

Coastal Permit Technical Comment

PAID
07 JUN 2019
ENVIRONMENT
SOUTHLAND

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For all consent applications that may affect navigational safety

1500 CR

Activities in coastal waters or on rivers and lakes may affect navigational safety or other areas of interest to the Harbourmaster. The Harbourmaster also assists the Consents Division by providing expert input into assessments of consent applications, where necessary.

Comments from the Harbourmaster assist with prompt decision making on consent applications.

This form should be completed and included with any consent application for an activity in a navigable water body that affects, or may affect, navigational safety. This includes applications for the installation, extension or removal of a structure in a navigable water body, any reclamation, and any commercial surface water activity in any navigable water body.

Section 1: Applicant to complete

Name: Te Anau Earthworks Limited

Address: 9 Snodgrass Rd / PO Box 218, Te Anau

Proposed activity: Gravel extraction project located adjacent to the western edge of the floodway. Screening, processing, and temporary stockpile outside of the floodway.

Location: Central position of proposed activity E: 1194974 N: 4944398

Use NZTM2000 or otherwise identify the location accurately

Type of consent sought Land Use Consent

e.g. Land use consent for works in a river bed; coastal permit for occupation of coastal space

- Consent sought:
- A new consent for a new activity, or
 - A new consent for an existing activity
 - A change to a condition of an existing consent

Section 2: Harbourmaster or the Deputy Harbourmaster to complete

In my assessment, the following has been taken into account by the applicant when assessing adverse effects of their proposed activity (tick all that apply):

	Yes	No	N/A
Effects of the activity on navigational safety/bylaws	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil transfer sites and oil transfers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil / fuel spill risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (Comment): _____

In my assessment the following variables have been taken into account when assessing the adverse effects of the proposed activity (tick all that apply):

	Yes	No	N/A
Suitability of depth of water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vessel size suitability for the proposed area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Integrity of holding ground for the anchor/mooring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficiency of the swing room for the vessel to rotate around the anchor/mooring without collision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other vessels are able to safely navigate in the area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The structure, if existing, is well maintained, is safe and poses no hazard in itself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effect on other users of the area(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adequacy of anchorage size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (Comment): _____

Further comments:

Insert general comments about the application, other factors which were considered if not listed and outline any concerns here

Section 3 Harbourmaster or the Deputy Harbourmaster to complete

I do / do not believe the activities proposed will cause adverse effects on navigational safety.

Signed: _____

Date:

Harbourmaster / Deputy Harbourmaster

(Disclaimer: The completion of this technical comment does not declare support for, or guarantee the granting of a resource consent application.)

**Report – Proposed Gravel
Extraction Project – Lower
Mararoa River – Te Anau
Basin**

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June 4, 2019

Te Anau Earthworks Ltd
Application for Land Use Consent
Authored by: River Pathways Consulting



Report – Proposed Gravel Extraction Lower Mararoa River, Southland

Supporting an Application for Land Use Consent by Te Anau Earthworks Ltd

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1. Introduction

This report provides detailed information supporting an application for Land Use Consent by Te Anau Earthworks Ltd of Te Anau (the applicant) to undertake a suite of works associated with the commercial extraction and processing of historic gravel resources laid along the outer existing flood plain margins of the Lower Mararoa River.

The proposed activity discussed in this report will provide a centralised location providing range of quality river-run gravel products servicing district development and construction needs primarily for the local Te Anau Basin community.

The proposed activity involves excavation of two separate ponds located along the true right bank of the Lower Mararoa River and adjacent to the outer edge of the cleared floodway. The activity also includes establishment of a gravel processing and temporary stockpile and storage site located outside of the floodway.

Location of the various activity sites are shown on Appendix 1 – Locality Plan.

Discussed throughout the report are matters that must be considered by Environment Southland (ES) when deciding whether or not to grant consent for a proposed activity over the bed of the section of Lower Mararoa River discussed in this report.

Data provided in this report has been developed following the study of an extensive range of reports associated with development and construction of the Lower Mararoa River Restoration Project led by ES, and a number of reports commissioned by ES relating to Gravel Extraction Activities in Southland Rivers.

Aerial photography in 'Real Time format' using Fiordland Drone Services has been utilised ensuring provision of accurate, surface area calculations, longitudinal and cross sectional data relating to each of the two proposed extraction ponds and the overall project that includes a processing and stockpile area, both being located outside of the cleared floodway boundaries adjacent to the true right bank of the Mararoa River.

The positioning, shape, dimensions and limits of gravel volumes discussed in this report have been developed using the above data, initially for preparation and distribution of a *Proposed Project Scoping Report* provided to key statutory agencies and Iwi (key organisations) for consideration and possible feedback in advance of a formal application to ES for a Land Use Consent.

The *Scoping Report* was specifically aimed as a 'Discussion Document' providing a partnership approach seeking positive input from the following key organisations to the activity proposed.

- Fish and Game New Zealand, Southland Region - *Feedback provided.*
- Te Ao Marama Inc - *Feedback provided.*
- Meridian Energy Limited - *Feedback provided.*
- Land Information New Zealand - *Feedback provided.*
- Environment Southland, Catchment Management Division - *Feedback provided.*

- Department of Conservation, Southland Conservancy, Te Anau Area Office - *Feedback provided.*
- Te Runanga o Ngai Tahu, Statutory Acknowledgements – *No feedback provided.*

The *Scoping Report* being a pre-consent application discussion document, Te Anau Earthworks Ltd (the applicant) sought constructive feedback and possible indications of 'guidance/support in principal' from the above key stakeholders, indicating confidence to the applicant that the proposed activity developed and discussed in the *Scoping Report* was 'generally' compliant with plans, mandates, specific organisational and legislative responsibilities associated with each of those key organisations whilst fitting into the surrounding community and environment.

Outcomes of the *Scoping Report* feedback process provided by five of the stakeholder organisations demonstrated support in general for the proposed gravel extraction project. Via the feedback process a number of issues were identified, with the principal concerns centring on the following:

- Construction effects of the ponds particularly with respect to preventing release of fine sediments to the main flow;
- Management schedule detailing day to day excavation activities based within the river floodway;
- Storage and management of hazardous substances e.g. fuel & oil and equipment against inundation by flood flows;
- Security of the stockpiles in terms of prevention of mobilisation during flood flows;
- Management of extraction ponds habitat values against periodic inundation by extreme flood flow events;
- Management of habitat values associated with connection of the extraction ponds to ephemeral (former flood gutters) and active floodway overflow channels;
- Pond depth and bed shape variations providing habitat values better suited to a range of fish and waterfowl;
- Pond shape in sympathy with the surrounding environment;
- Crossing ephemeral channels, placement/removal of culverts as required.

The applicant on consideration of the *Scoping Report* feedback received, has addressed the issues identified by the five key stakeholders with solutions and mitigations available and proposed as discussed throughout this report.

The relevance of sustainability values associated with the proposed activity discussed in this report are generally in accordance with the findings, objectives and recommendations contained in the following ES documents relating to gravel extraction activities in river beds:

- 1) Southland Regional Council (SRC) Publication No. 2007-01 *An Overview of Gravel Extraction Activities in Southland*, Compiled by Steven Leddington – Water Resources Scientist, Environment Southland [Ref 1].

That document provides a broad overview of past and present gravel extraction activities in Southland including a brief description of gravel extraction methods and processes of eight regions around New Zealand.

The effects of instream gravel mining (including beach skimming) are considered, as are the impacts of floodplain mining (habitat ponds). Although 11 years old, the information, objectives and recommendations contained in the document remain relevant to many present day river based gravel extraction activities.

Of particular relevance, ES Publication No. 2007-01 [Ref 1] notes the value of the extraction and use of river sourced aggregates being instrumental in the social and economic well-being and growth of the Southland Region. The on-going development and maintenance of the regional road network, construction industry, farming needs and general residential needs are the drivers behind present and future needs for river-based gravel supplies.

It is further considered that should gravel extraction operations were to relocate to land based pit operations outside of the river systems per se then this valuable river management component would be lost. If that were to occur then the significant burden of increased river management costs would fall back to the communities in one form or another.

A final recommendation of the ES Publication 2007-01 [Ref 1] confirms management skimming of aggradational bars should continue. These activities are considered by ES river managers as an important tool to maintaining floodway capacity and minimize the risk of flood bank overtopping. However the report also confirms that river sourced gravel removal quantities needs to be carefully managed ensuring re-supply and accumulation rates are sufficient to avoid negative impacts on channel morphology and wildlife habitat.

Within the context that the proposed activity discussed in this report sits within a river reach that clearly demonstrates an existing gravel over supply further exacerbated by a continuous annual re-supply and aggradational behaviour, it is clear the activity proposed by Te Anau Earthworks Ltd is fully compliant with the objectives and recommendations established by ES Publication 2007-01 [Ref 1].

- 2) Environment Southland, Brochure – *Guidelines to Floodway Pond Construction, Using Gravel Extraction to Restore Floodway Ponds* [Ref 2].
- 3) Environment Southland, Brochure – *Guidelines to Backwater Construction, Using Gravel Extraction to Restore A Backwater* [Ref 3].

These brochures developed by ES as part of its river management and flood control obligations provide valuable guidelines for river managers and gravel extraction contractors considering construction or restoration of floodway ponds and backwaters.

Many of the recommendations and guidelines provided in these ES brochures have been adopted by Te Anau Earthworks Ltd as part of the design and construction methodology for the proposed floodway/backwater/habitat ponds detailed throughout this report.

Note: A copy of each of the ES Guideline brochures is appended to this report.

An integral part of Environment Southlands river management strategy and that of its predecessor the Southland Catchment Board has been to utilize commercial gravel extraction by private contractors to assist in maintaining channel flood capacity, alleviate erosion threats to berms, farmland and assets such as bridges, river protection plantings and respond to conflicts between landowner supported river rating district needs and other stakeholder groups.

Working closely with river liaison groups and other stakeholders Environment Southland has endeavoured to place gravel extraction operations on a sound footing for the future and in a manner that incorporates and embraces to the greatest extent possible, the interests of these other key stakeholders without compromising Environment Southland river management responsibilities, or the statutory responsibilities of other parties whilst providing for a continuation of soundly based and managed commercial gravel extraction operations.

In that regard the need to achieve multiple objectives is acknowledged. Such objectives include flooding and erosion mitigation, preservation and enhancement of riverine and riparian ecosystems and habitats, threats to major national and local assets and infrastructure such as power lines, roading, bridges and water supplies. With respect to the latter it is recognised that the Te Anau Basin requires good gravel supplies of sound aggregate for, amongst other things, road construction, infrastructure servicing/development and the manufacturing of concrete and concrete products.

In response to that significant present and future needs, river-based gravel extraction servicing the wider Te Anau Basin not only requires a clear understanding of resource availability but also the relationship between supply and exploitation, and the consequential impacts that the latter may have under the current re-supply regime.

Some of those impacts may include degradation of river form, bed destabilisation, impacts on aquatic habitats supporting trout, salmon, native fish species, and river dwelling birds, particularly Banded Dotterel, Black-fronted Tern and South Island Oyster Catchers and the critically endangered Black-billed Gull.

The balance of effects and extent of these possible impacts on these nationally important range of aquatic animals and riverine dwelling birds depends on an array of factors, including but not limited to destruction of historic quality ecosystem habitat values, disturbance during nesting and moult periods, loss of food sources and exposure to increased predation.

Although river systems are not the only source of aggregates in Southland, historically they have become the preferred source of raw material over out of river deposits because of the

perceived limitless availability, ease of extraction, proximity to end use markets and aggregate quality (strength, grading and durability) and relatively clean composition. Gravel extraction can also be required for bed load management purposes where bank protection, river stability or structures are being threatened. Commercial extraction in conjunction with bed load management provides an economic source for the operator and a no cost river management option for adjacent land owners and utility providers. Out of river extraction is generally favoured by agencies such as Fish and Game Southland for reason it avoids interference with the active river bed and can provide opportunities for enduring riparian pond habitat for both fish refuges (where river reaches are ephemeral) and game birds.

It should be noted that from records provided by E S, identify past and present consented commercial gravel extractions from the Mararoa River as being minor and generally focused immediately downstream and around the SH 94 Key Bridge to maintain floodway capacity through the SH 94 Key bridge openings.

As a percentage of gravel extraction throughput from the Te Anau basin river systems using figures provided by Environment Southland it is estimated the Mararoa River has provided only 7% of consented extracted volume extracted from the Te Anau basin river systems. That relatively small quantity of gravel that has traditionally been removed from the Mararoa River reflects in part the need to manage bed levels at the SH 94 Key Bridge and the absence of sustainable access to major gravel deposits further downstream to the Whitestone River confluence due to the total invasion of the riverbed by crack willows.

Historically gravel extraction supplies meeting Te Anau Basin needs have been provided through extractions from the Whitestone and Upukerora Rivers and the Waiau River delta at its confluence with the Mararoa River.

Other minor gravel supply extractions across the district have generally focused on small steep farm based feeder streams that require intermittent gravel extractions in response to flow capacity values being compromised through significant gravel deposits generated through lateral erosion issues. Generally these small single purpose low volume extractions are absorbed as part of on-farm gateway and minor track maintenance programmes. In terms of scale and significance of the gravel extraction activity discussed throughout this report prepared in support of an application by Te Anau Earthworks Ltd (the applicant) to ES for a Land Use Consent, it is considered to be of a relatively small scale in terms of site operations and annual quantities of gravel sought.

It is considered the following level of detail discussed throughout this report corresponds to the scale and significance of identified effects of the activity on the environment, cultural, historic and community well-being considerations and having regard to issues identified by key stake holders as part of the *Scoping Report* feedback process.

2. Purpose of Activity

The purpose of the activity is to:

- 1) Provide Te Anau Earthworks with a commercial supply of locally sourced river run gravel over a 10 year period;

- 2) Provide the Te Anau basin commercial sector, rural/urban community with a range of quality concrete products;
- 3) Provide elements of floodway capacity maintenance at no cost to Mararoa River scheme ratepayers;
- 4) Provide elements of quality habitat values for aquatic animals and riverine dwelling/nesting birds;
- 5) Provide enduring elements of all-weather vehicle/foot access to the Mararoa River for recreational activities.

3. Objectives

Undertake a bed load excavation activity in a way that complies with yet to be established agreed conditions of consent and ensuring positive objectives embodied by the purpose of the activity are delivered.

4. Deliverables

The proposed activity will provide a number of positive benefits through delivery of the following:

- 1) Provide a reliable yield of quality river run gravel needed to meet the continuance of social, cultural and economic well-being of the Te Anau basin communities.
- 2) Provide a range of positive river management outcomes associated with maintenance of an unobstructed functioning floodway.
- 3) Provide new areas of safe habitat for riverine dwelling/nesting birds, particularly Banded Dotterel, Black Fronted Tern, South Island Oyster Catcher and the critically endangered Black-billed Gull.
- 4) Maintain riverine environmental values via a professionally managed gravel extraction process over a ten year period.

5. Management Statement – Proposed Activity

All components of the proposed activity discussed throughout this report will be managed and delivered by Te Anau Earthworks.

Te Anau Earthworks is a local Te Anau based company committed to delivery of excellence in all aspects of business associated with earthworks, commercial construction and demolition.

Supporting that commitment to excellence Te Anau Earthworks in 2018 were the Hynds Construction Award recipient from the Southland Branch of the Civil Contractors of New Zealand for construction projects of \$100,000 to \$500,000.

The Civil Contractors New Zealand Excellence Awards programme is an annual event held in recognition of excellence in the construction industry. The awards are designed to showcase excellence in construction and reward the accomplishments of construction companies, organisations and project teams that have achieved regional acclaim.

Under the leadership of company owner/operator Mr David Smith, Te Anau Earthworks Ltd has constantly demonstrated through involvement with many past and present river bed based gravel extraction activities, a sound understanding of the finite and fragile nature of river based gravel supplies required to sustain business continuance. Mr Smith also possess a strong belief in the value of partnerships in terms of community and key stakeholder focused beneficial outcomes from gravel extractive activities and its potential effects on water quality, and environmental matters through working genuinely with key partners/stakeholders.

