banded Dotterel between the dates of September 1 to January 31 (inclusive) each year.
8. Dredging or bed disturbance must not occur within the roosting and nesting areas of Black Fronted Tern, Black Billed Gull and Banded Dotterel at any time.
9. Mining or direct effects of mining must not adversely affect any bridge foundation, intake structure or compromise the quality of water taken up by any permitted or consented water takes.
10. Except as provided for by Discharge Permit RM21.XXX.0X, during the exercise of this consent, the consent holder must ensure that no contaminants, including fuel or oil, enter the Clutha River/ Mata-Au. In the event of contamination, the consent holder must undertake immediate remedial action, and must notify the Consent Authority and Otago Fish & Game Council within 3 days of the discharge.
11. Works must only be carried out between the hours of 7:00 am and 10:00 pm.
12. Mining must not take place within 20 metres upstream or downstream of the confluence with any tributary greater than one metre in width at the mouth of the tributary.
13. A GPS device must be on or near the dredge to continuously record the location of the dredge in relation to areas of operation authorised by this consent.
14. The total height of the dredge, including any antenna or other fixtures that can articulate and extend vertically above the craft, must be no more than 7.5 metres vertically above the water line.
15. The consent holder must ensure no structure comes within 15 metres of any high voltage line.
16. Vessels performing work under other electricity lines must maintain a 4 metres minimum approach distance from the conductors as per New Zealand Electrical Code of Practice for Electrical Safe Distances 34.

17. The applicant must take all measures to ensure the dredge and associated equipment is secured in high flows and flooding events to prevent any obstruction or blockage in river channel and to any bridges, dams or other structures.
18. Prior to the exercise of this consent, the Consent Holder must ensure that:
 - a) an industry standard hose and filler nozzle with automatic cut-off is fitted for refuelling equipment;
 - b) an additional shutoff valve is fitted to the handle and a remote stop push button and cable accessible at the filler nozzle location to stop the pump at the bulk tank;
 - c) the bulk onshore fuel tank is double skinned or banded and is located in an area that is above 1 in 50 year flood levels, in a safely accessible location;
 - d) spill kits are located at the bulk tank and onboard the dredge; and
 - e) all staff receive training in the location and use of spill kits.
19. The consent holder must submit an annual work program to the Consent Authority which must highlight 1,500 metre sections of the Clutha River/ Mata-Au where the consent holder would like to operate the dredge during the sports fish spawning season and the bird nesting season.
20. The annual work program must be prepared in consultation with the Otago Fish & Game Council and the Alexandra Office of the Department of Conservation.
21. The annual work program must at minimum include, but not be limited to:
 - a) Maps highlighting the upper and lower extents of each 1,500 metre section and also the associated GPS coordinates;
 - b) Monitoring requirements and procedures for refuelling;
 - c) Contingency plans in the event of system malfunctions or breakdowns;
 - d) The means of receiving and dealing with any complaints; and
 - e) Emergency contact phone numbers.
22. Prior to beginning dredging within the sports fish spawning season the consent holder must consult with the Otago Fish & Game Council and the Consent Authority to identify a 1,500 metre section of the of the Clutha River/ Mata-Au proposed for dredging during the spawning season and an alternative section should this section be unavailable.
23. Should any sports fish redds be identified by the Otago Fish & Game Council in consultation with the consent holder within the 1,500 metre section of the Clutha River/ Mata-Au approved for mining, the consent holder must then liaise with the Otago Fish & Game Council and determine an alternative 1,500 metre section of the Clutha River/ Mata-Au as identified in Condition 22. Once determined, the Consent Authority must be notified of the amended mining location within 5 working days.
24. A record of activity undertaken in accordance with this consent must be submitted to the Consent Authority by 28 February annually and made available for inspection at other times upon request. The report must at a minimum include:
 - a) Records showing the location of dredging activity complied with the annual work program, including the provision of GPS coordinates.
 - b) Records of any malfunctions and breakdowns in the refuelling system and any remedial action undertaken.
 - c) A record of any complaints received including:
 - i. The date, time, location and nature of the complaint;
 - ii. The name, phone number, and address of the complainant, unless the complainant elects not to supply this information;

- iii. Action taken by Consent Holder to remedy the situation and any policies or methods put in place to avoid or mitigate the problem occurring again.
25. All persons operating the dredge must read and be familiar with the conditions of these consents. A copy must be kept on the dredge at all times.
26. The consent holder must not excavate or disturb any riverbanks except for providing access.
27. There must be no disturbance of vegetated areas adjoining the Clutha River/ Mata-Au.
28. The consent holder must ensure that any mining event authorised by this consent does not cause any flooding, erosion, scouring, land instability or property damage.
29. The consent holder must take all reasonable precautions to minimise the spread of pest plants and aquatic weeds. In particular, the consent holder must:
 - a) Water blast all machinery to remove any visible dirt and/or vegetation prior to being brought on-site to reduce the potential for pest species being introduced to the bed of the watercourse. Machinery and equipment that has worked in watercourses must, prior to entering the site, also be cleaned with suitable chemicals or agents to kill didymo;
 - b) Avoid working in areas where aquatic weeds such as *Lagarosiphon major* are known to be present **(for information, contact the Consent Authority's Biosecurity Team); and**
 - c) To avoid the spread of the *Didymosphenia geminata* or any other pest plant, not use machinery in the berm or bed of the river that has been used in any area where the pest plants are known to be present in the previous 20 working days, unless the machinery has been thoroughly cleansed with a decontamination solution (for information on decontamination contact the **Consent Authority's Biosecurity Team**);
 - d) Remove any vegetation caught on the machinery at the completion of works;
 - e) Prior to leaving the site, water blast all machinery following the completion of works to reduce the potential for pest species being spread from the bed of the watercourse.
30. The consent holder must ensure that any bed disturbance is limited to the extent necessary to carry out the works.
31. On completion of each mining area, all plant, equipment, signage, debris, rubbish and any other material brought on site must be removed from the site.
32. This consent does not confer any right of access over any land. Any arrangements necessary for access are the responsibility of the consent holder.
33. In the event that an unidentified archaeological site is located during works, the following will apply:
34. Work must cease immediately at that place and within 20 metres around the site.
35. All machinery must be shut down, the area must be secured, and the Heritage New Zealand Pouhere Taonga Regional Archaeologist and the Consent Authority must be notified.
36. If the site is of **Māori** origin, the Consent Holder must also notify the appropriate iwi groups or kaitiaki representative [insert iwi groups/Kaitiaki representative if known to assist Consent Holder as to who to contact] of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken, as long as all statutory requirements under legislation are met (Heritage New Zealand Pouhere Taonga Act 2014, Protected Objects Act 1975).

37. If human remains (koiwi tangata) are uncovered the Consent Holder must advise the Heritage New Zealand Pouhere Taonga Regional Archaeologist, NZ Police, the Consent Authority and the appropriate iwi groups or kaitiaki representative and the above process under (c) will apply. Remains are not to be disturbed or moved until such time as iwi and Heritage New Zealand Pouhere Taonga have responded.
38. Works affecting the archaeological site and any human remains (koiwi tangata) must not resume until Heritage New Zealand Pouhere Taonga gives written approval for work to continue. Further assessment by an archaeologist may be required.
39. Where iwi so request, any information recorded as the result of the find such as a description of location and content, must be provided for their records.
40. The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this consent during the period of three months either side of the date of granting of this consent each year, or within two months of any enforcement action taken by the Consent Authority in relation to the exercise of this consent, [insert if required- or on receiving monitoring results], for the purpose of:
 41. Determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which becomes evident after the date of commencement of the consent;
 42. Ensuring the conditions of this consent are consistent with any National Environmental Standards, relevant regional plans, and/or the Otago Regional Policy Statement;
 43. Reviewing the frequency of monitoring or reporting required under this consent.

Discharge Permit

1. There must be no conspicuous change in colour or visual clarity of the Clutha River/ Mata-Au beyond a distance of 200 metres downstream from the point of discharge.
2. In the event that a noticeable sediment plume beyond a distance of 200 metres downstream from the point of discharge, all dredging activity must cease, and the Consent Holder must immediately notify the Consent Authority.

Water Permit

1. The rate of abstraction must not exceed:
 - a) 400 litres per second; and
 - b) 18,000 cubic metres per day.
2. All water taken while exercising this consent must immediately be returned to the watercourse it was sourced from.

APPENDIX 2 – EXCLUSION AREAS

No mining will occur within two locations deemed to be ecologically sensitive.

For the upper extent, being that land entirely within the QLDC area and shown below, there will be no mining carried out in the area identified in red below. This area incorporates the Luggate Creek confluence and is considered ecologically sensitive.



Within the lower extent of the permit, no mining will occur from the confluence with Lake Dunstan to the confluence with the Lindis Creek. This is because the vegetation and ecology is considered sensitive.





Suction Dredge Mining
Upper Clutha River
Freshwater Assessment

Prepared for Cold Gold
Clutha Limited

July 2022



Suction Dredge Mining Upper Clutha River
Freshwater Assessment

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1 Introduction

Cold Gold Clutha Limited (CGCL) have applied for resource consent from both the Otago Regional Council (ORC) and the Central Otago District Council (CODC) to carry out suction dredge mining by a maritime vessel in the Upper Clutha River / Mata-Au (see Figure 1). The application has been reviewed by Dr. Richard Allibone on behalf of Otago Regional Council (ORC) and a Section 92 (s92) for further information regarding the effects on the freshwater ecology has been requested. CGCL have commissioned e3Scientific Limited (e3s) to undertake an assessment of effects on the aquatic ecosystems and provide the information requested in the s92. This report identifies the freshwater ecological values and assesses the potential impacts associated with carrying out suction dredge mining within the Upper Clutha River / Mata-Au.

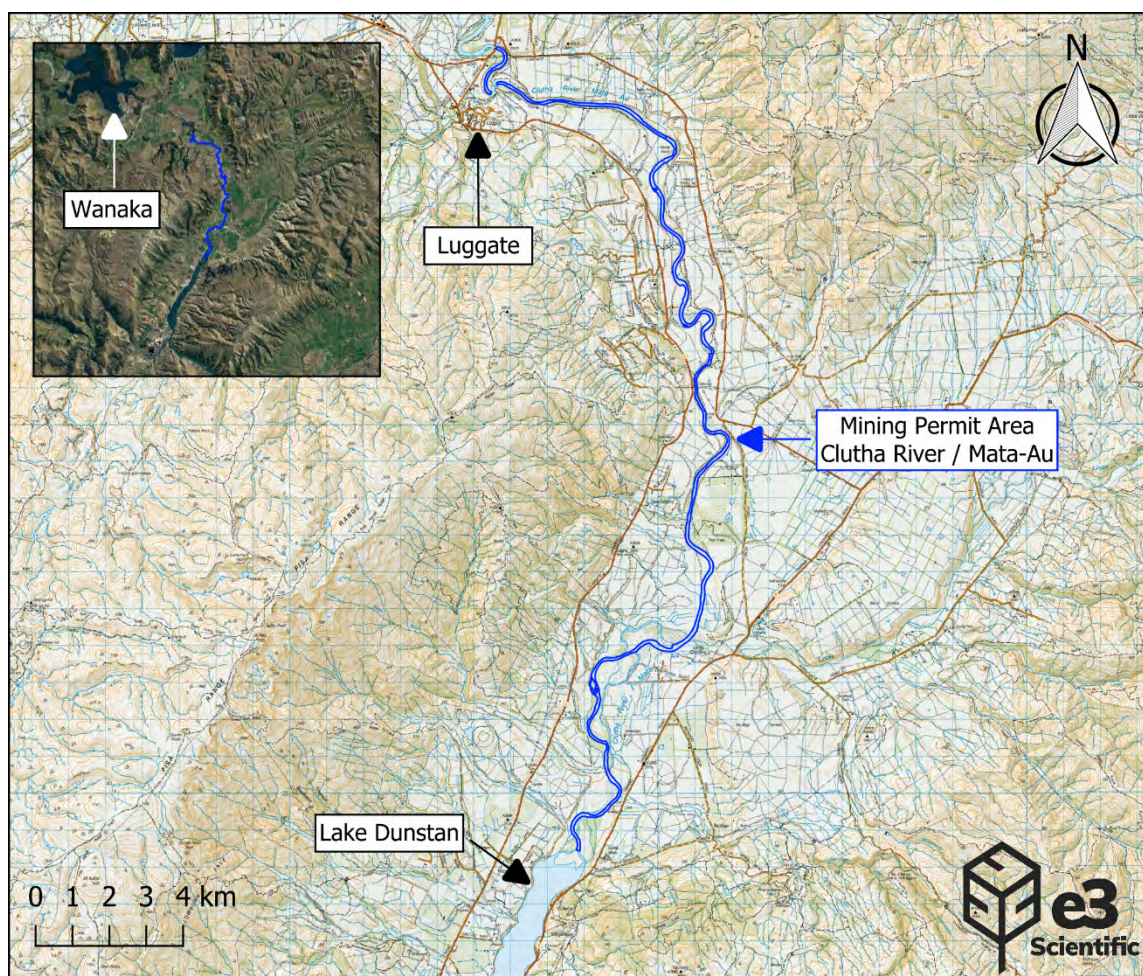


Figure 1: Location of the combined Mining Permit areas on the Clutha River / Mata-Au.



1.1 Report Structure

The ecological freshwater assessment is structured as follows:

- Section 2: Description of the proposed activity and environmental context.
- Section 3: Methodology employed during the ecological assessment.
- Section 4: Results from the site visit and ecological assessment.
- Section 5: Ecological values.
- Section 6: Ecological Impact Assessment.
- Section 7: Summary and recommended consent conditions.

1.2 Limitations

e3Scientific Limited (e3s) performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental science profession. No warranties, express or implied, are made. The confidence in the findings is limited by the Scope of Work, and limited data due to the singular site visit at one time of year. A full range of biota that are present at this site may not have been seen or recorded, however, desktop research was utilised to aid the assessment.

The results of this assessment are based upon a site inspection conducted by e3s personnel, and information provided in scientific literature. All conclusions and recommendations regarding the properties are the professional opinions of e3s personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, e3s assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside e3s, or developments resulting from situations outside the scope of this project.



2 Description of the Existing Environment and Proposed Activity

2.1 Environmental Setting

CGCL currently holds three active mining permits 60299, 60593 and 60515 along the upper reaches of the Clutha River / Mata-Au River. These permits cover a combined area of 256.925 hectares (ha) of riverbed (see Figure 1) over an approximately 33 km stretch. The upper limit of the mining permit is at the Luggate-Tarras Rd bridge, upstream of Luggate, and the lower limit of the permit extends to near the confluence of the Clutha River / Mata-Au with Lake Dunstan. The permits do not allow for mining within any associated tributaries which includes the confluence of Luggate Creek with the Clutha River / Mata-Au. The stretch of the Clutha River / Mata-Au where mining is proposed varied between approximately 70 – 100 m in width.

2.2 Biological Environment

Aquatic Fauna

The NZ Freshwater Fish Database (NZFFD) holds records for the Upper Clutha River / Mata-Au (Figure 2). The native species recorded within the study area are upland bully (*Gobiomorphus breviceps*), common bully (*Gobiomorphus cotidianus*), and longfin eel (*Anguilla dieffenbachii*). The exotic species present include brown trout (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*). Species additional to those listed, which are found in the lower reaches of the tributaries flowing into the study area include the native kōaro (*Galaxias brevipinnis*), Clutha flathead galaxias (*Galaxias "species D"*), and freshwater shrimp (*Paratya curvirostris*).

Additional species recorded within the main stem of the Upper Clutha River / Mata-Au, but outside the study area include unidentified salmon species (*Salmo* sp.), and unidentified galaxiid species (*Galaxias* sp.). Species recorded at the head of Lake Dunstan, but not within the Clutha River / Mata-Au are an unidentified eel (*Anguilla* sp.), chinook salmon (*Oncorhynchus tshawytscha*), and perch (*Perca fluviatilis*). Perch are unlikely to be present within the study area as they prefer still or slow-flowing water.



The Ministry for Primary Industries spawning indicator identifies the stretch of the Clutha River / Mata-Au in which suction dredging is proposed as spawning habitat for brown trout and rainbow trout, with a short stretch identified as kōaro spawning habitat.



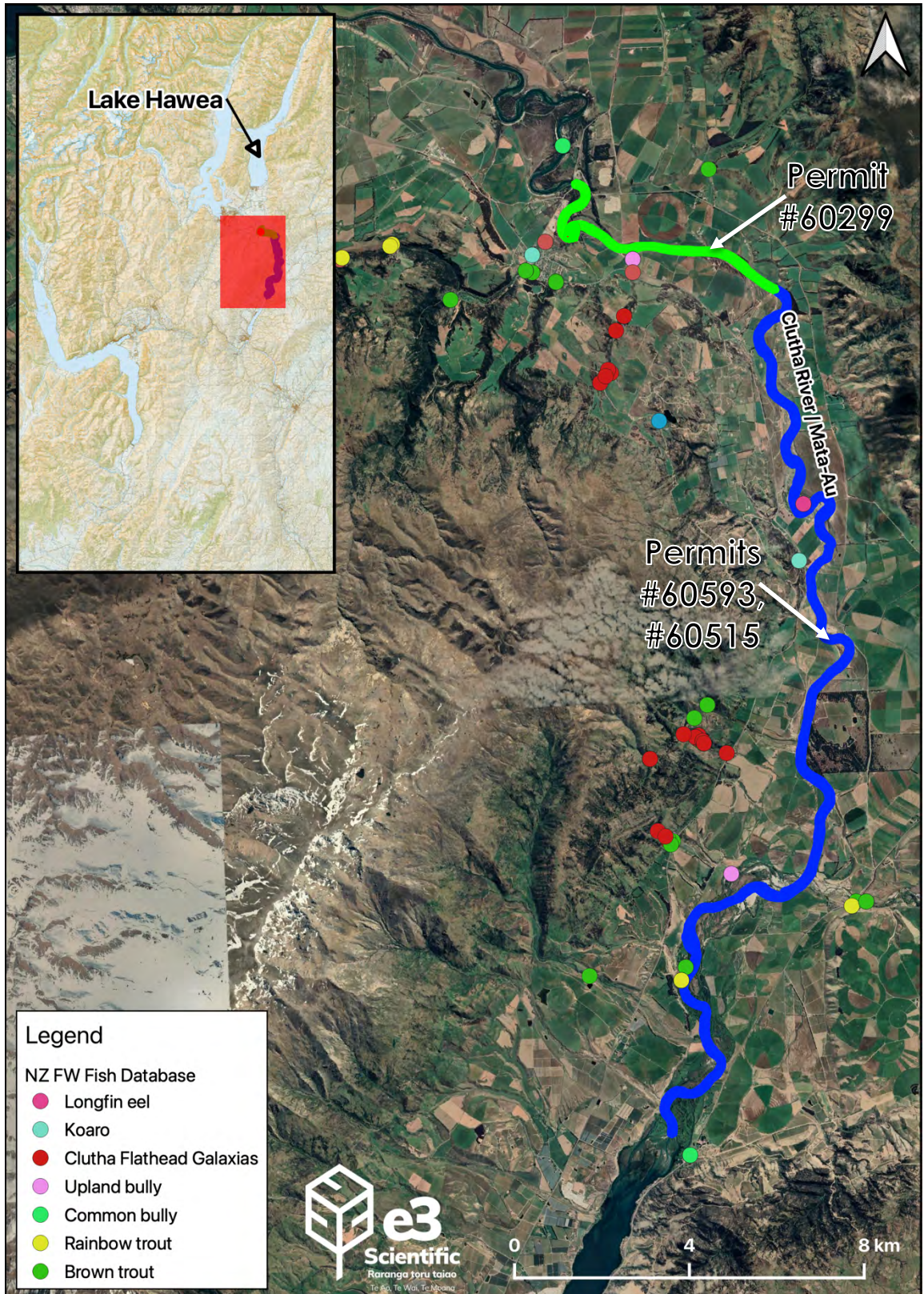


Figure 2: Fish identified within the upper Clutha River / Mata Au.



Aquatic Vegetation

Macrophytes recorded within the Upper Clutha River / Mata-Au include *Lagarosiphon* (*Lagarosiphon major*), however this was only noted in one location where a slow-moving pool had formed downstream of a willow tree. *Didymo* (*Didymosphenia geminata*) was present throughout the length of the study area and was noted on rocks in the shallower sections, typically on the inside of bends. Free-floating didymo were present in high numbers within the water column over the entire width and length of the study area. The turbulent nature and high flows through the majority of the Clutha River / Mata-Au study area, makes it generally unsuitable habitat for macrophyte beds.

The riparian vegetation along the Clutha River / Mata-Au is predominantly a mixture of exotic communities. The main species present are crack willow and poplars which continuously line the shore for long stretches of the study area, along with woody weeds such as broom and gorse. Patches of native kanuka woodland are present, as well as areas of pastoral farmland, and residential properties. Near vertical banks are present on a number of bends, which had minimal vegetation present, and gravel islands present on the inside of many bends were largely free from vegetation, however the occasional tree lupin was present. Where riparian vegetation is present, in particular willows, they overhang and shade the water column.

Regional Plan: Water for Otago

Schedule 1A of the Otago Region Council Regional Plan: Water for Otago (ORC, 2020) identifies the natural and human use values of Otago's surface water bodies. The Clutha River / Mata-Au between Alexandra and Lake Wanaka is identified as having the following ecosystem values.

- Large water bodies supporting high numbers of particular species, or habitat variety, which can provide for diverse life cycle requirements of a particular species, or a range of species.
- Bedrock and gravel substrate of importance for resident biota.
- Presence of significant fish spawning areas for trout and salmon.
- Presence of significant areas for development of juvenile fish (trout and salmon).
- Presence of riparian vegetation of significance to aquatic habitats.
- Significant presence of trout.
- Significant presence of eels.



- Significant presence of salmon.
- Presence of indigenous fish species threatened with extinction.
- Presence of a significant range of indigenous waterfowl.

The tributaries of the Clutha River / Mata-Au between Alexandra and Lake Wanaka are listed as significant habitat for the Clutha flathead galaxiid.

Luggate Creek and an unnamed tributary of the Clutha River / Mata-Au (to the south of Poison Creek) are identified as sensitive to bed disturbance caused by suction dredge mining due the unique values they have as native fish habitat. No suction dredge mining is permitted within any of the tributaries of the Clutha River / Mata-Au nor proposed within 20 m of the confluence with any tributary. For Luggate Creek it is proposed that no mining take place within 100 m upstream of the eastern edge confluence of Luggate Creek with the Clutha River/ Mata-Au to 50 m downstream of the river island at the Devils Nook (approximately 315 m downstream of the western edge of the Luggate Creek and Clutha River/ Mata-Au confluence).

2.3 Proposed Activity

The proposed activity has been outlined in the resource consent application and summarised below. CGCL are applying to the ORC for resource consent to undertake the following activities within the Clutha River / Mata-Au to enable suction dredge mining by a maritime vessel:

- To disturb the bed of a river for mining purposes.
- To disturb the bed of a river for the construction of slipways.
- The take of water.
- The discharge of sediment to water.

The dredge is a 23.9 m long catamaran, with a beam of 6.6 m, and a draft of 0.8 m. The catamaran is manoeuvred using twin diesel engines, and the dredge is also powered using a diesel engine. The applicant states that the catamaran engines are not used for dredging operations, instead two, 500 kg mooring anchors are set within the wetted bed and used to position itself with the river. Once the dredge has manoeuvred itself into position, set the anchors, the dredge then moves approximately 200 m downstream and works back upstream towards the anchors. Stern anchors and sidelines are sometimes used in addition to the



mooring anchors. The dredge works upstream typically in a 10 – 15 m wide strip but can work out to a 30 m wide strip. The internal diameter of the dredge suction pipe is 350 mm and is hydraulically controlled from the internal wheelhouse. A camera is fixed to the suction point. The method of working in an upstream direction allows backfilling and reinstatement of the substrate as works are occurring. Fine sediments are also discharged back to the water column; however, these will take longer to settle out than the heavier gravels, cobbles and boulders.

A maximum surface water take rate of 400 L/s, with a maximum daily take of 18,720 m³ is proposed. This level of take is based on the dredge working at maximum capacity for a 13-hour day. Water is returned to the Clutha River / Mata-Au near the point of take (albeit a few meters downstream due to the mining operations).

Refuelling of the dredge is a two-step process. The current refuelling procedure on the mid-Clutha River where the dredge is currently operating, uses a pilot boat which is refilled from a South Fuels self-bunded diesel storage tank, located above high flow levels on private property. The diesel is then ferried to the dredge, which is refuelled in-situ. A spill kit is present at each point of refuelling. No diesel spills have occurred during this process (pers comms. Peter Hall), as it is a strictly monitored process. The use of a pilot boat means that the dredge does not need to be moved and powered up/down the river each week for refuelling.

A launching and recovery 'slipway' is proposed as part of this application and was granted by the Otago Regional Council in 2020 under RM20.325 (consent to disturb the bank of the Clutha River / Mata-Au for the purpose of creating a slipway). This slipway enables the dredge to be extracted from the mid-Clutha River within the permitted areas and will then be immediately reinstated. This area has not been assessed as part of this report. The location of the slipway has been identified at -44.773 south, 169.335 east with an approximately 1.2 km transit off SH6 near Queensberry. This slipway will remain in place for the duration of the consent, to enable maritime surveys and repairs as necessary. Two potential locations were viewed during the site visit, the preferred location is identified within the application. This area will not require any in water works to create the slipway and will only require minimal earthworks to remove and level a 1 m high bank approximately 5 m from the wetted margin. The entry point and the proposed path off SH6 can be seen in Figure 3.



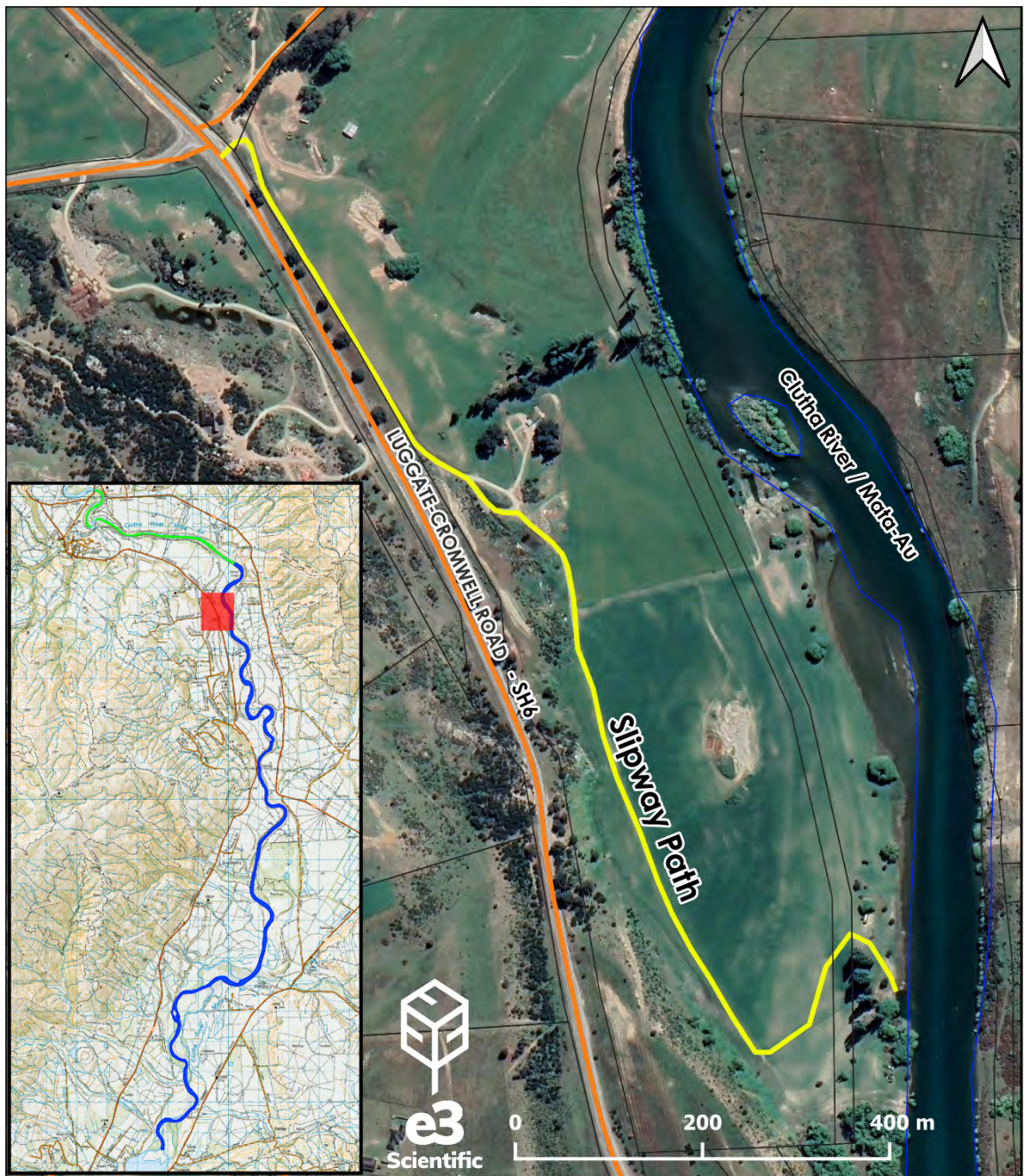


Figure 3: Slipway path into the Clutha River / Mata-Au.



3 Assessment Methodology

The ecological assessment for the proposed suction dredge mining is based on a desktop study, and site visit completed on 14 October 2021.

3.1 Desktop Research and Site Visit

The desktop and site visit included:

- Review of existing ecological information to determine ecological habitats and species likely present on the site;
- Site visit to determine the range of ecological habitat present;
- Visual macrophyte survey; and
- Macroinvertebrate sampling.

3.2 Ecological Assessment

The ecological assessment included field work, macroinvertebrate sampling, macrophyte visual assessments, visual fish passage assessment and a desktop review of the New Zealand Freshwater Fish Database (NZFFD) and Ministry for Primary Industries Fish Spawning Indicator for freshwater fish and other ecological values. No specific fish sampling was undertaken.

3.3 Macroinvertebrate Sampling

Macroinvertebrate sampling was undertaken at three locations along the Clutha River / Mata-Au (see Figure 4) using protocols from the National Environmental Monitoring Standards for Macroinvertebrates (NEMS, 2020). The locations sampled were chosen to reflect the different substrate habitats present within the stretch of the Clutha River / Mata-Au where suction dredging was initially proposed. A further stretch upstream (permit #60299) has since been included in the application in June 2022; however, this additional section has not been specifically sampled nor assessed.

The three substrates include fine silts and sand sediment (Sample 1), fine to coarse gravels on the inside of a bend (Sample 2), fine to coarse gravels within a run



(Sample 3). These three river habitats and associated substrates are considered to be representative of the wider study area. At each location substrate particles were washed into a kick net with a mesh size of 500 μm to collect macroinvertebrates. Macroinvertebrates, detritus and fine sediment collected in the net were transferred to a 500 mL sample jar and preserved in 70 % ethanol. Macroinvertebrates were returned to the laboratory, identified and enumerated to species level where possible.





Figure 4: Location of macroinvertebrate samples for the Clutha River / Mata-Au under mining permits 60593 & 60515. Additional permit 60299 was acquired after sampling was conducted.

Macroinvertebrate community health was determined by using the macroinvertebrate data collected to calculate health indices. The indices used include the Macroinvertebrate Community Index (MCI), Quantitative Macroinvertebrate Community Index (QMCI), Ephemeroptera, Plecoptera and



Trichoptera Percentage Abundance Index (EPT), and Shannon Wiener Diversity Index (SWDI).

3.3.1 Macroinvertebrate Sample Site Description

Sample 1 (see Figure 5) was located on the true left side of the Clutha River / Mata-Au at an elevation of 234 m above sea level (asl) and located within the upper area of the mining permit. The substrate consisted of silts and sands with detrital matter in the form of willow leaves. The sample was taken in water at a depth of 40 cm. No gravels or no macrophytes were present. Water clarity was clear. The river was approximately 85 m wide at this location. Riparian margin vegetation included crack willow and a flax. This location was selected as it is a potential slipway location, and representative of the sheltered, calmer pockets downstream of a willow tree in which the finer sediments are settling out of the water column. This sample location is adjacent to the Mata-Au Scientific Reserve.



Figure 5: Photographs showing the location of the sample (left) and benthic substrate (right).

Sample 2 (see Figure 6) was also located on the true left side of the Clutha River / Mata-Au at an elevation of 230 m asl and located within the upper stretch of the mining permit area. The substrate consisted of cobbles with fine to coarse gravels, and some coarse sands. The sample was taken in water at a depth of 55 cm. Some detrital material was present along with patches of didymo. The water clarity was clear, and the river was approximately 80 m wide at this location. No riparian vegetation was present as the location was on the inside bend of a gravel beach. The water at this location was swift, however not as swift as the main channel.





Figure 6: Photographs showing the location of the sample (left) looking upriver and benthic substrate (right).

Sample 3 (see Figure 7) was also located on the true right side of the Clutha River / Mata-Au at an elevation of 212 m asl and located within the middle stretch of the mining permit area. The substrate consisted of cobbles with fine to coarse gravels, with finer silt deposits and detrital material and didymo on top. The sample was taken in a run, in water at a depth of 80 cm. The water clarity was clear, and the river was approximately 90 m wide at this location. Riparian vegetation included woody weeds alongside a gravel beach. The water at this location was swift, however not as swift as sample location 2.



Figure 7: Photographs showing the location of the sample (left) looking down river and benthic substrate (right).

3.3.2 Macroinvertebrate Community Metrics

The health of the macroinvertebrate communities within the sampled sites was determined by using the macroinvertebrate data collected to calculate health



indices. The indices used included Taxa Richness, the Macroinvertebrate Community Index (MCI), Quantitative Macroinvertebrate Community Index (QMCI), and the number and percent abundance of Ephemeroptera, Plecoptera and Trichoptera taxa (%EPT and %EPT abundance, respectively). MCI and QMCI scores were assessed against National Policy Statement for Freshwater Management (NPS-FM) macroinvertebrate attribute national bottom-line values as well as Stark & Maxted (2004, 2007).

Macroinvertebrate community indicators have been used to determine the health of the macroinvertebrate community within the sample areas. These are detailed below and in Table 1.

- Quantitative Macroinvertebrate Community Index (QMCI) is a quantitative variant of the MCI and has similar considerations to bed type. It is an index based on both the number and relative abundance of different taxa present and is more sensitive to changes in abundance or sample size. As for MCI, a single QMCI value is calculated for each site with higher values indicating a healthier stream environment.
- Macroinvertebrate Community Index (MCI) as classified according to Stark and, Stark and Maxted (2004, 2007) in Table 2 below. This index is used to measure the water quality of freshwater streams and assigns a number to each species of macroinvertebrate based on the sensitivity of that species to pollution. The higher the MCI score generally indicates a healthier stream with scores ranging from >119 indicating 'Excellent' to <80 indicating 'Poor' water quality. Included here are values for both soft-bottomed (SB) and hard-bottomed (HB) streams and lakes which will be described based on sample location. QMCI (Quantitative MCI) and SQMCI (Semi-Quantitative MCI) scores are also included here, following the methodology of (Stark et al., 2001)
- Ephemeroptera, Plecoptera and Trichoptera (EPT) Richness Index estimates water quality by the relative abundance of three major orders of invertebrates that have a low tolerance to water pollution. A large percentage of EPT taxa indicates high water quality.
- Shannon Wiener Diversity Index (SWDI). This Index is a measure of community diversity that combines species richness and their relative abundances, ranging from values 0 – 5, with higher numbers representing better community diversity. A high macroinvertebrate diversity score generally indicates a healthy macroinvertebrate community.



- Taxa Richness indicates the number of taxonomic groups present in a sample. Streams supporting a high number of different taxa generally indicate a healthy macroinvertebrate community.
- In addition to NEMS guidance, stream health may also be inferred from macroinvertebrate attribute bands identified in the National Policy Statement for Freshwater Management (NPS-FM) (2020). The NPS-FM identify national bottom line for ecosystem health, values of 90 and 4.5 for MCI and QMCI, respectively, indicate a severely degraded system (Table 3).

Table 1: Description of macroinvertebrate community metrics.

Index	Equation	Description
Taxa Richness	Count (taxa)	The total number of macroinvertebrate types (taxa) present in a sample.
Macroinvertebrate Community Index (MCI)	$MCI = \frac{\sum_{i=1}^{i=S} a_i}{S} \times 20$	S = the total number of scoring EPT taxa, and a_i = the tolerance score for the i th taxon.
Quantitative Macroinvertebrate Community Index (QMCI)	$QMCI = \sum_{i=1}^{i=S} \frac{(n_i \times a_i)}{N}$	S = the total number of taxa, n_i = the abundance for the i th scoring taxon, a_i = the tolerance score for the i th taxon and N = the total abundance of EPT taxa.
Percent abundance of EPT taxa (%EPT taxa richness)	EPT taxa/total taxa	The percentage of taxa belonging to the orders Ephemeroptera, Plecoptera or Trichoptera (EPT).
Relative abundance of EPT taxa (%EPT Abundance)	EPT taxa Abundance /total Abundance	The relative abundance of individual macroinvertebrates belonging to EPT taxa.

Table 2: Interpretation of MCI-type biotic indices (Stark & Maxted, 2007).

Stark & Maxted (2004, 2007) quality class	Stark (1998) descriptions	MCI MCI-sb	SQMCI & QMCI SQMCI-sb & QMCI-sb
Excellent	Clean water	> 119	> 5.99
Good	Doubtful quality or possible mild pollution	100–119	5.00–5.90
Fair	Probable moderate pollution	80–99	4.00–4.99
Poor	Probable severe pollution	< 80	< 4.00



Table 3: National Policy Statement for Freshwater Management (2020): Macroinvertebrate Attribute delineation table.

Attribute band and description	Numeric attribute states	
	QMCI	MCI
A Macroinvertebrate community, indicative of pristine conditions with almost no organic pollution or nutrient enrichment.	≥6.5	≥130
B Macroinvertebrate community indicative of mild organic pollution or nutrient enrichment. Largely composed of taxa sensitive to organic pollution/nutrient enrichment.	≥5.5 and <6.5	≥110 and <130
C Macroinvertebrate community indicative of moderate organic pollution or nutrient enrichment. There is a mix of taxa sensitive and insensitive to organic pollution/nutrient enrichment.	≥4.5 and <5.5	≥90 and <110
National bottom line	4.5	90
D Macroinvertebrate community indicative of severe organic pollution or nutrient enrichment. Communities are largely composed of taxa insensitive to inorganic pollution/nutrient enrichment.	<4.5	<90

3.4 Water Quality Assessment

A water quality assessment focussing on the suspended sediment plumes created by a suction dredge activity was undertaken by CGCL separate to this assessment on another section of the Clutha River /Mata-Au. However, due to the similarity's regarding the activity and the receiving environment the results from this assessment have been included in Section 4.5 of this report.

3.5 Ecological Impact Assessment Methodology

The assessment of ecological effects for the proposed suction dredging has been completed using the Environment Institute of Australia and New Zealand Ecological Impact Assessment (EclA) guidelines (Roper-Lindsay, et al. 2018). The impact assessment follows the steps outlined in the sections below.



3.5.1 Ecological Value

Under the EIANZ guidelines (Roper-Lindsay, et al. 2018) ecological value is assigned based on the following assessment criteria:

- Representativeness
- Rarity and Distinctiveness
- Diversity and Pattern
- Ecological Context

Some of these assessment criteria are difficult to utilise within the freshwater environment as they rely on a range of information to support the assessment i.e., Assignment of a Representativeness value is supported by the Ecological District Framework and/or the Land Environments of New Zealand (LENZ) classification. Similar frameworks for the freshwater environment are not recognised within the LENZ classification, however sites recognised as important in the freshwater environment include the extent to which the site is typical of the natural characteristics, catchment size, stream order, and standing water characteristics. Therefore, it is considered appropriate that sites classified as such are recognised under the Representative criteria.

More easily incorporated into the EIANZ criteria are rarity, diversity and ecological context in the freshwater environment which can be utilised to support an assessment of ecological value.

Rarity / Distinctiveness

The New Zealand Threat Classification System (NZTCS) is used to assess the threat status of fish. This impact assessment has utilised the NZTCS reports to inform an assessment of rarity.

Diversity and Pattern

The desktop research undertaken within this report of the NZFFD, MPI Fish Spawning Indicator and ORC Regional Plan: Water for Otago provide the basis for an assessment of diversity at the proposed site.

Ecological Context

Ecological context describes an ecosystems role in ecosystem function. Examples may include:



- freshwater habitat may provide an important food source for fish or birds.
- freshwater habitat may play an important part in the lifecycle of a species e.g. breeding or spawning location fish species.

For the purpose of this assessment freshwater habitats that support threatened and At - Risk species, are biologically diverse, provide an important food source or play a critical role in the lifecycle for a species are considered to have a high ecological value.

3.5.2 Assigning Magnitude of Effect

The EIANZ guidelines provide criteria for assigning the extent of the effects on the ecological values within the area that may be disturbed by the activity. This assessment adopts the criteria for describing magnitude of effect and is provided in Table 4 below.

Table 4: Criteria for describing magnitude of effect (Roper-Lindsay et al., 2018).

Magnitude	Description
Very High	Total loss of, or very major alteration to, key elements/features/ of the existing baseline conditions, such that the post-development character, composition and/or attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature.
High	Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances or patterns; AND/OR having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; AND/OR having negligible effect on the known population or range of the element/feature



3.5.3 Assigning Level of Effect

The level of ecological effect is based on combining the ecological value of a freshwater environment that may be impacted by the proposed activities and the magnitude of the effect.

Table 5 is adapted from the EIANZ guidelines to provide a level of effect matrix. For the purpose of this assessment, where the level of effect is moderate or above, a management response is required to ensure potential environmental effects are managed appropriately.

Table 5: Criteria for describing level of effect (Roper-Lindsay et al., 2018).

		Ecological Value			
		Very High	High	Moderate	Low
Magnitude	Very High	Very High	Very High	High	Moderate
	High	Very High	Very High	Moderate	Low
	Moderate	High	High	Moderate	Low
	Low	Moderate	Low	Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low
	Positive	Net Gain	Net Gain	Net Gain	Net Gain

3.5.4 Residual Impact

The residual impact is the final impact level assigned to the proposed activity and potential effects once proposed mitigation/remediation options have been applied.



4 Results

4.1 Fish

No fish were observed in the Clutha River / Mata-Au during the site visit; however, this does not mean that they are not present. Species known to be present include brown trout, rainbow trout, salmon, longfin eels, common bully, and upland bully. Kōaro, Clutha flathead galaxias, and freshwater shrimp may also be present within the shallows of the main river body; however, it is more likely they are restricted to areas around the confluences of tributaries within the Clutha River / Mata-Au. The substrate present within most of the tributaries and some sections of the Clutha River / Mata-Au provides suitable spawning and feeding habitat for the above species, however the high, and variable flows means that not all habitat can and will be utilised.

4.1.1 Fish Passage Restrictions

No fish passage restrictions are present within the stretch of the Clutha River / Mata-Au that is proposed to be mined. However, the Roxburgh and Clyde Dams located along the Clutha River / Mata-Au downstream from the study area provide barriers to fish migration. Contact Energy have a relocation and transfer program that moves eels upstream of the dams and take large adult eels downstream of the dams to allow them to continue their migration pathway.

4.2 Macroinvertebrates

Macroinvertebrate community indicators have been used to determine the health of the macroinvertebrate community within the three sample locations. Table 6 presents the results of the macroinvertebrate samples taken from the Clutha River / Mata-Au (see Figure 4).

Macroinvertebrate Community Index (MCI) and Quantitative Macroinvertebrate Community Index (QMCI)

The MCI scores for the three samples ranged from 85 in Sample 1, 95 in Sample 2 and 100 in Sample 3. Sample 1 and 2 indicate 'Fair' water quality, while Sample 3 has the lowest threshold for 'Good' water quality. Quantitative MCI scores ranged from 4.00 in Sample 1, 6.20 in Sample 2 and 3.59 in Sample 3. These represent 'Fair',



'Excellent' and 'Poor' water qualities respectively (Stark & Maxted, 2007). Relative to the NPS – FM (2020) attribute bands, Samples 1 and 2 received a 'D' rating or below the 'National Bottom Line.' Sample 3 was scored in the 'C' band, indicative of moderate organic pollution. NPS – FM (2020) QMCI scores for Samples 1 and 3 scored in the D band below the 'National Bottom Line' with Sample 2 in the 'B' band. The high QMCI score for Sample 2 is representative of the high proportion of sensitive *Deleatidium* relative to other taxa present in the sample. The range of MCI and QMCI scores are reflective of the highly unstable environments that were sampled. The macroinvertebrate communities are likely representative of the substrate and habitat stability rather than water quality.

EPT Richness Index

The EPT % abundance scores ranged from 3.5% in Sample 1, 60% in Sample 2 and 11% in Sample 3. The low EPT percentage in Sample 1 is due to only having one individual in the EPT orders of the 29 invertebrates collected, and in Sample 3, only four of the 37 individuals were from the EPT orders. In comparison, Sample 2 had six of the 10 total individuals present within the EPT order. These percentages show that there is a variable percentage abundance of species within the EPT orders, however, in very low total abundances across all samples. The EPT % taxa abundance scores were however very similar over all three samples and only ranged from 25 to 29%.

Shannon Wiener Diversity Index (SWDI)

SWDI scores were low to moderate for the three sites, with 1.07 in Sample 1, 1.09 in Sample 2, and 1.60 in Sample 3. The very low (4 species) to relatively low (7 species) diversities and associated total invertebrate numbers across the samples is reflected by these indices.

4.2.1 Macroinvertebrate Summary

The macroinvertebrate samples taken from the three most common habitat and substrate types have been used to calculate a range of macroinvertebrate community indicators. These indicators reflect the highly variable and unstable environmental conditions that are present within the Clutha River / Mata-Au.



Table 6: Clutha River / Mata-Au Macroinvertebrate Results.

Order	Family	Subfamily	Genus/Species	MCI	Sample 1	Sample 2	Sample 3
Ephemeroptera	Leptophlebiidae		Deleatidium	8		6	
Plecoptera	Antarctoperlinae	Gripopterygoidea	Zelandobius	8	1		
			Zelandoperla	9			3
Trichoptera	Conoesucidae		Pycnocentria	8			1
Tricladida	Dugesiidae		Cura	7			2
Diptera	Chironomidae	Polypedilum		2			1
		Tipulidae	Eropterini	3		1	
		Tanypodinae		5	16	1	9
Nematoda				3	8	2	8
Oligochaeta				1	4		13
MCI score					85	95	100
QMCI					4.00	6.20	3.59
Abundance					29	10	37
Taxa Richness					4	4	7
EPT % Abundance					3.5	60	11
EPT % Taxa abundance					25	25	29
Shannon Wiener Diversity Index					1.07	1.09	1.60
Stark & Maxted (2007) Water Quality Classification - MCI					Fair	Fair	Good
Stark & Maxted (2007) Water Quality Classification - QMCI					Fair	Excellent	Poor
NPS – FM (2020) Attribute Band - MCI					D	C	C
NPS – FM (2020) Attribute Band - QMCI					D	B	D



4.3 Macrophytes

Macrophytes that were recorded within the Upper Clutha River / Mata-Au included the invasive *Lagarosiphon major* (*Lagarosiphon*); however, this was only noted in one location where a slow-moving pool had formed downstream of a willow tree. *Didymo* (*Didymosphenia geminata*) was present throughout the length of the study area and was noted on rocks in the shallower sections. Free-floating *didymo* were present in high numbers floating within the water column over the entire width and length of the study area.

4.4 Aquatic Habitat

The diversity of the habitat within this stretch of the Clutha River / Mata-Au is considered to be consistent with a highly dynamic and mobile river. The visible gravel substrate was relatively uniform across the full stretch and length of the river, with only some minor variation in the combination of substrate material present from small boulders through to coarse gravels. The nature of the bed is unstable and loosely consolidated. Deposition of finer silts and sands occurs where the water energy dissipates, which is typically along the rivers edge, particularly behind willow trees in back eddy sections. Few large visible boulders were present within this stretch of the river. Undercut banks may be present but were not able to be viewed through the water column. The variable but swift flows present within this stretch of river has resulted in highly mobile substrate, that has become relatively uniform in composition.

4.5 Water Quality Results

Surface water testing for turbidity (NTU) and total suspended solids (g/m^3) has been undertaken by CGCL in May 2020 for a similar resource consent application on the Mid Clutha River / Mata-Au (Table 7). Ten samples were collected at 5 m intervals directly behind the dredge for 50 m. A control sample was taken upstream of the dredge. Samples were analysed at Hill Laboratories in Christchurch. No in-river testing has been completed in the Upper Clutha River / Mata-Au as the dredge cannot be relocated prior to consent being issued.

Surface water turbidity samples collected from within the middle of the sediment plume produced by the suction dredge varied from 1.62 NTU 5 m behind the



dredge to near control limits of 1.13 NTU 50 m behind the dredge. The turbidity levels are all below the Otago Regional Council Water Policy Statement 2020 Schedule 15 good water quality limits of 5 NTU. The results show that typically suspended sediment decreases with distance from the dredge, and after 50 m is indiscernible from the control conditions.

Table 7: Water quality results.

Sample	Turbidity (NTU)	Suspended Sediments (g/m ³)
5 m	1.62	9
10 m	1.50	5
15 m	1.48	3
20 m	1.10	< 3
25 m	1.14	< 3
30 m	1.46	4
35 m	1.44	< 3
40 m	1.37	< 3
45 m	1.13	< 3
50 m	1.13	< 3
Upstream Control	1.12	< 3
Guideline Value	5*	

Receiving Water Group 2, Schedule 15 Good water quality limits (Otago Regional Council, 2020) are achieved when 80% of samples collected at a site when flows are at or below median flow, over a rolling 5-year period, meet or are better than the limits in Schedule 15.

Drone footage of the sediment plume produced by the dredge have been provided by the applicant and shows that the sediment plume is generally no wider than the width of the dredge, which is 6 m, and was scarcely visibly 50 m downstream. The sediments mined at the time of these samples and videos are considered representative and comparable to those in the Upper Clutha River / Mata-Au, as they consisted predominantly of mixed gravels with very little fine material (pers. comms. Peter Hall; 11 November 2021). The flow and mixing conditions in the location of the sampling are also considered to be consistent with the conditions present in the Upper Clutha River / Mata-Au.



5 Ecological Values

The ecological values of the Upper Clutha River / Mata-Au are associated with the fish species, spawning habitat, and aquatic habitat. The ecological values are summarised below.

Table 8: Ecological values.

Ecological Values	Description
Presence of Threatened and At Risk - Declining fish species	Brown trout, rainbow trout, salmon, longfin eels, common bully, and upland bully are likely to be present within the study area. Kōaro, Clutha flathead galaxias, and freshwater shrimp may be present within the shallows of the main river body, particularly around the confluences of tributaries within the Clutha River / Mata-Au. Longfin eels and kōaro have a conservation status of At Risk – Declining, and the Clutha flathead galaxias has a conservation status of Threatened – Nationally Critical (Dunn et al., 2018).
Spawning habitat	The stretch of the Clutha River / Mata-Au in which suction dredging is proposed is identified as spawning habitat for brown trout and rainbow trout, with a short stretch identified as kōaro spawning habitat.
Aquatic habitat	The aquatic habitat present within the study area is considered to be consistent with a highly dynamic and mobile river, however the gravel substrate still provides suitable habitat for a range of fish species. The shallow water depths, along with slower currents provide suitable refuge habitat for the smaller fish species, which would be unable to occupy the faster flows of the main channel.



Presence of macroinvertebrates	Macroinvertebrate communities were sampled in three locations to reflect the different substrate habitats present. Although macroinvertebrates are present, they are present in very low numbers. The range of macroinvertebrate community health indices are believed to reflect the unstable benthic environment of the Clutha River / Mata-Au, rather than poor water quality.
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6 Ecological Impact Assessment

The following ecological impact assessment has been completed using the methodology outlined in Section 3.5. The proposed suction dredging and associated activities could have the potential to result in ecological impacts on the Upper Clutha River / Mata-Au. Potential adverse effects could include sedimentation, habitat disturbance and loss, diesel spills, and the spread of unwanted organisms. The following section discusses the proposed activities and potential impacts and is summarised in Section 6.6 and Table 10.

The river and hydrological characteristics of the Clutha River / Mata-Au are considered to be representative of a highly dynamic river, and support Threatened and At - Risk fish species. The level of natural habitat diversity within the river is considered to be low, however this is typical of a river of this nature. The Clutha River / Mata-Au is a link to the tributaries, which support a range of rare species.

6.1 Disturbance of Benthic Substrate

6.1.1 Sedimentation and Sediment Plumes

The dredging of the benthic substrate will result in the disturbance of benthic material less than 350 mm, which will be drawn up through the dredge pipe and then discharged back to the Clutha River / Mata-Au at the rear of the boat. The coarser gravels and cobbles will settle immediately behind the dredge, but sedimentation and sediment plumes will occur from the finer sediments. An increase in suspended sediment within the water column can temporarily degrade water quality and may cause adverse impacts on fish species. These effects could include reducing visual feeding abilities, a reduction in favourable water quality parameters for fish species, as well as the associated sediment deposition adversely affecting benthic habitat for macroinvertebrate communities and fish spawning. The finer sediment will settle out in a graduated pattern with increasing distance from the dredge.

The ecological value of the species and habitats likely to be impacted by the sediment plumes and sedimentation are High. The magnitude of the effect from the sedimentation and sediment plumes is considered Low. This is because the



majority of the sediments have been shown via CGCL's study in May 2020 to fall out of the water column within 50 m of the dredge operation, and the visible discolouration would be hard to discern beyond 100 m. The currents and mixing pattern present within the Clutha River mean that the plume is typically contained in a narrow channel (the sediment plume remains a similar width to the dredge of approximately 6 m). As a result, fish species present will not be highly displaced as the plume will not encompass the entire width of the river. Smaller fish present within the shallows should be only minimally impacted by the fines as the sediments will settle gradually within these environments, not in large volumes. The dredge also has a draft of 0.8 m, which means that benthic substrate shallower than this depth is unlikely to be disturbed. This creates a refuge depth for smaller fish and migrating elvers, which will predominantly remain in the shallows at the rivers' edge out of the main current. The highly dynamic nature of the Clutha River / Mata-Au means that any fine sediment will likely have been remobilised during the next high flow event, and therefore any sediments mobilised during dredging are unlikely to be present on the benthic substrate habitat for any substantial length of time.

The overall level of effect of the sedimentation and sediment plumes is considered to be Low (a High ecological value and Low magnitude of effect). The highly dynamic nature of the river system means that sediment is continuously disturbed and deposited as part of the natural river pattern and therefore species present will be tolerant of this.

6.1.2 Habitat Disturbance

Habitat loss for in-stream fauna will occur as a result of the suction dredge mining. Bed disturbance will result in the temporary loss of spawning and feeding habitat, however, the coarser gravels and cobbles will settle immediately behind the dredge reinstating and backfilling the substrate as works are occurring, largely reflecting the substrate composition prior to disturbance. Habitat disturbance will predominantly occur at depths greater than 0.8 m, due to the draft of the dredge.

Macroinvertebrate habitat will also be disturbed, and macroinvertebrates will be displaced. However, a study by Ross Thompson (2001) (Appendix A) undertaken on the Pomahaka River, which is also a highly disturbed and mobile river, with loosely consolidated benthic substrates, found that there was no clear difference in the post dredging benthic macroinvertebrate community as a result of the gold-dredging. The diversity and abundance of the macroinvertebrates sampled



within the Clutha River / Mata-Au is very low, and therefore are already reflective of the high disturbed and mobile environment. No disturbance of benthic macroinvertebrates will occur at depths less than 0.8 m, due to the draft of the dredge, therefore re-colonisation of macroinvertebrates can occur from these adjacent shallower areas.

Macroinvertebrate communities will be temporarily lost from the areas where stream bed disturbance occurs; however, these areas will be readily re-colonised by macroinvertebrates from upstream and the immediate surrounding areas once the works have been completed. Further, habitats will only be disturbed once.

The ecological value of the substrate utilised as habitat for fish and macroinvertebrates is High, and the magnitude of effect of disturbing habitat is Low. This is because much of the habitat that is disturbed is already highly mobile, and the habitat predominantly utilised by macroinvertebrate species will be inaccessible to the dredging operation. Based on these factors, the overall level of effect is considered to be Low.

6.1.3 Disturbance of Fish Spawning and Migration

Dredging is proposed seven days a week with restrictions only around Christmas and Easter public holidays. This period of operation means that the dredge will be operating during fish spawning and migration periods. The spawning times of fish species identified to be present from the appropriate fish databases are listed in Table 9 below. No fish passage restrictions will occur as a result of the suction dredging.

Table 9: Fish Spawning Periods (Smith, 2015).

Species	Threat Classification*	Spawning Period
Clutha flathead galaxias	Threatened – Nationally Critical	1 August to 15 November
Kōaro	At Risk - Declining	1 April to 30 May
Longfin eel	At Risk - Declining	Do not spawn within rivers
Upland bully	Not Threatened	1 October to 31 December
Common bully	Not Threatened	1 August to 28 February
Brown trout	Introduced and naturalized	1 May to 30 June
Rainbow trout	Introduced and naturalized	1 June to 30 August

* Threat classification from Dunn et al., (2017).



Kōaro and Clutha flathead galaxias are unlikely to spawn within the main body of the Clutha River / Mata-Au, as they prefer clear, swiftly flowing forested streams with vegetated riparian margins. These conditions are not present within this stretch of the Clutha River / Mata-Au; therefore, they are likely to migrate up the tributaries of the study area. This is reflected within the records of the NZFFD, which shows these species with a higher presence within the tributaries rather than the Clutha River / Mata-Au. No dredging is proposed within 20 m upstream and downstream of a confluence of a tributary greater than 1 m in width. A large exclusion zone approximately 450 m wide is also proposed around the confluence of Luggate Creek (see Figure 8). The ecological value of At Risk – Declining and Threatened species is High and Very High respectively, however, as the spawning habitat of these species is actively avoided, they are unlikely to be affected by the proposed activities and the magnitude of effect is considered Negligible. The level of effect on these species is Low.

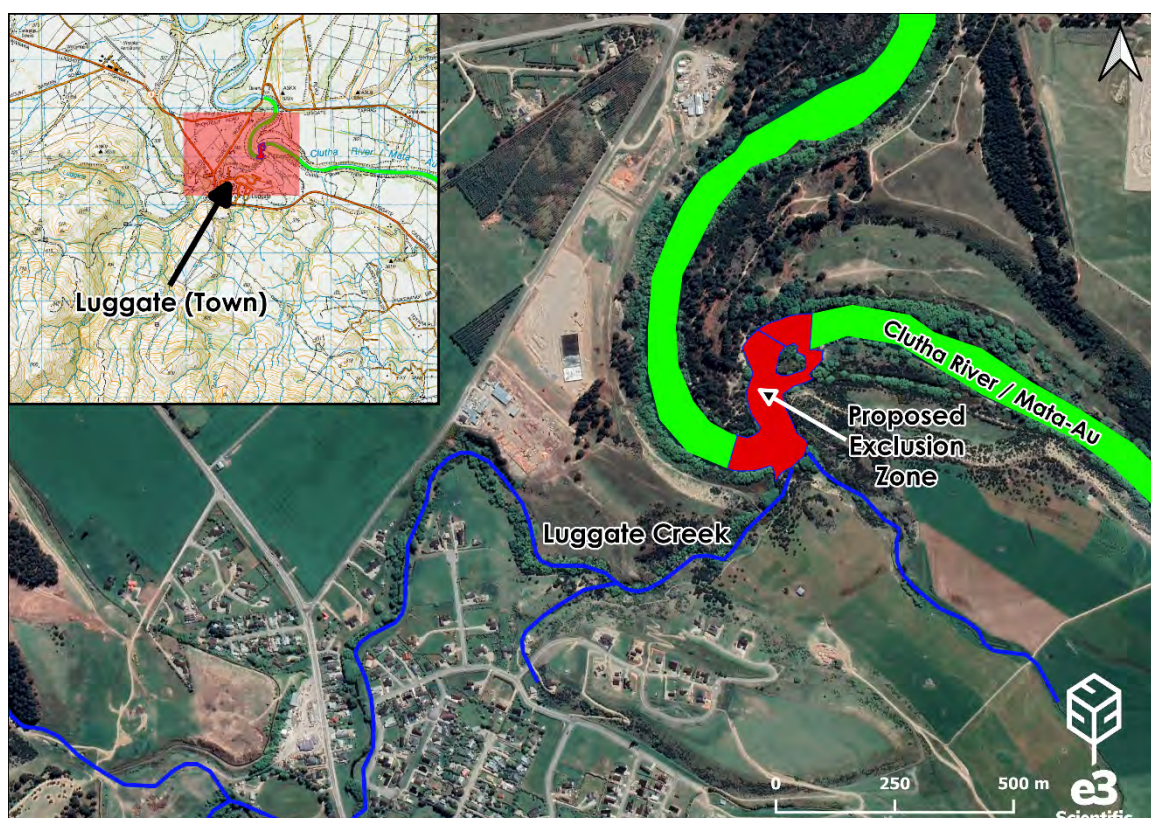


Figure 8: Luggate Creek confluence exclusion zone within the Clutha River / Mata-Au.