6. Location of the Proposed Activity

The site of the proposed activity is positioned approximately 1.86 km downstream of the Lagoon Creek confluence (3.6 km downstream of S.H 94 Key Bridge) and along the outer edge of the cleared floodway adjacent to the true right bank of the Mararoa River as shown on Appendix 1 – Locality Plan

The proposed activity is made up of four separate components being:

- 1) Site 1 – Floodway Pond – Surface area: 4.174 ha.
Map Reference: NZTM E: 1194135 N: 4944419

- 2) Site 2 – Processing Area – Surface area: 0.817 ha.
Map Reference: NZTM E: 1195822 N: 4944386

- 3) Site 3 – Stockpile Area – Surface area 0.800 ha.
Map Reference: NZTM E: 1195487 N: 4944362

- 4) Site 4 – Backwater Pond – Surface area: 3.10 ha.
Map Reference: NZTM E: 1195167 N: 4944324

7. Consent Sought from Environment Southland

The following applicable Acts and Statutory documents apply to the proposed Activity:

1) Resource Management Act 1991 (RMA)

- Section 13 (restrictions on certain uses of beds of lakes and rivers).
- Section 15 (discharge of contaminants into the environment).

Resource consent sought – Land Use Consent – River bed activity including:

- Disturbance of the bed of a river – remove bed load gravel.
 - Relevant Plan: Regional Water Plan for Southland (RWPS).
 - Relevant Rule: Rule 41 and 48 (standard conditions).
 - Activity Status: Discretionary activity.
- and;

- Relevant Plan: Southland Water and Land Plan (SWLP)
 - Relevant Rule: Rule 73 (c)
 - Activity Status: Discretionary activity.
- Disturbance of the bed of a river – Culverts
 - Relevant Plan: RWPS
 - Relevant Rule: Rule 28 (a) (i) – (vii)
 - Activity Status: Permitted activity provided conditions (i) – (vii) are met. and;
 - Relevant Plan: SWLP
 - Relevant Rule: Rule 59 – Culverts (a) (ia) – (ix)
 - Activity Status: Permitted activity provided conditions (ia) – (ix) are met.
 - Dry Screening and crushing
 - Relevant Plan: Regional Air Plan for Southland
 - Relevant Rule: Rule 5.5.3 (10)
 - Activity Status: Permitted Activity (operating at less than 100 tonnes in any hour).
- 2) Consideration of the effects of the proposed gravel extraction activity on water in terms of the RWPS, SWLP and the Natural State Water Quality Standards (NSWQS).
- Relevant Plans: RWPS, SWLP, NSWQS
 - Relevant Rules: SWLP Policy 15A – Maintain Water Quality Where Standards Are Met.
 - Consideration of the effects of the proposed activity on the NSWQS set out in Appendix E of the SWLP.
 - SWLP Policy 15A – Maintain water quality where standards are met.

Having consideration to the effects of the gravel extraction activity proposed by Te Anau Earthworks against the Acts and Statutory document listed above it is determined the activity proposed will not alter the natural quality of the water of the Mararoa River or the receiving environment.

These matters are discussed in greater detail under Section 21 – Assessment of Environmental Effects.

8. Land Use Consent – Term Sought

The term sought for land use consent for all proposed activities discussed in this report is **10 Years**.

The rationale for a 10 year term is that as stated in Section 4 – Deliverables, a 10 year term provides Te Anau Earthworks Ltd with a degree of certainty to operate the proposed site in a progressive manner and within a variable commercial gravel product demand environment.

The 10 year term also matches sustainability of the annual/total volumes sought from the location in terms of current identified abundance of bed load and re-supply mechanisms in action throughout the proposed operational reach of the river bed.

The matter of aggradational behaviours, abundance of stored gravel and annual recharge values affecting the lower section of the Mararoa River downstream of the S.H 94 Key Bridge are discussed at length under Section 20. River Form and Section 21. Geology and Geomorphology.

9. Total Volumes of Gravel Sought

The following volumes proposed provides for an extraction volume in the order of 18,450m³ of gravel per year over the 10 year life of the proposed activity.

However, due to the nature of the aggregate supply industry being a fluctuating market, it is anticipated that annual extraction volumes over the 10 year term of consent are likely to fluctuate in the range between 12,000m³ to 20,000m³ per year.

- Site 1 - Floodway Pond Volume: 107,000m³
- Site 4 – Backwater Pond Volume: 77,500m³
- Total Volume both ponds: 184,500m³

10. Activity Area – Legal Status of Land

Land tenure at the proposed various activity sites:

- 1) Floodway ponds – Located on Crown Land managed by Land Information New Zealand (LINZ).
- 2) Processing and Stockpile site – Located on Conservation Land managed by Department of Conservation (DOC).
- 3) Access over Conservation Land managed by DOC. This activity will be subject to a concession application process outside of this resource consent process.
- 4) Occupation of Crown Land managed by LINZ. This activity will be subject to a Section 165 Licence application process outside of this resource consent process.

11. Status of the Proposed Activity

The proposed activity discussed in this report is not new. Persons and organisations who have been approached by commercial contractors and casual individuals seeking to extract gravel from river bed sources and having consulted Environment Southland Catchment Management Division (ESCMD) river managers about gravel extraction activities and how they may be linked to beneficial outcomes for river management and providing quality enduring environmental outcomes will be familiar with them.

The type of activity discussed in this report and requiring authorisation are based on the provisions of the Resource Management Act 1991 (the act) specifically:

Section 13 – Restrictions on certain uses of beds of lakes and rivers.

Within that context the various activities for which consent is sought include the following:

- 1) The excavation and disturbance of the river bed for the purpose of:
 - 1) Removing gravel;
 - 2) Dry screening and crushing of gravel;
 - 3) Temporary stockpile of gravel;
 - 4) Placement and removal of temporary culverts less than 1200mm in dia.

12. How the Proposed Activity Will Be Carried Out

The proposed activity involves a staged gravel extraction via excavation of two ponds located along the outer edge of the existing floodway margins, processing of gravel and temporary stockpile of raw and processed gravel.

Note: Appendix 1 Locality Map shows the location of each activity.

Prior to commencement of excavation the location and shape of each of the floodway ponds will be accurately marked out, and temporary crossing culverts installed as required across on-site ephemeral channels.

Prior to establishment and commencement of processing and temporary stockpile, both sites will be marked ensuring accurate placement of both activities as detailed on Appendix 1 and Appendix 4.

Additionally throughout the 10 year term of consent frequent visual assessments of the proposed works sites will be carried out determine any presence of riverine birds nesting on any of the sites. Should nesting activities of any riverine birds be discovered, mitigation will be undertaken that ensures any nesting sites remain undisturbed.

Such mitigation is detailed in Section 27.5 Effects on Riverine Dwelling and Nesting/Roosting Birds.

13. Floodway Ponds – Proposed Activity Timing, Sequence of Excavation and Methodology

13.1 Overview

Having consideration that demand for the gravel products provided via the proposed activity are entirely market driven and therefore requiring a degree of risk analysis and assumption by Te Anau Earthworks however, it is not intended that the activity at the proposed site become a 24/7 operation with regard to excavation of the raw gravel then to further processing for supply to the construction and project needs of Te Anau Earthworks and external needs of the Te Anau basin commercial market.

Activity with regard to the temporary stockpile of processed material by contrast will be a more variable and potentially regular activity as markets and load out demands dictate, albeit still not representative of a 24/7 operation.

Regarding the gravel stockpile it is envisaged that the site may store up to 5,000m³ of processed gravel initially as an outcome of a proposed once three monthly, fifteen day extraction and processing activity.

However, it is anticipated that a quantity of that material will be immediately transported from the site to storage delivery elsewhere. The remaining volumes being distributed from the site as required within the three monthly period.

It is expected that the site will be exhausted of stockpiled gravel products at any given time through the three monthly activity sequence. Meaning the site from time to time will be totally clear of activity and or stockpile storage.

Machinery (wheeled loader) required to meet the variable loadout demands will not be permanently based on site, instead secured over short periods generally off site for security reasons and in response to need elsewhere.

Fuel and lubrication products required to service this machinery will be via mobile supply meaning no hazardous substances are required to be stored on site.

13.2 The Activity Sequence

Following marking out the habitat pond boundaries, the considered sequence (having regard to market demand) of a planned staged approach using a three monthly 5,000 m³ cycle to undertake the proposed activity as described below will commence.

- 2) Commencement of Stage 1 – Excavation and development of the Floodway Flow Through Backwater Pond located at Site 4.

Note: Commencement of Stage 2 – It is intended excavation and development of the Floodway Pond at Site 1 will adopt the same methodology as for Stage 1.

Activation of gravel extraction on Stage 2 will only occur on full completion of Stage 1 works.

- 3) Work on Stage 1 will commence at the downstream end of the pond with site surface scrape clearance of grasses to expose only sufficient clean area for the first excavation stage of up to 5,000m³ of gravel. The rationale for minimal site clearance is to mitigate potential loss of fine aggraded sediments resulting from any future significant high flow event over running the activity site.

Clarification: Surface scraped material is described as being small volumes of grass including sediment removed clearing the gravel excavation sites will be saved and placed along the edge of the cleared floodway behind each habitat pond to be re-used as part of the habitat pond edge batter completion process.

- 4) To further mitigate work site fine sediment loss during possible future high flow events throughout the construction phase of the proposed activity, movements of machinery working the site will be restricted to a single unformed access track positioned as close to the outer edge of the cleared floodway as possible. In

other words limiting unnecessary disturbance of the floodway grass cover as possible.

- 5) On extraction of the maximum quantity of gravel being up to 77,500 m³ sought from the Site 4 Flow Through Backwater Pond anticipated to be over a 4 year timeframe but subject market demand, pond edge shaping will be finished to a flat 2.5 to 1 batter using material saved from the initial site scraping process.
- 6) The excavation phase required to complete the three monthly sequence is expected to be over a ten hour - 5 day work period providing the 5,000m³ of raw gravel estimated to meet market demands over the forward three month period.
- 7) On exhaustion of processed gravel supplies an evaluation and assessment covering supply needs anticipated to cover the next three monthly period will occur to determine the next activity sequence.

Key points of the proposed activity are:

- 1) No excavation in flowing water or the actively mobile channel will occur.
- 2) Ensuring total mitigation of sediment release from the proposed activity, no open channel connection to flowing water or any of the former flow gutters and ephemeral channels located either side of the proposed activity will occur.

Pond flow through benefits via existing former flood gutters and ephemeral channels are expected to occur naturally during future high flow events.

- 3) Site activity involving the presence and use of machinery on site is not intended to be a full time 24/7 operation instead limited to a staged three monthly excavation and processing activity over a fifteen day period followed by cartage of processed gravel from the site as markets and alternate stockpile locations require.
- 4) The excavator and mobile screening/crushing plant will be transported from the site on completion of the anticipated fifteen day works activity period undertaken on a three monthly cycle.
- 5) Plant on-site during the anticipated fifteen day work period and on-going load out of processed gravel will only remain on-site as required during the three monthly activity sequence.

14. Processing and Temporary Stockpile

Excavation of the floodway ponds will be carried out using a single hydraulic excavator loading trucks to transport the material to the stockpile and processing sites located outside of the floodway in quantities of 4,000 m³ to 5,000 m³.

Processing and crushing of the raw loose gravel into various products will involve a dry screening and crushing process using modern self-contained plant on tracks (cover picture) that requires no water take or discharge to undertake the activity.

The processing and crushing process throughput of 4,000 m³ to 5,000 m³ raw loose gravel at 90 tonnes per hour will involve up to 10 days' work partially coinciding with the pond excavation activity.

Following processing, gravel products will be transferred to the temporary stockpile area in readiness for the following actions:

- 1) Immediate delivery to local markets.
- 2) A quantity transferred to Te Anau Earthworks distribution facility located on the outskirts of Te Anau Township.
- 3) A quantity possibly remaining at the Mararoa temporary stockpile site over the balance of the three monthly cycle awaiting delivery to surrounding rural markets.

The 'temporary' definition of the stockpile site is a genuine description of the site developed to initially store up to 5,000 m³ of processed gravel over short periods of time over the three month activity cycle described by the above activity sequence. The location of the processing and stockpile sites although being outside of the cleared floodway may be impacted by major significant river flow events.

In recognition of that possibility it is planned the site will be managed in a way that mitigates potential issues associated with loss of processed stockpiled gravel to flow erosion and subsequent water quality issues associated with fine sediments and potentially hazardous pollutants lost from on-site machinery.

That mitigation involves the locating the processing and stockpile sites outside of the cleared floodway and surrounded by dense woody vegetation i.e. gorse and broom. The footprint of the stockpile to temporarily store up to 5,000 m³ of gravel will be in the order of 8,000 m², oblong in shape and in alignment with the flow direction of the Mararoa River.

15. Equipment on Site

Being an isolated unsecured site located within a public access regime, security of plant will present a major risk management factor for Te Anau Earthworks Ltd. That security aspect and demand elsewhere for the specialised machinery required to undertake the proposed activity means machinery will generally only be present on site during the once three monthly, fifteen day excavation and processing activity. A loader and trucks engaged in the cartage of gravel from the stockpile will be required on a more frequent basis on site as load out demands dictate.

Should a risk of inundation of the site by a high flow event become evident at any time during the excavation/processing activity, all plant items being fully mobile will be

shifted from the at risk area thereby mitigating any fuel based products leaching from machinery and entering water.

Plant and equipment on site will be limited to that required to undertake and complete the various proposed activities.

16. Management of Hazardous Substances

Hazardous substances such as fuel, oil and machine maintenance/servicing fluids will not be stored on the proposed site at any time during undertaking of the proposed activity.

- Machine servicing requirements will be undertaken at Te Anau Earthworks workshop located in Te Anau.
- Work site machine fuel and lubrication needs will be delivered as required using a mobile fuel supply.
- Machines will only be refuelled away from the habitat pond under construction.
- In the unlikely event that a fuel spill does occur during the machine re-fuelling process Te Anau Earthworks staff are fully trained in actioning Te Anau Earthworks *Fuel Spill Management Process*.

17. Days and Hours of Work

The days and hours of work for which extraction, processing and cartage of gravel from the proposed activity site will be undertake are:

- Monday to Friday – 7.00 am to 6.00 pm
- Saturday 7.00 am to 5.00 pm
- Sunday – Nil

Ensuring mitigation of potential disruption and negative effects to the public enjoyment of the river system and environment, work will not occur on the following days:

- Days of National and Regional significance.
- Throughout the official Christmas holiday period.

The above Days / Hours of work are compliant with the Southland District Plan – Section 2.11 – Noise, Rural Zone – Section 3.1.

18. Environmental Setting

The Mararoa River rises on the western flank of the Livingstone Range and the eastern flanks of the Thompson Mountains. Prior to exiting its headwater mountainous section of the catchment the Mararoa River and its headwater tributaries flow sequentially into and out of the North and South Mavora Lakes.

The upper Mararoa valley above the South Mavora Lake outlet exhibits classic glacial features overlaid by fluvial features processes. These features include steep rugged ice shaped mountains of stunning beauty and valley fill characterised by outwash flats, floodplains, fans and terraces.

The upper sections of the valley Beech forest is extensive and drapes over steep mountain slopes and out of side tributaries and gorges. This characteristic extends below the South Mavora Lake and although the large areas of the valley floor and surrounding foothills are now subject to agricultural development the mountainous vistas and Beech forest remain a feature of outstanding natural beauty so stunning much of the Lord of The Rings Trilogy was filmed in the area showcasing to the world the grand mountains and forests of the Mararoa River valley and Mavora Lakes. Truly a part of Middle Earth.

The section of the valley extending below South Mavora Lake to Mararoa Station along the western flanks of the Mararoa River contains extensive highly developed pastoral farms covering the valley floor surrounded by native tussock grasslands up to Beech forests along the high country peaks.

Below the S.H 94 Key Bridge the Mararoa River is surrounded by highly developed pastoral farming units under the shadow of the impressive Takitimu Mountain Range to the east and the Mountainous Fiordland National Park to the west providing an impressive 360 degree view of the overall beauty of the Te Anau Basin. It is within this section of the Mararoa River that the proposed gravel extraction activity sits.

Overall the Mararoa River and valley environment is full of spectacular natural diversity that continues to deliver a strong feeling and sense of an untouched wilderness that continues through the section of river downstream of the S.H. 94 Key Bridge and past the location of the proposed gravel extraction activity discussed in this report.

19. Catchment Area and Hydrological Data

The Mararoa River has a catchment area at The Cliffs hydrometric site in the order of 1,220 km².

Hydrological data timeframe for the Mararoa River is relatively short at 43 years commencing April 1976 with establishment of a hydrological site by the New Zealand Electricity Department (now Meridian Energy Limited) at the Weir Road Cliffs site.

Although the Whitestone River is a major tributary of the Mararoa River flow data is limited to infrequent manual flow gauging's by Environment Southland staff and the cumulative effect with the Mararoa River recorded at the Cliffs hydrometric site.

Using the short timeframe flow data for the combined Mararoa and Whitestone Rivers the following flow record data has been developed:

- Mean annual flow – 27.8 m³/s
- Mean annual flood – 360 m³/s

- Notable flow events:

Date	Flow	Recurrence Interval
➤ May 1978	906 m ³ /s	50 years
➤ August 1980	983 m ³ /s	60+ years (largest recorded flow)
➤ January 1984	826 m ³ /s	25 years
➤ November 1999	655 m ³ /s	11 years
➤ September 2002	430 m ³ /s	7 years
➤ August 2007	420 m ³ /s	5 years
➤ June 2009	260 m ³ /s	Calculated as annual flood

Note: The design discharge flow for the Lower Mararoa River Restoration Project completed in 2011 is 600 m³/s allows for a level of flow fallout onto pasture at flows over 500 m³/s.

20. River Form

The form of the Mararoa River is described as having a form which is characterised by a mobile gravel bed, which has both braiding and meandering tendencies.

Since the close of the Otiran Glaciation some 10,000 years ago they have cut down through lateral moraines and piedmont gravel deposits so that over a significant part of their course they are entrenched. Elsewhere, beyond the entrenched reaches these rivers are lodged on alluvial plains formed from the erosion of these old moraines and piedmont deposits.

Gravel sources from these rivers are essentially bed and bank deposits within and immediately adjacent to the active river beds. Episodic erosion processes result in non-uniform passage of material through the river systems. This type of activity results in a slow migration of the active river system across the valley floor.

RD Sutherland [1995 Mararoa and Whitestone Catchments Sediment Source & Management Opportunities Report] [Ref 4.] describes in some detail the erosion processes operating in the Mararoa and Whitestone Catchments. It is notable that a distinction is made in the Sutherland study between the sources and behaviour of course bed load materials as opposed to the suspended sediment component. He attributes high suspended sediment yield to out of river sources rather than in river sources.

The sands and gravel historically won by commercial operators in the Mararoa, Whitestone and Upukerora Rivers have been favoured over out of river deposits because of the ease of extraction, proximity to end use, aggregate quality [strength, grading, and durability] and being relatively clean.

Whilst out of river sources have been used in the past this has been an option of second choice and quality particularly with regard to compliance with the New Zealand Transport Agency mandatory specifications regarding sealing chip production and supply for the State Highway network and other heavily trafficked roadways.

The construction industry also requires high quality gravel products complying with an extensive range of specifications associated with production of concrete and concrete products.

Bed load gravels, as aggregate as opposed to land based pit mining are a commodity of wide use and demand where they exist in larger volumes such as throughout the Mararoa River, are of good quality, suitable for processing to multiple uses. The quality of the cobbles found in historic flood plain deposits such as the proposed activity site are highly sought after for cleanliness and hardness without fractures.

River form in relation to the proposed activity will not be altered in any way due to the entirety of the proposed activity being located out of and away from the active channel planform.

21. Geology and Geomorphology

In spite of being in a steep mountainous region and close proximity to the Alpine Fault, the Mararoa River has few major landslides due in part to the strength of the rock formations in the catchment.

Catchment headwater geomorphic processes play a key role in river ecosystems functioning since spatial and temporal variability in the geomorphic template controls the type, range and abundance of physical and hydraulic habitat and the persistence of the river over time.

The dynamics of a river system are reflected in its channel pattern and channel pattern is a strong predictor of how a river will respond to disturbance. Continuing land development as continues to occur on a relatively large scale in the Mararoa River valley and hillslope instability as native cover is removed and gullyng also contribute sediment sources to the Mararoa River system.

The mid reaches of the Mararoa Catchment is typically a mountain sourced semi-braided gravel bed river with a single thread wandering channel existing in some reaches. The width of the river valley floor varies from 360 and meters below South Mavora Lake to 850 meters at Centre Hill and for most of its length has the freedom to adjust laterally and there is clear evidence of abandoned river channels across and throughout the full extent of the floodplain. The bed material ranges from sand and small gravels to small boulders, but is dominated by cobbles.

In its natural state a river constantly alters the landscape without restriction. That action is in response to adjustment in form required to transport bed load to base level, which in the case of the Mararoa River is via the Waiau River to the coast at Foveaux Strait at the rate it is supplied by catchment erosion and other sediment sources.

With regard to basic river behaviour tendencies, empirical evidence shows that rivers achieve natural planforms (e.g. meanders) and configurations (e.g. ripples).

The Mararoa River has adjusted to relatively high supplies of sediment from land development throughout the Te Anau basin and relatively reworking by flood flows. Such

adjustments should be considered as laterally mobile and subject to in bed and plan form due to both downstream and lateral bar migration. These sediments migrate through the river system until they are deposited into Foveaux Strait via the Te Wae Wae Lagoon.

The riverbed load transport capacity of a river system such as the Mararoa River depends on channel stability as being (stable, eroding or depositing) and mode of sediment transport (mixed load, suspended load and bed load).

River pattern morphology is directly influenced by eight major variables including channel width, depth, velocity, discharge, channel gradient, roughness of channel materials, sediment load, and sediment size (*Leopold et al., 1964*). A change (natural or man-made) in any one of these variables sets up a series of channel adjustments which lead to a change in the other variables, resulting in channel pattern alteration.

In the case of the Mararoa River the capture of the Upper Waiau River Catchment flow for hydroelectric generation via the Manapouri Lake Control Weir located at the confluence of the Waiau and Mararoa Rivers in addition to the major uncontrolled colonisation of the Lower Mararoa River by Crack Willows over a fifty year period led to a significant number of changes in the variables underpinning the morphology of the reach of Mararoa River where the proposed activity is located.

With regard to basic river behaviour tendencies, empirical evidence shows that rivers achieve natural planforms (e.g. meanders) and configurations (e.g. ripples and runs) that correspond to local maximum of bed shear stress [*Davis 1980, & Sutherland 1971*]. A river in its natural state (width, depth, channel pattern) and behaviour transports the maximum possible bed load it can, given its flow rate to base level, which in the case of the Mararoa River is Foveaux Strait, at the rate supplied by the catchment.

In terms of basic river behaviours it is clear that the Lower Mararoa river reach extending over 19 km from the S.H. 94 Bridge downstream to Weir Road and the Manapouri Lake Control weir (MLC) have been significantly changed leading to pre restoration project channel avulsion and major aggradational behaviours throughout the reach resulting in an estimated 2.0+ million cubic meters (2Mm³) of locked up bed load occurring through the 35+ years of uncontrolled crack willow infestation impacting the 10 km river reach between The Key S.H. 94 Bridge to the Whitestone confluence.

Carefully managed extraction of significant volumes of bed load will assist in stabilising bed and plan form as the channel readjusts to a new post restoration project form and bed load transport regime.

A recent document of significant scope and relevance in terms of the morphology of the Mararoa River is A Briefing Paper: Gravel Management, Te Anau Basin Rivers, 24 February 2009.

This document was the result of Environment Southland engaging R.J. Hall of GHD to assist them to work with key stakeholders to develop an operational protocol for river

management activities particularly in regard to gravel extraction operations within the river beds and berm lands of the Mararoa, Whitestone and Upukerora Rivers.

The purpose of the initiative was to try and place these operations on a sound footing for the future and in a manner that incorporates and embraces to the extent possible the interests of these other key stakeholders without either compromising either the Environment Southland river management responsibilities or the statutory responsibilities of other parties whilst providing for a continuation of soundly based and managed commercial gravel extraction operations. In that regard the need to achieve multiple objectives was acknowledged. Such objectives included flooding and erosion mitigation, preservation and enhancement of riverine and riparian ecosystems and habitats, threats to major national and local assets and infrastructure such as power lines, roading, bridges and water supplies, whilst providing commercially viable sites for commercial gravel extraction allowing a rational use of the gravel resources in a manner which ideally should complement rather than compromise stakeholder interests.

In terms of understanding the mechanisms that drive downstream movement of sediment under the influence of channel gradient the following Gravel Resource Assessment by R.J. Hall GHD – Briefing Paper: (to Environment Southland) Gravel Management, Te Anau Basin Rivers 2009 [Ref 7] is particularly relevant to the Mararoa River system and this application for consent to extract gravel.

{*Start* - Gravel Resource Assessment – Briefing Paper: Gravel Management, Te Anau Basin Rivers (to Environment southland) R.J. Hall 2009 - Sediment conveyed downstream under the influence of channel gradient can be differentiated as suspended sediment, saltation load and bedload. Suspended sediment comprises predominately sand particles and smaller which are readily entrained from the gravel bed deposits as fluid velocities rise and/or are injected into the system from runoff sourced from land within the catchment but outside the active part of the river. Sutherland. R.D. {Ref 4} discusses the importance of suspended sediment input from tributaries in terms of its effect on the clarity of the Mararoa and Whitestone Rivers in his 1995 report to the Electricity Department of NZ. Saltation load comprises particles that temporarily are dislodged from the bed and entrained temporarily in the flow at higher river flows before falling back to the bed downstream of where they were originally dislodged. Bed load is that fraction of the sediment being transported that moves as part of the bed once the bed proper activates under high flows. It is primarily this and the saltation fraction that is of interest in terms of recoverable resources (gravel extraction operations).

Williams, G.E. [Ref 8] reported three grain size distributions from the Whitestone River. It is not clear from that report where these samples were taken or whether they are surface or depth integrated samples; from the shape of the grading curves it appears likely that they are surface samples. About 5% of the samples have mean diameters less than 2mm i.e. sand, silt and finer. About 10% in the medium to coarse gravel range (6 to 60mm dia. and the bulk (about 85%) of the material lies in the coarse gravel to cobble range, with a maximum size about 200mm dia.

It is likely that there will be some variation between the Upukerora and Mararoa bed material gradings compared with these Whitestone River samples and that there will be a tendency for larger clast size to occur further up the river system. Nevertheless these samples do provide an indication of typical sediment composition in the reaches of interest. The D50 size (i.e. the diameter of which 50% of the sample is finer) is 80 to 100mm for the three samples examined. The uniformity coefficient (i.e. the ratio of the diameter of which 60% is finer to the diameter of which 10% is finer) ranges between 10 and 12 for these three samples. The results indicate that the material is coarse in relative terms and gap graded, that is to say that there is generally an absence of sizes in the coarse sand through to medium gravel range. In turn this suggests that the material of which these beds are composed are strong and tend to resist disintegration under current river flow regimes and that the sands and finer fractions represent basically the end result of abrasion and impact effects when the bed load sediments are mobilised. Direct observations of coarse bed particle shape in all three rivers adjacent to S.H. 94 shows they are generally sub-rounded, again indicating sound material. The conclusions regarding harness and general good quality of the material (i.e. high proportion of useable content from coarse sand sizes upwards) sourced from all three rivers has been confirmed in discussions with Te Anau gravel and concrete manufacturing contractors. This also suggests that the preliminary assumptions regarding the likely similarity of material grading's between the Upukerora, Whitestone and Mararoa Rivers is justified.

Of particular interest is the amount of bedload material moving through these river systems because this provides a basis for considering what might represent a sustainable yield for each river. It is also necessary to identifying reaches where bed degradation is evident and where aggradation is occurring or could occur. It must be recognised in this regard these rivers are highly dynamic systems where sediment input and transport operate in episodic way, usually in response to high flows.

As has already been noted sediment injection to the system can operate at a number of distinctly different scales and on highly variable time scales. These range from the immediate effects of earthquake activity where large volumes of material can be injected almost instantaneously and also where a temporal component exists for subsequent injection from source areas disturbed by primary shock and also aftershocks that often persist for some time following major earthquakes. As time moves on it may become difficult to differentiate seismic from aseismic action as the trigger that gave rise to the injection of this material. In some situations the sedimentation effects observed are likely to be the combination of initial seismic disturbance and rainfall events and weathering. It has also been noted that fault uplift across the active channel can initiate headward erosion, upstream tributary alluvial fan and channel rejuvenation, and downstream aggradation (where supply rates the downstream bedload transport capacity). The potential for major landslide debris dam to form and fail, particularly in the catchments upper confined reaches adds another dimension to downstream channel and floodplain stability and form.

The combined effects of these actions and depending on the scale of the original disturbance and subsequent hydrological conditions, is that substantial re-adjustments to river form and location must be expected. It is anticipated that surcharging to mid to lower reaches with an over-abundance of bed load sediments would result in present pseudo-

meander shifting to a fully braided form which over time would revert to a pseudo-meander form as the over-supply diminished and the river system begins to degrade through its aggradational deposits. An examination of aerial photographs and ground observations suggest that this is a realistic expectation for the mid to lower reaches of the Mararoa, Whitestone and Upukerora Rivers. As noted earlier in the mid reaches on all three rivers there is evidence of what would appear to be both comparatively recent river activity over a considerable width of the flood plain and where subsequent incision has occurred resulting in the present river/flood plain form. These rivers in their present form, may have reached equilibrium condition where the sediment inputs of the last major disturbances (1717 AD Toaroha River, 1620 AD Crane Creek and 1425 AD Geologist Creek events, Alpine Fault?) have more or less worked their way through the river systems. If that is the case then sediment supply is now primarily normal bed and bank erosion activity at a level to be expected as the active pseudo-meandering form slowly migrates on the flood plain. As this migration processes material is sourced primarily from the active rivers banks and from high eroding terrace where the river is intersecting these features.

Notwithstanding this observation there are sites where aggradation has and is occurring. These tend to be where either natural land forms restrict the active river bed or where man-made features such as bridges have the same constricting effect.

Estimates have been made of the bedload sediment throughput for the Upukerora, Whitestone and Mararoa Rivers using as a basis Hudson, H.R. [Ref 10] estimate for the Upukerora River delta and then adjusting for grade, overall reach length through to the 500m amsl contour and representative active gravel width. The results of this analysis have been cross checked with estimates obtained for the Mararoa River at the Weir derived by Worley Consultants Ltd. [Ref 9]. The Worley estimates in turn were based on suspended sediment rating curves developed by MOWD from suspended sediment gauging undertaken from 1976 through to 1978 and flow duration curves developed from The Cliffs hydrometric site. This work suggested some 100,000 tonnes per year (t/yr) of suspended sediment moves through the Mararoa River lower Reaches. Worleys anticipated that bed load could increase this load between 110,000 and 120,000 t/yr. They estimated that this amount of material expressed in volumetric terms is equivalent to some 70,000 cubic meters per year (m³/yr, of which 80% could be expected to be sand size or greater i.e. say about 55,000 to 60,000 m³/yr.

Hudson, H.R. [Ref 10] estimated average annual throughput of bedload on the Upukerora at the delta to be in the order of 38,000 m³/yr. The source reach for this material assuming river bank and bed in the lower and mid reaches extending to the 500m amsl contour to be some 33km in length, has an average gradient of 0.0078 and a representative active channel width in the order of 90m. Comparable parameters for the Whitestone River are estimated at 43km, 0.0061 and 120m. On that basis throughput for the Whitestone River to the Mararoa River confluence is estimated at 52,000 m³/yr, and the Mararoa River at the Whitestone River confluence at 64,000 m³/yr which would suggest about 116,000 m³/yr at The Cliffs hydrometric site i.e. about double the Worley estimate.

In considering the difference between the two Mararoa River estimates, it needs to be remembered as noted earlier that the Mararoa River downstream of The Key experienced

rapid willow colonisation over a substantial portion of its active river bed until the willow clearance programme was undertaken from 2005/6 onwards. Prior to the clearance operation there were clear signs of aggradation observed in the reach through to the Whitestone confluence. These bed changes were systematically forcing the river outwards and away from its natural pseudo-meandering location. If it is accepted the Worley figure of 56,000 m³/yr of course bed load arriving at The Cliffs hydrometric site to be a reasonable average rate allowing for upstream entrapment above the Whitestone River confluence then the greater proportion of the 56,000 m³/yr is being sourced from the Whitestone. Further to that if it is assumed the area where sediment accumulation is occurring in the Mararoa River downstream of The Key is essentially 10km in length (through to the Whitestone confluence) and some 400m wide on average, then annually on average about 59,000m³ goes into storage. Allowing this process to run for 35 years from 1975 then the mean bed level across the 400m width rises approximately 0.5m.

A level change of this order readily account for the changed river behaviour observed before the clearance programme was undertaken. On this basis there could be something in the order of 2 Mm³ (Volume, Mm³ = million cubic meters) in storage in this 10km reach of the Mararoa River) *End*.

Note: The proposed activity site is located 3.6 km downstream of The Key.

A preliminary analysis suggests that the throughput for these rivers is in the order of:

- Upukerora River: 38,000 m³/yr
- Whitestone River: 52,000 m³/yr
- Mararoa River: 115,000 m³/yr

Conclusion

Considering the above R.J. Hall sediment transport analysis and description of mechanisms that drive braided river behaviour and processes such as the Mararoa River, his calculations relating to per year sediment throughput, per year, additional aggradational storage adding to current storage volume in excess of 2 Mm³ suggest an urgent need to manage bed levels.