Longfin eels only breed once, at the end of their life and they do not breed in the Clutha River / Mata-Au. In April, eels that are ready for spawning, will migrate down the Clutha River / Mata-Au to the sea. The migration pathway of adult eels is unlikely to be affected by the dredge, as the eels will be able to detect the

dredge activity and actively avoid it, and the size of the adult migrating eels means that they are unlikely to be entrained by the dredge. Smaller elvers will utilise the Clutha River to migrate upstream and their smaller size indicates they could be entrained by the dredge. However, elvers will typically remain close to river banks where current velocity is lower and avoid the main channel. The draft of the dredge (0.8 m) means that the river banks are typically avoided due to operational difficulties. The ecological value of At Risk – Declining species is High, however, as the migratory pathway of most of these species will not be affected the magnitude of effect is Negligible. The level of effect on these species is Very Low. However, effects on the smaller elvers migration pathway should be actively avoided. It is therefore recommended that the dredge avoids all river bank areas, regardless of depth. Based on this additional avoidance of migration pathways, the residual effect is considered Low.

Upland bully and common bully prefer gentle flowing, stream margins. These species and their habitat will be protected as the dredge cannot enter water shallower than 0.8 m due to the draft of the dredge. The ecological value of these Not Threatened species is Low, however, as the spawning habitat of these species is unlikely to be affected by the proposed activities the magnitude of effect is Negligible. The level of effect on these species is Very Low.

Brown trout and rainbow trout are likely to spawn within the Clutha River / Mata-Au. The area of benthic substrate disturbed during the spawning periods of these species is proposed to be restricted through consent conditions, which will allow only a single 1,500 m stretch of the river to be mined during the sports fish season. This area will be required to be approved in the annual work program submitted to the Consents Authority but prepared in consultation with the Otago Fish & Game. Brown trout and rainbow trout can also spawn within the tributaries, provided there are no fish passage restrictions. The ecological value of these Introduced species is Low, however, as the spawning habitat of these species is likely to be affected by the proposed activities the magnitude of effect is Moderate. Based on this the overall level of effect on these species is Low.

The Hokonui Rūnanga have raised concerns regarding the impact on lamprey. No lamprey are recorded within the Upper Clutha River / Mata-Au; however, it is acknowledged that lamprey are difficult to fish for and therefore there are likely more present than is identified within the NZFFD. Spawning habitat for lamprey appears to be small, shady, hard bottomed freshwater streams (DOC, 2008). Little



is known about lamprey, but the literature review by DOC (2008) found that lamprey typically migrate upstream during night, and during the day they actively conceal themselves and seek cover, under boulders and bank side debris to avoid sunlight. Lamprey have been shown to avoid sunlight under whatever is available in a particular reach as opposed to having preferred habitat type (DOC, 2008). The juvenile lamprey, ammocoetes in the Mataura River, show a preference for sandy spots and shallows at the banks of the rivers (DOC, 2008). Habitat of ammocoetes, will therefore be avoided, as where sandy spots are occurring within the Clutha River / Mata-Au, the dredge is unlikely to be able to operate. No dredging is permitted within the side tributaries, or at night, which will avoid the spawning habitat and migration pathway for adult lamprey. The ecological value of Threatened – Nationally Vulnerable species is Very High, however, as the spawning habitat, and juvenile rearing habitat of these species is unlikely to be affected by the proposed activities the magnitude of effect is Negligible. Based on these factors the overall level of effect on these species is Low.

6.1.4 Entrainment of Fish

The disturbance of the benthic substrate could result in the entrainment of fish species, which will then pass through the sluicing equipment along with the benthic substrate. The dredge nozzle is positioned near the gravels and then drives into the gravels through the gravel-water interface where fish may reside. The entrainment of fish may result in fish mortality however, the fish are more likely to pass through unharmed and will be returned back to the Clutha River / Mata-Au with the tailings. Due to the location and depths within the river where the dredge is operating, the only species considered to be present in this section of the river are trout, which are more likely to move out of the way as they will detect the presence of the dredge before being entrained. To verify this assessment, it is considered appropriate that the dredge operator maintains a record of any fish observed to be entrained by the suction dredge. If the species survives, the record should be entered into the NZFFD with species and location provided. If mortality is observed, this shall be reported to the consenting authority in a brief quarterly report with species and GPS location provided. The ecological value of the introduced trout species is Low, and the magnitude of effect is Low as the frequency of this occurring is considered minimal. The level of effect of fish entrainment is therefore, Very Low.



6.2 Water Diversion

To operate the dredge, a maximum water take of 400 L/s for an average of 13 hours a day (approximately 18,000 m³ per day) is proposed. This take is considered to be a non-consumptive take as water is returned immediately back to the water column after passing through the dredge operations. A non-consumptive take of this volume of water, will not be discernible for instream fauna as water levels, in a body of water the size of the Clutha River / Mata-Au is not likely to be affected. The location of the water intake is on the inside wall between the hulls of the dredge and has a 20 mm screen. The ecological value of the habitat and species that this water body supports are High, however, as the water take will be indiscernible for instream fauna the magnitude of effect is Negligible. The level of effect of the water take is Very Low.

6.3 Refuelling of Diesel

6.3.1 Diesel Spill and Contamination of Water Column

The two-step refuelling process associated with the dredge operation occurs over the water column, as the vessels are located within the Clutha River / Mata-Au. This means that there is the potential for a diesel spill to occur, which may result in contamination of the water column. The spilling of diesel into the water column will degrade water quality and cause adverse impacts on fish species, and macroinvertebrates, potentially resulting in mortality. However, as diesel floats on the surface of water, the environmental effects will be largely confined to the river's margins, where the diesel will accumulate. This refuelling process has been undertaken weekly by CGCL on the mid Clutha River / Mata-Au for the past 10 years, without a spill occurring. The ecological value of the habitat and species that Clutha River / Mata-Au supports are High. The magnitude of the effect of a diesel spill will vary depending on volume of the spill and the speed in which it can be contained by floating absorbent booms, therefore can range from Low to Very High. The level of effect from a spill will therefore vary from Low to Very High.

Management actions to reduce this impact include the requirement to have appropriate spill kits onboard the dredge vessel and to ensure all crew are trained to respond to a spill emergency. Industry standard equipment shall be used, including automatic cut offs, shutoff valves, remote stop buttons, and double skinned/bunded fuel tanks. If a spill occurs despite the prevention measures in place, this should be immediately reported to ORC and crew should respond



immediately to minimising the spread of the spill. If these measures are followed, the residual impact can be considered Low.

6.4 Macrophyte Disturbance

6.4.1 Spread of Unwanted Organisms

Didymo and *Lagarosiphon* are already present within the Upper Clutha River / Mata-Au. *Didymo* is already widespread, however, *Lagarosiphon* is not widely spread. No disturbance of *Lagarosiphon* beds is to occur during the dredging operation, as *Lagarosiphon* can easily establish from broken fragments. The only disturbance of *Lagarosiphon* beds to occur is for the removal of beds. The ecological value of the habitat and species that are present is High, and the magnitude of effect of *Lagarosiphon* beds establishing over these areas is High. The level of effect of disturbing *Lagarosiphon* beds, allowing them to further establish within the Clutha River / Mata-Au is Very High.

Aquatic biosecurity measures are required to prevent further aquatic pests being introduced into the Clutha River / Mata-Au. These include equipment inspection and cleaning prior to and after entering the site to avoid the introduction and spread of unwanted aquatic organisms from both machinery and personnel. If these measures are followed, the residual impact can be considered Low.

6.5 Construction of a slipway

6.5.1 Riverbank disturbance

The location of the slipway can be seen in Figure 3 and will not require in water works to slip the dredge. Approximately 5 – 10 m³ of earthworks will be required to remove and level a 1 m high bank approximately 5 m from the wetted margin to create the required gradient to enable to dredge to be slipped. No sediment will be discharged to the water column during the creation of this slipway. The sediment will be stored in a stockpile outside of the flood plain. The detailed design of the slipway in regard to erosion measures required for the slipway during flood events has not yet been provided, however this has been commissioned by Flood Sense Limited. Measures such as rock armouring may be used. The slipway will remain in place for the 10-year duration of the consent.



The ecological value of the habitat and species that the Clutha River / Mata-Au supports are High. The magnitude of the effect of constructing a slipway at this location is Low as no in-water works are proposed and no sediment will be discharged. The level of effect is therefore Negligible. The level of effect of the slipway during flood events has not been determined as the detailed design regarding erosion control has not been provided. During flood events, the Clutha River / Mata-Au will be sediment laden from erosion within the wider catchment, therefore the effects of sediment discharge from the slipway, although not yet known, are not anticipated to be high.

6.6 Ecological Impact Assessment Summary

Overall, it is assessed that the ecological value of the Upper Clutha River / Mata-Au, is High; however, the overall risk to the ecology of this location from the proposed suction dredge activity is considered Low. This is predominantly due to the activity type and the management responses currently in place or proposed to be adopted by the applicant. Table 10 summarises the potential effects and the associated proposed impact management.



Table 10: Summary of potential effects on the Clutha River / Mata-Au from the proposed suction dredge mining.

Proposed Activity	Potential Impacts	Rationale	Ecological Value	Magnitude of Effect	Level of Effect	Proposed Impact Management	Residual Impact
Disturbance of benthic substrate.	Sedimentation and sediment plumes.	<p>Section dredge mining of the benthic substrate will result in sediment plumes and sedimentation onto downstream habitat.</p> <ul style="list-style-type: none"> • Gravels and cobbles will settle immediately behind the dredge. • Suspended sediments have been shown to largely fall out of the water column within 20 m. • The visible plume is not likely to exceed 100 m. • Due to the currents, the sediment plume remains a similar width to the dredge of approximately 6 m. 	High	Low	Low	<ul style="list-style-type: none"> • No impact management required. 	Low
	Habitat disturbance and loss for in-stream fauna.	<p>Section dredge mining of the benthic substrate will result in the disturbance and temporary loss of habitat for fish and macroinvertebrates.</p> <ul style="list-style-type: none"> • Gravels and cobbles will settle immediately behind the dredge reinstating and backfilling the substrate as works are occurring. • Substrate will be reinstated to reflect the substrate composition prior to disturbance. • Re-colonisation of macroinvertebrates can occur laterally or upstream from the area mined. 	High	Low	Low	<ul style="list-style-type: none"> • No impact management required. 	Low



	Disturbance of fish spawning areas and migration.	<p>Section dredge mining of the benthic substrate will be operating during fish spawning and migration periods.</p> <ul style="list-style-type: none"> • Elvers utilise this area as migration pathway. 	Low to Very High	Negligible to Moderate (Elvers)	Very Low to Moderate (Elvers)	<ul style="list-style-type: none"> • No substrate disturbance will occur at depths less than 0.8 m. • River banks will be avoided. • No mining is permitted in any side tributaries. • No mining is permitted within 20 m upstream and downstream of a confluence of a tributary > 1 m. • No mining is permitted within 100 m upstream and 315 m downstream of Luggate Creek. • No more than 1,500 m length and 9,000 m² of wetted bed is to be worked at one time. • Between 1 May and 31 August only one, 1,500 m stretch of the river may be mined. This is to be approved in the annual work plan prepared in conjunction with Fish and Game. • Where redds are identified the consent holder will liaise with Fish and Game to determine an alternate location. 	Low
	Entrainment of fish.	<p>Fish may be sucked into the intake nozzle during benthic disturbance.</p> <ul style="list-style-type: none"> • The nozzle is typically operating within the gravel column. • Fish species present where the dredge is operating are likely to only be trout (Low ecological value). • Entrained fish are likely to pass through unharmed. 	Low	Low	Low	<ul style="list-style-type: none"> • No impact management required, however, to verify this the following is volunteered: • Any entrained fish will be recorded into the NZFFD or if mortality is observed, this will be reported to ORC quarterly. 	Low
Water diversion.	Lowering of water level.	<p>A non-consumptive water take is proposed to enable to operation of the suction dredge.</p> <ul style="list-style-type: none"> • The location of the water intake is on the inside wall between the hulls of the dredge and has a 20 mm screen. • The non-consumptive take of water, will not be discernible for instream fauna as water levels are not likely to be affected, 	High	Negligible	Very Low	<ul style="list-style-type: none"> • No impact management required. 	Low



		in a body of water the size of the Clutha River / Mata-Au.					
Refuelling of diesel.	Diesel spill and contamination of water column resulting in instream mortality.	<p>Refuelling of diesel is proposed weekly. The two-step refuelling process associated with the dredge operation occurs over the water column.</p> <ul style="list-style-type: none"> No spills have occurred using this protocol in 10 years of operation. 	High	Low to Very High	Low to Very High	<ul style="list-style-type: none"> Spill kits are present on the dredge and at the onshore fuel tank. Industry standard equipment will be used, including automatic cut offs, shutoff valves, remote stop buttons, and double skinned/bunded fuel tank. Crew are trained in the use of spill kits. Any spills will be immediately reported to ORC. 	Low
Macrophyte bed disturbance.	Spread of unwanted organisms.	<p>Didymo and <i>Lagarosiphon</i> are already present within the Upper Clutha River / Mata-Au. The disturbance of macrophyte beds could result in the further spread and establishment of <i>Lagarosiphon</i> beds.</p>	High	High	Very High	<ul style="list-style-type: none"> No disturbance of <i>Lagarosiphon</i> beds is to occur. Aquatic biosecurity measures including equipment inspection and cleaning prior to and after entering the site to avoid the introduction and spread of unwanted aquatic organisms from both machinery and personnel. 	Low
Construction of a slipway.	Riverbank and riparian margin disturbance.	<p>The dredge is required to be slipped into the Clutha River / Mata-au.</p> <ul style="list-style-type: none"> Careful site selection has resulted in minimal earthworks within the riparian margin. No in-stream works are required at this location. 	High	Low	Negligible	<ul style="list-style-type: none"> No impact management is required. 	Low
	Erosion of slipway during flood events.	<p>Erosion of the slipway may occur during high flows of sufficient erosion and control measures are not in place.</p> <ul style="list-style-type: none"> Detailed design of the slipway in regard to erosion measures required for the slipway during flood events has not yet been provided. Flood Sense Limited have been commissioned to undertake this work. 	To be determined (TBD)			<ul style="list-style-type: none"> Measures such as rock armouring may be used. Sediment control barriers are to be used ensuring no material transport into the river. 	TBD



7 Conclusions and Recommendations

CGCL have applied for resource consent from both the Otago Regional Council and the Central Otago District Council to carry out suction dredge mining by a maritime vessel in the Upper Clutha River / Mata-Au. This report has been prepared to provide the information requested in the s92. A third mining consent was added to this application in June of 2022 (permit #60299) and therefore was not assessed as part of the original macroinvertebrate sampling. It is expected that ecological values within this additional area should be consistent with the lower reaches (permits #60593 & #60515). Consent conditions below have been updated to reflect both the s92 and the additional mining permit.

A range of ecological values are present within the Clutha River / Mata-Au including fish species, spawning habitat and aquatic habitat. The proposed suction dredge mining has the potential to result in a range of adverse ecological effects, however impact management measures and a suite of consent conditions is proposed within the resource consent application and elaborated on below to ensure that the effects on the freshwater ecology are less than minor.

7.1 Consent Conditions

In order to mitigate and manage the potential ecological impacts from the proposed works, the following consent conditions have been proposed by CGCL and are considered mostly appropriate. Changes to these conditions are shown using strike through and additions are underlined.

1. The consent holder must submit an annual work program to the Consent Authority which must highlight 1,500 metre sections of the Clutha River/ Mata-Au where the consent holder would like to operate the dredge during the sports fish spawning season (1 May to 31 August) and the bird nesting season (1 September to 31 January).
2. The annual work program must be prepared in consultation with the Otago Fish & Game Council and the Alexandra Office of the Department of Conservation.
3. The annual work program must at minimum include, but not be limited to:

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- a) Maps highlighting the upper and lower extents of each 1,500 metre section and also the associated GPS coordinates;
 - b) Monitoring requirements and procedures for refuelling;
 - c) Contingency plans in the event of system malfunctions or breakdowns;
 - d) The means of receiving and dealing with any complaints; and
 - e) Emergency contact phone numbers.
4. In order to minimise the amount of benthic habitat disturbed, no more than 1,500 metres length of the wet bed and 9,000 square metres area can be disturbed and worked at one time.
 5. Upon completion of mining each 1,500 metre section of riverbed, the consent holder must ensure that the riverbed is remediated as near as is practicable to its natural bed form, consistent with the adjacent areas.
 6. Between the periods of 1 May and 31 August (the trout spawning season) the consent holder may only operate in a single 1,500 metre section of the Clutha River/ Mata-Au as provided for in a current and approved annual work program.
 7. No mining shall be conducted in the area under Permit #60299 within the Clutha River / Mata-Au during trout spawning season (1 May through 31 August).
 8. Prior to beginning dredging within the sports fish spawning season the consent holder must consult with the Otago Fish & Game Council and the Consent Authority to identify a 1,500 metre section of the of the Clutha River/ Mata-Au proposed for dredging during the spawning season and an alternative section should this section be unavailable.
 9. Should any sports fish redds be identified by the Otago Fish & Game Council in consultation with the consent holder within the 1,500 metre section of the Clutha River/ Mata-Au approved for mining, the consent holder must then liaise with the Otago Fish & Game Council and determine an alternative 1,500 metre section of the Clutha River/ Mata-Au as identified in Condition 22. Once determined, the Consent Authority must be notified of the amended mining location within 5 working days.



10. Mining must not take place within 20 metres upstream or downstream of the confluence with any tributary greater than one metre in width at the mouth of the tributary.
11. Mining must not take place within 100 m upstream of the eastern edge confluence of Luggate Creek with the Clutha River/ Mata-Au to 50 m downstream of the river island at the Devils Nook (approximately 315 m downstream of the western edge of the Luggate Creek and Clutha River/ Mata-Au confluence). See Figure 8 in Section 6.1.3.
12. Except as provided for by Discharge Permit RM20.087.01, during the exercise of this consent, the consent holder must ensure that no contaminants, including fuel or oil, enter the Clutha River/ Mata-Au. In the event of contamination, the consent holder must undertake immediate remedial action, and must notify the Consent Authority and Otago Fish & Game Council within ~~3 days~~ 24 hours of the discharge.
13. Prior to the exercise of this consent, the Consent Holder must ensure that:
 - a) an industry standard hose and filler nozzle with automatic cut-off is fitted for refuelling equipment;
 - b) an additional shutoff valve is fitted to the handle and a remote stop push button and cable accessible at the filler nozzle location to stop the pump at the bulk tank;
 - c) the bulk onshore fuel tank is double skinned or bunded and is located in an area that is above 1 in 50-year flood levels, in a safely accessible location;
 - d) spill kits are located at the bulk tank and onboard the dredge; and
 - e) all staff receive training in the location and use of spill kits.
14. The consent holder must not excavate or disturb any riverbanks except for providing access.
15. The consent holder must ensure that any mining event authorised by this consent does not cause any flooding, erosion, scouring, land instability or property damage.



16. The consent holder must take all reasonable precautions to minimise the spread of pest plants and aquatic weeds. In particular, the consent holder must:
- a) Water blast all machinery to remove any visible dirt and/or vegetation prior to being brought on-site to reduce the potential for pest species being introduced to the bed of the watercourse. Machinery and equipment that has worked in watercourses must, prior to entering the site, also be cleaned with suitable chemicals or agents to kill didymo;
 - b) ~~No disturbance of Lagarosiphon beds is to occur. Avoid working in areas where aquatic weeds such as Lagarosiphon major are known to be present~~ (for information, contact the Consent Authority's Biosecurity Team); and
 - c) To avoid the spread of the *Didymosphenia geminata* or any other pest plant, not use machinery in the berm or bed of the river that has been used in any area where the pest plants are known to be present in the previous 20 working days, unless the machinery has been thoroughly cleansed with a decontamination solution (for information on decontamination contact the Consent Authority's Biosecurity Team);
 - d) Remove any vegetation caught on the machinery at the completion of works;
 - e) Prior to leaving the site, water blast all machinery following the completion of works to reduce the potential for pest species being spread from the bed of the watercourse.
17. The consent holder must ensure that any bed disturbance is limited to the extent necessary to carry out the works.

Condition 3 of the application (listed as condition 18 below), which relates to restricting the disturbance of nesting river birds is proposed as below.

18. Between the periods of 1 September to 31 January the consent holder must only operate in two of the 1,500 metre sections of the Clutha River/ Mata-Au (from bank to bank with the exclusion of the shore area inaccessible due to the draft of the dredge) identified in the current annual work program and prepared in conjunction with the Department of Conservation.

In addition to the conditions above, it is also proposed to include the condition below, which will record and monitor any fish entrained within the dredge.



- The dredge operator is to maintain a record of any fish observed to be entrained by the suction dredge. If the species survives, the record should be entered into the NZFFD with species and location provided. If mortality is observed, this shall be reported to the consenting authority in a brief quarterly report with species and GPS location provided.

Discharge Permit

1. There must be no conspicuous change in colour or visual clarity of the Clutha River/ Mata-Au beyond a distance of ~~200~~ 100 metres downstream from the point of discharge.
2. In the event that a noticeable sediment plume beyond a distance of ~~200~~ 100 metres downstream from the point of discharge, all dredging activity must cease, and the Consent Holder must immediately notify the Consent Authority.

Water Take Permit

1. The rate of abstraction must not exceed:
 - a) 400 litres per second; and
 - b) 18,000 cubic metres per day.
2. All water taken while exercising this consent must immediately be returned to the watercourse it was sourced from.

Provided these consent conditions are met, e3s considers the potential effects on the freshwater ecology of the Clutha River / Mata-Au from the proposed activities to be less than minor.



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Appendices



Appendix A:
Impacts of gold-dredging activities on benthic macro-invertebrates of the
upper Pomahaka River (Thompson, 2001)



**Impacts of gold-dredging activities on benthic macro-
invertebrates of the upper Pomahaka River.**

**Prepared for : D.Scott
11 February, 2001**

**Prepared by : R.Thompson
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Dunedin**

Introduction:

This study aims to assess the impact of a small gold dredging operation on stream benthic invertebrates. The resource consent for this operation covers a 27 kilometre stretch of the upper Pomahaka River in Southland (Figure 1). Gold dredging is carried out using a mobile suction dredge. The dredge uses a 16.5 cm inlet and operates in the top 20-30cm of stream sediments. Sediment is passed through the dredge, the heavier component is retained, and the remainder is discharged back into the stream. Operated in ideal conditions the dredge can process up to 10 m³ of sediment per day. In reality however, the operator tends to focus on patches of the bed that he considers likely to yield gold, but avoiding obvious areas of fine sediment and undercut banks.

The impacts of gold dredging on stream fauna have been described elsewhere (Pearson and Jones, 1975; Griffith and Andrews, 1981; Harvey, 1986; Hall, 1988). Such studies have shown short term impacts on stream invertebrates. The largest impacts on stream fauna are seen where the bed of the stream is tightly packed ('armoured') and has a high component of fine sediments. Disruption of bed armouring and mobilisation of fine sediment can have serious effects on both fish and invertebrates. Specifically, where there is an impact of dredging we can expect to see loss of species that are intolerant of fine sediment loading or bed disturbance. This will result in lower values for metrics of ecosystem health (e.g. Macroinvertebrate Community Index; [MCI] Stark, 1993). Impacts can be expected to be less severe in streams that have highly disturbed, mobile beds, as tends to be true of many New Zealand streams (Winterbourn, 1995). In these streams the fauna tends to be dominated by species able to deal with bed disturbance, and fine sediments are mobilised and removed from the system by natural disturbance.

This report follows on from an earlier study (Bagrie, 1998) in which two sites (one dredged, one undredged) were surveyed. Bagrie found higher numbers of invertebrate species and higher values for measures of ecosystem health (Macroinvertebrate Community Index [MCI]; Stark, 1993) at the dredged site, however there was high variation and some confounding factors present. This study builds on Bagrie's work and uses her data as background. The current study utilises a classical BACI (Before, After, Control, Impact) design to try and address the problems that Bagrie encountered with inter-site variability.

Methods:*Site Description:*

The Pomahaka River at the site of dredging is a fourth order stream flowing through low intensity farmland (pasture interspersed with remnant tussock). The surrounding landscape is rolling hill country. Riparian margins of the stream are not fenced and there is abundant evidence of stock damage of banks. The riverbed is composed of bedrock sheets with a shallow (10-50cm) or absent covering of cobbles and pebbles. The nature of the bed is unstable and loosely consolidated. This area was extensively worked for gold last century, and in many places the river is reworking tailings from past gold mining activities. These contribute a significant amount of silt to the stream.

The study reach is comprised of a series of run-riffle/pool sequences that are unshaded by vegetation.

Sampling locations:

The river was sampled at two locations, a control site upstream of the intended dredging operations and a site that was dredged (Figure 1). Both locations were shallow riffles (30-50cm deep) with cobble/pebble substrate. The two locations were sampled twice, once (3/2/01) before dredging took place at the lower site (5/2/01), and once after the lower site had been dredged (10/2/01). By comparing the change at the upper site (the control, not dredged) with the change in the lower site (dredged) we can ascertain how much change has been due to the dredging operations and how much is due to natural variation.

Field Sampling:

At each location three kick-net samples (ORC, 1998) were taken. A 250 micron mesh net was placed downstream of an area of cobbles which was disturbed to a depth of 10cm until a sample of 400 mL of river fines and invertebrates was achieved.

In addition, some samples were taken during dredging operations in November (25/11/00). Measurements of water clarity were taken (using a Secchi disk) upstream of dredging operations, downstream 1m (directly in the dredge tailing flow and 1 m to the side of the dredge), 5m, 20m, 50m and 500m (in the centre of the stream). Water samples

were also taken upstream of the dredge, 1m downstream, 50m downstream, and 300m downstream and returned to the lab for further clarity analyses.

Sample Processing and Sample Analysis:

Invertebrate samples were sieved through a 250µm sieve to remove fine material and picked and identified live. Contents of the sieves were then placed in a white tray and macroinvertebrates removed. The macroinvertebrate samples were then identified under dissecting microscope (10-40X) and binocular microscopes (100-400X) using criteria from Winterbourn & Gregson (1989) and Towns and Peters (1996). Where necessary (as for Leptophlebiid mayflies and Chironomidae), permanent mounts of mouthparts were prepared to aid in identification.

To measure water clarity duplicate 10mL samples of water were taken from each water sample. Absorbance of samples at 665nm (measuring turbidity) were taken using a Shimadzu spectro-photometer.

Data Analysis:

In addition to number of taxa, the Macroinvertebrate Community Index (MCI; Stark, 1993) and Open-ended MCI (OEMCI; ORC, 1998) were calculated. The MCI uses the occurrence of specific macroinvertebrate taxa to determine the level of organic enrichment in a stream.

$$\text{MCI} = \left(\frac{\sum \text{of taxa scores}}{\text{Number of scoring taxa}} \right) \times 20$$

A site score is obtained by summing the scores of individual taxa and dividing this total by the number of taxa present at the site. Taxon scores are between 1 and 10, with low scores indicating high tolerance to organic pollution and high scores indicating the taxa that will only be found in “pristine rivers” (ORC, 1997).

The OEMCI is a derivative of the MCI that is abundance weighted. Invertebrates are classed as rare (<5/sample), common (5-19/sample) or abundant (20+/sample). The taxon scores are then multiplied by an abundance weighting (1=rare, 3=common, 5=abundant) before being summed in the same way as above.

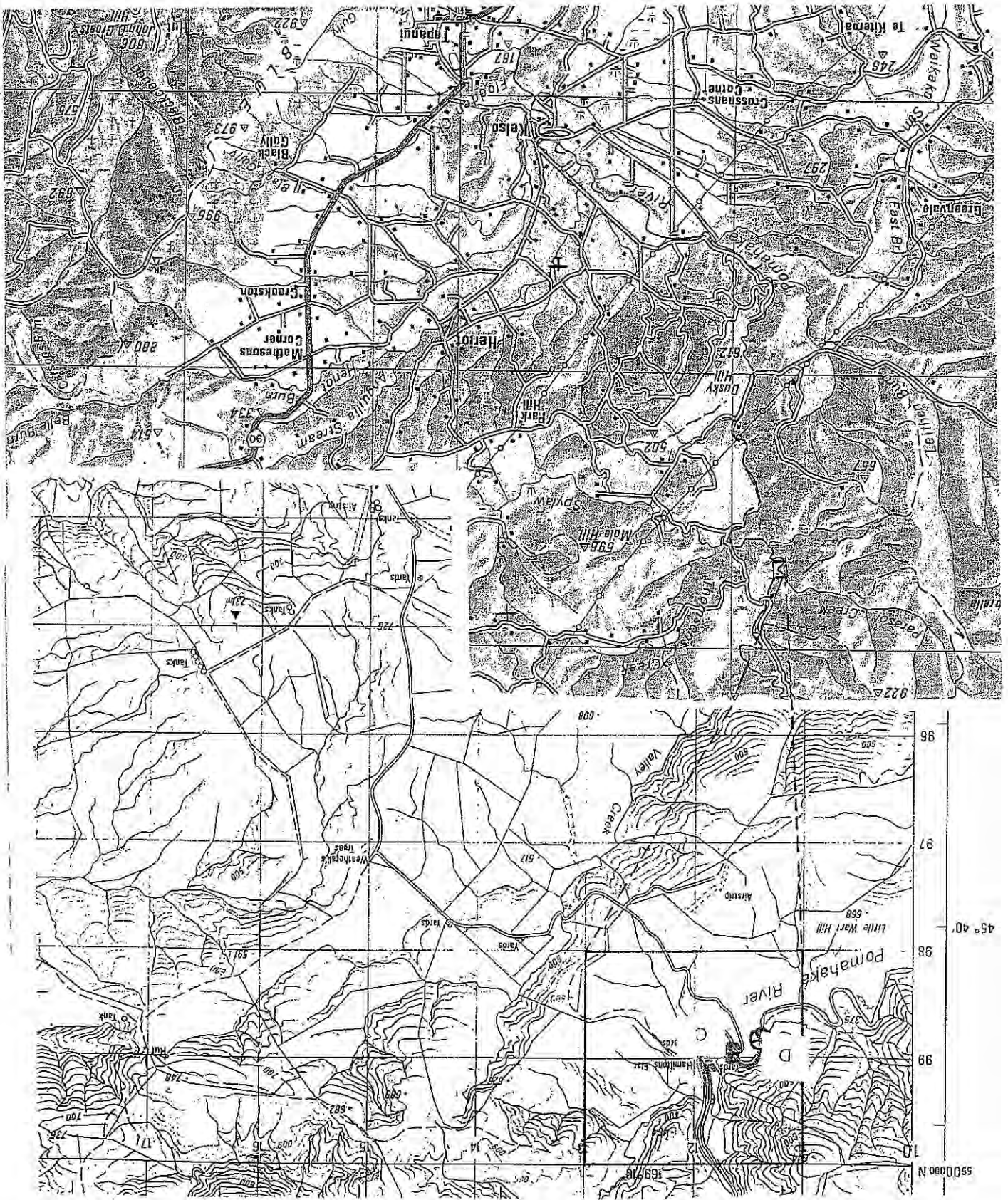


FIGURE 1. Map showing location of sampling sites. The dredged site is marked 'D' and the control site is indicated with a 'C'

Results:

Water clarity:

Dredging observed in November, 2000, resuspended significant amounts of fine sediment and disturbed the stream bed. Despite this, there were no obvious differences in bed consolidation or armouring between dredged and undredged areas. The bed was unstable, and large cobbles could easily be overturned. Fine sediment was obvious in the water column immediately behind the dredge but was not noticeable 10 metres downstream. Even immediately behind the dredge the streambed was still visible through the water.

Secchi depths were much greater than the depth of the stream. There was evidence of reduced Secchi depths in the 5m immediately behind the dredge but no change further downstream even after 1 hr of dredging activity (Table 1).

TABLE 1. Secchi depths in Pomahaka R. during dredging operations in November, 2000. d/s = downstream. Secchi depth describes the water depth at which a standard black and white disk is still clearly visible. Three measurements were taken, the mean is shown.

Distance d/s of dredge (m)	Location	Secchi Depth (mm)
1	Behind dredge	230
	1m to side of dredge	>500
5	Behind dredge	430
	1m to side of dredge	450
20	Mid stream	>500
50	Mid stream	>500
300	Mid stream	>500
Pre dredging	Mid stream	>500

Water clarity as measured by absorbance at 665nm was very high but was reduced 1m behind the dredge (Table 2). Differences were not detectable 20m downstream or 300m downstream.

TABLE 2. Absorbance of 665nm light by water samples taken during dredging of the Pomahaka R. in November, 2000. High values indicate high turbidity. Values shown are the means of two samples.

Location	Absorbance
Upstream of dredge	0.012
1m downstream of dredge	0.051
20m downstream	0.016
300m downstream	0.011

Invertebrate samples:

The number of taxa found in this study (7-14) was slightly lower than the average of 14 for New Zealand rivers (Quinn and Hickey 1990) (Table 3). The value was also much lower than the 14-26 taxa found by Bagrie (1998) (Appendix One). Species composition of the samples from this study and those of Bagrie's (1998) were broadly similar, although some rare species were absent for the 2001 samples. Several species indicative of very high quality habitat (e.g. *Stenoperla prasinia*) were present in the samples although in low abundances. Values for MCI were similar to Bagrie's (1998) and moderate to high. Both sites would be classified as high quality (MCI score >100) according to Otago Regional Council criteria (ORC, 1998). OEMCI values were lower than those recorded in the previous study, and would classify these sites as being of average quality. This is mainly due to the relatively low abundances of all invertebrates recorded in this study.

Sampling post-dredging revealed no clear differences (Table 4). Both the control site and dredged site samples contained similar numbers of species and had similar MCI scores (Figure 2), with no statistically significant differences evident (two-sample t-test). OEMCI values had declined slightly (Figure 3), although this difference was not

statistically significant for either site (two sample t-test). There were no apparent patterns in the presence or absence of species that could be correlated with dredging activities.

TABLE 3. Species present in kick-net samples from Pomahaka R. taken pre-dredging (3/2/01). R=<5 individuals/sample, C=5-19 individuals, A=20+ individuals. Taxon scores (ORC, 1998) for pollution tolerance are shown, low scores = high tolerance. Sites denoted BI are to be dredged, sites marked BC are controls.

Group	Species	Score	BI			BC		
Mayflies	<i>Deleatidium myzobranchia</i>	8	A	A	A	A	A	A
Stoneflies	<i>Megaleptoperla grandis</i>	9			R	R		
	<i>Stenoperla prasinia</i>	10		R		R	R	C
	<i>Zelandoperla fenestrata</i>	8					R	
Dobsonflies	<i>Archicauliodes diversus</i>	7		R	R	R	R	
Dipterans	<i>Aphrophila neozelandica</i>	5				R		R
	<i>Austrosimulium australense</i>	3			R		R	
	Empididae	3	R					
	<i>Mischoderus</i> sp.	4			R			
	<i>Paralimnophila skusei</i>	6		R	R		R	C
	<i>Pirara matakiri</i>	3			R			
	<i>Rhabdomatrix</i> sp.	5		R				
Coleopterans	<i>Hydora nitida</i> (adults & larva)	6	A	A	A	A	C	A
Caddisflies	<i>Aoteapsyche raruraru</i>	4	R	R	R	R	C	
	<i>Chostachorema xanthoptera</i>	7			R		R	C
	<i>Helicopsyche albescens</i>	10		R				
	<i>Hydrobiosis frater</i>	5	R		R	R	C	C
	<i>Hydrobiosis parumbripennis</i>	5						R
	<i>Neurochorema confusum</i>	6						R
	<i>Olinga feredayi</i>	9	C	C		C	C	C
	<i>Polyplectropus puerilis</i>	6				R		
	<i>Psilachorema bidens</i>	6		R	R	R	R	
Molluscs	<i>Potamopyrgus antipodarum</i>	4		C	R			
Oligochaeta	Oligochaete worms	1	C	C	C	C	C	C
	Number of Taxa		7	12	14	12	11	11
	MCI		103	123	104	127	145	124
	Average MCI		110			132		
	OEMCI		294	242	187	253	295	364
	Average OEMCI		241			304		

TABLE 4. Species present in kick-net samples from Pomahaka R. taken 10/2/01. R=<5 individuals/sample, C=5-19 individuals, A=20+ individuals. Taxon scores (ORC, 1998) for pollution tolerance are shown, low scores = high tolerance. Sites denoted AI were dredged on the 5/2/01, sites marked AC are controls.

Group	Species	Score	AI			AC		
Mayflies	<i>Deleatidium myzobranchia</i>	8	A	A	A	A	C	A
	<i>Nesameletus scita</i>	9	R			R		
Stoneflies	<i>Stenoperla prasinia</i>	10			R		R	R
	<i>Zelandobius confusus</i>	5			R			
Dobsonflies	<i>Archicaultiodes diversus</i>	7		R	R	R	R	R
Dipterans	<i>Aphrophila neozelandica</i>	5		R	R	R		R
	<i>Austrosimulium australense</i>	3		R				
	Empididae	3					R	
	<i>Mischoderus</i> sp.	4		R				
	<i>Paralimnophila skusei</i>	6	R	C	C	C	C	C
	<i>Pirara matakiri</i> .	3					R	
	<i>Rhabdomastrix</i> sp.	5		R				
Coleopterans	<i>Hydora nitida</i> (adults & larva)	6	A	A	A	A	A	A
Caddisflies	<i>Aoteapsyche raruraru</i>	4	R	R	R	R	R	R
	<i>Chostachorema xanthoptera</i>	7		R	R		R	
	<i>Hydrobiosis frater</i>	5	R		R	R	R	R
	<i>Hydrobiosis parumbripennis</i>	5	R				R	
	<i>Olinga feredayi</i>	9	R		C	C	R	C
	<i>Psilachorema bidens</i>	6	R	R	R	R	R	
	<i>Pycnocentrodes</i> sp.	5				R		
Oligochaeta	Oligochaete worms	1	R	R	C		C	C
	Number of Taxa		10	12	13	11	14	10
	MCI		118	103	122	127	114	122
	Average MCI		114			121		
	OEMCI		230	217	257	284	191	298
	Average OEMCI		235			258		

FIGURE 2. MCI scores for impact (dredged) and control sites before and 5 days after dredging. Results shown are a mean of three samples.

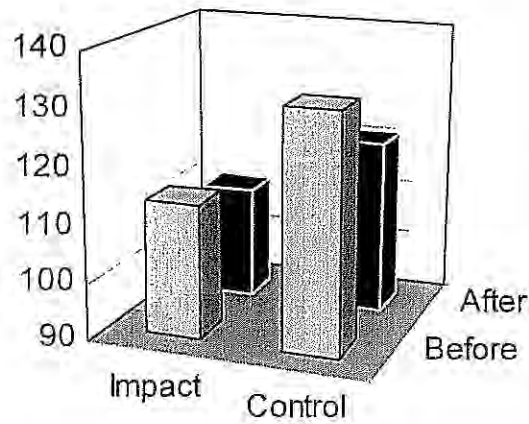
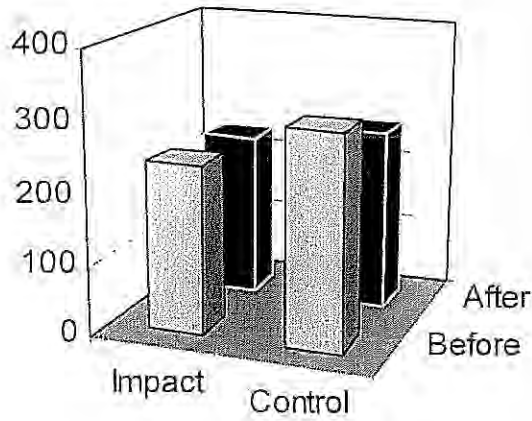


FIGURE 3. OEMCI scores for impact (dredged) and control sites before and 5 days after dredging. Results shown are a mean of three samples.



Discussion:

This study clearly shows impacts of dredging on water clarity in the immediate vicinity of dredge operations, and there are clearly disturbance effects on the streambed. However the lack of any clear evidence of detrimental effects on benthic macro-invertebrates suggests that this effect is relatively short term. Invertebrates found included species that are considered indicative of high quality habitat. In this area these species are present because of a lack of organic pollution, and may not be good indicators of any detrimental effects of physical disturbance of the streambed. Therefore interpretation of MCI and OEMCI values from a single sampling occasion is likely to be less meaningful. However comparisons of species richness, MCI and OEMCI before and after disturbance will provide an index of the impact of dredging operations.

In a stable environment, where the stream bed is armoured and disturbance events are rare, disturbance intolerant taxa may come to predominate. Disturbing these environments may cause species to be lost. The Pomahaka River however has a loose bed and can be classified as a high disturbance system. The fauna is dominated by species that display traits that infer disturbance resistance (Townsend et al. 1997). These species are adapted to a high disturbance environment and some may even be capable of physically passing through the dredge without damage (Griffith and Andrews, 1981). Where localised detrimental effects occur it is likely that the diffuse and patchy nature of the disturbances will allow invertebrates to re-colonise quickly (Hall, 1988). Dredging operations on the scale taking place for this study are not of comparable scale or intensity to natural high flow events.

This study can find no evidence of medium term impacts on stream macro-invertebrates due to gold-dredging activities. This is probably due to the disturbed nature of the habitat, which has resulted in the presence of a disturbance resistant fauna. The effects of dredging operations, as compared to the effects of a flood or spate are likely to be extremely small. The effects of dredging on stream fish have not been studied here but are likely to be minimal (Harvey, 1986) unless there is direct dredging activity in trout redds (Griffith and Andrews, 1981). Effects on invertebrates would be increased if the operator were to dredge in areas where banks of fine sediment have accumulated or beneath undercut stream banks. Currently, operations are not carried out in those areas, and it is recommended that those precautions continue.

Appendix One:

Species present in Pomahaka R. 1998 (adapted from Bagrie 1998). D = dredged site, sites marked U are controls. were dredged in the preceding season. See Table 4 above for key to codes and explanation.

Group	Species	Score	D			U		
Mayflies	<i>Ameletopsis</i>	10					R	
	<i>Austroclima</i>	7	A	A	A			R
	<i>Coloburiscus</i>	7			R			
	<i>Deleatidium</i>	8	A	A	A	A	A	A
	<i>Nesameletus</i>	9	R					
Stoneflies	<i>Megaleptoperla</i>	9			R			
	<i>Stenoperla</i>	10	R	R		R	C	R
	<i>Zelandobius</i>	5	C	C	C	R	C	C
Dobsonflies	<i>Archicauliodes diversus</i>	7	C	C	R	R	R	R
Dipterans	<i>Aphrophila neozelandica</i>	5	A	A	A	R	C	C
	<i>Austrosimulium australense</i>	3	R	R	C	R	C	R
	Chironominae	3		R	R		R	
	Empididae	3	R		R		R	
	<i>Ephydrella</i>	4						R
	Orthocladinae	3	R		R			R
	<i>Paralimnophila skusei</i>	6	C	R			R	R
	<i>Rhabdomastrix</i> sp.	5	A	C	C	R	A	C
	Tanypodinae	5	C	R				
	Coleopterans	<i>Hydora</i>	6	A	A	A	R	C
Scirtidae		8				R	R	R
Caddisflies	<i>Aoteapsyche</i>	4	A	A	A	C	R	A
	<i>Chostachorema</i>	7	R		R			
	<i>Helicopsyche</i>	10	C					
	<i>Hudsonema</i>	5	R	R				
	<i>Hydrobiosis</i>	5	C	R	R	R		R
	<i>Olinga</i>	9	A	A	A	C	R	C
	<i>Polyplectropus</i>	6	R					
	<i>Psilachorema</i>	6	C	C	C	A	A	A
	<i>Pycnocentria</i>	7		R	R			
	<i>Pycnocentrodus</i>	5	A	C	A			
	<i>Tiphobiosis</i>	5	R	C	R			R
Molluscs	<i>Potamopyrgus antipodarum</i>	4	C	C	C	R		R
Oligochaeta	Oligochaete worms	1						
Crustacea	Ostracoda	1	R				R	
	Number of Taxa		26	21	22	14	16	19
	MCI		115	114	112	104	124	116
	Average MCI		114			115		
	OEMCI		339	315	314	239	291	239
	Average OEMCI		323			256		

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Cold Gold Clutha LTD

***Gold Dredging Operation Clutha River
Central Otago***

Maritime Transport Operator Plan

Version 7

30/06/2021

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Introduction

This maritime transport operator plan (operator plan) is designed to provide the information, policies and procedures necessary for the safe, effective and compliant operation of the vessel named within it. The plan is split into three sections.

Section A – General information and policy

This section contains information, policy and procedures that apply to the entire operation and are not specific to any one vessel. All information contained in this section will remain relevant to the entire operation. This section may be amended if a vessel is added or removed.

Section B – Vessel manual for *CGC1 (MNZ 134266)*

This section contains the current and complete copy of all safe operating procedures required for the operation of the vessel. If the vessel is changed or any other vessel(s) added to the operation, this section will be updated by the replacement or additional vessel manual(s).

Section C – Records and plans

This section contains records and plans which relate to the entire operation.

SECTION A GENERAL INFORMATION, PROCEDURES AND POLICY

A1 Maritime transport operator details

The details contained in 1.1 to 1.5 apply to the entire operation. Approval must be obtained from Maritime New Zealand (MNZ) for any changes to these sections before the amendment is recorded and implemented.

1.1 Full legal name of the operator

Cold Gold Clutha Limited

1.2 Responsibilities assigned to fit and proper persons

The following table names the person(s) that have control over the exercise of privileges under the Maritime Transport Operator Certificate.

Person(s) responsible for compliance	Area of responsibility			
	The maritime transport operation	Resourcing of the maritime transport operation	Crew training and competency assessments	Operational decisions
Matt Blair (General Manager)	Y	Y	N	Y
Ewan Speirs (Skipper)	Y	N	Y	Y

1.3 Primary port and area of operation

The Primary Port from which the maritime transport operation is conducted is:

- Roxburgh

CGC1's home port is Roxburgh and operations are based on the Clutha River downstream of the Roxburgh Hydro Dam to Centre Road, Inch Clutha.

1.4 Vessel categories

Vessels of the following categories are operated under the Maritime Transport Operator Certificate.

- Non-Passenger Ship

1.5 Activities

The following activities will be conducted under the Maritime Transport Operator Certificate.

- Suction Dredging for Gold

The vessel will not be used in any capacity without the consent of the owner. The relevant safe operating procedures contained within this plan will be applied during any operations.

1.6 Vessels

The following vessel is operated under the Maritime Transport Operator Certificate. MNZ must be notified in an acceptable form as soon as is practicable after a ship enters or exits this operation.

MNZ number	Name	Category
134266	CGC1	Non-Passenger

1.7 Overview of the operation and its maritime activities

Cold Gold Clutha Limited is a privately owned gold dredging company that uses the vessel CGC1 as part of its operation. The main activity is river bed suction dredging. *CGC1* is not used for non-commercial purposes.

Cold Gold Clutha Limited is a New Zealand listed Company. Company Director Peter Hall oversees the Dredge operation from his base in Dunedin. The Company's Head Office is in Nelson, New Zealand. The dredge is permanently located on the Clutha River and a Skipper and crew are employed by the Company to carry out the Company activities.

1.8 Operation contact details

Name	Position	Contact phone number
Matt Blair	Main Contact (General Manager)	021 276 1551
Ewan Speirs	Skipper	027 458 0334

The mailing address for the company is;
30 Hunt St, Andersons Bay, Dunedin 9013.

1.9 Maritime transport operator certificate display

The Maritime Transport Operator Certificate (MTOC) is available to be viewed at the Companies head Office. A copy of this Certificate can be viewed on the vessel at all times.

A2 Control of information, records and documents

2.1 Storage and sharing of the operator plan

A hard copy of the operator plan with all up-to-date records (including maintenance and survey plans) is held in the home office. An electronic copy of the plan is stored on the office computer. A hard copy of section A – General information and policy and Section B – Vessel manual will be available on board during any use of the vessel. The current ship's log is maintained on board the vessel during any use. Old ship's logs are retained in the office.

At the home office

Complete operator plan (hard and electronic copies)

Up-to-date records

Maintenance and survey plans

Crew records file

Survey and maintenance file

Ship's logs (old logs retained for records)

On board the vessel during all operations

General information and policy

Vessel manual

Current ship's log

Crew Contact details

Maintenance file

A copy of the operator plan will be made available to all new personnel. Any parts of the plan relevant to their position must be read and understood, with confirmation by signature, before taking any responsibility in the operation. Feedback is encouraged on the effectiveness of the policies and procedures within the plan. This information may be used during the regular review process.

2.2 Review and continuous improvement

- Reviews will be conducted at least annually and generally on a continual basis. Reviews will also be conducted when an accident, incident, mishap, new information or any other occurrence demonstrates the need for an immediate improvement.
- Information considered during reviews will include the outcome of assessment of any hazard, incident or accident reports, crew feedback from operations and training, customer feedback, peer discussions with other operators and information contained in Maritime NZ newsletters and safety guidelines.
- Reviews and any changes made to the operator plan will be recorded on the Record of operator plan reviews (located in Section C Records and Plans).
- Major or safety-related changes to the operator plan will result in a new version number.
- If changes are made to the operator plan, the hard copy located on-board the vessel will be replaced by the current version as soon as practicable, and before any operations of the vessel. This will be noted on the **Record of Operator Plan Reviews** in Section C. Any other printed copies are uncontrolled.

- The version number of the hard copy on board the vessel will be checked against the current version number of the main office copy as part of monthly checks.
- All staff and crew will be made aware of any changes made.
- The operator plan will **not be** amended without the consent of the Managing Director.

2.3 Crew qualifications and records

All crew who are required to hold a Certificate of Competency will provide a copy of their certificates and CV to the owner. Copies will be retained in the **crew records file** at the company's home office. Crew records for any employee described above will be retained for at least one year from the date that employee ceases to perform duties requiring a Certificate of Competency.

Details of all crew including contact numbers and details of certificates of competency and expiry dates (where applicable) will be recorded on the **record of crew details record** (in Section C1). The crew records table will be checked regularly and skippers and crew will be reminded of any expiry dates due within six months.

2.4 Accident and incident recording and reporting

Details of any accidents, incidents and mishaps that occur will be recorded in the vessel logbook immediately or as soon as practicable thereafter. The information will then be copied into the **Incident and accident register** (in Section C2) at a more suitable time.

All accidents and incidents will be reviewed to determine whether corrective action needs to be taken and/or if official reports are required. If it is determined that changes to procedures and/or further training are required this will be undertaken as soon as possible. Any changes to the operator plan will be made in accordance with **2.2 Review and continuous improvement**.

Incidents, accidents, and mishaps resulting in serious harm will be reported to Maritime New Zealand as soon as practicable. This reporting shall be carried out, in all circumstances, by the Managing Director, Peter Hall, in accordance with MNZ reporting policy and requirements.

2.5 Ship's logs

Details of the conditions and vessel activities are recorded in the vessel logbook and the "Daily Maintenance Check Sheet" including (but not limited to) details of the following.

- river flows
- crew numbers
- mechanical checks and failures
- fuel levels
- bilge alarm systems
- vessel movements
- incident, accidents or mishaps
- notable radio communications
- battery conditions

- hazards to navigation
- dredging hazards
- training and drills
- main & auxiliary engine hours and checks

2.6 External audit of the operator plan

External audits, conducted by Maritime New Zealand, will be undertaken with the full cooperation of Cold Gold Clutha Limited.

Details of audits carried out will be entered on the **Record of external audits, inspections and surveys** (in Section C5). Copies of audit reports will be filed in the home office.

2.7 Display of Certificate of Survey

As the vessel is over 6 metres in length, a copy of the Certificate of Survey will be displayed in a prominent position on the ship at all times.

A3 Health and safety

3.1 Safety policy

It is the policy of Cold Gold Clutha Limited to always strive to ensure the safest operation possible. We will do this by following the Safe Operating and Emergency Procedures established within this operator plan and actively engaging in hazard identification and control, and continuous improvement of this operator plan. Staff will be trained in safe operating procedure of all equipment and machinery prior to their first use of such equipment and first use will only occur in the presence of a fully trained operator.

3.2 Hazards identification and control

- All skippers, crew and staff are obliged and encouraged to actively engage in hazard identification.
- The Managing Director, Skipper or any staff will record in the vessel logbook any newly identified hazards (or potential hazards).
- As soon as possible after arrival ashore the leading crew will advise the Managing Director of the hazard and the hazard will be assessed.
- If the hazard cannot be eliminated it will be isolated; if it cannot be isolated it will be minimised.
- If a hazard cannot be eliminated the hazard and controls will be recorded in the Hazard Register in the applicable vessel manual.
- All reported hazards (whether eliminated, isolated or minimised) will be recorded in the **record of hazard reviews** (in Section C4).
- All crew or staff who could be exposed to, or will be involved in controlling the newly identified hazard will be notified of the hazard and any controls established.
- If procedural changes are or may be required, the relevant section of the operator plan will be reviewed in accordance with **2.2 Review and continuous improvement**.
- Reviews of all identified hazards will take place at least annually during operator plan reviews and recorded in the **record of hazard reviews** (in Section C4).

3.3 Fatigue management

Fatigue is the state of feeling very tired, weary or sleepy resulting from insufficient sleep, prolonged mental or physical work, or extended periods of stress or anxiety. Boring or repetitive tasks can intensify risk of fatigue. **Factors that contribute to fatigue may be internal or external to the work environment.**

Signs and symptoms of fatigue include:

- Tiredness
- sleepiness, including falling asleep against your will ("micro" sleeps)
- irritability
- depression
- giddiness
- loss of appetite
- increased susceptibility to illness

A person who is fatigued may not be capable of recognising it.

Studies report that the effects of fatigue include:

- reduced decision-making ability
- reduced communication skills
- reduced attention and vigilance
- reduced ability to handle stress on the job
- reduced reaction time – both in speed and thought
- a failure to respond to changes in surroundings or information provided
- being unable to stay awake (for example falling asleep while operating machinery or driving a vehicle)
- increased tendency for risk-taking
- increased forgetfulness
- increased errors in judgement
- increased accident rates.

Cold Gold Clutha Limited acknowledges the risks posed by the fatigue in the operation. It confirms that it will fully support all crew members in reporting their fatigue or concerns of the condition of other crew members (including the skipper) to the skipper and/or Managing Director when it arises. Action to mitigate the risks of fatigue may include finding replacement crew, adjusting schedules or cancelling operations if necessary.

3.4 Drug and alcohol policy

Cold Gold Clutha Limited has a zero-tolerance policy with respect to crew working while under the influence of illicit drugs or alcohol. There may also be risks associated with the use of prescription medicines, and this must be considered if required.

Random drug testing may be conducted at any time, in the event of a serious incident or for reasonable cause to suspect any crew are under the influence.

3.5 Personal protective/ safety equipment

Cold Gold Clutha Limited acknowledges the risks posed by certain aspects of the operation. In light of these concerns it provides lifejackets, safety boots, earmuffs, gloves, eye protection and torches for all crew members. These items of equipment are to be carried by all crew and must be brought to, or available at, work every day that the crew member works on the vessel.

3.6 Health Monitoring of Crew

Cold Gold Clutha Limited acknowledges the risks posed by the ill health of crew in the operation. It confirms that it will fully support all crew members in reporting their health issues and/or concerns of the health condition of other crew members (including the skipper) to the skipper and/or Managing Director when it arises. Action to mitigate the risks of ill health may include finding replacement crew, adjusting schedules or cancelling operations if necessary.

A4 Environmental Policy

Cold Gold Clutha Limited acknowledges that protection of the aquatic environment is vital and central to the on-going sustainability of our business and so we strive to run the cleanest operation possible. We do this by following all pollution prevention procedures established in this operator plan. We will meet or exceed all legal requirements and where possible will use only environmentally friendly and biodegradable products.

4.1 Refuelling

Cold Gold Clutha Ltd acknowledges the potential environmental hazards associated with transferring fuel to the dredge operation. In all cases it uses best practice in the transfer of fuel to the Tender and then to the dredge. Closely following the refuelling procedure will mitigate the potential for spillage of fuel into the river environment.

4.2 Rubbish Disposal

Cold Gold Clutha Ltd uses best practice for rubbish disposal and all rubbish materials from the operation are returned to shore and transferred to a Council operated refuse station. There are rubbish receptacles on the vessel which are regularly emptied.

Under no circumstances is any rubbish discarded into the river.

4.3 Bilge Waste

Any bilge waste generated is collected in appropriate containers and transferred to an approved shore base disposal centre.

Under no circumstances is bilge waste discarded or pumped into the river environment.

4.4 Sewage Disposal

The toilet facilities consist of a sealed holding tank which, on a regular basis, is changed and taken ashore to be emptied in an approved sewage disposal facility.

Under no circumstances is sewage discharged into the river environment.

4.5 On Board Product Use

Where ever possible environmentally friendly, biodegradable products are used within the operation. This includes paints, cleaners and even hydraulic vegetable oils for use in the water environment.

All dispersants carried will be of an approved type supplied by a reputable manufacturer.

A5 Crew familiarisation and training

5.1 Skipper induction and training

Before taking control of the vessel any new skippers must read and understand this Maritime Transport Operator Plan and be trained and conversant in all competencies relevant to the safe and clean operation of the vessel.

New skippers will complete and sign the **Skipper induction checklist** (in Section C1). Completed forms will be stored in the **Crew records file** at the company's home office. Blank sign off sheets are in Section C1.

Only the Managing Director in conjunction with the incumbent Skipper may conduct new skipper training and sign off.

5.2 New crew member induction and training

Within one week of joining Cold Gold Clutha Limited all new crew must have read the relevant sections of this operator plan as listed on the Crew induction checklist (in Section C1).

New crew will complete and sign a copy of the **Crew induction checklist**. Completed forms will be stored in the **Crew records file** at the company's home office. Blank sign off sheets are available in Section C 1.

Any skipper employed by Cold Gold Clutha Limited may conduct new crew member training. The Managing Director must approve final sign off.

All new skippers and crew must receive a safety induction (including reading the hazard register) and sign the relevant section of the induction sheet before completing an operating shift on the vessel.

5.3 Competency, drills and on-going training

Skipper and crew competency will be monitored on an on-going basis by observation, from feedback and by examining the outcome of any drills and incident, accident or hazard reviews. Crew will undertake refresher training if they have not worked on board the vessel within the preceding 6 months or any time they need to increase their competency.

Drills will be carried out at intervals not exceeding 6 months. Where it is not practical to undertake a simulated drill, we will discuss the procedure and familiarise the crew and skippers with the operation of the associated equipment.

All crew drills and refresher training will be recorded primarily in the vessel logbook. At a suitable time, records of all training and drills will be recorded on the **Record of drills and on-going training** (in Section C1).

Training outcomes that could require changes to procedures in this operator plan may result in an immediate review (if necessary) or be considered at the next review.

A6 Overdue Vessel and Emergency Procedures

6.1 Overdue Vessel

If the vessel or Tender is overdue or misses a scheduled call in time the Managing Director will follow the following procedure:

1. If more than 15 minutes late, try to contact the vessel by mobile telephone firstly then via Satellite phone and VHF radio or contact crew personal phones.
2. If there is no answer then, try again in 5 minutes and
3. If there is still no answer, attempt to make contact via means such as through other operators known to be in the area.
4. If concerns for the safety of the vessel still exist, call 111 and ask for the Police. Advise them of the situation and follow their instructions.
5. Note: A Coast-guard crew is based in Clyde and equipped with a rescue jet boat. There is no VHF Ch16 Maritime Radio coverage and the local coastguard operate on a repeater channel 28. The Coast-guard skippers Cell phone number is 021-606887.