Environment Southland river managers are very aware of the potential flood risks and damage to property associated with the Mararoa bed levels downstream of The Key however, costs involved in reducing this issue on a sufficiently large scale are without doubt beyond the financial resources of the authority and its district ratepayers. That is not to say the matter is unattended with an annual maintenance inspection process and response programme plus event triggered re-survey of a set of cross sectional points established as part of the river restoration project to identify any sudden mobilisation of the 2 Mm³ of locked up bed load that may negatively impact the Manapouri Control structure (MLC).

Notwithstanding reluctance of contractors concerned at the current complexity of the resource consent process to extract gravel from the regions river beds, an integral part of Environment Southland's river management strategy is to utilize wherever possible

commercial gravel extraction by private contractors to assist in maintaining channel flood capacity, alleviate threats to berms, farmland and assets such as bridges, river protection plantings and stopbanks.

Having regard to the current and increasing excess bed load issues negatively impacting bed levels of the lower Mararoa River it appears prudent that any opportunity to remove bed load via commercial activity from this reach of the Mararoa River albeit helpful, is insignificant in terms of negative effects on river morphology when considering the proposed activity of 12,000 to 20,000 m³ extracted annually with a proposed total over 10 year time frame of 184,500 m³ against over 2Mm³+ currently in storage and annual bed load throughput of 115,000 m³ leaving a further 59,000 m³ going to storage.

22. Climate

The climate of the Te Anau basin area is dominated by frequent strong, westerly winds which make the weather changeable and often dramatic. Annual rainfall for the central Te Anau basin is around 1,194 mm with rain falling in the area more than 200 days in each year.

By contrast the Te Anau/Fiordland National Park has a wet mountain climate. In this area rainfall is the highest in New Zealand and varies between 6,500 mm and 7,000 mm annually. Typical daytime temperatures in the summer range from 10 deg. C to 23 deg. C and the winter from -3 deg. C to 8 deg. C.

Although there is significant rainfall throughout the year in the Te Anau basin the proposed activity sites are located on free draining river gravel.

Access roads are to be constructed and maintained to a high standard using river gravel providing all weather access free of fine sediment/mud issues for both Te Anau Earthworks in undertaking the activity and provision of smooth public recreation access suitable for a standard family vehicle.

23. Consideration of Alternatives

The Fourth Schedule requires that where it is likely that an activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity. Although the potential adverse effects of the proposed activity are considered to be less than minor, alternatives are nevertheless outlined below.

The centralised nature and specific location being relatively distant and obscure with regard to adjacent landowners, households, school and the passing public/tourist traffic and in providing a sustainable demonstrated existing and recharge supply of gravel supporting the volumes sought by this application, consideration of alternative locations providing similar benefits and sustainable level gravel supply proved to be negative.

Due to the identified local community and wider district benefits in providing a needed sustainable resource (gravel products), floodway management benefits in addition to improved habitats for aquatic animals, riverine nesting birds and provision of upgraded

public all weather vehicle, cycle and walking access to a substantial reach of the Mararoa River for recreation it is considered the proposed activity site exceeds all other locations considered as part of the alternative locations analysis.

24. Statutory Considerations

24.1 Resource Management Act 1991

In reaching a decision on a resource consent application, Council has to be satisfied by granting the application, Part 2 – Purposes and Principals of the RMA will be achieved.

The purpose of the RMA is to promote the sustainable management use, development, and protection of natural resources in a way or rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety.

Conclusion - The purpose and rational underpinning construction of the proposed gravel extraction activity detailed in this report are considered to be consistent with the Purpose of the RMA as defined by Part 2.

24.2 Regional Policy Statement

The Regional Policy Statement for Southland (RPS) provides an overview of the resource management issues for the region. It sets out how natural and physical resources are to be managed in an integrated way to promote sustainable management.

The proposed activity discussed in this report are considered to be consistent with RPS policies (particularly BRL.1 – BRL.5 Beds of Rivers and Lakes and NH.1 – NH.8 Natural Hazards).

Conclusion – In particular, the proposed activities are consistent with respect to social, economic and cultural benefits, preservation and protection of many of the values of lakes and rivers including enhancement of public access, the quality of the environment and intrinsic values of ecosystems.

24.3 Regional Water Plan for Southland

The Regional Water Plan for Southland (RWPS) provides the statutory frame work for the management of Southlands water resources. The following objective and policy are of particular significance to the proposed activity discussed in this report.

Objective 10 – Habitats and ecosystems.

To maintain or embrace the diversity and integrity of aquatic riverine habitats and ecosystems.

Policy 32 – Manage structures and bed disturbance activities in the beds of rivers and lakes to avoid, remedy or mitigate adverse effects on:

- a) Water quality and quantity;*
- b) Habitats, ecosystems and fish passage where that is expected to naturally occur;*
- c) Indigenous biological diversity;*

- d) *Heritage, cultural and spiritual values;*
- e) *Public access (except in instances where public health and safety are at risk) and amenity values;*
- f) *Natural character and outstanding natural features;*
- g) *River morphology and dynamics, including erosion and sedimentation;*
- h) *Flood risk;*
- i) *Infrastructure assets;*
- j) *Navigational safety.*

Rule 1 of the RWPS addresses discharges to surface water bodies where the discharge meets specific water quality standards.

It is certain that the water quality standards requirements throughout the undertaking of the proposed activity will be met due to the isolation of the activity from flowing water.

It is possible that in response to extreme weather event related changes in river flow and levels, re-activation of ephemeral channels and or former flood gutters in the location of the proposed work sites may occur from time to time throughout the consent duration.

Following an inspection of the site it is determined that an existing ephemeral channel along the west side of the Site 4 Backwater Pond impacted by intermittent flows may require installation of a single 1200 mm dia. pipe to mitigate vehicles crossing flowing water.

Should that crossing be required, installation will be undertaken when the channel is dry. The gravel extraction, processing and temporary storage activities will occur away from and out of flowing water at all times throughout the proposed extraction and rehabilitation process thereby avoiding damage to or disruption to aquatic animals and ecosystems. Suspended sediment generated as part of the excavation process will be contained at all times within the ponds.

The proposed activity is to be staged and managed to adjust and manage the possible impacts of a high flow event overrunning the proposed activity as the activity progresses and to avoidance of disturbance of riverine birds, particularly the nesting and fledging of Black-billed Gulls in the event to various proposed activity sites be chosen habitat. For these reasons the proposed activity is consistent with Objective 10 – Habitats and Ecosystems.

Conclusion – The proposed activity is also considered to be consistent with Policy 32 (g.) (river morphology and dynamics) as it will clearly assist in managing current excessive bed load and aggradational behaviours.

24.4 Proposed Southland Water and Land Plan

The proposed Southland Water and Land Plan (pSWLP) forms part of a suite of planning instruments which manage Southland’s water and land resources. It provides a regulatory tool for a variety of issues relating to these resources, with particular emphasis on the management of activities that may adversely affect the quality of the region’s freshwater. In consideration of the effects of the proposed gravel extraction, processing and temporary stockpile activity on water in terms of Policy 15A of the pSWLP and the Natural State Water Quality Standards set out in Appendix E of the pSWLP the following applies:

Policy 15A of the pSWLP discusses the maintenance and improvement of water quality by:

1. Avoiding new discharges to surface water bodies that will reduce water quality beyond the zone of reasonable mixing;
2. Avoiding point source and non-point source discharges to land that will reduce surface or groundwater quality, unless the adverse effects of the discharge can be avoided, remedied or mitigated;
3. Avoiding land use activities that will reduce surface or groundwater quality, unless the adverse effects can be avoided, remedied or mitigated; and
4. Avoiding discharges to artificial watercourses that will reduce water quality in a river, lake or modified watercourse beyond the zone of reasonable mixing;

So that:

1. Water quality is maintained where it is better than the water quality standards specified in Appendix E 'Water Quality Standards'; or
2. Water quality is improved where it does not meet the water quality standards specified in Appendix E 'Water Quality Standards'; and
3. Water quality meets the Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007; and
4. Australia New Zealand Environment and Conservation Council (ANZECC) (as shown in Appendix C of this plan) are met.

Appendix E – Water Quality Standards of the pSWLP classifies the Waiau River as a 'Natural State Water' meaning – The natural quality of the water shall not be altered.

Note: As clarification associated with the proposed activity and points 1 and 2 above- The

Mararoa River flows into the Waiau River approximately nine kilometres downstream of the proposed activity discussed in this report.

Conclusion - In consideration of the potential effects of the gravel extraction activity proposed by Te Anau Earthworks Ltd and mitigations proposed it is determined the activity will not alter the natural quality of the waters of the Mararoa or Waiau Rivers for reason that:

- No point source or non-point source sediment discharge will occur;
- All gravel excavation will be confined to the Habitat Ponds at Sites 1 & 4 that are isolated from the main body of flowing water;
- No vehicles associated with the activity will cross flowing water;
- The habitat ponds at Site 1 & 4 have no physical excavated connection to flowing water other than via the existing ephemeral channels at both sites;
- No discharge of sediments via dust generated during excavation of the habitat ponds or activities at the processing and temporary stockpile site will occur due to the location and isolation of all activity sites from flow water.

The rationale supporting that determination relates to mitigation measures, actions and extraction/processing methods established that avoid potential adverse effects of sediment discharge to flowing water.

Those actions are:

- No extraction from flowing water. Throughout excavation of the habitat ponds no connection to the main body of flowing water will occur thereby ensuring containment of sediments generated and mixing with groundwater within the ponds. The distance of the ponds from flowing water being a minimum of 48 meters provides a substantial buffer ensuring any flow through of ground water to the main river flow is clear of fine sediments;
- Excavation of the habitat ponds will be planned to ensure the existing ephemeral channels are separated from the initial excavation process;
- No vehicles associated with the proposed activity crossing flowing water. Temporary culverts up to 1200 mm dia. will be installed for vehicles crossing any ephemeral channels and flood overflow gutters as required ensuring no vehicle movements across flowing water at any stage during excavation of the habitat ponds.
- On completion of the gravel extraction activity all culverts installed will be removed and each site rehabilitated to its former natural state.

24.5 Regional Air Quality Plan for Southland

Section 5.5.3 – Any discharges of contaminants into the air from industrial or trade premises are permitted activities, provided the criteria follow the list (1) – (12) are met:

Rule 5.5.3 (10) Any gravel extraction process operating at 100 tonnes or less in any hour.

Conclusion – The proposed activity will be managed in a way that ensures compliance with Rule 5.5.3 (10)

24.6 Conservation Act 1987 and Wildlife Act 1953

The Conservation Act 1987, Wildlife Act 1953 and other key legislation guides the Department of Conservation (DOC) work. DOC was formed in 1987 when the Conservation Act was passed to integrate conservation management functions. This Act sets out the majority of DOC's responsibilities and roles.

In terms of the proposed activity discussed in this report and its relationship and obligations in terms of the Conservation Act 1987 the following Policies are of particular relevance:

Policies 11.1 All Activities

- 11.1 (a) Any application for a concession or other authorisation will comply with, or be consistent with, the objectives of the relevant Act, the statutory purposes for which the place is held, and any conservation management strategy or plan.
- 11.1 (b) All activities on public conservation lands and waters which require concession or other authorisation should, where relevant, avoid, remedy or mitigate and adverse effects (including cumulative effects) and maximise any positive effects

on natural resources and historical and cultural heritage, and on the benefit and enjoyment of the public, including public access.

- 11.1 (c) The department and all concession and other authorisation holders should monitor the effects of authorised activities on natural resources, historic and cultural heritage, and the benefit and enjoyment of the public, including public access, to inform future management decisions.
- 11.1 (d) Concession and other authorisation holders will be responsible for the safe conduct of their operations, including the safety of staff, clients, contractors, and the public, and compliance with relevant safety standards and legal obligations.
- 11.1 (e) The policies below for the activities specified are to be considered in conjunction with policies 11.1 (a) to 11.1 (d).

The Wildlife Act 1953 is also relevant to the proposed activity in terms of the known presence of riverine dwelling and nesting birds throughout the river system, particularly the critically endangered Black-billed Gull that favours nesting habitats within semi-braided gravel river bed environments clear of vegetation such as that provided throughout the Maroaroa River.

From frequent river inspection observations by Environment Southland river management engineers and Department of Conservation initiated annual counts of nesting colonies throughout Southland river systems, it is known that since completion of the Lower Mararoa River Restoration Project capital works willow clearance phase in 2010 a large colony (1,000+) of Black-billed Gulls have annually nested on gravel bars immediately downstream of the S.H. 94 Key Bridge, with smaller colonies found to nest on other cleared gravel bars slightly further downstream of that point.

Although the location of the proposed activity is some 3.0 km downstream of current known nesting sites for Black-billed Gulls the potential use of other sites on the river system, particularly in the vicinity of the proposed activity by Black-billed gulls and other riverine birds including Black-fronted Tern, Banded Dotterel and South Island Oyster Catchers will be constantly monitored and any presence responded to as described in Section 20 e).

Conclusion – There being a demonstrated connection between the proposed activity with regard to many of the environmental, native fish, riverine bird life and public use of conservation land it is considered that the activity will deliver positive benefits to all of the above components connected to the proposed activity.

These matters are discussed in greater detail under Section 20 Assessment of Environmental Effects.

24.7 Fish and Game Councils

The functions of Fish and Game Councils consisting of 12 regions is to oversee the effective management, enhancement and maintenance of New Zealand's sports fish and game

resources in the recreational interests of anglers and hunters is defined by Section 26B (Establishment and Powers of New Zealand Fish and Game Council) of the Conservation Act 1987.

To do that the New Zealand Fish and Game Council has a number of formal statutory powers under the following Acts:

- Conservation Act 1987;
- Wildlife Act 1953;
- Freshwater Fisheries Act 1983 (Part 6 – Fish Passage);
- Wildlife Regulations 1995;
- RMA Sections 6 and 7 are also relevant.

Of particular relevance to the proposed activity the following matters apply:
Conservation Act 1987 - Section 26 Q – Functions of Fish and Game Councils.

(1) The functions of each Fish and Game Council shall be to manage, maintain and enhance the sports fish and game resource in the recreational interests of anglers and hunters, and, in particular;

- (a) To assess and monitor
 - (iii) The condition and trend of ecosystems as habitats for sports fish and game.
- (b) To maintain and improve sports fish and game resource.
 - (i) By maintaining and improving access.

RMA – Section 7(h) – The protection of the habitat of trout and salmon.

This provision derives from the Water and Soil Conservation Act 1967 which protected both indigenous and introduced fisheries. Indigenous fish and their habitat are now protected under the Conservation Act 1987 and the freshwater fisheries regulations as well as under section 6 (c) of the RMA. Section 7(h) carries on the protection for introduced species.

Note: Trout and Salmon are useful water quality indicators. There is a close relationship between the habitat requirements of trout and salmon and suitable water quality for public use such as swimming.

Conclusion – Effects of the proposed activity on both indigenous and introduced fish is determined positive for reason the activity is totally isolated from flowing water by way of the pit based gravel extraction process.

The most obvious potential effect relates to vehicle crossing of the significant ephemeral channel directly to the west of Site 4 Habitat Pond. The spasmodic nature of flow through that channel is entirely the result of changing river position, flow and level fluctuations upstream of the activity site.

On completion of the activity, benefits to the sports fish and game (waterfowl), and indigenous fish are likely to be significant in terms of enhanced and enduring habitat values.

24.8 Te Tangi Au Tairua – The Cry of the People – Ngai Tahu ki Natural Resource and Environmental Iwi Management Plan.

This Natural Resource and Environmental Iwi Management Plan reflects the attitudes and values of the four Runanga Papatipu o Murihiku – Awarua, Hokonui, Oraka/Aparima and Waihopai.

The kaupapa of this Plan is *ki Uta Ki Tai* – From the Mountains to the Sea. It is a culturally based natural resource framework developed by and for Ngai Tahu Whanui and has been identified and advocated as a key tool in assisting Ngai Tahu achieve a more meaningful rangatiratanga and kaitiaktanga in natural resource management. It is about indigenous understanding of the environment that can be used to help address the wide range of issues runanga face with regards to environment management. *Ki Uta ki Tai* is based on the idea that if the realms of *Tawhirimattea* (god of the winds), *Tane Mahuta* (god of of all living things), *Papatuanuku* (mother of earth) and *Tangaroa* (god of the sea) are sustained then the people will be sustained.

The *kaupapa* reflects the knowledge that resources are connected, from the mountains to the sea, and must be managed as such. Furthermore the kaupapa reflects that we belong to the environment and are only borrowing the resources from our generations that are yet to come. It is considered our duty to leave the environment in as good or even better condition than received from our tupana. The historical practices were established by our tupuna and must be passed on to nga uri kei heke mai, the generations to come.