6.2 Emergency Procedure

The shore based Managing Director has the overall responsibility of managing all emergency procedures for the vessel and the Tender. All references in the emergency procedures to shore based staff are direct reference to the Managing Director Peter Hall or in his absence his delegated representative.

A7 Maintenance and survey

7.1 Maintenance policy

Cold Gold Clutha Limited will make sure the vessel operated is fit for purpose and holds a current Certificate of Survey at all times during any operations.

7.2 Maintenance plan

All scheduled maintenance will be carried out in a timely manner in accordance with the **Maintenance plans and records** (in section C6) – Maintenance plans and records.

Any changes to the maintenance plan will be noted on the **Record of maintenance plan amendments** (in section C6). Amendments must be dated and signed.

7.3 Maintenance records

All maintenance whether planned or unplanned will be recorded in the **Maintenance log**.

Faults requiring corrective action that are discovered during operations will be recorded primarily in the vessel logbook. At a suitable time, the fault will be added to the **Maintenance log** and the corrective action taken will also be recorded.

7.4 Survey plan

Surveys will be carried out in accordance with the Survey plan (in section C7).

Survey plans will not be amended without prior approval by the vessel's recognised surveyor.


7.5 External audits, inspections and surveys

All audits, inspections and surveys carried out by external parties will be recorded on the **Record of external audits, inspections and surveys** (in section C5).

Reports generated by these audits inspections and surveys will be stored in the **Survey and maintenance file** in the home office.

SECTION B
VESSEL MANUAL FOR
CGC1 (MNZ 134266)

B1 Vessel particulars

Vessel Name	CGC1		
MNZ Number	MNZ 134266		
Call Sign	CGC1		
Year Built	2012		
Drive Type	Jet Units x2		
Engine	Detroit 2x466kw(932kw)		
Auxiliary			
Length Overall	23.9m		
Hull Construction	Steel		
Certificated areas of operation		Enclosed Waters ✓ The Clutha River from below the Roxburgh Hydro Dam downstream to Centre Road at Inch Clutha.	
Certificate(s) of Competency Required ¹			
Skipper	Skipper Restricted Limits (SRL) ^[1]		
Crew	Minimum total Crew of 2 with maximum of 8.		
Minimum Crew	Maximum Crew	Passengers	
2	8	0	

B2 Vessel certificates required

Certificate Type	Issue Date	Expiry Date
MTOC	02/02/2016	01/02/2026
Radio Survey	08/06/2021	08/06/2025
Compass Cert	N/A	See note ^[2]
EPIRB Registration	01/2016	12/2026
Fire Extinguisher Inspection	11/06/2021	11/06/2022
Life Jackets	06/0218	09/2021

^[1] As per Maritime Rules Part 31 Subpart E – Transitional and revocation provisions, crewing requirements may be fulfilled by certificates issued under former Part 32 or legacy certificates as specified by table 20 until relevant

end date. Cold Gold Clutha Limited will ensure all affected CoC certificates will be transitioned prior to 1 April 2019.

B3 Vessel's equipment

3.1 Safety equipment list

Navigation Safety Equipment			
Item	Description	Location	
GPS	Garmin	Wheelhouse	
Differential GPS	Trimble TPL450L	Wheelhouse	
Depth Sounder	Hummingbird 150	Wheelhouse	
Clock	Battery Analogue	Wheelhouse	
Maps x 3	Local Area 1:50,000 Topographical	Wheelhouse	
Communications Safety Equipment			
Item	Description	Location	Expiry/service date
Satellite Phone	Iridium (00881622455902)	Wheelhouse	N/A
VHF Radio	ICOM IC-F50(25Watts)	Wheelhouse	08/06/2022
VHF Radio	ICOM IC-F502(25watts)	Tender	08/06/2022
Cell Phone	Samsung (0211903978)	Wheelhouse	N/A
EPIRBs x 2	SafetyAlert SAG1	Wheelhouse and Tender	12/2026
Lifesaving Safety Equipment			
Item	Description	Location	
Life Buoys	1 x Buoy	Starboard side of wheelhouse	
	1 x Buoy	Port side of wheelhouse	

	1 x Buoy with line 1 x Buoy with light	Aft Outside wall Port side gold room Aft Outside wall Stbd side gold room
Life Jackets	8 x 150N	Wheelhouse
First aid kit and book	1	Wheelhouse
Safety Torches	2	1 x Wheelhouse 1 x Tender
Tool Kit / Spares Kit	2	1 x Gold Room 1 x Tender
Tender 1	Wave Break 4.5m Jet RIB	Stationed alongside CGC1 whilst CGC1 operating
Life Belt	Wrap around life belt	In Tender –under seat

Anchoring and Mooring Safety Equipment		
Item	Description	Location
Anchors /Chain(s)	2 x 500kg Bruce Anchors with 9m of 22mm stud link chain 1 x 150kg Stingray Anchors with 7m of 12.5mm stud link chain 1 x 80kg Bruce emergency anchor with 7m of 10mm chain and 75m of 22mm nylon rope.	Forward quarter davit arms and all Gear on the winch drum Aft quarter anchor davits and all gear on the winch drum Starboard side wheelhouse
Anchor Wire Forward	2 x 250m 19mm wire rope	Anchor Winch Drums fwd
Anchor Wire Aft	2 x 100m 13mm wire rope	Anchor winch drums aft
Mooring Lines	2 x 50m 25mm rope	Forward Deck area and Starboard side of wheelhouse.
Boat Hook	1 x Boat hook	Forward deck area behind winches
Heaving Line	1 x 20m 12mm nylon heaving line	Starboard side of wheelhouse
Anchor Backing Wires	2 x 60m 13mm wire rope	Attached to forward anchors
Heavy duty Bolt Cutters	1 x 900mm bolt cutters	Immediately through wheelhouse

		door into gold room.	
Fire Fighting Appliances Safety Equipment			
Item	Description	Location	Expiry / service date
Fire Extinguisher	3 x Dry Powder x 4.5kg ABE	1 x wheelhouse 1 x gold room Aft 1 x gold room Forward	06/2022
Fire Extinguisher	3 x Foam x 9L ABF	1 x gold room Aft 1 x Port Engine Room 1 x Stbd Engine Room	06/2022
Fire Extinguisher	1 x Carbon Dioxide x 3.5kg	Wheelhouse	06/2022
Fire Extinguisher	1 x Carbon Dioxide x 2.0kg	Tender- Under Forward seat	06/2022
Fire Pumps	1 x pump off main hydraulic engine 1 x off auxillary	Main suction jet pipes aft deck both port and stbd. Hose on stbd side aft deck.	N/A
Fire Blanket	1 x 1.2m x 1.8m	Wheelhouse	06/2022
Fire Axe	1 x Fire Axe	1 x gold room Aft	N/A
Fire Hydrant and Hose	1 x Hydrant	Port Aft Deck Area	06/2022
Flooding Prevention Equipment Item			
Item	Description	Location	Expiry / service date
Electric Submersibles	5 x 3000 GPH Port Hull 5 x 3000 GPH Stbd Hull	2 x port and stbd tank rooms 2 x port and stbd void spaces 1 x port and starboard jet drive engine rooms.	Test Monthly

High Level Alarms	3 x Port Hull 3 x Stbd Hull	Void space, Tank Room, Main jet drive engine rooms Port & Stbd.	Test Monthly
Water tight Bulkheads	4 x Port Hull 4 x Stbd Hull	Between each Compartment	03/2022
Hand Bilge Pumps	1 x Hand lever pump 1 x Hand lever pump	Port Aft Engine room (pumps located on air intake structures on deck level) Stbd Aft Engine room	03/2022
Mechanical Pumps	1 x Mechanical pump 1x Mechanical pump	Port aft engine room. (Pumps ballast tanks port side) Stbd aft engine room. (Pumps ballast tanks Stbd side)	03/2022
Signals, Lights and Shapes			
Item	Quantity	Location	Expiry/Service
Port and Starboard Lights	1 x set	Wheelhouse	03/2022
All round Anchor Light	1	Mast Head	03/2022
Mast Head And Stern Lights	1 x set	Mast Head Back of Gold room	03/2022
Day Shape	1 x Riam Anchor	Wheelhouse roof	03/2022
Hand Flares	2 x Dredge 2 x Tender	Wheelhouse Under Tender seat	07/2022 09/2021
Smoke Floats	2 x Dredge 2 x Tender	Wheelhouse Under tender seat	05/2022 09/2021
Horn/Bell		Wheelhouse	03/2022

3.2 Spare parts list

Spare Parts Needed	Location on Board
Fuses	Gold Room Workshop area
Navigation Light Bulbs	Gold Room Workshop area
Hose clamps	Gold Room Workshop area
Cable ties	Gold Room Workshop area
Duct tape	Gold Room Workshop area
Electrical tape	Gold Room Workshop area
Assorted Tools	Gold Room Workshop area
Alternator and cooling belts all engines	Gold Room Workshop area
Spare Oil all engines	Gold Room Workshop area
Spare Hydraulic steering oil	Beaumont Yard
Spare seals for hydraulic steering Rams	Beaumont Yard
Absorbant cloths for oil spillage	Gold Room Workshop area
Spare shackles for anchor equipment	Gold Room Workshop area
Emergency Battery starter pack with jumper leads	Wheelhouse

B4 Safe operating procedures

4.1 Conditions in which the operation is conducted

The skipper is responsible for the safety of the vessel and all persons on board at all times. Operations must be altered or suspended at any time the safety of the vessel or any persons on board is in doubt. Cold Gold Clutha Limited fully supports any decisions made by the skipper with intent to preserve safety.

The skipper must consider at least the following information when making decisions about the operation of the vessel:

- River levels and forecast weather conditions
- Visibility for navigation purposes
- Water visibility for both dredging and Navigation purposes.
- Other river users/traffic
- Any other information relevant to the safety of the operation.
- Displacement is not to exceed 100tons
- The Vessel is not to be operated at a baseline draught at midships of over 900mm
- Maximum cargo load permitted on deck is 5T assuming that the centre of gravity of the cargo is 0.7m above the deck.
- Watertight closing devices are to be kept closed and watertight whenever practicable.

4.2 Crewing Levels

The minimum number of crew are required to be on board for:

Manoeuvring and anchoring – 3

Normal dredging operations - 2

4.3 Trip reporting

The shore based Managing Director will be informed of all planned operations of the vessel. This will be done in face-to-face conversation, cell phone call or text message. The information must be confirmed as received and understood before the Tender departs to or from the dredge and when the Tender arrives at its destination. All trip reports made will include:

- when the Tender is departing and from where;
- the planned area of operation;
- the expected time of arrival onto the dredge (ETA) and next communication;
- the total number of people on board (POB);
- confirmation of arrival at the destination.

4.4 Tender Vessel Transfer procedure

Confirmation will be relayed to the shore based Managing Director via text or phone conversation of the intention to operate the dredge operation on each day prior to the next work day. This confirmation will be affirmation that the Tender vessel will be departing from the designated Tender mooring point at the confirmed start time the following day.

The following procedure will be followed for transit to and from the dredge;

Operational check details		Before departing Mooring point	During operation	At end of day when departing dredge
Weather and River Conditions	Check that conditions are safe for the transit via the Tender to the dredge (Visibility acceptable for safe passage and river flows safe- not flooding).	X	X	X
Hull	Make visual inspection to confirm no water is present in the Tender- leaking hull or fittings.	X	X	X
Navigation	Check navigation lights and spot lights are operating if the transit is to be during darkness or poor light	X	X	X
Engine	Check voltage on batteries	X		X
	Check fuel level	X		X
	Check service dates / hours	X		
	Check engine running properly	X	X	X
	Coolant flowing	X	X	X
Crew	Check correct crew compliment	X	X	X
	Check that lifejackets worn and fitted correctly	X	X	X
	Check all crew seated	X	X	X
	Check engine cut out cord attached to Tender driver	X	X	X
Transit	Use suitable speed during transit to and alongside dredge ensuring transit is according to river navigation bylaws.	X	X	X

4.5 General Vessel Start Up and Operating Procedure

CGC1 is used as a Non-passenger vessel for the purpose of suction dredging for Gold. The vessel is operated in accordance with the MOSS system. Once aboard the vessel the following general operational checks and procedures are undertaken prior to and during the vessels operation.

The following procedure is to be followed when the vessel is operated without the gold suction dredge operating. This situation arises when the vessel is moving anchors or transiting the river to new dredge locations.

Operational check details		Before operation Commences	During Operation	Shutdown
Hull	Make visual inspection inside and outside checking for damage and or leaks.	X		X
Universal Power Source	Check the UPS is operating and Alarms and 24-12 converter circuit breakers are on	X		X
Main Hydraulic Engine	Check voltage on batteries	X	X	X
	Check main Hydraulic engine (oil / fuel leaks, exhaust, cooling water, gear oil)	X		
	Check service dates / hours	X		X
	Check fuel filter (filter float, water presence, leaks)	X		
	Check all fuel lines and connectors for deterioration		X	
	Check water cooling filters x 3 - engine coolant filter - hydraulic oil coolant filter no. 1 - hydraulic oil coolant filter no. 2	X X X	X X X	
	Check Water intake screens	X	X	
	Check Hydraulic oil level x 2	X		
	Check Fuel Levels	X	X	
	Check security / condition of engine mounts	X		
	Check any belt drives for wear	X		
	Turn on the engine room circulation fan and turn off at end of day	X		X

	NB. Ensure hydraulic engine revs are above idol before any hydraulic machinery is used (700 RPM).	X	X	
Helm Controls and Circuit breakers	Check Helm controls (steering, jet control unit, cameras, GPS and hydraulic circuit breakers) are on and throttle levers in neutral position and disengaged.	X		X
	Check jet buckets are in up position.	X		X
Bilge Pumps	Check auto switches are on and not pumping (a sign there is water on board)	X	X	X
Electronics	Ensure GPS and sounder and VHF are on and forward and aft deck cameras.	X	X	
Main Suction Pipe	Check suction pipe is fully up and safety chain is secured to pipe	X		
All Anchor winches	Check all winches are operating	X		
Rear hopper	Lift the hopper and secure with safety chain	X		
Check Starboard Fuel Compartment	Check for leaks/ bilge dry	X		
	Check for Fuel leaks	X		
	Check Fuel level	X		
Check Port Fuel Compartment	Check for leaks/ bilge dry	X		
	Check freshwater fittings and filter for leaks	X		
	Check for fuel leaks	X		
	Check Fuel level	X		
Jet Unit Drive Engines x 2	Check battery Voltage	X		
	Check engines (oil / fuel leaks, exhaust, cooling water, gear oil)	X		
	Check fuel filter (signs of corrosion, water & leaks)	X		
	Check all fuel lines and connectors for deterioration and open the fuel delivery valve	X		

	Open the gearbox cooling water valve	X		
	Check water intake screens	X	X	
	Check belt drives for wear	X		
	Start both engines and run them for 10 minutes to warm up.	X		
Steering	Check linkage connections	X		
	Check steering hydraulics and movement in relation to helm gauges once the engines running (a 2 person job)	X	X	
Electrical	Check batteries are charging once engines on and all electronics are working.	X	X	
Safety equipment	Check life jackets on board	X		X
	Test bilge alarms and lights at the helm master switching board.	X		
	Check navigation lights and day shapes	X	X	
	Test radio is on and operating	X		
Navigation	Check vessel location on chart plotter in relation to previous day	X		
	Check river flows and water visibility	X	X	
	Check depth sounder	X	X	
	Check for any obstacles by Tender along proposed travel route	X	X	
	Proceed to retrieve anchors one at a time and relocate vessel.		X	
	Reset anchors one at a time once at new location		X	
Records	Write up log book	X	X	X
	Transfer incident and accidents to register			X
	Report new hazards		X	X
	Record faults, maintenance issues	X	X	X
Toilet	Check level of holding tank. Replace when full with an empty tank.	X		
Galley	Check all is in order and tidy for move	X		

4.6 Suction Pipe Start Up and Operation Procedure

The following procedures is to be followed when the vessel is to be used for the suction dredging operation.

Operational check details		Before operation Commences	During Operation	Shutdown
Hull	Make visual inspection inside and outside checking for damage and or leaks.	X		X
Universal Power Source	Check the UPS is operating and Alarms and 24-12 converter circuit breakers are on.	X		X
Hydraulic Engine	Check voltage on batteries		X	X
	Check main Hydraulic engine (oil / fuel leaks, exhaust, cooling water, gear oil)	X		
	Check service dates / hours	X		X
	Check fuel filter (filter float, water presence & leaks)	X		
	Check all fuel lines and connectors for deterioration		X	
	Check water cooling filters x 3	X	X	
	- engine coolant filter	X	X	
	- hydraulic oil coolant filter no. 1	X	X	
	- hydraulic oil coolant filter no. 2	X	X	
	Check Water intake screens	X	X	
	Check Hydraulic oil level x 2	X		
	Check Fuel Levels	X	X	
	Check any belt drives for wear	X		
	Start engine and warm up for ten minutes	X		
Turn on the engine room circulation fan and compressor and turn off at end of day	X		X	
Helm Controls and Circuit Breakers	Check Helm controls are off and appropriate suction operation circuit breakers are on (cameras, underwater lights, hydraulics, GPS)	X		
Bilge Pumps	Check auto switches are on and not pumping (a sign there is water on board).	X		

Electronics	Ensure GPS and sounder and VHF are on and forward aft deck and underwater cameras are on.	X		
Main Pipe winch	Check suction pipe safety chain is unhooked and lower pipe into the river.	X		
All Anchor winches	Check all winches are operating	X		
Main aft gold screen table	Change front mats(daily) or clean entire tables (weekly). Replace and secure all screens checking/repairing wear and tear	X		
Main Water Pumps	Turn on the main hydraulic pump and increase hydraulic engine revs to 1500 RPM then turn on the main water pumps ensuring pump dials are set as required.	X		
Gravel Pump	Turn on the gravel pump only when the main water pumps are operating and water is traveling over the aft gold screen.	X		
Check Port Fuel Compartment	Check for fuel leaks	X		
	Check for leaks/ bilge dry	X	X	
	Check freshwater fittings and filter for leaks	X	X	
Check Starboard Fuel Compartment	Check for fuel leaks	X		
	Clean the gravel pump shaft gland filter and grease according to maintenance plan	X		
	Check pump belts and lubricate according to maintenance schedule	X		
	Check for dry bilge	X		
Lifting Equipment	Check all lifting equipment is secure and stored away for dredge operation	X		
Electrical	Check all batteries charging and all electronics functioning.		X	
Safety equipment	Check life jackets on board	X		X
	Test bilge pump(s) and alarms	X		
	Check navigation lights and day shapes	X	X	
	Test radio	X		

Navigation	Check vessel location on chart plotter in relation to previous day	X	X	X
	Check river flows and water visibility	X	X	X
	Check Depth sounder	X		
Records	Write up log book	X	X	X
	Transfer incident and accidents to register		X	X
	Report new hazards		X	X
	Record faults, maintenance issue	X	X	X
Toilet	Check level of holding tank. Replace when full with empty tank.		X	
Galley	Check galley is all tidy and stowed for operation.		X	

4.7 Specific Operation Shutdown Procedure (Dredging and Non-Dredging)

Operational check details	Shutdown
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Suction Pipe	Lift pipe off bottom and let run for 5 minutes to clear the hopper of gravel	X X
Gravel Pump	Turn the gravel pump off only when little /no gravel appearing on internal tables.	X X
Main Suction Pumps	Turn off the main Suction pumps	X
Suction Pipe	Lift the pipe right up and hook the safety chain onto it.	X X
Hydraulic pump	Turn off the main hydraulic pump control.	X
Jet Drive Engines	Shut down the jet drive engines if these have been running for a relocation manoeuvre. Close the fuel and gearbox cooling water valves in the engine rooms. Close and tightly secure engine room hatches.	X

Hydraulic Engine	Turn off the hydraulic engine at the key Turn off the hydraulic circuit breaker on the helm controls Turn off the cooling fan and compressor pump.	X
Helm Controls	Ensure the jet engine control levers are left in neutral position and the throttle levers are disengaged. Turnoff the jet control and steering control circuit breakers. Turnoff all circuit breakers associated with the dredging operation- lights, cameras, GPS	X
Trimble GPS	Shut down the GPS unit	X
Universal Power Source	Ensure the Alarm and 24-12 Circuit Breakers are "ON" and remain "ON" at all time and all other Circuit Breakers are "OFF"	X

4.8 Refuelling procedures

The following procedure is to be used for refuelling. All care must be taken to avoid any accidental discharge to the environment. All equipment used must be appropriate and fit for purpose. The Cold Gold Clutha LTD bulk storage tank onshore is an industry approved facility operated and maintained by "Southfuels". The tank meets all requirements under law for the storage of fuel. This procedure is for the transfer of fuel from this facility to the dredge and also for the re-fuelling of the Tender. The Tender Tank is a fit for purpose 400 litre professionally manufactured tank meeting industry standards.

From Storage Tank to Tender Tank

1. Make sure the Tender is securely berthed alongside the river bank before commencing the fuel transfer.
2. No smoking, or any other source of ignition is to be allowed on or near the tender or shore tank.
3. Use absorbent material at the refuelling point to absorb any fuel spillage (on board the Tender)
4. The person carrying out refuelling must keep control of the refuelling nozzle (or tote tank) at all times. The refuelling nozzle must **NEVER** be left unattended whilst the fuel is being transferred.
5. Start the fuel storage transfer pump ensuring that both the valve at the storage tank and the safety valve at the nozzle are both turned off.
6. When the pump is operating open the valve at the storage tank
7. Proceed back to the tender with the delivery hose with the safety valve still closed.
8. Board the tender and open the lid on the transfer tank and place the nozzle in the tank.
9. Only once the nozzle is in the tank can the safety valve on the nozzle be opened and the fuel can be delivered to the tank by operating the nozzle control lever.
10. Never leave the nozzle unattended whilst delivering fuel into the transfer tank.
11. Once the tank is full, release the lever and empty the nozzle of any fuel.
12. Turn off the safety valve on the nozzle
13. Clean up any drops of fuel outside the tank with an absorbent cloth.
14. Remove the fuel nozzle and hose from the tender and replace securely in the appropriate position.

15. Shut the storage tank valve and turn the transfer pump off (or the tote tank is properly sealed and secured)
16. If a spill occurs, follow the pollution control flow diagram (in Section B5).
17. Make sure the fuel filler caps are securely re-fastened when the refuelling operation has been completed.

From Tender Tank to Main Tanks of Dredge

18. Make sure the Tender is securely berthed alongside the Dredge before commencing the fuel transfer.
19. No smoking, or any other source of ignition is to be allowed on or near the tender or dredge.
20. Use absorbent material at the refuelling point to absorb any fuel spillage (on board the Tender as the dredge has a fuel spillage reservoir).
21. Ensure the fuel spillage reservoir taps are closed.
22. Ensure there is adequate room in the dredge fuel tanks to take the volume of fuel you are about to add.
23. Turn on the circuit breaker in the wheelhouse to supply electricity to the transfer pump connector plug.
24. Plug in the transfer pump to the dredge's electricity supply via the connector plug.
25. Open the main dredge fuel caps and put the tender transfer tank nozzle in the tank filling pipe ensuring the nozzle is closed and cannot deliver fuel.
26. The person carrying out refuelling must keep control of the refuelling nozzle at all times. The refuelling nozzle must **NEVER** be left unattended whilst the fuel is being transferred.
27. Start the tender storage transfer pump ensuring that the nozzle is not open. (Note. The Transfer pump will not operate unless the circuit breaker is switched on in the Wheel house)
28. When the pump is operating begin to transfer the fuel by operating the nozzle lever. **Never** leave the nozzle unattended.
29. Once the transfer tank is empty release the nozzle lever and ensure the nozzle is empty of all fuel.
30. Place the lid back on the dredge fuel filling pipe.
31. Return the delivery hose with nozzle to the Tender and turn off the transfer pump.
32. Place the delivery hose and nozzle in its correct holder.
33. Turn off the transfer pump and disconnect the transfer pump electricity cable.
34. Clean up any drops of fuel with an absorbent cloth.
35. If a spill occurs, follow the pollution control flow diagram (in Section B5).
36. Make sure the fuel filler caps are securely re-fastened when the refuelling operation has been completed.
37. Switch "OFF" the transfer pump circuit breaker in the Wheelhouse.

4.9 Pollution prevention measures

- All garbage must be placed in the garbage bag kept in the gold room
- No rubbish will be left on deck, in case it blows into the water.
- All garbage will be taken ashore by the leading hand when the receptacle is full.
- **No garbage is to be thrown overboard.**
- **No bilge waste is to be disposed of in the river (appropriate containers are provided for collection of any bilge waste if any.**
- **If a fuel/oil contamination occurs use the procedure outlined in the emergency procedure section.**

Sewage will not be discharged:

- Into the river in any circumstance
- When the toilet holding tank is full it is to be replaced with an empty tank and the full tank is to be taken ashore and emptied at an approved facility.

4.10 Operation of Machinery and Equipment.

All crew must have knowledge of operation of the vessels plant and machinery. The crew structure will always be based around 1 leading hand being a component of the 2-man crew. This is to ensure that an excellent level of knowledge of the machinery operation is always on a work shift.

4.11 General End of Trip Shut Down

At the end of each trip the following procedure will be followed;

1. The vessel is to be cleaned down and all equipment stored in appropriate place
2. Shut down all operating systems as necessary according to the operating procedure above.
3. Close the jet drive engines gearbox cooling water and fuel valves
4. Check that the house battery is on.
5. Ensure that the automatic bilge pumping and warning system is operating and circuit breakers are left on
6. Ensure all other circuit breakers are turned off.
7. Update the log book ensuring that all required entries are completed including shut down check
8. Lock vessel
9. Disembark dredge using appropriate procedure.

4.12 Radio communications

All crew must have a basic knowledge of operation of the vessel's VHF radio.

Key information is provided below.

- Turn the radio on, adjust the volume and squelch, and select a channel.
- **Listen.** Others may be using the channel for messages more urgent than your own.
- **Think.** Prepare what you are going to say before you transmit, and keep your message brief.
- When not transmitting, make sure you do not hold down the transmit switch (Push to Talk or PTT). If this switch is jammed or held down by mistake it prevents any other person from transmitting any messages on your selected frequency or channel and your radio cannot receive.
- Speak simply and clearly, using the correct words.
- Avoid using local names, terms and jargon, which will cause confusion.

Stow the microphone properly at all times when not in use to avoid accidental transmission.

4.13 Anchoring Procedures

The following procedure is to be used for setting and retrieval of main anchors.

A minimum of two crew plus the skipper are required to move anchors. **Life jackets shall be worn by crew working on the foredeck or in the tender.**

Prior to any anchoring manoeuvres, the skipper will conduct a survey of the relevant river area(s), identify where the anchors are located and/or the proposed new anchoring locations, and identify any hazards. The skipper will conduct a meeting with crew to discuss the order of manoeuvres and review hazards before commencing.

Main propulsion engines shall be warmed up and running and hydraulic engine running. Raise the rear hopper.

The tender shall be untied from the dredge and will stand off while the dredge is underway.

To Retrieve Anchors (uncrossing)

1. Set hydraulic engine to fast idle speed – approx. 1200rpm
2. Ensure hydraulic engine circuit breakers are on.
3. Select “High Speed” on the hydraulic control panel.
4. Using the high or low speed winch levers, the dredge shall be dropped back to a point where the shackled joins of the anchor warps are accessible on the foredeck.
5. Lower the main dredging pipe to the river floor and tighten main pipe side winches to hold the dredge position.
6. Secure one anchor warp to the bow side bollard using a snick chain adjusting the join position with the main winch as necessary.
7. Remove the mausing wire and joining shackle so that the winch end is free.
8. Let the winch wire out so that it can be fed around to the opposite anchor davit for connecting to the opposite anchor warp with the shackle provided ensuring it is tightened.
9. Release the snick chain so that the uncrossed anchor warp can be hauled tight.
10. Repeat steps 6-8 for the remaining anchor ensuring the anchor warps are uncrossed.
11. Using the tender, 1-2 crew shall release the anchor backing wires from the river banks, retrieving shackles and returning to the dredge when complete. One crewman will then take the tender and stand-off while the dredge is underway.
12. Lift the pipe to the fully raised position.
13. The skipper will maintain dredge position and one anchor at a time may now be winched in until seated in the davit and raised clear of the water.
14. Using the boat hook, recover the backing wire and haul it on board taking care to lay it out neatly for run out when re-setting.
15. The dredge is now fully under the control of the skipper.

To Set Anchors (crossing)

16. When the skipper has manoeuvred the dredge into the required position and at his command, lower the pipe to the main dredging pipe to the river bottom and tighten main pipe side winches to hold the dredge position.
17. Using the tender, run out the backing wire to the relevant river bank and secure with the shackle to a large tree. Taking care not to overlap, make three wraps around the tree as

this will generally permit the tail end to remain loose when any load is applied to the backing wire.

18. Using the “high speed” operating handle of the required anchor winch, lower the anchor to the river floor.
19. Lift the main dredging pipe up into the fully raised position.
20. While a crewman pays out anchor warp, the skipper will now manoeuvre the dredge to the opposite river bank to set the other anchor.
21. Repeat step 16-19 to set second anchor.
22. With the skipper maintaining river position, the dredge can now be dropped back down river until the anchor warp joins are again accessible on the foredeck.
23. At this point, the tender can be returned to the dredge.
24. Lower the main dredging pipe to the river floor and tighten main pipe side winches to hold the dredge position.
25. Secure one anchor warp to the bow side bollard using a snick chain adjusting the join position with the main winch as necessary.
26. Remove the joining shackle so that the winch end is free.
27. Let the winch wire out so that it can be fed around to the opposite anchor davit for connecting to the opposite anchor warp with the shackle.
28. Re-install mausing wire on the joining shackle.
29. Release the snick chain so that the anchor warp can be hauled tight.
30. Repeat steps 25-29 for the remaining anchor. The anchors are now crossed.
31. Note which anchor is crossed over the other and write it on the white board for reference when next uncrossing.
32. Lift the main dredging pipe to the fully raised position and secure.
33. The dredge is now fully anchored.
34. Shutdown main propulsion engines and hydraulic engine if required.
35. Update the log book as required.

4.14 Raising/Lowering the Rear Hopper

Prior to getting underway the rear hopper shall be raised as follows:

1. Remove the two locking down bolts from their locations on each side of the hopper
2. Using the chain winch fitted, raise the hopper so that it is well above the level of the bottom of the hulls.

Reverses these steps when lowering the hopper checking the rubber seal is clear of stones.

4.15 Knudsen Bowl Operation

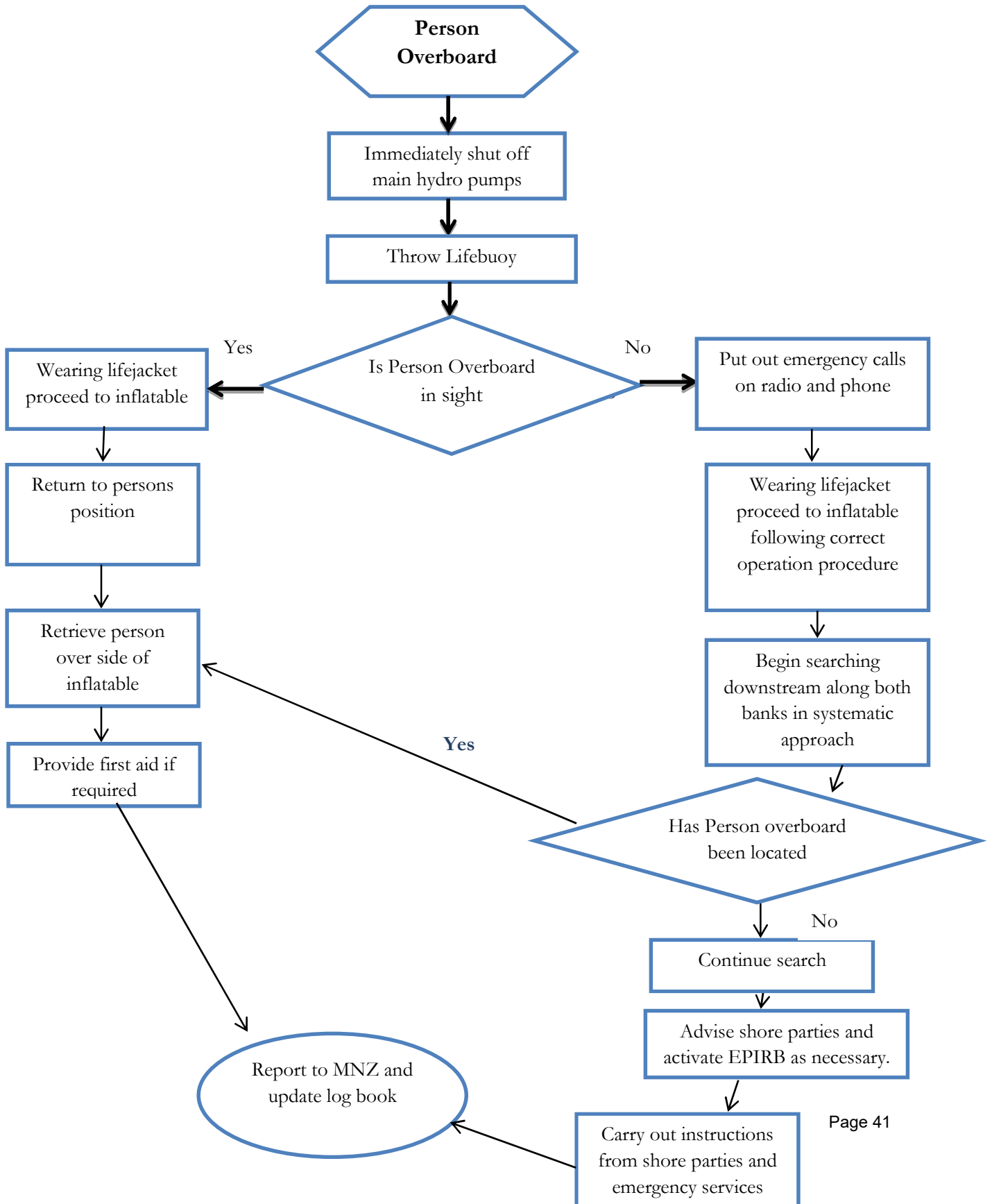
The Knudsen bowl is for on-board reduction of gold concentrates. This equipment has rotating parts and at no time should hands or any object be placed into the bowl while it is operating.

- 1 Before starting, ensure the bung is in and a bucket is placed underneath the discharge hose.
- 2 Slowly open the fluidisation valve so that water is flowing at 120lpm as marked.

- 3 Open fully the hydraulic control valve so that bowl is rotating.
- 4 Using the laser rev counter, check the bowl rotation is 105rpm (-2 ro +3 rpm). Adjust the flow control on the hydraulic valve as required. Note: speed will vary with cold hydraulic system.
- 5 Using the coal shovel, feed one spade full of concentrates onto the hopper. Slowly wash into the Knudsen bowl using the adjacent wash hose.
- 6 When all concentrates are washed and no or very little material is being discharged, shut off the hydraulic valve and fluidisation simultaneously.
- 7 Remove the feed hopper.
- 8 Remove the bung form the bottom of the bowl and allow water to drain into the bucket underneath.
- 9 Using the adjacent wash hose, fully wash all concentrates and gold into the bucket.
- 10 Remove the bucket and attach dated ID label.
- 11 Replace a clean bucket underneath bowl.
- 12 Replace bowl bung and feed hopper.

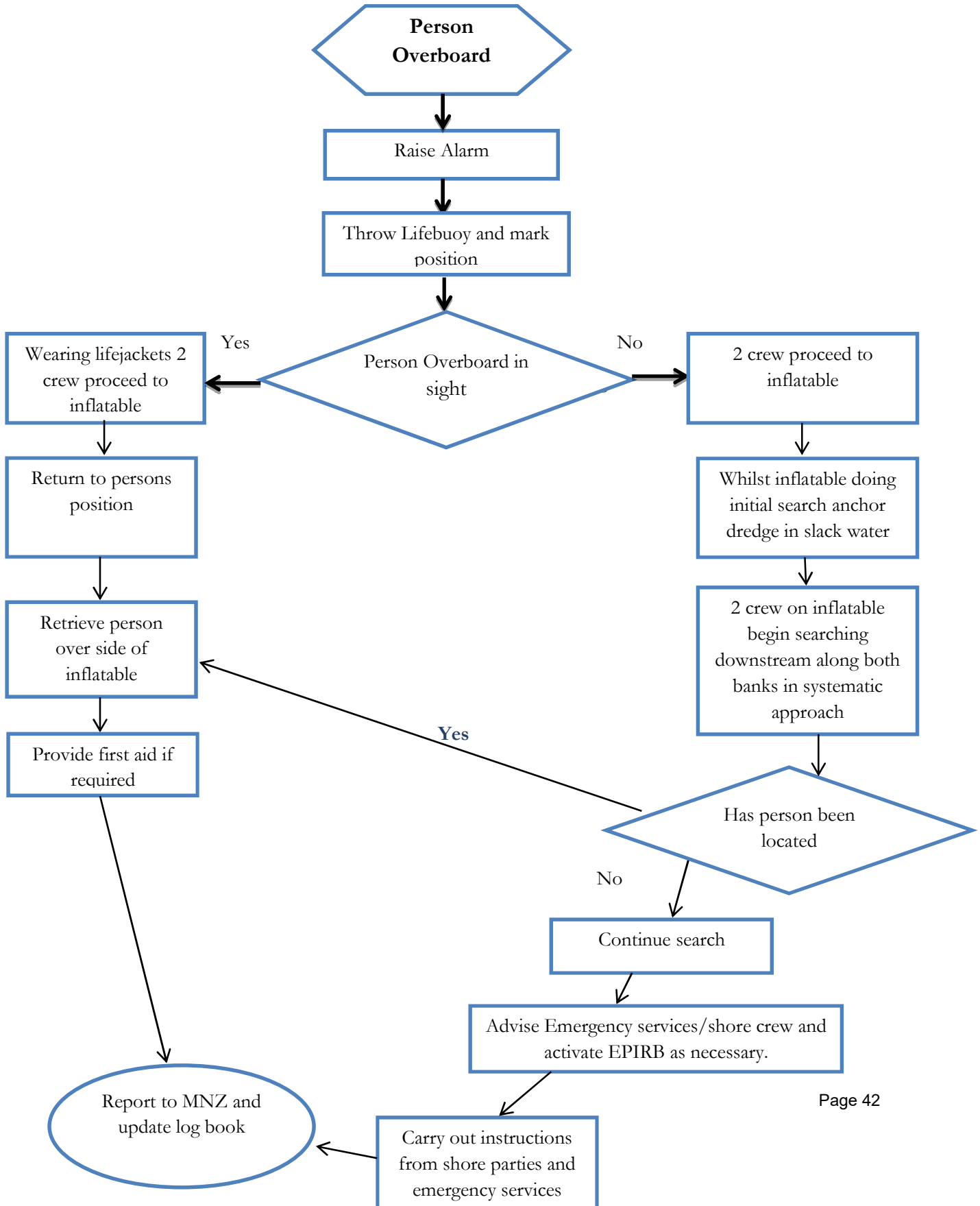
B5 Emergency procedures (shore-base 021-2075164)

5.1 Person overboard (At Anchor Dredging- 2 Crew)



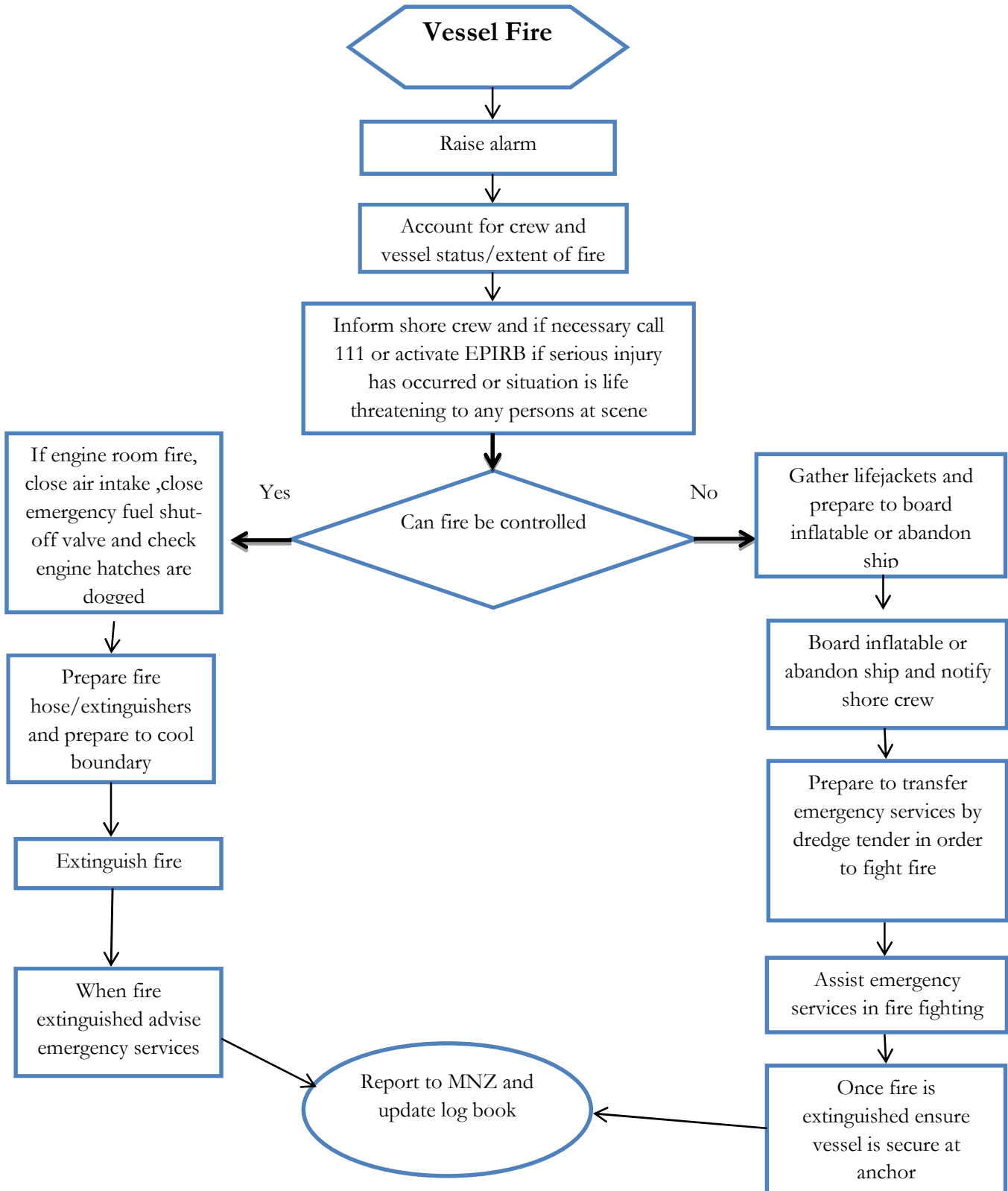
B5 Emergency procedures (shore-base 021-2075164)

5.2 Person overboard (Underway- 4 crew)



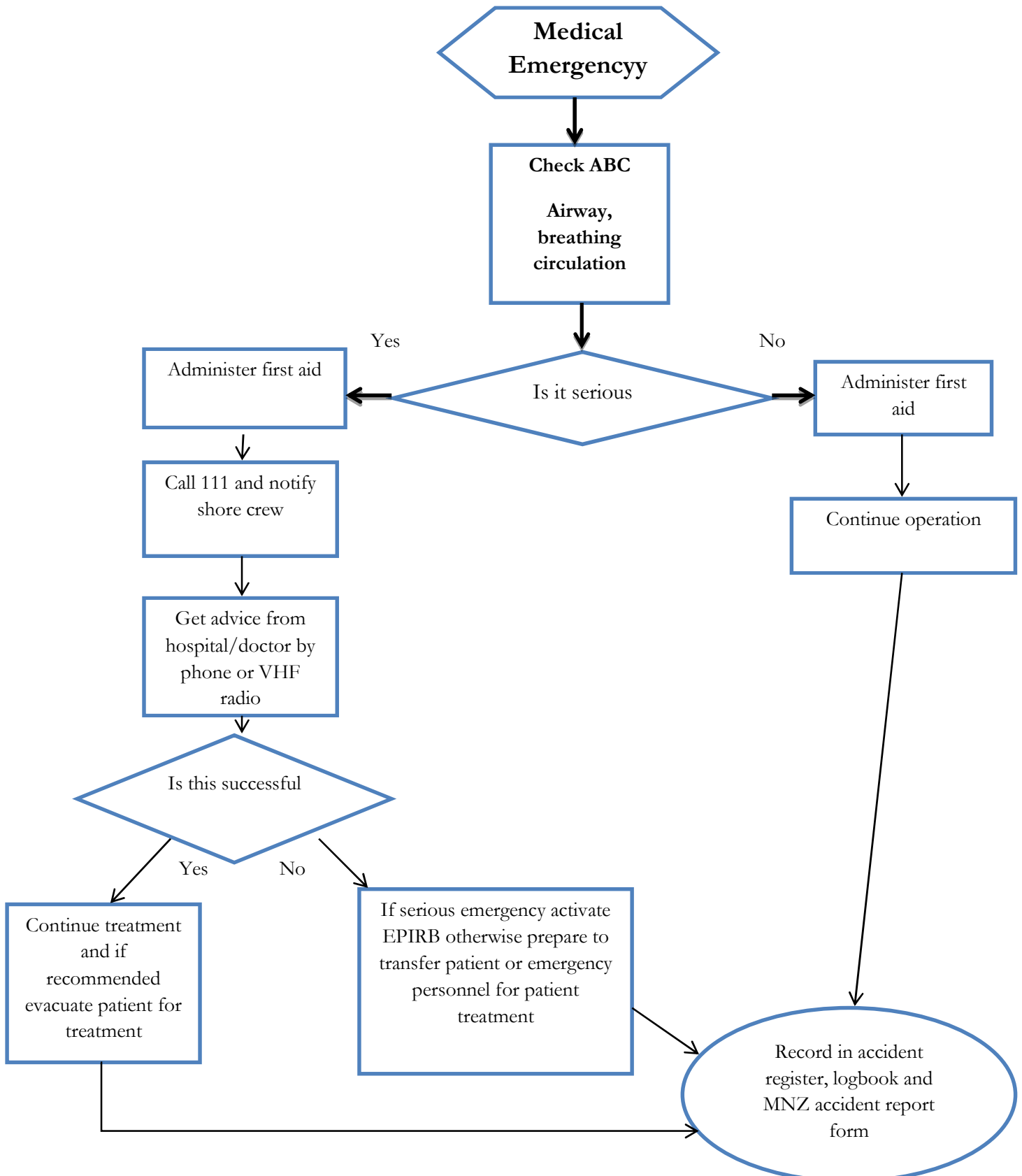
B5 Emergency procedures (shore-base 021-2075164)

5.3 Vessel Fire



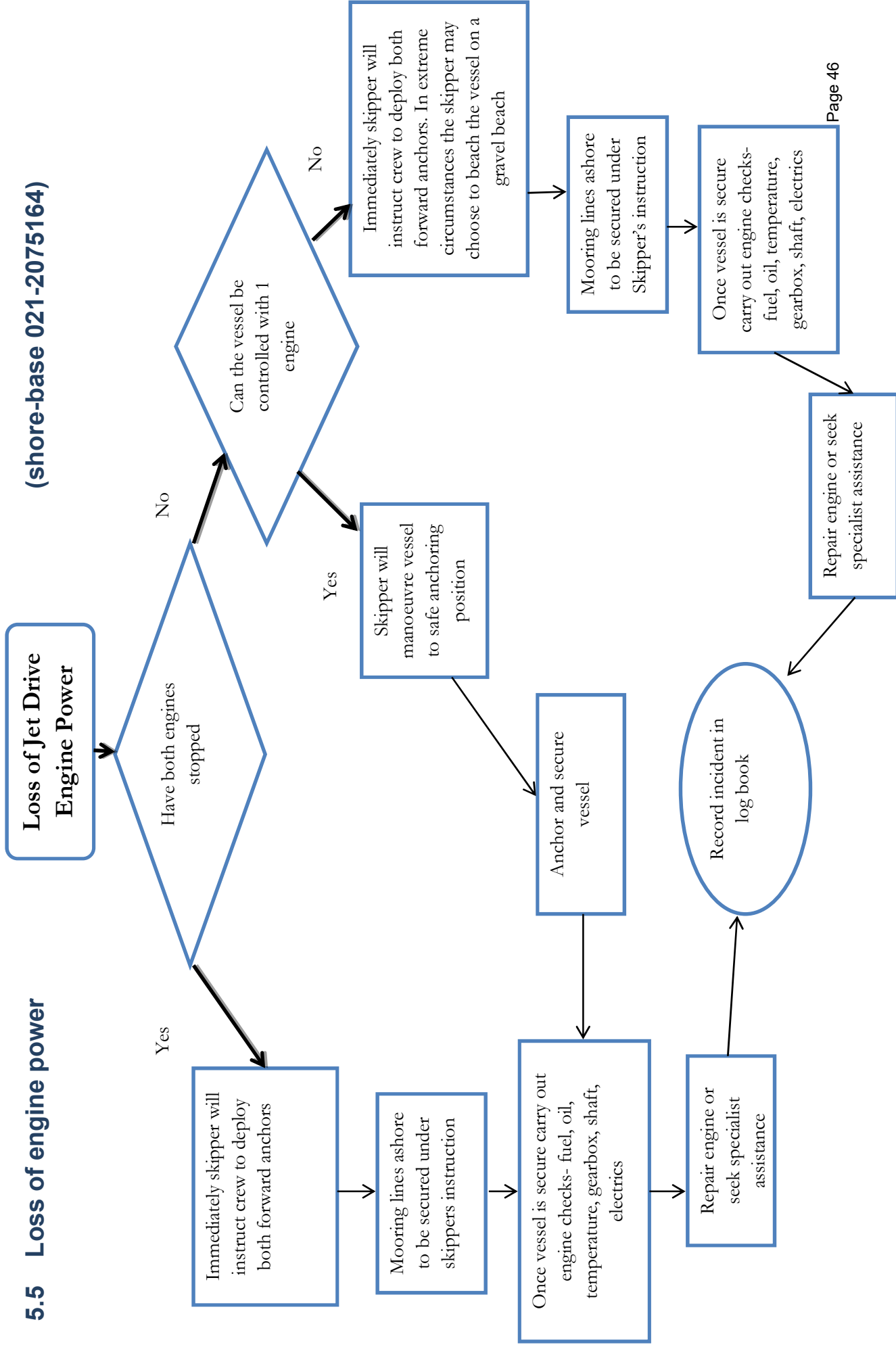
B5 Emergency procedures (shore-base 021-2075164)

5.4 Medical Emergency



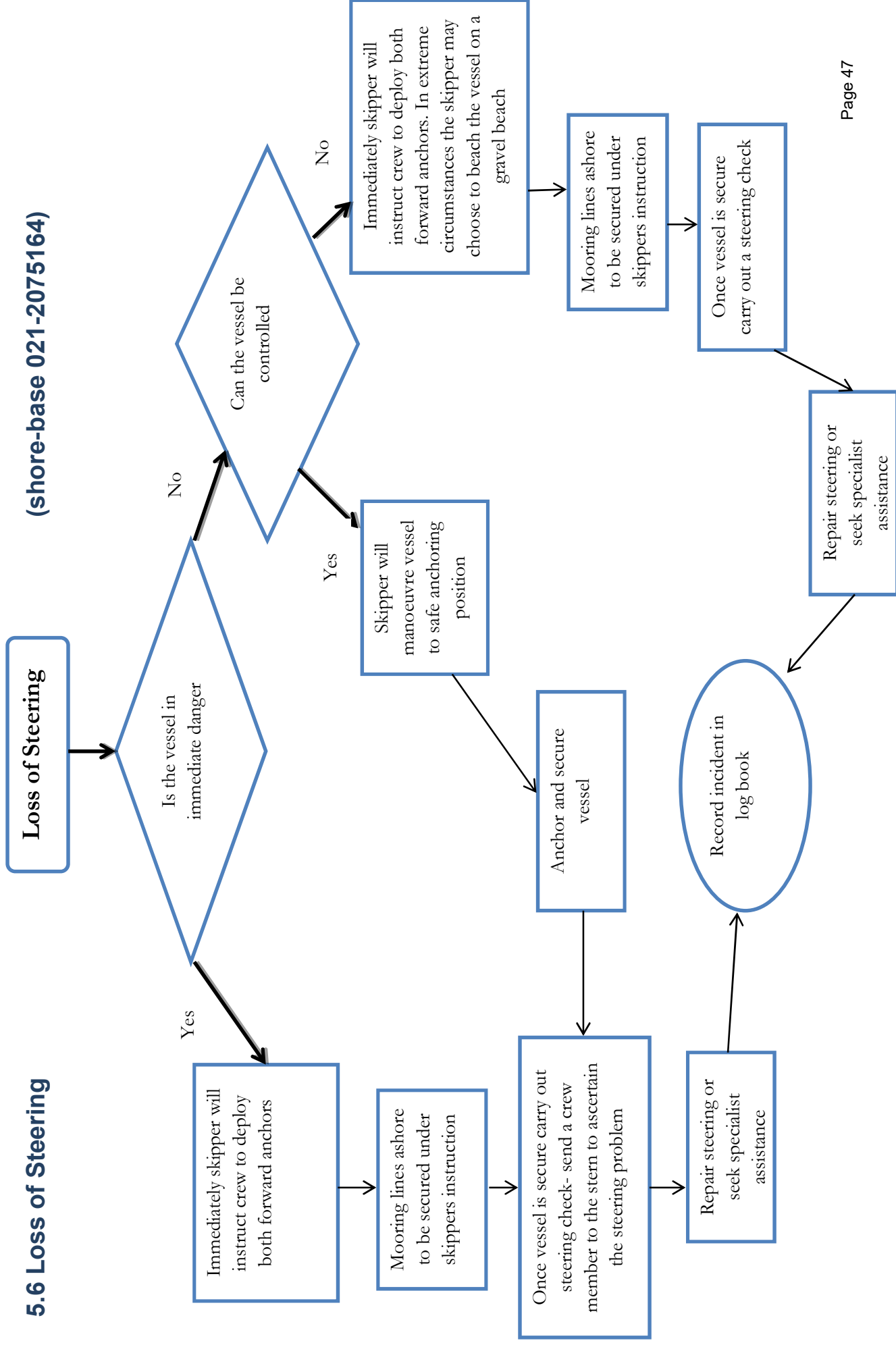
5.5 Loss of engine power

(shore-base 021-2075164)



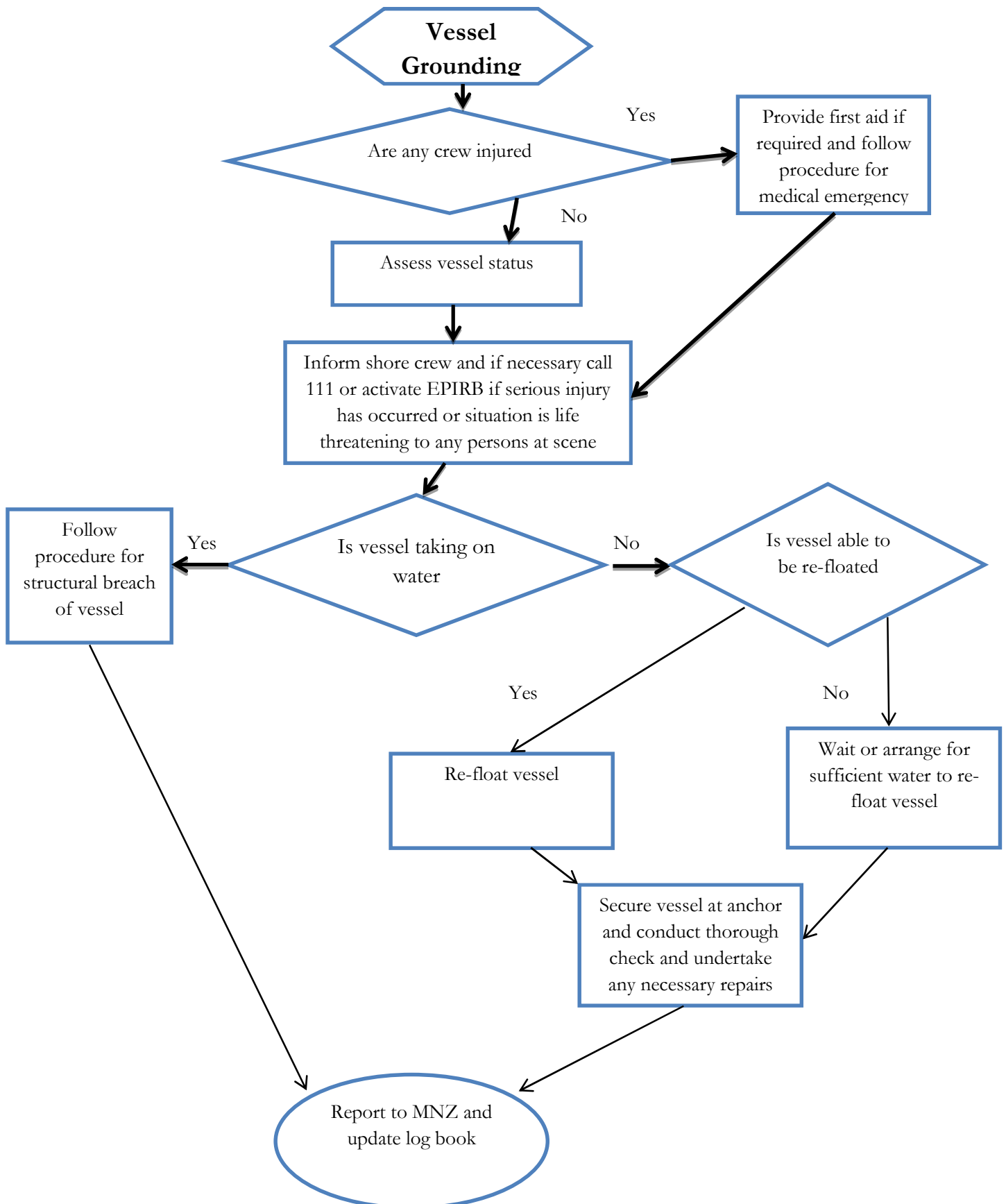
5.6 Loss of Steering

(shore-base 021-2075164)