The relevant sections of the Iwi Management Plan with regard to the gravel extraction activity proposed by Te Anau Earthworks Ltd are:

- 3.5.11 Rivers – Nga Kaupapa – Policy
 1. Promote catchment management planning (*ki uta ki tai*) as a means to recognise and provide for the relationship between land and water.
 2. Promote river management that adopts the priorities established in the Te Runanga o Ngai Tahu Freshwater Policy 1997. The priorities are:
 - Priority 1: Sustain the mauri of the waterbodies within the catchment.
 - Priority 2: Meet the basic health and safety needs of humans (drinking water).
 - Priority 3: Protect cultural values and uses.
 - Priority 4: Protect other instream values (indigenous flora and fauna).
 - Priority 5: Meet the health and safety needs of humans (sanitation).
 - Priority 6: Provide water for stock.
 - Priority 7: Provide for economic activities including abstractive uses.

Priority 8: Provide for other uses.

- 3.5.15 Activities in the Beds and Margins of Rivers – Nga Kaupapa - Policy
Gavel Extraction
 1. Assess applications for gravel extraction in terms of the following considerations:
 - a. Cultural values associated with the river (e.g. mahinga kai or taonga species habitat);
 - b. Amount of material extracted;
 - c. Design and extraction operations;
 - d. Times of year that extraction will occur;
 - e. Number of existing consents associated with the location;
 - f. How many adverse effects are being mitigated;
 - g. Monitoring provisions;
 - h. Cumulative effects assessment.
 2. Land use consents to carry out activities in the beds and margins of rivers should include information about ecological, cultural, natural and community values associated with the surrounding areas (e.g. adjacent wetlands, bird nesting sites, instream life, community use of the area, inanga/whitebait habitat.
 3. Require that a Ngai Tahu ki Murihiku Accidental Discovery Protocol (see Appendix 6) is a condition on resource consents.
 4. Require consent conditions for gravel extraction activities stipulating the use of “work windows” and other methods to ensure that such activities do not:
 - a. Disturb roosting and or nesting sites of birds during the operation activity;
 - b. Adversely affect native fish species (e.g. interrupt spawning);
 - c. Cross flowing water with heavy vehicles;
 - d. Extract gravel where there is the potential to be , running water;
 - e. Damage native vegetation on the river bed or riparian area.
 5. Discourage gravel extraction via beach skimming, except where it is demonstrated that beach areas are aggrading and lateral erosion is a concern.
 6. Where gravel extraction occurs on beaches that are aggrading, monitoring of stream bed elevation must be a condition of consent. The goal must be to maintain bed height.
 7. Advocate for the creation of habitat ponds to facilitate gravel extraction activities, whereby such activities incorporate restoration of riverine habitat, primarily on inactive reaches of the river system (refer to: case study Habitat Ponds for Gravel Extraction)
Case study – Historically the Southland region has obtained the bulk of its river sourced aggregate through the skimming of gravel beaches and bars, and instream dredging. Such activities have resulted in adverse effects on some rivers,

including bed degradation, bank erosion, changes to river channel structure and riverine ecology (e.g. fishery values).

Today, river restoration and rehabilitation has become part of the managed gravel extraction activities on the Southland plains. Floodway ponds, oxbow lakes and backwaters are examples of habitat that is being restored in conjunction with gravel extractions away from the active river channel. Effectively, gravel is extracted from a site, which then fills with water creating habitat for fish and waterfowl. Habitat ponds can offset some of the habitat loss that has occurred over time.

The location and design of habitat ponds is important to ensuring that such activities do not have adverse effects on cultural and ecology values. For example, old oxbows can be deepened and developed to create a backwater, as opposed to creating a "hole" in an area less suitable for habitat. Further, sites should be located in areas that are infested with gorse or broom. Finally, ponds must be deep enough to hit groundwater, as groundwater gives fish relief during hot periods.

For Ngai Tahu ki Murihiku, gravel extraction via habitat ponds can be a win win situation if managed sustainably and monitored carefully.

8. Require that design, construction and maintenance of habitat ponds are such that habitat is created, and not just "holes" on floodplains or in riverbeds.
9. Support and encourage programmes that monitor the effectiveness of habitat ponds as a fishery and waterfowl habitat.
10. Work collaboratively with Regional Councils, the Department of Conservation, Fish and Game and the MFish with respect to gravel extraction activities and applications, for information sharing and discussion of issues.

Ngai Tahu Murihiku policies on gravel extraction and other activities in the beds and margins of rivers focus on balancing the protection of river environments, and the cultural values associated with such environments, while recognising the need to ensure supply of gravels and aggregates, and to undertake river management and flood works.

Conclusion – Following consideration of the proposed activity discussed in this report against the relevant Ngai Tahu Murihiku policies on gravel extraction and activities in beds and margins of rivers outlined above, it is considered the proposed activity discussed in this report is fully in accordance with the Ngai Tahu Murihiku policies and values associated with the Mahinga Kai.

24.9 Operative Southland District Plan 2018

The Southland District Plan (the District plan) enables the Southland District Council (the Council) to carry out its functions under the Resource Management Act 1991 (the Act). The purpose of the Act is to provide for the sustainable management of natural and physical resources. Section 73 of the Act requires territorial authorities to have a District Plan. The District Plan is a legally enforceable document and the Act provides penalties for breaches of the Plan rules. The District Plan sets a framework for development and the management

of natural and physical resources in the District. It establishes objectives, policies and policies for managing the environmental effects of land use, subdivision and development. The District Plan is representative of both the Council and the community's aspirations for the Southland District.

In terms of the relationship between the Rules and Objectives of the District Plan and the Te Anau Earthworks proposed gravel extraction activity discussed in this report the activity is determined to be a Permitted Activity being allowed without resource consent, provided the activity complies with the provisions specified in the District Plan. This includes all the relevant Zone Standards and General district-wide Standards.

Conclusion - As the proposed activity discussed in this report complies with the overall status of a Permitted Activity in terms of the relevant Rules, Objectives and provisions specified in the District Plan there is no need to apply for District Council land use consent.

The following District Plan Rules and Objectives are those determined relevant to the proposed activity:

District Plan Section 2.3 Natural Features and Landscapes

Landscapes reflect relationships between landform, land cover and land use and continue to evolve through natural and cultural processes. The District is encompassed by a range of landscapes, from those dominated by natural processes and patterns such as those in Fiordland and Rakiura National Parks to those which reflect human modification and settlement such as 'working' rural landscapes and urban areas. Notable natural landforms and geological features also form a key part of the Districts landscapes. Natural features and landscapes contribute to the character and identity of an area and afford a range of natural science, aesthetic, transient, scenic, natural character, ecological and open space values. Many also have historical or cultural significance. While natural features and landscapes change gradually over long periods of time through natural processes, they can be vulnerable to modification and destruction through inappropriate land use, subdivision and development.

Two tiers of landscapes are identified in the District Plan: Outstanding Natural Features and Landscapes and Visual Amenity Landscapes. Outstanding Natural Features and Landscapes have been identified as the top tier of landscapes under Section 6 of the Resource Management Act 1991 (RMA), Visual Amenity Landscapes have been identified as the second tier of landscapes under Section 7 of the RMA. To date Outstanding Natural Features and Landscapes have been identified in the District's coastal environment and in the Fiordland/Rakiura Zone. Visual Amenity Landscapes have been identified in the coastal environment and in the Te Anau Basin. The two tiers of landscape have been identified through the following studies:

- Landscape and ecology Southland District Report 1993
- Southland Regional Landscape Assessment 1997
- Southland Coastal Landscape Study 2006
- Te Anau Landscape Capacity Study 2006
- Te Anau Scenic Zones Visibility/Visual Landscape Assessment 2012.

Activities located in areas of Outstanding Natural Features and Landscapes should be managed to ensure that outstanding values are protected from inappropriate subdivision, land use and development. It is expected that identified Outstanding Natural Features and Landscapes will not change significantly over time as a result of subdivision, land use and development.

Visual Amenity Landscapes have a mix of human and natural elements and generally have high aesthetic value. The majority of these landscapes identified within the Te Anau Basin are visible from the main highways and contribute as a scenic resource of the area. Activities located in the Visual Amenity Landscapes should achieve a balance between the maintenance and enhancement of natural feature and landscape values, with a focus on the visual aspects of amenity, whilst enabling continuation as predominantly a working rural environment.

Conclusion – As the location of the proposed activity discussed in this report sits within the Visual Amenity Landscapes tier the visual aspects of the activity being totally concealed from highway and overall views regarding the surrounding community, it is determined the proposed activity will not detract from the natural features or landscape values of the area.

District Plan Section 2.9 Energy, Minerals and Infrastructure

Energy, minerals and infrastructure are incorporated into one Section of the District Plan in acknowledgement of the strategic importance of a co-ordinated approach to these matters.

In particular there is close association between the development of energy resources, the generation of electricity and the provision of essential infrastructure throughout the district. Energy and mineral resources play a key role in the socio-economic wellbeing and growth of the District. For example quarries and aggregates for agricultural products, building materials and roading materials, provide important social and economic benefits. A range of renewable and non-renewable energy and mineral resources are located within the District. While the development of these resources and the generation of energy can provide wide-ranging benefits, they can also give rise to adverse environmental effects.

Conclusion – As availability of quality gravel and aggregate is a key component required for support, development and maintenance of community infrastructure it is determined the proposed activity discussed in this report delivers a renewable mineral resource as quality gravel and aggregate without adverse environmental effects.

District Plan Section 2.11 Noise

Noise is a derivative of a range of activities in the District, however it can cause nuisance and gives rise to adverse effects on amenity values and the health and wellbeing of people and communities. Often adverse effects arise where the character, intensity, duration and timing of noise levels are determined by the standard of amenity and ambient noise level of the receiving environment and Council provides direction on this through the prescription of noise levels for each Zone. Noise is also managed by Council through the use of relevant New Zealand Standards for noise.

The Resource Management Act 1991 (RMA) requires every occupier of land and every person carrying out an activity to adopt the best practicable option to ensure noise does not exceed a reasonable level. Subdivision, land use and development activities, including temporary activities and events, should be managed in a manner that avoids, remedies or mitigates the adverse effects of noise. Activities should consider the control of noise at the source and the mitigation of adverse effects of noise on the receiving environment. The onus on the reduction of effects of noise should not always fall on the noise generating activity. In some cases it may be appropriate for the noise receiver to avoid or mitigate the effects from an existing noise generating activity, particularly where the noise receiver is a noise sensitive activity. The RMA defines noise to include vibration.

Objective NSE. 1

- To control the adverse effects of noise emissions and manage the potential for conflict between land use activities.

Policy NSE. 1

- Manage subdivision, land use and development in a manner that avoids, remedies or mitigates the adverse effects of noise.

Rule NSE.1 – Permitted Activities

- All activities shall be Permitted Activities (unless specified below) provided that they comply with all of the relevant noise standards, Zone and district-wide rules.

The excavation and processing of gravel will create noise.

Rule NSE.2 – General Standards addresses construction noise and states:

Noise Measurement – Noise levels shall be measured and assessed in accordance with NZS 6801:2008 Acoustics – Measurement of Environmental Sound and NZS 6802:2008 Acoustics – Environmental Noise, except where another standard has been referenced in these rules, in which case that standard should apply.

Note: The only way to measure compliance with the plan is through the methods outlined above, No other method will be accepted.

Regarding noise management and mitigation measures ensuring operation of the proposed activity is continually compliant with the Permitted Activity Rules NES.1 and NES.2, Te Anau Earthworks propose a noise measurement and recording programme in accordance with Rule NES.2

Should a breach of the Permitted Activity status be recorded, Te Anau Earthworks will immediately undertake an action of “Identify, Isolate, Mitigate” ensuring continued compliance with the Permitted Activity status.

Importantly, the proposed activity site is located below a 30 metre high escarpment to the west and a 500 meter wide river floodway lined with willow erosion control buffers to the east, noise generated by the proposed activity will be totally managed and controlled at the source.

Of equal importance regarding on-site activity is that activity will be spasmodic as discussed under Sections 12.1 Floodway Pond – Sequence of Excavation and Methodology and 12.2 Processing and Temporary Stockpile.

Specifically noise generated by the proposed activity will comply with the Rules defined by the Southland district Plan Section 2.11 – Noise, Rural Zone – Section 3.1

Straight line distances from the proposed work site to the location of the closest residential dwellings and local area school are:

- Residential dwelling to the north-west – 2177 meters.
- Residential dwelling to the east – 4858 meters.
- Mararoa School to the north east – 6745 meters.

Conclusion – Due to the location and nature of the proposed activity sited below a 30 meter high terrace riser to the west with river flood fairway willow buffer lines to the east, noise measurement and noise response mitigation measures proposed by Te Anau Earthworks, it is determined that there will be no on-site or off-site adverse effects relating to noise generated by the proposed activity.

District Plan - Part 3.8 Natural Hazards and 3.13 Public Works and Network Utilities

This section of the District plan contains objectives and policies relevant to this proposed activity.

Objective NHZ.1 – Non Structural Approach – To reduce the adverse effects from any actual or potential natural hazard by providing a non-structural strategy to avoid and/or mitigate these effects.

Explanation – The principal reason for adopting a non-structural approach to natural hazard mitigation is because the level of structural defences is now reasonably well developed, particularly in regard to flooding. The protection provided however, is far from absolute and certainly on its own, be considered to constitute sustainable management of the rural flood plains of Southland. To place undue reliance on structural protection (flood banks) as a standalone flood management tool could leave a community very vulnerable to a flood event. Therefore, further measures are needed to compliment the migratory works that are in place. By identifying and planning for potential natural hazards, the economic and social impacts of such events should not be as devastating or costly as in the past and therefore regional development will be more sustainable.

Conclusion – The proposed activity (gravel extraction) meets the objective of a non-structural approach to complimenting maintenance of existing flood control measures and floodway efficiency developed by Environment Southland as part of the capital construction and on-going maintenance phase of the Lower Mararoa River Restoration Project completed 2011-12.

25. Access

Access to the proposed activity sites is via the existing access road constructed as part of the Mararoa River restoration project and detailed in Section 25.4.

This road located outside of the cleared floodway provides access for heavy vehicles to within approximately 50 meters of each of the proposed activity sites.

The forming of final access onto the floodway and each of the habitat pond sites will be made by clearing a pathway through standing gorse and broom along the edge of the floodway and installation of a temporary 1200 mm. dia. culvert providing access across an intermittently flowing ephemeral channel if required.

26. Management of Pest Species on Plant and Vehicles

Plant and vehicles required to undertake the proposed activity will have been through an assessment of the previous work environment and cleaning process undertaken if required prior to being engaged on the proposed activity site.

The management of pest species impacting plant and vehicles engaged on the work site are likely to be limited to pest plant seeds such as gorse and broom. The same of which via wind borne spread will have impacted the main access road and S.H. 94 in the vicinity of the proposed works.

The South Island being a controlled area for Didymo makes is a legal requirement to clean all gear used in water before going from one waterway to another.

To prevent the spread of freshwater pests like Didymo, Te Anau Earthworks has adopted Biosecurity New Zealand – Check, Clean, Dry method to clean machinery that has been working in water, before shifting that machinery to another location.

Regarding the matter of mitigation of the spread of Didymo via plant and vehicles leaving the proposed activity sites, it is considered mitigation involving the MPI & Biosecurity New Zealand approved process of cleaning potentially affected vehicles and or plant will not be required for reason no item of on-site plant will cross waters of the Mararoa River while excavators engaged on excavation of the habitat ponds will not be working in flowing water of the known Didymo affected Mararoa River.

Should exposure of machinery to Didymo infected waters be identified, items of plant affected will be subjected to the Biosecurity New Zealand Check, Clean, Dry process prior to leaving the proposed works site.

27. Assessment of Environmental Effects

27.1 Overview

Section 104 of the RMA requires that the consent authority, when making a decision on a resource consent application to have regard to the actual and potential effects on the environment of allowing the activity.

The environmental effects of the proposed activity are discussed in this section of the report.

27.2 Effects on River Form, Character and Morphology

The following description is provided on the form of the Mararoa River being a major tributary of the Waiau River catchment concentrating primarily on the reach upstream and downstream of the proposed activity sites. The selection of this section of the river has been

made for reasons discussed in Section 18, and that any effects to river form from the carrying out of the proposed activity are easily absorbed by the local environment and fitting with the surrounding landscape.

As discussed in Section 19 River Form, river character and morphology will not be negatively impacted by the proposed activity.