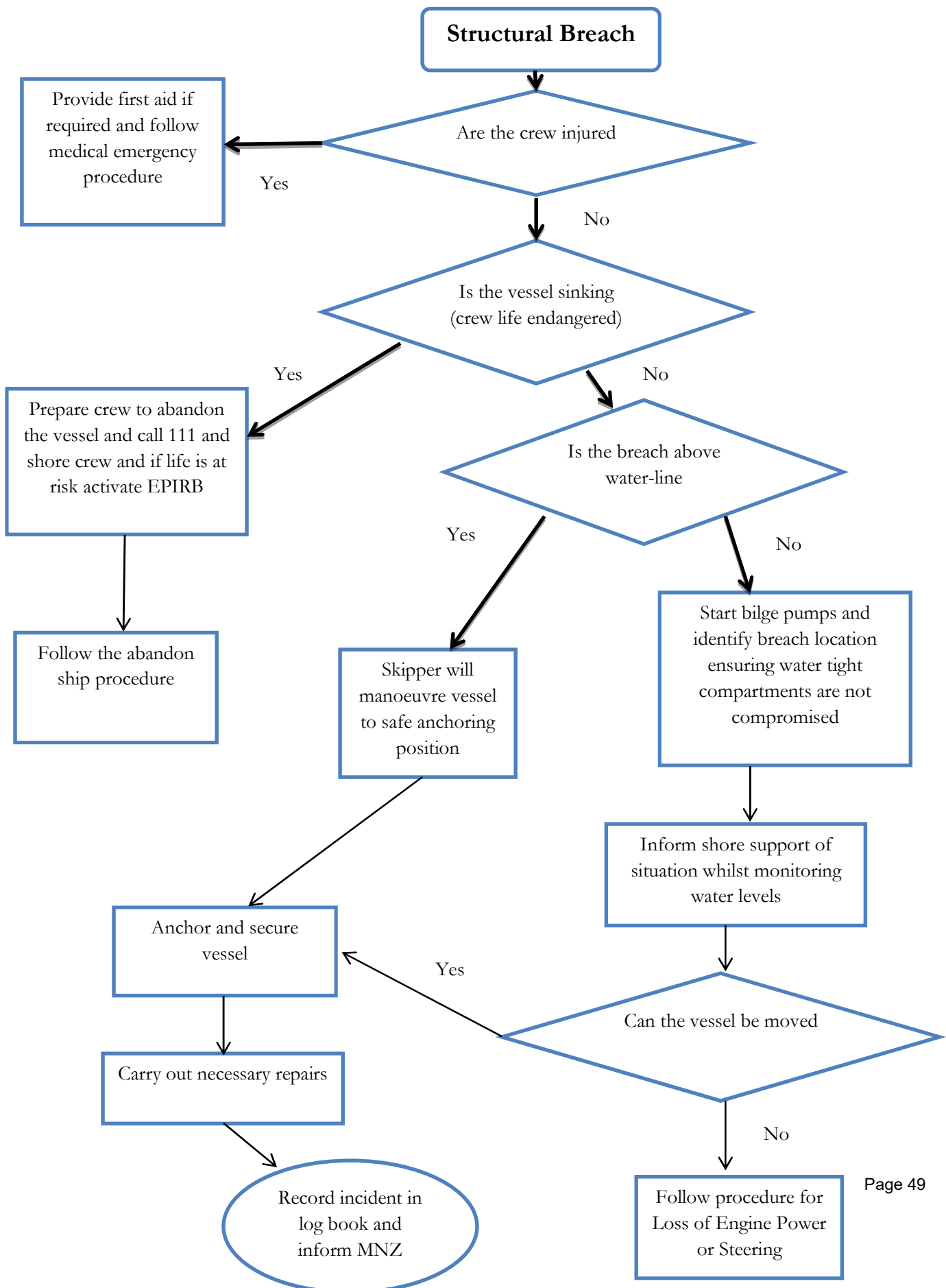
5.7 Vessel Grounding

(shore-base 021-2075164)

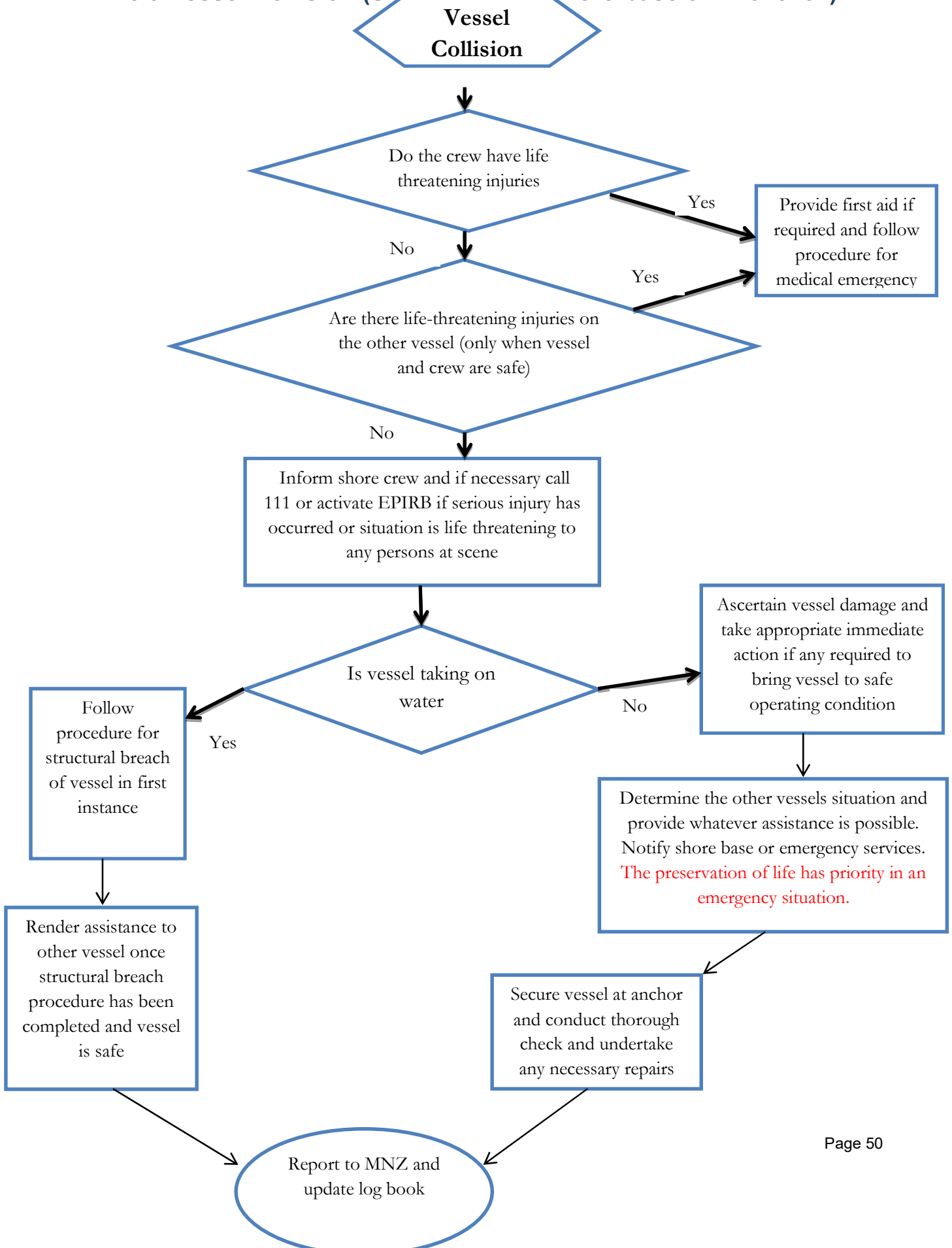


5.8 Structural Breach of Vessel

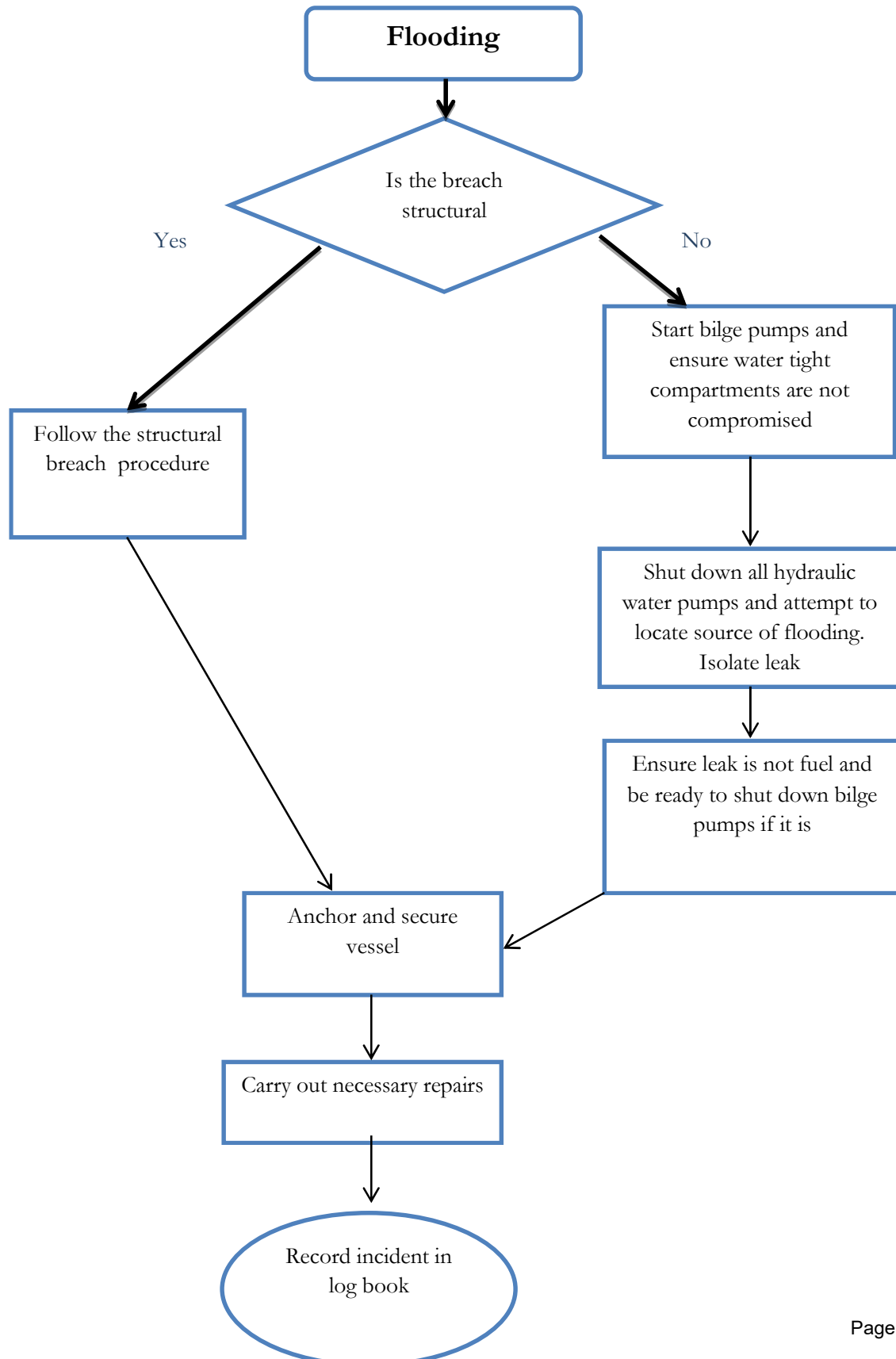
(shore-base 021-2075164)



5.9 Vessel Collision (Ship to Ship) (shore-base 021-2075164)

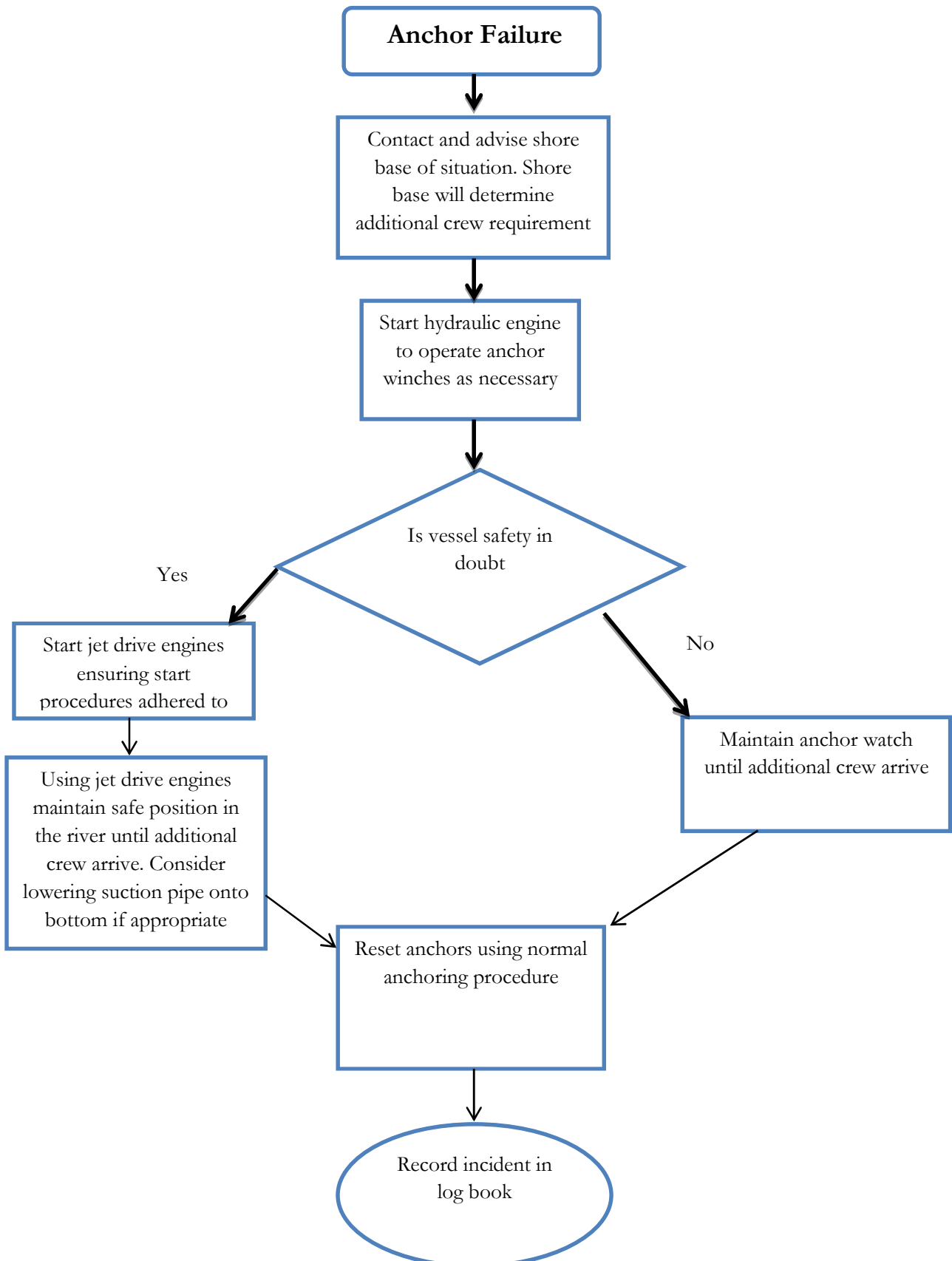


5.10 Non Structural Breach of Vessel (Flooding) (shore-base 021-2075164)



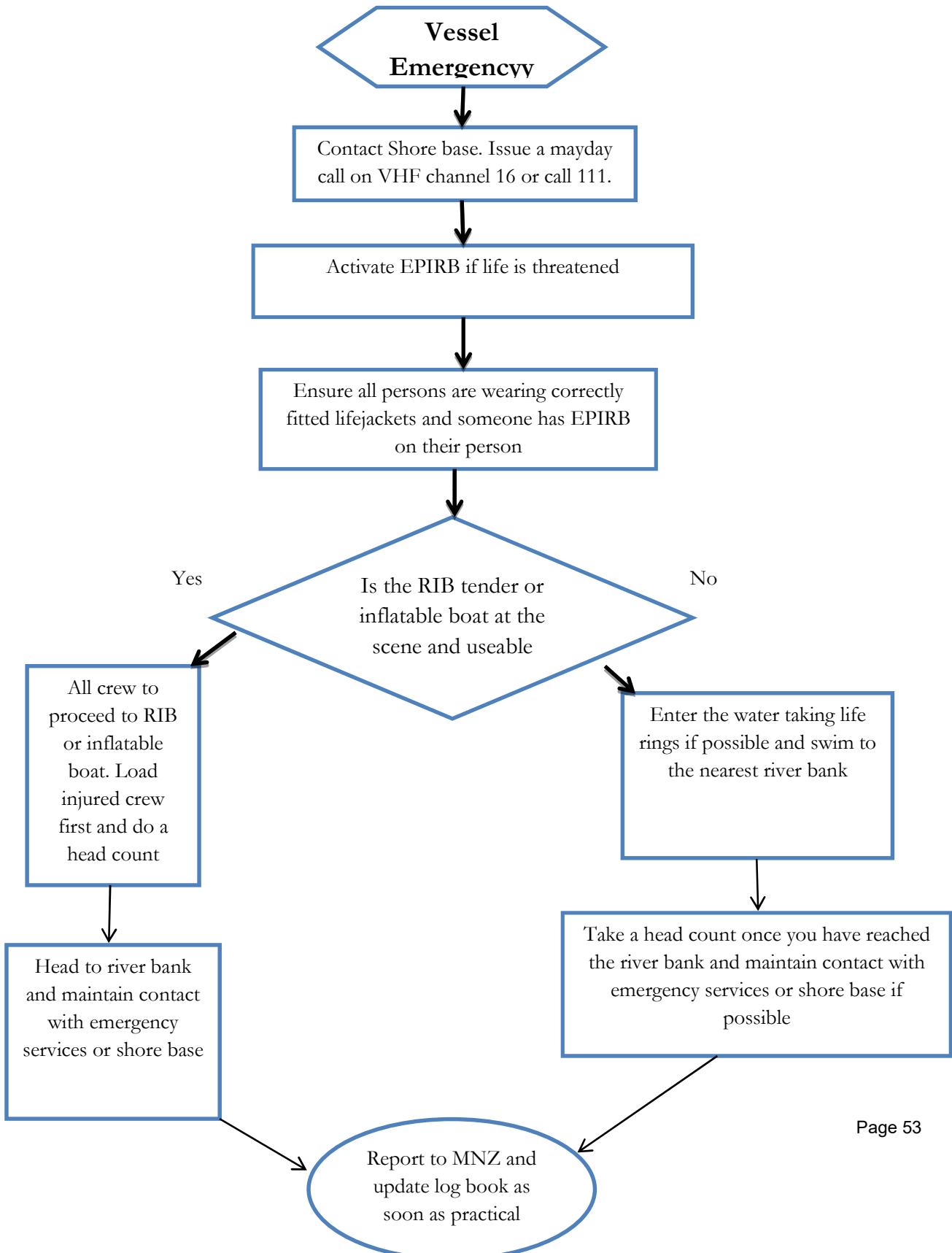
5.11 Dragging Anchor

(shore-base 021-2075164)



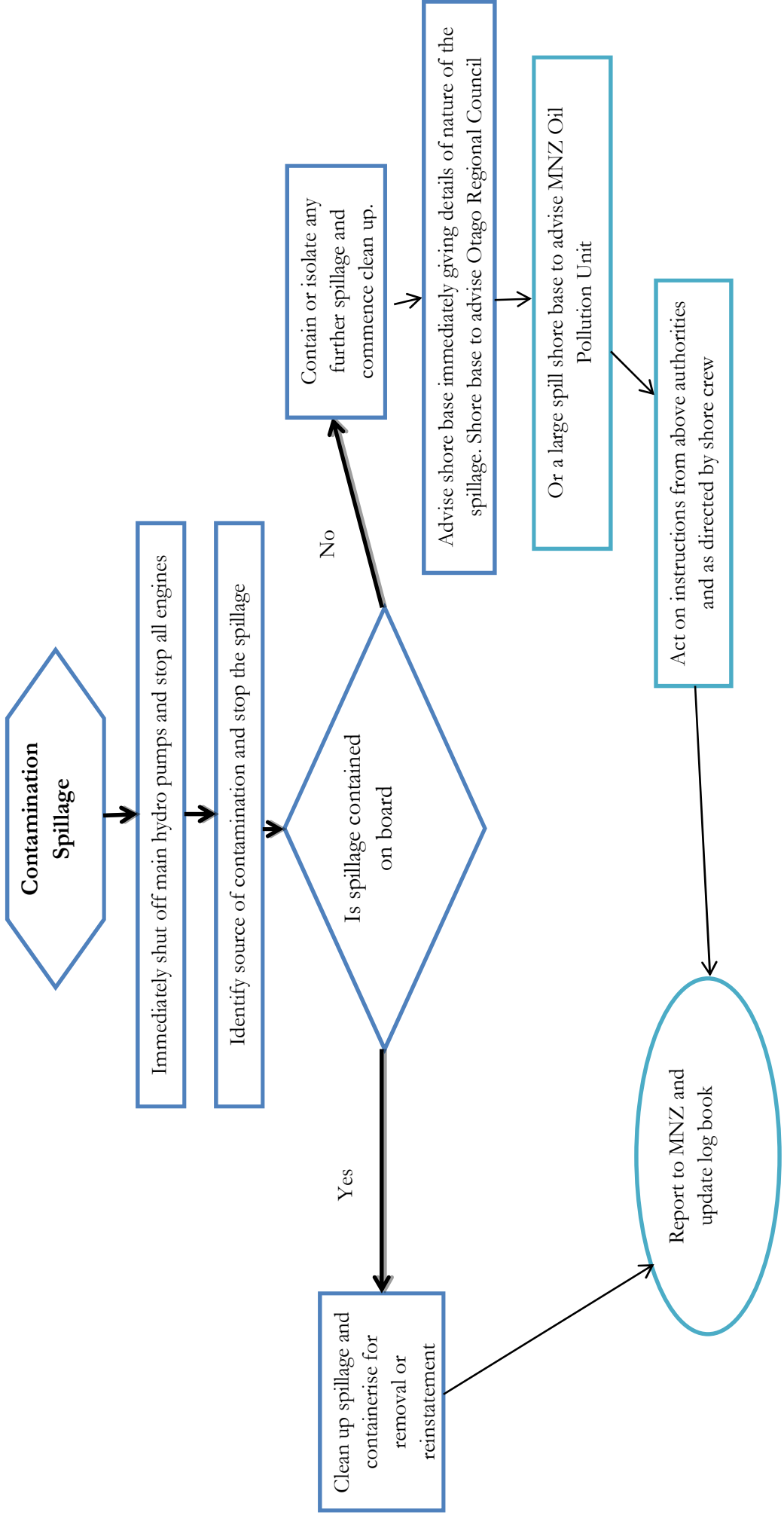
5.12 Abandon Ship

(shore-base 021-2075164)



5.13 Pollution Control

(shore-base 021-2075164)



B6 – Hazard register for CGC1

Hazard (list the hazard)	Significant (Yes / No)	Isolate or Minimise	Actions Required / Controls in Place	Person Responsible
Transit To And From The Dredge via Tender	Yes	M	<ul style="list-style-type: none"> • Check River levels and weather conditions/visibility are safe for a safe transit. • Identify any river hazards. • Safely Board the Tender whilst alongside river bank or Dredge • Check Tender Fuel/Oil Levels • Ensure All Tender lights are operating and used when required • Ensure all Tender passengers are wearing lifejackets that are fitted and fastened correctly • Ensure kill switch cord is attached to Tender Driver • Ensure crew have torches if and when operating in periods of darkness • Ensure no crew move around the Tender during transit 	Tender Driver
Berthing ,departure and Boarding The Dredge from the Tender	No	M	<ul style="list-style-type: none"> • Ensure all crew body parts are within the Tender and not outside when departing or coming alongside the Dredge of the River bank • Ensure all crew are seated before moving off • Ensure Tender is secured to dredge fore and aft before embarking or disembarking from the Tender • Ensure dredge boarding platform is chained off once the crew board the dredge 	Tender Driver

Hazard (list the hazard)	Significant (Yes / No)	Isolate or Minimise	Actions Required / Controls in Place	Person Responsible
Winch Operations – Anchors and Main Pipe	Yes	M	<ul style="list-style-type: none"> Crew keep well away from forward winches when in operation Care with hands and clothing Be aware of location of cables 	Leading Hand
Hydraulic Engine	No	M	<ul style="list-style-type: none"> Care with hands and clothing 	Leading Hand
Cleaning and Changing Rear Matts and under main screens rear deck	No	M	<ul style="list-style-type: none"> Lifting chains attached properly Fingers well clear when removing and then replacing screen meshes Not overloading bins with too much material 	Leading Hand
Cleaning and Changing Interior matts	No	M	<ul style="list-style-type: none"> Ensuring ladder is set up properly before climbing on ladder Not overloading bins Ensure 2 people used in lowering bins to the ground. 	Leading Hand
No Safety Rails	Yes	M	<ul style="list-style-type: none"> Ensure suction operator monitors aft deck camera screen Lifebuoys positioned and ready for immediate use All crew to report intentions if transferring fuel Main deck Tender access ways always chained off when not in use. Wear lifejacket when working on fore and aft decks 	Leading Hand

Hazard (list the hazard)	Significant (Yes / No)	Isolate or Minimise	Actions Required / Controls in Place	Person Responsible
Main Propulsion Engines	No	M	<ul style="list-style-type: none"> Care with hands and clothing Care with slippery surfaces Ensure all guards are fitted correctly 	Leading Hand
Hot surfaces and hot oil	No	M	<ul style="list-style-type: none"> Care if touching or working in vicinity of hot surfaces Wear appropriate safety equipment (gloves) if working with hot surfaces eg. welding or gas cutting Beware of hot hydraulic oil if leaks occur Be careful of gas stove whilst cooking or boiling water. 	Leading Hand
Lifting chains and hooks	No	M	<ul style="list-style-type: none"> Give lifting chains a visual inspection prior to use Have the lifting blocks load tested yearly. Do not lift more than the lifting block and chain is rated for. 	Leading Hand
Workshop Injury/Hand tools	Yes	M	<ul style="list-style-type: none"> Use appropriate safety equipment provided (safety glasses and gloves) Ensure tools only used for design purpose Keep work area clean and tidy Ensure power tool cords are not damaged 	Leading Hand
Blocked Main Suction Pipe	Yes	M	<ul style="list-style-type: none"> Ensure suction pipe fully elevated and safety chain fitted before working on main pipe Ensure lifejacket worn and fastened properly before attempting to investigate or unblock forward section of the main suction pipe. Use fitted companionway to investigate/unblock 	Leading Hand

Hazard (list the hazard)	Significant (Yes / No)	Isolate or Minimise	Actions Required / Controls in Place	Person Responsible
Repairs necessary from Tender	Yes	M	<p>forward section of main pipe.</p> <ul style="list-style-type: none"> At night wear safety harness and ensure it is attached to the vessel. Do not travel out on companionway without another crew member present. Vessel to be moved to slow water flow area before the Tender can be used for an external repair to the vessel Lifejackets to be worn at all times whilst on the Tender Any Tender work carried out on forward section of the vessel must be done in very low flow areas of the river. Crew members must be harnessed onto Tender if leaning over the side of the Tender is required. 	Leading Hand
Slips and trips	Yes	M	<ul style="list-style-type: none"> Deck to be kept as clean as possible, spilled fluids cleaned up immediately All equipment and personal items is to be stored correctly to avoid tripping hazards 	Leading Hand
Heavy lifting, strains etc	Yes	M	<ul style="list-style-type: none"> Only lift what can be handled comfortably If in doubt ask for help Use correct lifting techniques 	Leading Hand
Cleaning chemicals, poisoning, burns	Yes	M	<ul style="list-style-type: none"> Only use appropriate products Wear correct clothing/protective gear Follow product instructions 	Leading Hand

Hazard (list the hazard)	Significant (Yes / No)	Isolate or Minimise	Actions Required / Controls in Place	Person Responsible
Launching and landing Tender on trailer			<ul style="list-style-type: none"> • Ensure suitable site for conducting the procedure- not to steep and safe from hidden rocks and trees. • Winch the Tender onto trailer and do not drive it on • Ensure winch locking ratchet is in place • Ensure safety chain fitted once tender is on the trailer. 	Leading Hand
Setting and Retrieving Anchors	Yes	M	<ul style="list-style-type: none"> • Ensure decks clear of any obstacles before starting procedure • Ensure all ropes coiled and secured outside work area. • Ensure Tender operators are wearing lifejackets • Ensure radio communication turned on and operating between Tender and the Dredge • Ensure enough crew available to cover the situation • Ensure good communication signals between Skipper and the anchor winch operators exist and are understood by both parties. ie Stop and go signals most important. • Crew to keep clear of winches in operation 	Skipper
Re-fuelling	No	M	<ul style="list-style-type: none"> • Ensure lifejackets worn whilst on Tender • Exit the Tender with care both onto the river bank and onto the dredge • Be careful of slippery river bank 	Leading Hand

Hazard (list the hazard)	Significant (Yes / No)	Isolate or Minimise	Actions Required / Controls in Place	Person Responsible
Transit of Dredge up and down the river	Yes	M	<ul style="list-style-type: none"> Vessel speed and course must be adjusted to be suitable for the river state. Operations must be stopped if concerns for safety exist Decks clean and tidy with all lines and ropes coiled and stored appropriately River water visibility must be good enough to see obstacles and sub-surface rocks that could be a risk to navigation. Crewing levels must be sufficient to ensure observation by crew to help the skipper identify obstacles. 	Skipper
Open Hatches	Yes	M	<ul style="list-style-type: none"> Close the hatches when not in use Extreme care moving about around open hatches 	Leading Hand
Ice on Decks	Yes	M	<ul style="list-style-type: none"> De-ice the deck prior to work Grit the deck if necessary Extreme care whilst negotiating the deck boarding the vessel in the winter mornings. 	Leading Hand

Hazard (list the hazard)	Significant (Yes / No)	Isolate or Minimise	Actions Required / Controls in Place	Person Responsible
Noise (>85db)	Yes	M	<ul style="list-style-type: none"> Wear ear muffs 	Leading Hand
Knudson Bowl	Yes	M	<ul style="list-style-type: none"> Care with hands and clothing 	Leading Hand
Power Jet / Main Pipe Maintenance	Yes	M	<ul style="list-style-type: none"> Care around open well Keep work area tidy 	Leading Hand

B7. Maintenance Plan

7.1 General Maintenance

The maintenance plan for Cold Gold Clutha Limited is time based and will follow the following procedures and practices;

- For all mechanical equipment reference will be made to the manufacturers / supplier's service manuals for service requirements and the appropriate staff or suppliers will be used for maintenance.
- As per manufacturers recommendations check and change when appropriate the following;
 1. Hydraulic steering pump filters and oil
 2. Gearbox oils and filters
 3. Fresh water systems filters
 4. Engine air filters
 5. All engine oils and filters
 6. Fuel water traps and filters
 7. Hydraulic system oil and filters
- Also on a regular basis as per the manufacturers recommendations the following will also be carried out;
 1. Grease all winches, drives and bearings
 2. Replace worn parts as required
 3. Operate all sea valves and check hose clips
 4. Check and replace engine zinc nodes as necessary
 5. Check and test lifting gear as per manufacturers requirements

All safety and fire-fighting equipment will be checked on a monthly basis.

7.2 Specific Maintenance

Cold Gold Clutha Limited has equipment on board that has been designed and modified by the Company over the subsequent 3 years of dredging operations. During this period a significant effort has gone into establishing recommended maintenance periods for this equipment. The Company has a vested interest in ensuring the maintenance periods are completely adequate as gold recovery is directly impacted by failure to have equipment operating at its best capacity. This equipment is as follows along with the recommended maintenance periods to ensure 100% efficiency

Main Suction Pipe Liner	rotation every- 400-500 hrs
	Full replacement every 1200-1500 hrs

Main Suction Power Jets inspection every 400-500 hours

Suction Pipe nozzle inspection every week, otherwise every 400-500hrs.