27.3 Effects on Water Quality

As discussed in Section 24 (Statutory Considerations) the only likely effect on water quality will relate to the effects of natural causes e.g. occurrence of a significant high flow event in the Mararoa River over running the partially completed habitat ponds.

27.4 Effects on Recreation, Landscape and Rural Character

Recreation values over the Te Anau basin including the adjacent Fiordland National Park are held in high regard by the local community and visitors to the district.

The 'Landscape Capacity Study' – April 2006 prepared by Boffa Miskell Limited for Environment Southland describes the landscape character of the lower reach of the Mararoa River is that [of a long, semi-braided river that begins at the Mavora Lakes in the Livingstone Mountains. Varies between confined single braid and more open braids. The river environment is quite modified. However the natural patterns and processes of the river remain dominant overall].

The Landscape Values are described as [Important natural feature and recreational resource]

An important part of the community involvement and consultation phase associated in the initial planning for restoration of the Lower reach of the Mararoa River, the local community established a set of outcomes expected to be delivered through completion of the Lower Mararoa River Restoration Project.

Objectives relating to recreation activities included:

- Kayaking
- Swimming
- Picnics
- Angling
- Walking
- Cycling

For good reason Te Anau is known as the fly fishing and walking capital of New Zealand through being an amazing World Heritage area, Fiordland and the Te Anau Basin have a wealth of activities to offer

There is no doubt the Mararoa provides internationally renowned fly fishing for large rainbow and brown trout set within a stunning mountainous backdrop albeit with limited access to the lower section pre the restoration project.

An important component of the Lower Mararoa River Restoration Project related to all weather quality access for heavy vehicles and machinery involved in construction of the project. Post completion of the project on-going maintenance of a number of these access tracks have delivered new access roads suitable for the family car to significant section of the Mararoa River via the true right bank downstream to the Whitestone confluence. It is a section of this access that will provide access to the proposed works sites.

Note: Access road shown on Appendix 1 and Appendix 2.

Starting from S.H. 94 highway some 460 meters west of the Lagoon Creek highway culvert the access road occupies Crown Reserve (both sides being deer fenced) to the riverbed terrace riser. From that point the access road follows along the base of the terrace riser, past the proposed activity sites ending at the commencement of a four wheel drive track some 2,300 meters downstream of Site 4.

Originally this access track was constructed as a single lane with a light metal surface to accommodate machinery and service vehicles engaged on the restoration project. Although a good standard it is proposed that widening and resurfacing of the access road will be undertaken by Te Anau Earthworks to better accommodate a safer better quality access environment for recreation access e.g. cars, cyclists, walkers, plus movements of machinery and trucks involved in carting processed gravel from the proposed work sites.

Appropriate signage will be installed by Te Anau Earthworks as part of a site safety plan to be prepared prior to commencement of the activity.

Conclusion

The most significant effect of the proposed activity on recreation and rural residents can be best described as positive with respect to access road improvements and continuous maintenance providing quality access for recreation associated with the river environment. In terms of visual effects and noise on nearby rural residents and traffic travelling the popular S.H.94 Scenic Highway, the proposed activity is out of sight being below the high terrace riser to the west and dense lines of crack willow erosion protection plantings to the east and north.

Any visual and noise aspect of the proposed activity will only occur as trucks and machinery enter/exit the access road leaving/joining other commercial traffic using S.H. 94 completely in accordance with the Southland District Plan (Section 2.11) regarding Council awareness to noise generating activities that include certain industrial, agricultural and construction processes, together with the operation of the transport network and other infrastructure. Council is also aware that noise is a derivative of activity within the District and that much of that activity contributes to socio-economic wellbeing and growth, thus noise control measures should achieve a balance between reducing adverse effects of noise and the continued operation of noise generating activities without undue restriction.

27.5 Effects on Riverine Dwelling and Nesting/Roosting Birds

Regarding the proposed activity and its possible effects on riverine dwelling birds, particularly the critically endangered Black-billed Gull is unknown at this point.

The single known factor is that no riverine birds currently occupy the proposed activity site being one covered with dense grasses, habitat not suitable or favoured by any of the riverine bird species that utilise the Mararoa River bed.

Also, the proposed activity being located away from the active river channels, clean gravel beaches and point bars suggests that food sources and security from predation needed to support riverine birds may be available some distance from the proposed work site.

It is also known that historically a large colony of Black-billed Gulls nest on river gravel islands and point bars within a kilometre reach downstream of the S.H. 94 Key Bridge providing a minimum separation distance of 2.6 km between known historic Black-billed Gull nesting sites and the proposed work site.

Having regard for the needs of riverine dwelling birds it is considered the proposed activity will when complete, and, possibly during construction, provide positive benefits in terms of new food sources via stable pond habitat with long sloping batters and possible nesting sites secure from the effects of river level rises.

Ensuring safety of riverine birds that may choose to occupy the proposed activity site during construction the following actions are proposed:

If Black-fronted Tern, Black-billed-Gull and Banded and Black-fronted Dotterel establish nesting sites within any of the active works sites 1 & 4, Te Anau Earthworks (consent holder) shall:

- a) Cease all gravel extraction activities within that extraction area;
- b) Mark out a 100 meter buffer zone around the nesting site;
- c) Once the buffer zone has been marked out in accordance with (b), gravel extraction works may resume, except that there shall be no gravel extraction activities within the buffer zone marked out in accordance with (b).;
- d) Take photographs of the nesting site and buffer zone, and provide these to the Consent Authority (Environment Southland) within two weeks of the photographs being taken.

Appendix 7 – South Island Riverine Birds – Breeding Timeframe - Matrix 1 provides guidance to breeding periods and when machine operators need to be aware of the possible presence of breeding birds on the proposed activity sites.

Conclusion – It is considered the above mitigation actions proposed in the event of riverine birds found to be nesting on any of the proposed activity sites is not only qualified, it is appropriate for any given situation that may arise. It also demonstrates a knowledge and understanding of the potential impacts on the habitat values of riverine dwelling birds when operating commercial gravel extractive business in river bed environments.

27.6 Effects on Aquatic Animals and Instream Life

As the proposed activity is entirely based around the excavation of enclosed habitat ponds away from flowing water, point bars and the active channel regime potential impacts on aquatic animals and instream life will be limited to the possible placement and removal of a temporary culvert in an intermittently flowing ephemeral channel immediately to the west of the proposed habitat pond at Site 4 shown on Appendix 1.

27.7 Effects on the Environment

In New Zealand the RMA is the principal statutory document governing the use of land, air and water. Part 2 of the RMA, contained in sections 5 - 8 sets out the purpose and principals of the Act.

The purpose of the RMA as set out in section 5, is to “promote sustainable management of natural and physical resources”. The method of applying section 5 involves an overall broad judgement which allows for the comparison of conflicting considerations, the scale of them and their relative significance or proportion of the final outcome.

Sections 6, 7 and 8 of the RMA set out the principals to be applied in achieving the purpose of the Act. These sections respectively outline the matters of national importance and must be recognised and provided for, other matters to which particular regard must be had; and the requirement to take into account the principles of the Treaty of Waitangi.

Assessment of the proposed activity against part 2 of the Act is dealt with in this section of the AEE.

Dealing with matters of national importance under Section 6 of the RMA the most relevant matters associated with this application are considered to be:

- 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;
- b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use and, development;
- c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;
- d) The maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers;
- e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga;
- f) The protection of historic heritage from inappropriate subdivision, use, and development.

The above matters have been assessed and discussed throughout this report and supporting sections of this AEE.

By way of summary:

- The natural character of the Mararoa River valley will not be adversely effected by the proposed activity through ensuring visual aspect of the habitat ponds is in sympathy with the surrounding river bed environment, albeit a fluid medium;
- The outstanding landscape character of the Mararoa River valley in the context of being viewed from the proposed activity site, the dominant landscape feature is the impressive western face of the Takitimu Mountains. The activities proposed by this application will not adversely affect those values when viewed from either the proposed work site, or any other viewing point in the vicinity of the works site as there are very limited vies of the proposed works from most public vantage points, and the rehabilitation programme will ensure the works blend in with the natural environment;
- The proposed floodway ponds being located along the edge of a floodway recently cleared of all vegetation indicates an absence of areas of indigenous vegetation or significant habitats;
- The works will improve public access to the Mararoa River by expanding the existing road network and provision of additional public access points onto the river berm area;
- Iwi groups via Te Ao Marama Inc and Te Runanga o Ngai Tahu – Statutory Acknowledgements have been initially consulted via the Scoping Report process and no significant concerns have been offered with respect to conflict with Maori relationship with the environment.

On the above basis, it is considered the proposed activity will be consistent with all matters of national importance.

27.8 Effects on Heritage and Cultural Values

There are no recorded Maori or European archaeological sites within the New Zealand Archaeological Association database in the vicinity of the proposed activity. Nor are there any sites of features, of either Maori or European origin, protected by the Historic Places Act 1993 or the Southland District Plan. Therefore no specific authorisations are required with respect to heritage sites.

Nevertheless, the area does have heritage values of note. It is well documented that Maori historically travelled from the southern and east coasts via the Waiau Trail and crossing the Mararoa River to Manapouri, Fiordland and on to the West Coast to collect Pounamu (greenstone) and mahinga kai (food).

27.9 Effects of Noise on the Rural Environment

The matter of noise the relevant Rules, Objectives and provisions of the Southland District Plan are discussed under Section 23.9 Operative Southland District Plan 2018 (OSDP) (Section 2.11 Noise).

Accepted is that noise will be generated by heavy machinery working on site. That machinery will include a hydraulic excavator, rubber tired loader, trucks and mobile crushing and screening plant.

Also, trucks will enter and leave the activity site supplying gravel directly to customer demands and or, an alternate temporary stockpile site on the outskirts of Te Anau.

All items of machinery engaged throughout the proposed activity are of modern design in terms of noise suppression requirements, fully compliant with operational noise requirements when working in and close to residential occupation within urban and rural environments.

Specifically noise generated by the proposed activity will be compliant with the rules defined by the OSDP, Section 2.11 – Noise, Rural Zone – Section 3.1.

Objective NSE.1 – To control the adverse effects of noise emissions and manage the potential for conflict between land use activities.

Policy NSE.2 Avoid, remedy or mitigate reverse sensitivity effects from noise emissions. Straight line distances to the closest residences and Mararoa School to the proposed activity are:

- Residential dwelling to the north-west: 2177 meters.
- Residential dwelling to the east: 4858 meters.
- Mararoa School to the north-east: 6745 meters.

Conclusion: It is concluded the proposed activity will have no negative impacts regarding noise on the surrounding community or environment.

27.10 Work Site Rehabilitation

Rehabilitation and general tidiness of the work site will be continuous throughout the term of consent. The habitat ponds as excavation progresses will be shaped with a long sloping batter for public safety and the around pond work area will be continually shaped to mirror the contours of the surrounding environment.

As the proposed activity progresses through the 10 Year consent cycle, the works sites will be regularly inspected for the presence of rubbish introduced or foreign to the site. Any such rubbish will be collected and disposed of via the district transfer station facilities.

27.11 Positive Effects

The purpose of the proposed activity is to provide a sustainable supply of river run gravel for development of community infrastructure.

Clearly there are a number of positive effects that include environmental, community beneficial outcomes and benefits to river management provided by the activity. The most obvious of those relate to development of two floodway ponds providing habitat values for water fowl, wading birds and aquatic animals, significant improvements to the existing

access road and provision of additional access opportunity onto the floodway areas in the vicinity of the proposed activity site thereby increasing access values for a range of recreation enjoyment by the local community and visitors to the area.

Other positive outcomes provided by the proposed activity relate to the identified need to reduce bed load excess volumes throughout the river reach and the provision of a much needed quality gravel resource for construction, development required to support the local population and major tourism industry having regard to the overall social and economic well-being of the local community.

Other important positive effects relate to the protection against flood damage (as occurred in November 1999) of continuance of major access into and out of Te Anau Township, Milford Sound and movement of local communities via the state highway network crossing the Mararoa River via The Key Bridge. This major infrastructure unit is one of only two access points across the Mararoa River, the other being 20 km downstream at Weir Road. Removal of even relatively small quantities of the identified bed load excess through the 10 km reach downstream of the S.H. 94 Key Bridge will provide positive benefits albeit small in terms of the significant volumes currently available.

The above positive effects are elaborated on throughout this AEE.

27.12 Negative Effects and Mitigation

While some adverse effects are avoidable, overall it is considered that any adverse effects arising from the proposed activity can be avoided or mitigated as discussed throughout Section 26. Assessment of Environmental Effects.

Specifically, with respect to the potential for negative effects on aquatic, riverine bird and riparian habitat ecosystems, fish passage and biodiversity, the proposed work site sits within the ecological diversity of the Mararoa River valley and world renowned outstanding landscape.

In assessing all the ecological diversity associated with the site, particularly aquatic animals and riverine birds, the only identified potential negative impact or threat arising from the proposed activity relates to the human activity associated with the small scale gravel extraction activity proposed at the site and encounters with recreational users of the Mararoa River in close proximity to the proposed activity site.

Conclusion – While some adverse effects arising from human activity are unavoidable and balanced against the values of the activity proposed, it has been determined that because the activity is located out of and away from the active river channel and clean gravel beach and point bar habitat favoured by riverine birds any negative effects with regard to the possible presence of riverine birds favouring the activity site for nesting can be avoided or mitigated.

28. Environment Southland and the Proposed Activity

The detail and data relating to the proposed activity discussed in this report albeit primarily for the purpose of a commercial activity providing river run gravel supplies and concrete products to the wider Te Anau basin district is supported by Environment Southland's Catchment Management Division in responding to its functions associated with river management, flood protection and the wellbeing, and social and cultural environment of the people of the region.

29. Consultation and Potentially Affected Party Written Approvals

As detailed in Section 1 Introduction initial consultation involving key organisations has already occurred via development and delivery of a Pre-Resource Consent Application Scoping Report.

Informal feedback sought as part of the Scoping Report process provided general support for the proposed activity that included a number of suggested revisions to various components of the proposed activity. Without exception all suggested revisions have been incorporated into the proposed activity detailed in this report supporting Te Anau Earthworks application for resource consent from Environment Southland.

Note: A copy of the Scoping Report and Feedback received is provided to Environment Southland Consents Division staff as Appendix 8 – 14 on the basis of providing 'Further Information' in support of this application report.

In order to progress this application through the consent application process, formal written approvals to the proposed activity are to be sought by the Applicant from the following identified potentially affected parties.

Note: It is understood that Environment Southland Consents Division staff will assess and confirm the final determination regarding potentially affected party sign off required.

Potentially Affected Party	Address
Fish and Game – Southland Region	PO Box 159, Invercargill 9840 Attention: Mr Jacob Smyth & Mr Bill Jarvie
Te Ao Marama Inc	Stevie-Rae Blair, Maori Environmental Officer, PO Box 7078, South Invercargill 9844
Land Information New Zealand	C/- Colliers International, PO Box 416, Queenstown 9348 Attention: Poppy Simpson-Wells – Corporate Solutions
Department of Conservation	Te Anau Area Office, PO Box 29, Te Anau 9640 Attention: Phoebe Shaw – Ranger Community
Meridian Energy Limited	PO Box 2146, Christchurch 8140

	Attention: Catherine Bryant – Environmental Specialist
Te Runanga o Ngai Tahu – Statutory Acknowledgements	PO Box 13 046, Christchurch 8141
Landcorp Farming, Lynmore Farm	Wilderness Road, Te Anau 9672 Attention: Wayne Webb – Farm Manager

30. Other Approvals

The following other approvals/sign-off required for the proposed activity will be sought:

- Environment Southland – Catchment Management Division
 - Gravel Extraction Evaluation Form
- Environment Southland – Harbour Master
 - Coastal Permit Technical Comment (navigational safety)

31. Appendices – Maps, Plans and Documents

Appendix 1	Locality Map
Appendix 2	Land Boundary Map
Appendix 3	Site 1 Floodway Pond
Appendix 3A/1	Site 1 Floodway Pond – Cross Section and Elevation profiles
Appendix 3A/2	Site 1 Floodway Pond – Longitudinal Section and Elevation profile
Appendix 4	Site 2 - Processing, Site 3 - Temporary Stockpile, Site 4 - Backwater Pond
Appendix 4A/1	Flow Through Backwater Pond – Cross Section and Elevation Profile
Appendix 4A/2	Site 4 – Flow Through Backwater Pond – Cross Section and Elevation Profile
Appendix 4A/3	Site 4 – Flow Through Backwater Pond – Longitudinal Section and Elevation Profile
Appendix 5	Environment Southland – Floodway Ponds Brochure – Guidelines to Floodway Pond Construction
Appendix 6	Environment Southland – Backwaters Brochure – Guidelines to Backwater Construction
Appendix 7	South Island Riverine Birds – Breeding Timeframe Matrix
Additional Information to Environment Southland Consents Division	
Appendix 8 – Scoping Report	Pre Consent Application - Scoping Report
Appendix 9 – Scoping Report	Fish and Game – Feedback
Appendix 10 – Scoping Report	Department of Conservation - Feedback
Appendix 11 – Scoping Report	Meridian Energy - Feedback

Appendix 12 – Scoping Report	Te Ao Marama Inc.
Appendix 13 – Scoping Report	Land Information New Zealand
Appendix 14 – Scoping Report	Environment Southland

32. Glossary - Abbreviations

ES	Environment Southland
ESCMD	Environment Southland Catchment Management Division
SRC	Southland Regional Council
LINZ	Land Information New Zealand
DOC	Department of Conservation
ANZECC	Australia New Zealand Environmental and Conservation Council
S.H.	State Highway
RMA	Resource Management Act 1991
RWPS	Regional Water plan for Southland
pSWLP	proposed Southland Water and Land Plan
NSWQS	National State Water Quality Standards
OSDP	Operative Southland District Plan 2018
NZS	New Zealand Standards
MLC	Manapouri Lake Control (Waiiau/Mararoa control weir)
m3	Cubic meters
m2	Square meters
km2	Square kilometres
m3/yr	Cubic meters per year
2Mm3	Two million cubic meters
t/yr	Tonnes per year
24/7	24 hours per day 7 days per week
mm	Millimetres
Deg.C	Degrees Centigrade
NH	Natural Hazards
BRL	Beds of Rivers and Lakes
dia.	Diameter
amsl	Above mean sea level
AEE	Assessment of Environmental Effects

33. Glossary - Terms

River Systems and Processes

Morphology - with reference to river systems, a term used to and describing the processes whereby that system evolves over time.