7.3 Significant Maintenance

Cold Gold Clutha Limited has a five-year Inspection Programme designed to keep the vessel in a safe operating condition. This plan is as follows;

Year 1:

Thoroughly inspect the hull and structure and all lifting equipment. Dry out any wet areas and restore and/or repaint as necessary with particular attention to corners and other areas prone to corrosion. Inspection of lifting equipment by a certified tester.

Year 2:

Thoroughly inspect the hull and structure and all lifting equipment. Dry out any wet areas and restore and/or repaint as necessary with particular attention to corners and other areas prone to corrosion. Inspection of lifting equipment by a certified tester.

Year 2.5

Thoroughly inspect the hull and structure and all lifting equipment. Dry out any wet areas and restore and/or repaint as necessary with particular attention to corners and other areas prone to corrosion. Inspection of lifting equipment by a certified tester.

In water inspection of all safety equipment and inspection of all sea valves by a certified surveyor.

Year 3:

Thoroughly inspect the hull and structure and all lifting equipment. Dry out any wet areas and restore and/or repaint as necessary with particular attention to corners and other areas prone to corrosion. Inspection of lifting equipment by a certified tester.

Year 4:

Thoroughly inspect the hull and structure and all lifting equipment. Dry out any wet areas and restore and/or repaint as necessary with particular attention to corners and other areas prone to corrosion. Inspection of lifting equipment by a certified tester.

Year 5 End:

Out of water inspection thoroughly inspecting hull and structure and lifting equipment. Dry out any wet areas and restore and/or repaint as necessary with particular attention to corners and other areas prone to corrosion. Inspection of lifting equipment by a certified tester. In water inspection of all safety equipment and out of water inspection of complete

vessel by a certified surveyor including inspection of shafts, jet impellers, couplings, drive trains and steering mechanisms. Inspection of lifting equipment by a certified surveyor.

7.3 Maintenance Reporting

Any major maintenance will be recorded in the maintenance records that are contained in Section 3 of this operator plan.

SECTION C RECORDS AND PLANS

1.2 Record of drills and on-going training

Date	Crew Present	Drill/Training Details	Skipper's Initials
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1.2 Record of drills and training

Crew Name:

	Training Details	Date	Crew Init.	Trainer Init
A	SAFETY & EQUIPMENT			
A1	Induction, safety equipment & locations			
A2	Hazard awareness (hazard register)			
A3	Radio & emergency communications			
B	GENERAL EQUIPMENT			
B1	Tender operation and navigation			
B2	Re-fuelling			
B3	Vessel general start up and shutdown			
B4	Suction pipe start up and shut down			
B5	Dredging			
B6	Anchor setting & retrieval			
B7	Setting/removing side lines			
B8	Cleaning mats and gold recovery systems			
B9	Knudsen bowl operation			
C	MAINTENANCE			
C1	Routine maintenance checks			
C2	Suction nozzle, power jet and liner replacement			
C3	Main mesh replacement			
C4	Isuzu Engine maintenance			
C5	Generator engine maintenance			

1.3 Skipper induction checklist

ALL skippers who work on *CGC1* **MUST** complete this process.

Please circle the appropriate word and initial in the space provided	Yes/No	Initials
Do you have any medical condition that may cause safety concerns or prevent you from doing certain tasks or increase the likelihood of a medical incident?	Yes/No	_____ —
If yes, please indicate what the medical condition is: _____		
Are you taking any medication that may cause safety concerns or increase the likelihood of a medical incident?	Yes/No	_____ —
If yes, please indicate what the medication is: _____		
I acknowledge that I have read and understood the maritime transport operator plan and am familiar with the following sections:		
• Maritime transport operator details	Yes/No	_____ —
• Roles of responsible persons	Yes/No	_____
• Control of information and documents	Yes/No	_____
• Health and safety	Yes/No	_____
• Crew familiarisation and training	Yes/No	_____
• Environmental policy	Yes/No	_____
• Vessel details	Yes/No	_____
• Safe operating procedures	Yes/No	_____
• Emergency procedures	Yes/No	_____
• Hazards of the operation	Yes/No	_____
I acknowledge that I have been shown and am familiar with how the vessel handles when on the river	Yes/No	_____ —
I acknowledge that I have been shown and am familiar with how to use all navigational and safety equipment on board the vessel.	Yes/No	_____ —
I acknowledge that I have been briefed on the emergency procedures in place aboard the vessel and instructed in my role in the event of an emergency.	Yes/No	_____ —
I acknowledge that I have been briefed on the safe operating procedures in place aboard the vessel and instructed in my role in carrying out these procedures.	Yes/No	_____ —
I acknowledge that I am responsible for leading and instructing the crew.	Yes/No	_____ —

I acknowledge that I have been briefed on hazards and safety procedures as outlined above, and that I have read and understood all safety information and instructions supplied to me as

part of this induction process. I am prepared to meet my obligations and responsibilities under the Maritime Operator Safety System and the Health and Safety in Employment Act.

Name of new Skipper _____

New Skipper's signature _____

Date _____

Senior Skipper's name _____

Senior Skipper's signature _____

Date _____

1.4 Crew induction checklist

ALL crew who work on CGC1 **MUST** complete this process.

Please circle the appropriate word and initial in the space provided.	Yes/No	Initials
Do you have any medical condition that may cause safety concerns or prevent you from doing certain tasks or increase the likelihood of a medical incident?	Yes/No	_____
If yes, please indicate what the medical condition is:		—

Are you taking any medication that may cause safety concerns or increase the likelihood of a medical incident?	Yes/No	_____
If yes, please indicate what the medication is:		—

I acknowledge that I have read and understood all hazard notices and warnings posted on the vessel.	Yes/No	_____
		—
I acknowledge that I have been shown the vessel's hazard register and been advised of the hazard management process aboard the vessel.	Yes/No	_____
		—
I acknowledge that I have been given a safety tour of the vessel and shown the location of the emergency equipment.	Yes/No	_____
		—
I acknowledge that I have been briefed on the emergency procedures in place aboard the vessel and instructed in my role in the event of an emergency.	Yes/No	_____
		—
I acknowledge that I have been briefed on the safe operating procedures in place aboard the vessel and instructed in my role in carrying out these procedures.	Yes/No	_____
		—
I acknowledge that I am prepared to follow all lawful instructions of the skipper.	Yes/No	_____
		—

I acknowledge that I have been briefed on hazards and safety procedures as outlined above, and that I have read and understood all safety information and instructions supplied to me as part of this induction process. I am prepared to meet my obligations and responsibilities under the Maritime Operator Safety System and the Health and Safety in Employment Act.

Name of crew _____

Crew's signature _____

Date _____

Skipper's name _____

Skipper's signature _____

Date _____

C2 – Incident and accident register

Accident number	Accident date	Accident details	Report to MNZ? Yes/No
IR006	22/2/2016	Partial loss of steering of main jet drive units on vessel relocation trip (suspect leaking hydraulic seal) No mishap and vessel continued to safe anchorage with limited steering and at reduced speed using individual engine controls to steer vessel.	N
IR007	19/7/16	Tom Rae – Grinder cut to left hand.	Y
IR008	20/10/16	Ash Holmes – Fall.	N

C3 – Record of operator plan reviews

Review number	Review date	Notes, review findings and record of changes	Next review due
01	2/4/2016	Changes to Communication equipment and Emergency procedures (2x EPIRBS purchased)	2/06/2016
02	17/7/2017	E-copy updated with all revisions	17/7/2018
03	26/9/2017	Operating procedures added plus annual checks	26/9/2018
04	29/1/2019	General update.	01/2020
05	24/2/2020	Reviewed and updated	01/2021

C4 – Record of hazard reviews and changes

Review number	Review date	Details of review and/or changes	Changes made? Yes/No	Crew informed
1	14/07/2017	Power jet maintenance added	Y	

C5 – External audits and survey reports

5.1 Record of external audits, inspections and surveys

Date of audit	Name of auditor	Details	Auditor initials	Report filed? (Yes/No)
March 2016	SGS	Full out of water 4-year survey		Y
19/03/2018	Cory Ward	Mid-term survey		Y

C6 – Maintenance plans and records

This section contains the vessel's maintenance plan, based on the MNZ maintenance plan template and covers the following,

1. Preferred suppliers and service agents
2. Maintenance log
3. Record of maintenance plan amendments
4. Monthly and routine maintenance
5. Annual checks and routine maintenance

6.1 Preferred suppliers and service agents

CGC Supplier List

Nov-15

Item/Part	Description	Part No / Ref	Qty	Supplier Name
Naval Architect	Dredge Hull			Harry Stronach & Associates
Surveyor	Vessel Survey			Cory Ward
Hydraulics	Servicing, hoses & fittings			Hydraulic Services & Repairs
Electrical	All general electronics			Turret House
Electrical	Marine systems			JLE Electrical
Engineering equipment – general	Valves, tools, welding equipment, etc			Blackwoods Protector (Nelson)
	Welding gas			Gas & Engineering Supplies / BOC
	Pipes, hoses and fittings			Allflow (Nelson)
	Paint			Altex Coatings (Dunedin)
	Steel - general			Steel & Tube (Nelson)
	Fastenings			Blacks Fasteners (Invercargill)

	Wire ropes, shackles				Bridon Cookes (Dunedin)
	Lifting equipment				Bridon Cookes (Dunedin)
	Voltage Selection Switch		BEP 720-MVDSO	1	Burnsco Marine
Safety equipment	General				Blackwoods Protector (Nelson)
Safety equipment – Marine	Life jackets, flares, life rings, etc				Survitec / RFD (Chch)
Fire extinguishers -	Servicing				Firewatch Otago
Marine Radio	Supply / servicing				TERadio/Navcom
Sat Phone	Supply and servicing				Wright Satellite Connections
Isuzu Engine – Parts	Isuzu		6WG1TC-AA3		Cable Price (Nelson)
Engine oil	I-Sigma Superfleet 15W40		E00940305		Transdiesel Ltd
Coolant	Powercool 3000-3 HD Pre-mix				Southfuels
Oil filter			O1522	1	Transdiesel Ltd
Oil filter			O1535	1	Transdiesel Ltd
Air filter			P153551	1	Transdiesel Ltd
Pry fuel filter			F1507	1	Transdiesel Ltd
Sec fuel filter			F1007	2	Transdiesel Ltd
Alternator belt					
Splitterbox oil	Rotra MP 80W90				Transdiesel Ltd
Splitterbox filter	Donaldson		P565243	1	Transdiesel Ltd
Hydraulic oil	OSO32				Oil Intel
Bio oil	Biohydran TMP46				Southfuels
Hydraulic oil filter (Main tank return)	Donaldson		P165762	6	Transdiesel Ltd
Hydraulic oil filter (Bio tank return)	Donaldson		P165243	1	Transdiesel Ltd
Hydraulic oil filter (Valve Block)	Filtri-MP		CH-070-P-10-A	2	Transdiesel Ltd

Generator – Parts	Kohler	9EF02D	Transdiesel Ltd
Engine oil	I-Sigma Superfleet 15W40	E00940305	Transdiesel Ltd
Coolant	Powercool 3000-3 HD Pre-mix		Southfuels
Oil filter		GM47465	Transdiesel Ltd
Air filter		278858	Transdiesel Ltd
Fuel filter		229715	Transdiesel Ltd
Water pump belt			
Water pump		GM46936	Transdiesel Ltd
Main Engines			
Engine oil	Detroit Diesel	8V92TA	Transdiesel Ltd
Coolant	Powercool 3000-3 HD Pre-mix		Southfuels
Oil filter	Donaldson	P551670	Transdiesel Ltd
Fuel filter	Donaldson	P556916	Transdiesel Ltd
Air filter			
Gearbox		ZF350	Transdiesel Ltd
Oil		AGIP Sigma S30W	Transdiesel Ltd
Oil filter	Donaldson	P551327	Transdiesel Ltd
Jet Units			
	Ultrajet	UJ575	Marine Jet Power (UK)
Tender			
Servicing & oil	Wavebreak 5.5		GP Engineering
			Dunedin Marine Centre
HDPE Liner	12m Length	DN400 SDR17	Coal Creek Plastics

Steel Pipes		HDPE100		Pipes NZ
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6.2 Maintenance log

Maintenance date

Details of fault and/or maintenance

Initials

Refer to Maintenance Log Book.

6.3 Record of maintenance plan amendments

Date	Item reference	Details of amendment made	Sign
------	----------------	---------------------------	------

6.4 Daily Maintenance Check Sheet

CGC1 - Daily Maintenance Check Sheet

DATE:

Dredging (Y/N):

ITEM	OK	Action	Init.	Comments
Helm / Controls				
Bilge switches set to auto				
Alarm MCB ON				
Alarm LEDS working (press to test)				
Batt Volts				
Port				
Starboard				
Hydraulic Eng				
House				
Radio sending/receiving				
Hydraulic Engine				
Engine oil level				
Gear Box oil level				

Coolant Level					
Hydraulic Oil Level x 2					
Plate Cooler water filter clean					
Leaks					
Port Fuel Compartment					
Hyd Engine filters clean					
Port Ctr Fuel Tank level					
Clean Gen Water Filters					
P3					
Leaks					
Bilge Dry					
Hydraulic tube cooler water filter clean					
Starboard Fuel Compartment					
Stbd Ctr Fuel Tank level?					
Leaks					
Bilge Dry					
Gravel pump gland seal OK water filter					
Grease Pump Bearings x 4 (1 shot daily)					
Inspect belts					
Generator					
Service Due?					
Port Main Water Pump					
Leaks					
Bilge Dry					
Starboard Main Water Pump					
Leaks					

Bilge Dry						
Main Screen						
Mesh condition						
Cracks/ Fixings						
Hopper mesh clear of oversize stones						
Aft Winches x 2						
Oil Leaks?						
Shackles / pins						
General						
Bow Winches (x5)						
Oil Leaks?						
Shackles / pins						
General						
Pipe winch blocks greased (daily)						
Main Equipment Room						
Oil leaks						
Knudsen Bowl rpm (Nom. 105)						
Belt						
Bearing grease due?						
Toilet						
Tank level						
Flush water level						
Soap / Toilet paper						
Hand towel						

Galley					
Tea/coffe/sugar/milk					
Tea Towels					
Clean					
Jet Boat					
Fuel level					
Engine oil tank level					
Coolant flowing					

6.5 Monthly routine checks and maintenance

Reference	Equipment or item details	Monthly Routine Checks and Maintenance															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
A	Safety equipment and radio / navigation																
A1	Fire extinguishers																
A2	First aid kit																
A3	Navigation charts																
B	Miscellaneous																
B1	Torch and other battery-operated devices																
B2	Spares and essential systems on board																
B3	operator plan vessel copy version no.																

Reference	Equipment or item details	Monthly Routine Checks and Maintenance														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
C7	Tender Bilge Pump															
C8	House battery hydrometer test.															
D	Deck Equipment															
D1	Check all 4 anchor winches and main Suction pipe winch															
D2	Check all anchor warps, shackles and shackle mausings.															

Reference	Equipment or item details	Monthly Routine Checks and Maintenance															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
E	Fit Out																
E1	Check lighting and replace bulbs as required																
F	Crew Safety																
F1	Inspect condition of lifejackets																

6.6 Specific Maintenance Schedule- Hours based

ISUZU & HYDRAULICS

CHANGE INTERVALS (HRS)

Engine oil	500
Coolant	2000
Splitter box oil & filter	2000

FILTERS

Air filter	500
Bypass engine oil	500
Main engine oil	500
Primary fuel X 1	1000
Main fuel X 2	1000
Air filter	2000
Main Hydraulic X 6	1000
Bio oil	1000

Alternator belts

2000

GENERATOR

Engine oil

250

Coolant

2000

FILTERS

Engine oil

250

Fuel filter

250

Water pump belt

1000

Alternator belt

2000

PORT / STARBOARD DETROIT'S & JET UNITS

Engine oil

250

Gear box oil

250

Coolant

2000

Jet lube oil 1000

Jet hydraulic oil 1000

FILTERS

Air filter 500

Engine oil 250

Primary fuel 250

Main fuel 250

Gear box 250

Alternator belts 2000

Jet unit belts 2000

SOUTHERN CROSS PUMPS

Bearing housing oil 1000

LARGE GRAVEL PUMP

Water pump end seal

3 shots every 3-4 days

Hyd motor end seal

3 shots every 3-4 days

SERVICE TENDER (Jet Boat)

Full Service by Dealer

100hrs

Suction Pipe Liner

Rotation

400 Hrs

Renewal

1200

Hrs

Main Suction Jets

Inspection

400 hrs

Renewal

As required

6.7 Annual checks and maintenance

Reference	Equipment or item details	2020		2021		2022		2023		2024	
		Month due	Date checked	Month due	Date checked	Month due	Date checked	Month due	Date checked	Month due	Date checked
	Crew safety										
	Verify compliance of "Official safety equipment list" with maritime rules.										
	Arrange annual service of fire extinguishers										
	Safety equipment and radio / navigation										
	Radio installation check										
	Check / self-test EPIRB										
	Hand Tools Leads & Extn Cords										
	Lifting Equipment										

Reference	Equipment or item details		2020		2021		2022		2023		2024	
	Month due	Date checked	Month due	Date checked	Month due	Date checked	Month due	Date checked	Month due	Date checked	Month due	Date checked

C7 - Survey plans and records

This section contains the vessel's survey plan, based on the MNZ Survey plan template and covers the following:

1. Ship details
2. Scope of certification
3. Certificates and exemptions
4. Survey or inspection checklist
5. History of survey plan amendments
6. Survey items schedule
7. Survey plan approval

CGC1 survey plan

1. Ship details

Full name of ship

Name of operation

MNZ number

Call sign

Primary harbour (or main location you operate from)

Hull construction

Total engine power (in kW, as applicable)

Drive type (number and type)

--	--	--	--	--	--	--	--

Number of shafts

--	--	--	--	--	--	--	--

Length overall (LOA)

Carries dangerous goods (tick which applies)
yes / no

Design approval

number

Date of build
DD / MM / YYYY

2. Scope of certification

Indicate the purpose of your vessel, the number of crew and passengers, cargo capacity, operating limits and more.

Vessel categories (tick as many as apply)

<input type="checkbox"/>	Passenger ship	<input checked="" type="checkbox"/>	Non-passenger ship
<input type="checkbox"/>	Fishing ship	<input type="checkbox"/>	Sailing ship

Minimum crew (number)

Maximum passengers (number)

Maximum persons (number)

Maximum cargo load (tonnes)

Activities engaged in (refer to your operator plan)

Operating limits

Eg restricted coastal, coastal – as applicable to the ship's activities

Special conditions or
limitations
(imposed by a surveyor or
Maritime New Zealand)

Enclosed Limits

Non-Passenger

The Vessels Tender is treated as part of the mother
ships equipment.

3. Certificates and exemptions

Certificates and exemptions held or required for this ship		Certificate number	Expiry date (DD/MM/YYYY)
<input checked="" type="checkbox"/>	Certificate of Survey (or Fit for Purpose Certificate and SSM Certificate)	DGP182	28/2/2021
<input type="checkbox"/>	Compass Certificate	N/A	N/A
<input checked="" type="checkbox"/>	Radio Certificate	225	02/03/2021
<input checked="" type="checkbox"/>	Safety equipment certificates	10327	15/06/2020
<input type="checkbox"/>	Medical stores certificates		

Add other certificates and exemptions held or required for this ship	Certificate number	Expiry date (DD/MM/YYYY)
<p>Exemption to Maritime Rule 40C.28 (6)</p> <p>(6) Two means of escape must be provided from a machinery space</p> <p>of Category A, except that a surveyor may permit a single means of</p> <p>escape that does not lead to other areas of major fire hazard if the</p> <p>space is an unmanned space not exceeding 5 metres in length.</p>	159-EX-17	28/02/2021

4. Survey or inspection checklist

Survey or inspection type (tick which applies)	Expected frequency
<input checked="" type="checkbox"/> Out of water hull inspection	At initial survey, then at intervals prescribed in the survey performance requirements
<input checked="" type="checkbox"/> Steering and propulsion survey	At initial survey, then at intervals prescribed in the survey performance requirements
<input checked="" type="checkbox"/> Sea trial of steering and propulsion	At initial survey, then not less than once every 4 years
<input checked="" type="checkbox"/> Radio inspection	At initial survey, then not less than once every 4 years

6. Survey items schedule

As per attached survey plan.



SGS Survey Plan.pdf

7. Survey plan approval

Signature of recognised
surveyor

Name of surveyor

SGS

Date plan approved

09

04

2016

DD / MM / YYYY

Noise Testing - CGC Gold Dredge.

CGC conducted noise testing to determine a notional boundary from the dredge at which noise emissions are at or below the maximum allowable noise levels specified in the Central Otago District Plan.

Noise Rule

Specifically, Central Otago District Plan rule 4.7.6E, (a) specifies the following noise levels are not exceeded at any point within the notional boundary of any dwelling, rest home or hospital, or at any point within any Residential Resource Area or any Rural Settlements Resource Area:

On any day 7.00am to 10.00pm – 55dBA L10
10pm to 7am the following day – 40dBA L10
70dBA Lmax

Provided that the above noise limits shall not apply to:

1. any temporary activity (as defined)
2. devices used to protect crops from birds or frost
3. sirens associated with emergency service activities

“Notional boundary” is defined as a line 20 metres from part of any living accommodation or the legal boundary where this is closer to the living accommodation.

Location of dredge: Clutha river/ Mata-au between Ettrick & Millers Flat, Central Otago.

Test Date: 04 October 2013

Atmospheric Conditions: Overcast, calm/very light NW.

Other noise Factors: The dredge location is adjacent to SH8. Road traffic and river noise were significant interference factors.

Test Equipment:

1. Smart Sensor digital sound level meter
Model: AR824
Accuracy: IEC651 type 2
Measuring range: 30-130dBA
Accuracy: +/- 1.5dB
Test frequency weighting: A
Test time weighting: slow
2. Nikko Stirling laser range finder – Model NSLRF501
3. Garmin GPSmap 62S hand held GPS.

Test Procedure:

The sound level meter was moved away from the dredge to an accessible location where the average noise level was below 55dBA and from which there was an unfettered line of sight directly to the dredge. i.e. no trees, object or structure which could provide a sound barrier. Due to access, test locations were on both river banks upstream and downstream from the dredge. Distances to the dredge were measured using the laser range finder and were measured to the nearest part of the dredge superstructure. Position of the dredge and test positions were noted on the GPS. Noise levels were measured for a period of 2 minutes. Peak noise limits caused by passing traffic were discounted.

Results:

The dredge was operating under normal conditions. Ambient noise level = 42dBA.

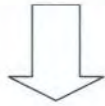
Position	Location (NZTM)	Distance from Dredge (m)	Av. Sound Pressure Level (dBA)
Dredge	E1318803, N4938354		
1	E1318684, N4938354	173	54.5
2	E1318649, N4938244	158	45.5
3	E1318905, 4938072	177	53
4	E1318961, N4938201	149	54
5	Nearest House	171	47
6	Below E&I Brown's House	750	43

Conclusion:

CGC Gold dredge does not exceed the sound pressure level of 55dBA L10 at a distance any greater than 175m.

N

River Flow



To Ettrick



P5

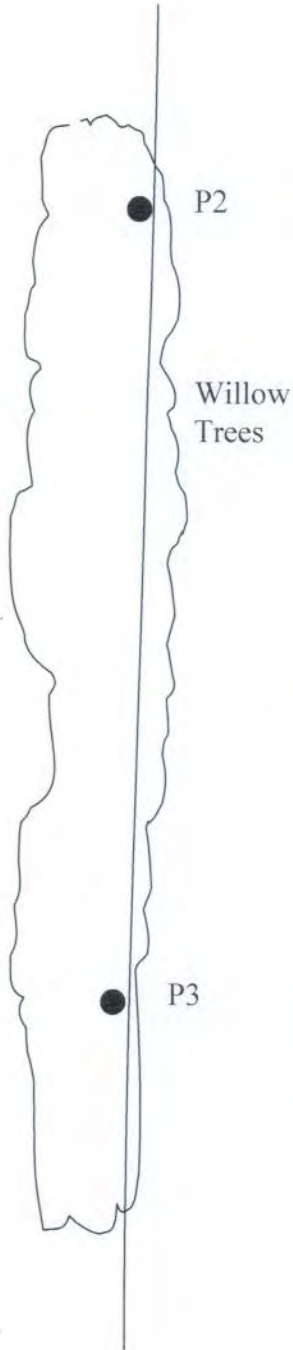


SH8

To Millers Flat



P6



P2

Willow
Trees

P3

Dredge



P1

Willow
Trees

P4



Hydraulic capacity and flow characteristics of the Clutha River

Flood Sense Limited

Flood Sense Limited has been engaged to report on any potential flood issues created by Cold Gold Clutha Limited's proposed excavation of a slipway on the right bank of the Clutha River between Beaumont and the Rongahere Gorge. The purpose of the slipway is to allow the removal of the company's dredge from the river for the purposes of maintenance, survey or, in the event of river flood, safety.

As part of the consenting process, questions have been raised by the consenting authority as to whether, or how, the excavated slipway will affect flood and/or erosion risk.

The site was visited on the early afternoon of 26 January 2021. The berm at the proposed slipway was observed to consist of three grassed terraces. The lower terrace lies some 1.2 m above a gravel beach and is typically 10m wide. The second terrace is some 2.2 m higher and is typically about 60m wide. The third terrace is typically a further 1.8m m higher and typically extends more than 100m towards the Beaumont-Clydevale highway. The terraces are all grassed and utilised for grazing dairy cattle.

At the time of our visit the river flow (subject to diurnal electricity generation-induced variation) was sufficient to cover the gravel beach to a depth of some 600 mm. Allowing for the likely lag time between the site and the Balclutha recording site, the river flow was estimated to have been of the order of 550 m³/s.

The largest flood flows in this reach of the Clutha River since the record event of 1878 occurred in 1978 and 1999. According to the local farm manager, the flood of November 1999 rose to close to the level of the upper terrace, lapping near the base of the red shed (see photo provided in the original application), but did not threaten the nearby unoccupied farmhouse. For purposes of context, it is noted that both the 1999 and October 1978 flood flows at Clydevale were of the order of 3600 m³/s, although the flow at Balclutha was substantially the greater in 1978 because of the contribution of the Pomahaka River which enters the Clutha downstream of Clydevale.

The proposed excavation of a 10 m wide slipway extends some 20 m across the second terrace and across the lower terrace to the gravel beach. It does not therefore approach the upper terrace, and can pose no risk of "breakthrough" as flood levels cannot be increased by the proposed works and as the physical integrity of the upper terrace is not compromised.

The excavation of the spillway into the stony material of the lower terraces will remove the upper grassed layer. The stony river sediment exposed by the excavation may be disturbed in the event of subsequent significant flood flows, but it is considered that there is minimal risk of resulting significant erosion developing as the depth of excavation is small and there will be negligible fall across the excavation, regardless of flow magnitude. It is nevertheless envisaged that the "upstream" edge of the excavation may erode back a few metres via a process of headward erosion during a flood if the mode of excavation were to leave a steep-albeit shallow- exposed cut. Similarly, the "downstream" batter could be subject to small direct erosive forces from increased turbulence (eddying). While the impact of such erosion is considered to be extremely minor, any potential issues could be easily avoided if the "batters" of the excavation were to be graded back to be no steeper than, say a gradient of 2.5:1 and "armoured" with larger material available onsite.

Inundation of both the lower and second terraces is likely to continue to occur on a reasonably frequent basis; however, given the assessed minor impacts of the proposed work (see above), a detailed analysis of flood levels is seen as irrelevant to any assessment of impacts. Nevertheless, for completeness it is estimated that inundation of the second terrace would occur at flows in excess of approximate 1200 m³/s. This compares with a mean river flow of 550 m³/s, and is based on an estimated main channel width of approximately 150 m and a typical flood flow velocity of 1.5 m/s.

Our conclusions are that

1. The proposed works will have no impact on flood level or flood flow characteristics;
2. Any potential induced erosion will be local, minor and easily mitigated by grading and armouring of the slipway batters.

Neil Johnstone

Flood Sense Limited



Certificate of Analysis

Client:	Cold Gold Clutha Limited	Lab No:	2365195	SPV1
Contact:	Peter Hall C/- Cold Gold Clutha Limited 30 Hunt Street Andersons Bay Dunedin 9013	Date Received:	13-May-2020	
		Date Reported:	14-May-2020	
		Quote No:	104769	
		Order No:		
		Client Reference:		
		Submitted By:	Peter Hall	

Sample Type: Aqueous

	Sample Name:	5m 12-May-2020 9:28 am	10m 12-May-2020 9:28 am	15m 12-May-2020 9:29 am	20m 12-May-2020 9:29 am	25m 12-May-2020 9:30 am
	Lab Number:	2365195.1	2365195.2	2365195.3	2365195.4	2365195.5
Turbidity	NTU	1.62	1.50	1.48	1.10	1.14
Total Suspended Solids	g/m ³	9	5	3	< 3	< 3

	Sample Name:	30m 12-May-2020 9:30 am	35m 12-May-2020 9:31 am	40m 12-May-2020 9:31 am	45m 12-May-2020 9:32 am	50m 12-May-2020 9:32 am
	Lab Number:	2365195.6	2365195.7	2365195.8	2365195.9	2365195.10
Turbidity	NTU	1.46	1.44	1.37	1.13	1.13
Total Suspended Solids	g/m ³	4	< 3	< 3	< 3	< 3

	Sample Name:	Control 12-May-2020 9:33 am				
	Lab Number:	2365195.11				
Turbidity	NTU	1.12	-	-	-	-
Total Suspended Solids	g/m ³	< 3	-	-	-	-

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Turbidity	Analysis using a Hach 2100 Turbidity meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2130 B 23 rd ed. 2017 (modified).	0.05 NTU	1-11
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2540 D (modified) 23 rd ed. 2017.	3 g/m ³	1-11

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Dates of testing are available on request. Please contact the laboratory for more information.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Xiaozheng (Nadia) Ni BAppSc
Laboratory Technician - Chemistry