River regime - the form of a particular river under the prevailing sediment supply and range of river flows the river experiences.

Riparian – the land area which is immediately adjacent to and flanking the active river bed area.

Berm – the area immediately adjacent to a river which is routinely flooded when overbank flows occur during a flood event.

Episodic – a process which occurs at irregular intervals and in which the scale may also vary between episodes.

Hydrological processes – the natural process which results in rainfall generating runoff from the land surface, infiltration into the ground and evaporation back to the atmosphere.

Headward erosion – a situation which can develop in a river bed when a step or discontinuity is introduced to the bed slope with the upstream side of the step raised relative to the downstream side. The river then endeavours to re-grade the stream bed back to a uniform grade and to do this erosion of the bed occurs migrating upstream away from the discontinuity (headward erosion) and deposition occurs downstream of the discontinuity.

River form – a term for describing or categorising the plan form of the river e.g. braided, meandering, straight, single thread.

Semi braided / pseudo-meandering – a river form that is essentially braided but in a subdued way either alternating for example between braided sections and single thread sections or one in which there may be a dominant thread with a small number of poorly developed secondary braids.

Meandering – a river form which has a single channel winding its way across the floodplain.

Single thread – a river with a single as opposed to multiple channel (braided) form.

Sinuosity – the ratio of the length of a river channel measured along the centre line of the channel to the overall length of the channel measured directly down the floodplain.

Thalweg – a line traced along the bed of a channel which more or less follows the deepest part of the channel bed.

Aggradation – the process whereby the rate of sediment input to a section of river exceeds the rate of removal and the bed builds up as a consequence.

Degradation – the converse of aggradation.

Fluvial – the process where alluvial sediments are variously entrained, transported, deposited and stored under the action of flowing water within a river.

Alluvial – Alluvial soils are soils which consist of fine particles of silt and clay and larger particles of sand and gravel left behind on land which has been flooded or where a river once flowed.

Aggregate – A term for sand and gravel extracted for commercial reasons.

Bed load – that part of the rivers sediment loads that moves downstream on and beneath the bed of the river.

Saltation load – that part of the river sediment load that during higher flows is plucked off the stream bed, and moves downstream temporarily entrained into the flow before settling back on the bed.

Suspended sediment load – that part of a rivers sediment load that is transported downstream within the flowing water only settling out when water velocity falls sufficiently for that to occur.

Bed load throughput – the volume of bed load sediment transported through a section of river within a specified time (e.g. a year).

Sustainable yield – the amount of aggregate that can be removed from a river system within a specific time interval without materially altering the river processes and hence river form; at a level of extraction that does not cause erosion responses.

Flooding and Related Terms

Flood frequency – a Statistical term referring to how often a particular sized flood might be expected to be equalled or exceeded over a specific time interval such as a year.

Recurrence interval – a term used in risk analysis associated with for example the occurrence of floods, drought or earthquake that represents the average period of time which might be expected to elapse between events of a particular severity or greater occurring.

Mean annual flood – that flood of any particular river which has a recurrence interval of 2.3 years. This value is determined by taking the sum of all the largest flood peak flow in each year of a record for a particular river, then averaging that result.

Hydrometric site – a site where a calibrated water level recorder has been installed to record at predetermined time intervals water levels (i.e. stage) from which with the aid of a rating curve for the section of river where the recorder is installed river flow can be estimated.

Rating curve – a rating curve is a plot of several discrete measured water flows (i.e. gauged flows) over a range of flows against river stage at the time that each flow measurement is made.

Runoff – water that travels primarily overland and discharges into a water body as a consequence of rainfall.

Sediment Terms

Grading curves – a plot which shows the distribution of the various particle diameters present in a soil sample.

Clast size – synonymous with the term particle size.

Uniformity coefficient – with reference to the grading curve, the ratio of the particle diameter at which 60% of the sample is smaller than that diameter to the particle diameter at which 10% of the sample is smaller.

Gap graded - a soil sample whose grading curve shows that a particular range of sizes lying between finer and coarser clasts in the sample is either missing or alternatively is a small percentage of the total soil sample. This often occurs with hard aggregate where coarse gravel is present with fine to medium sand the latter the result of abrasion of the coarser sizes during active sediment movement within the river bed under high flows. In this situation the coarse sand, and fine to medium gravel sizes are either missing or alternatively only a small percentage of the total mass of the soil sample.

Abrasion when used in the context of sediment movement within a river bed refers to the process where a result of impact and/or a scraping action between two particles the larger particles reduce in size and produce abrasion products such as silt and sand.

Geological Terms

Pleistocene/Otiran Glaciation – A period of the most recent glaciation of New Zealand that ended about 10,000 years ago. All the ice sculptured landforms that add so much to the beauty of the South Island are the product of the earlier Pleistocene and the more recent Otiran glaciations. Lakes Manapouri, Te Anau and Wakatipu and almost all lakes of the South Island occupy hollows scooped out by the Otiran glaciers.

Piedmont – a geological term used to describe the location of alluvial deposits lying at the foot of a mountain range and typically includes the coalescence of several alluvial fans.

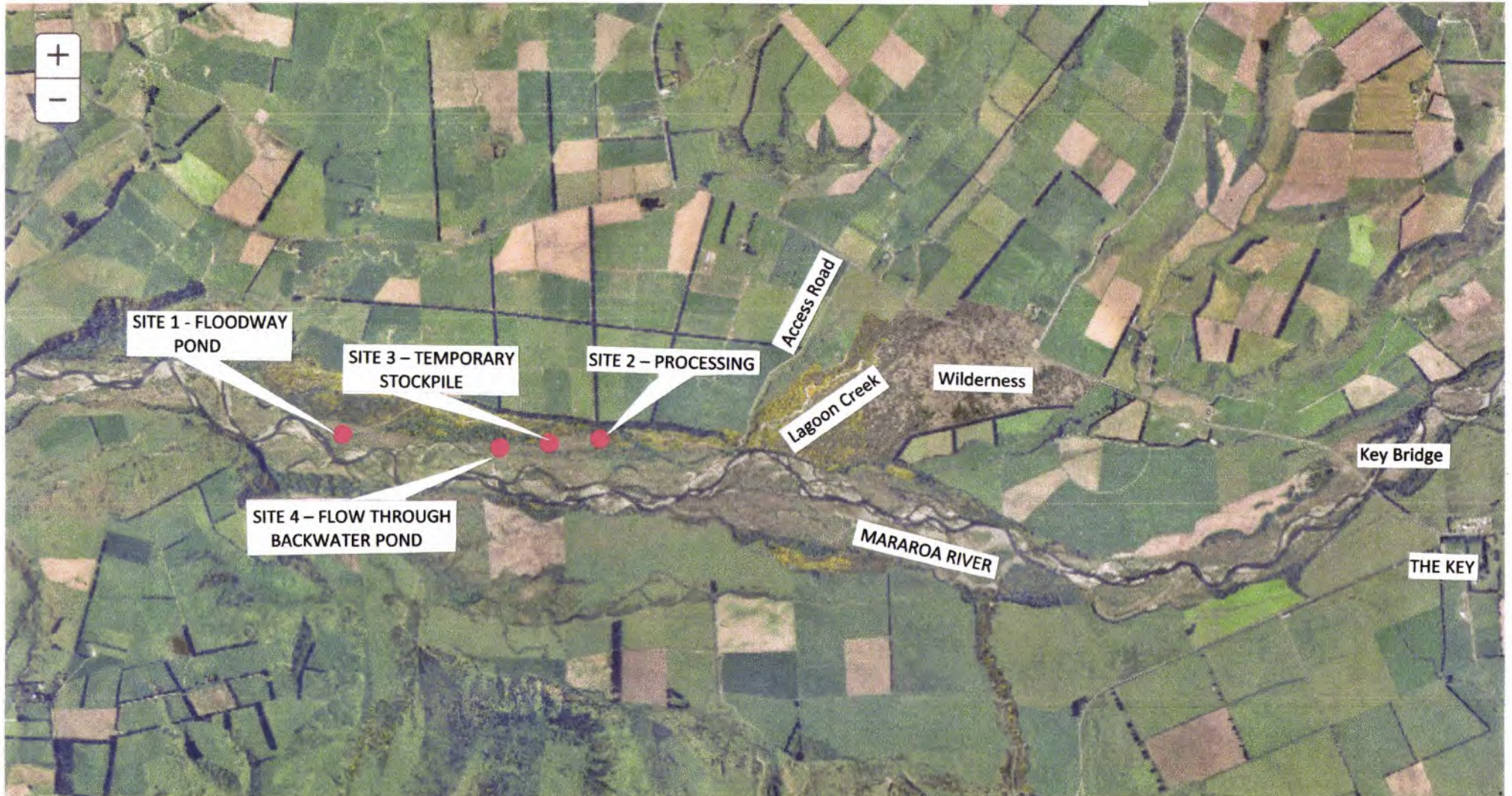
34. References and Acknowledgements

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- 2) Environment Southland Brochure – Guidelines to Floodway Pond Construction Using Gravel Extraction to Restore Floodway Ponds:
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- 3) Environment Southland Brochure – Guidelines to Backwater Construction Using Gravel Extraction to Restore a Backwater:
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By ENVIRONMENT SOUTHLAND (WWW.ES.GOV.T.NZ)

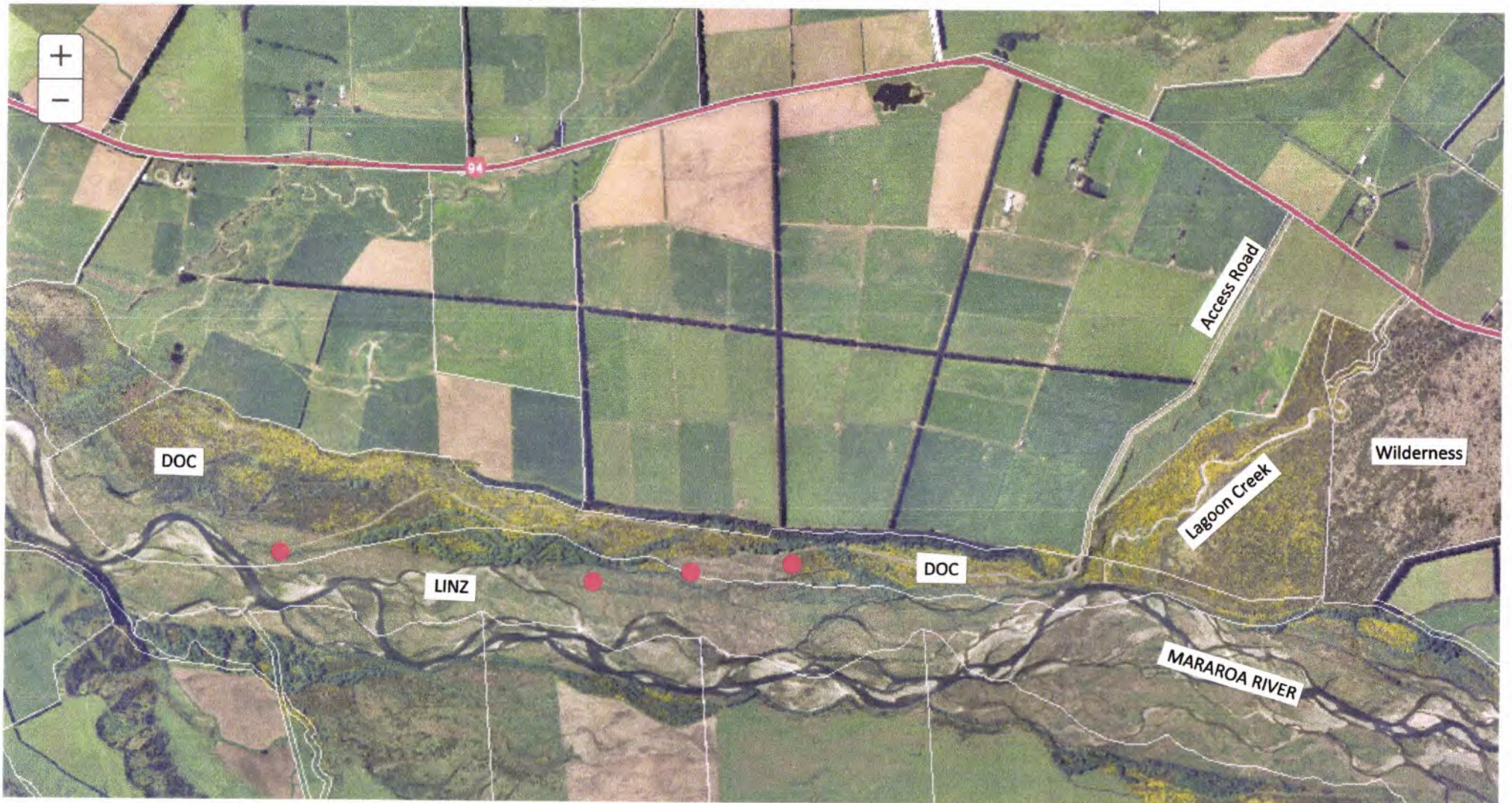
APPENDIX 1 – Te Anau Earthworks – Proposed Gravel Extraction Activity - Locality Map - Mararoa River





By ENVIRONMENT SOUTHLAND (WWW.ES.GOV.T.NZ)

APPENDIX 2 – Te Anau Earthworks – Proposed Gravel Extraction – Land Boundary Map – Mararoa River



Annotation Report

Copy of Wilderness Extraction Site



Map imagery captured on December 4, 2018



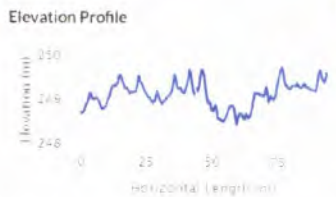
**APPENDIX 3 – Te Anau Earthworks – Proposed Gravel Extraction –
Site 1: Floodway Pond – Mararoa River**



Cross Section at widest point.
 Southern Point 247.23m.
 Northern Point 248.18m.



Cross Section at mid-point.
 Southern Point 248.70m.
 Northern Point 249.64m.



**APPENDIX 3A/1 – Te Anau Earthworks – Proposed Gravel Extraction Activity –
 Mararoa River**

Site 1 - Floodway Pond - Cross Section & Elevation Profiles

Floodway Pond cross section and gradients.



B1 Floodway Pond area 3D image view.

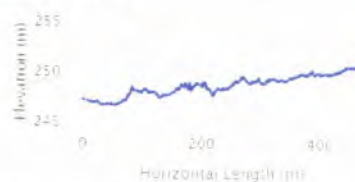


Elevation profile of blue line downstream gradient.

Downstream point on left. = 247.36m

Upstream end point right. = 250.77m

Elevation Profile



**Appendix 3A/2 – Te Anau Earthworks – Proposed Gravel Extraction Activity –
 Mararoa River**

Site 1 – Floodway Pond - Longitudinal Section & Elevation Profile

Annotation Report

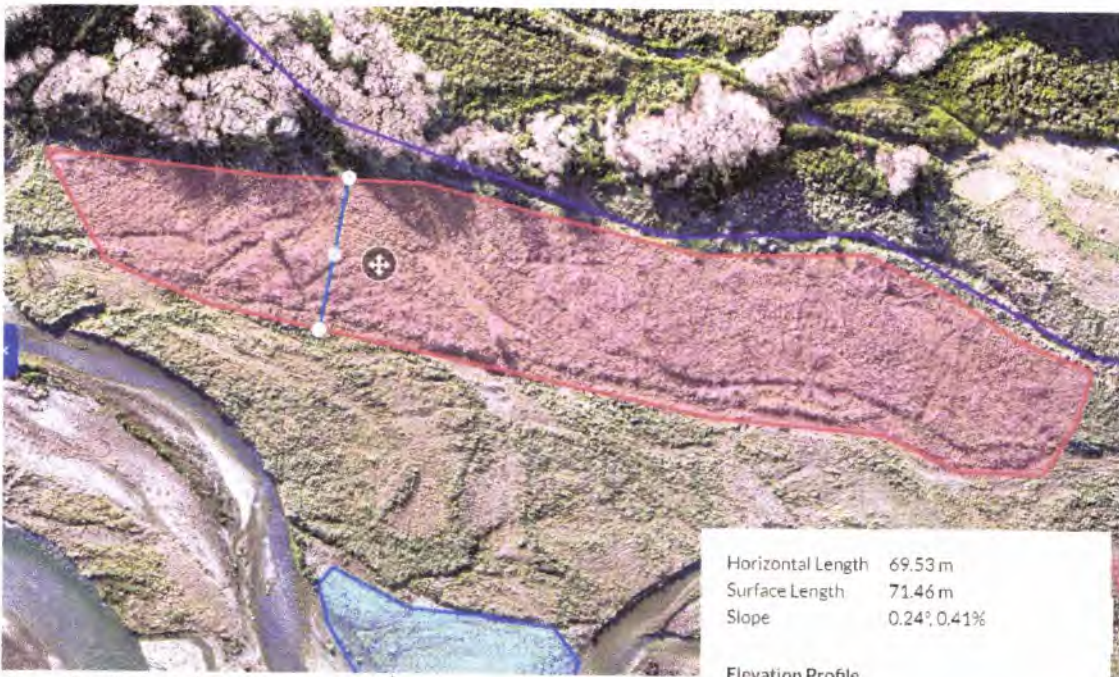
Wilderness Extraction Site



Map imagery captured on May 31, 2018

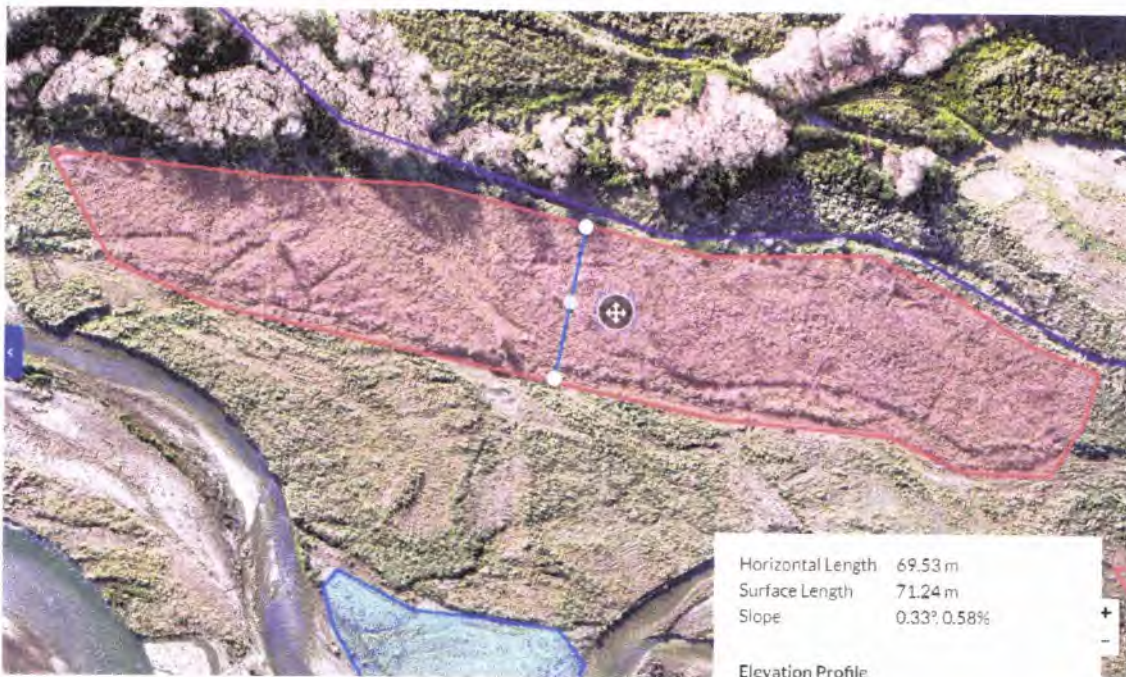


**APPENDIX 4 – Te Anau Earthworks Ltd – Proposed Gravel Extraction
– Site 2: Processing, Site 3: Temporary Stockpile, Site 4: Flow
Through Backwater Pond – Mararoa River**



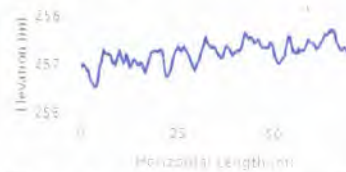
Cross Section at downstream end.
 Southern Point 256.60m.
 Northern Point 256.88m.

Elevation Profile



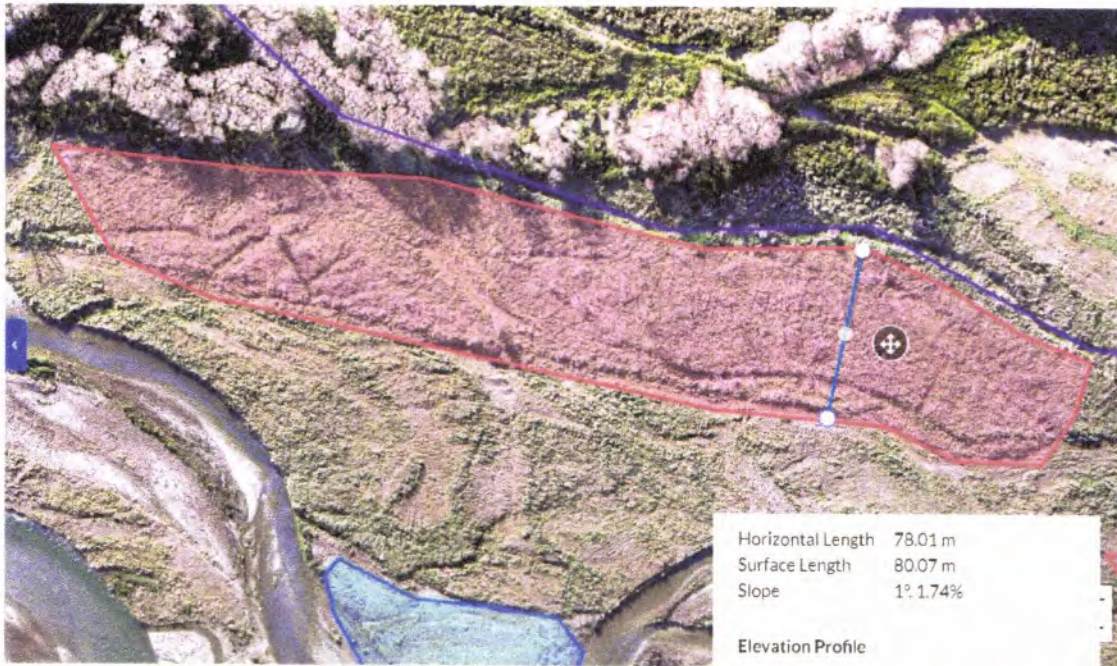
Cross Section at mid-point.
 Southern Point 256.97m.
 Northern Point 257.37m.

Elevation Profile



**Appendix 4A/1 – Te Anau Earthworks – Proposed Gravel Extraction Activity –
 Mararoa River**

Site 4 – Flow Through Backwater Pond - Cross Section & Elevation Profiles

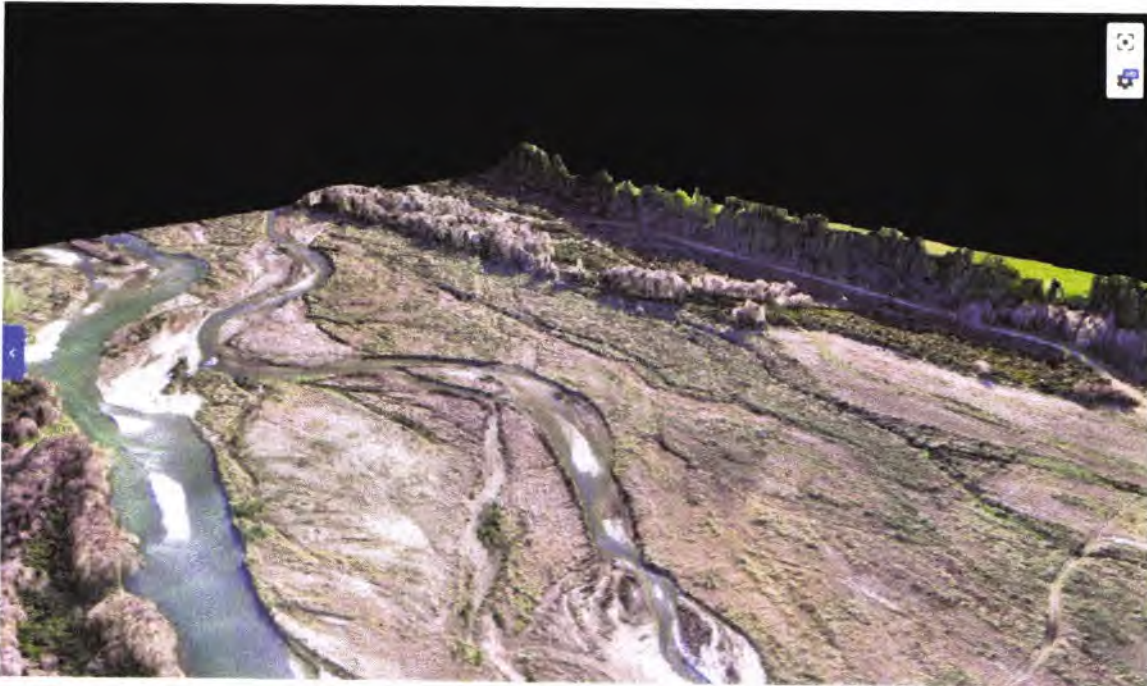


Cross section at eastern end.
 Southern Point 257.13m.
 Northern Point 258.48m.

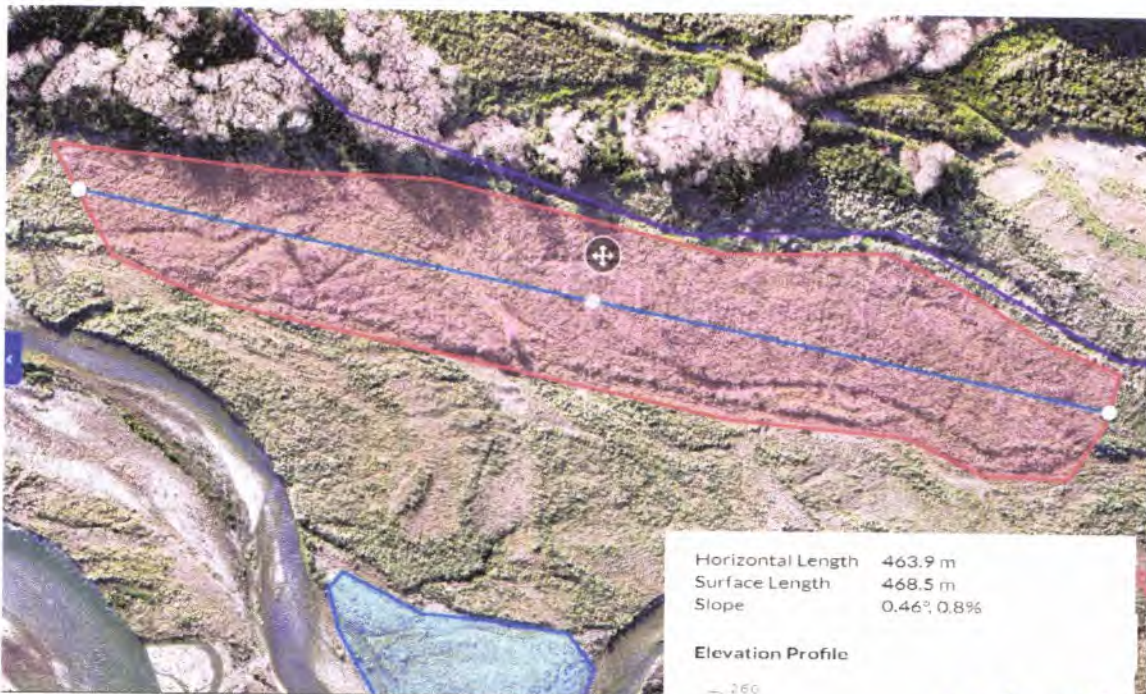
**Appendix 4A/2 - Te Anau Earthworks – Proposed Gravel Extraction Activity –
 Mararoa River**

Site 4 – Flow Through Backwater Pond – Cross Section & Elevation Profiles

A1 Throughflow Backwater Pond cross section and gradients.



A1 Throughflow Backwater Pond 3D image.



Elevation profile of downstream gradient.
 Downstream point on left end = 255.63m
 Upstream point on right = 259.44m

Appendix 4A/3 – Te Anau Earthworks – Proposed Gravel Extraction

Activity – Mararoa River

Site 4 - Flow Through Backwater Pond – Longitudinal Section & Elevation Profiles

Guidelines to Floodway Pond Construction

When constructing floodway ponds avoid interrupting gravel movement along the active channel. Ponds should be constructed in areas where channel shifts are not expected to occur over a period of decades or more. In braided reaches, the location is not critical because frequent channel shifts affect the whole floodway.

1. Mark out and confirm the site position with Environment Southland staff.
2. Natural ponds are not square or circular so you should excavate a pond with curves along the alignment of an old channel.
3. Bunds are left or are constructed to prevent dirty water flow into the river during construction.
4. Remove the overburden and stockpile away from flowing water.



5. Start the excavation at one end of the pond and work upstream or downstream. Dig a trench leaving an irregular bottom. Poor quality material can be left as islands or shallow areas in the pond. Edge details and bottom contours will be developed when the pond is finished off.
 - use existing bank vegetation to provide shade, cover and food.
 - excavate gentle side slopes and grade the banks into the pond.
 - leave tree trunks along the banks and place some in the pond to provide food and cover for fish and birds.
6. Overburden can be used to create shallow water wading shelves and islands.
7. If an excavation is carried out in stages over several years then:
 - each stage should be completed as if you are not coming back.
 - a bund should be left between construction stages to stop dirty water entering the river.
 - finish the edges and bottom before the bunds are removed.
8. Once the pond is completed, the bunds are removed or are allowed to breach naturally in flood flows. In this way, the sediment is dispersed into the river when natural sediment loads are high and the river is turbid.

The End Result

Pond excavations will restore important habitats.

The ponds have a range of depths and edge forms providing productive deep and shallow water habitats for native fish and trout and islands for waterfowl nesting and loafing. And you get high quality river gravel.



Contact Information

Environment Southland

Phone 03 215 6197
Toll Free 0800 76 88 45
Fax 03 215 8081
Email service@envirosouth.govt.nz
Website www.envirosouth.govt.nz

Catchment Management

Private Bag 90116,
Invercargill



Using Gravel Extraction To Restore Floodway Ponds

Floodway Ponds



River Management and
Flood Control

Restoring degraded
or lost river habitats.

Floodway Ponds

What are Floodway Ponds?

Floodway ponds are depressions in the floodway that are left behind following river channel shifts. They range greatly in size, depth and composition, from gravel bed to mud drapes.

Riverbed degradation, channel straightening, and bank protection can limit the development of ponds in the floodways of many Southland rivers.



Using gravel extraction to restore floodway ponds along rivers:

Environment Southland promotes gravel extraction techniques, which aim to restore river habitats degraded or lost by drainage, riverbank protection and flood control.

What should a Floodway Pond look like?

- The width, depth, and cross section shape are based on adjacent river channels
- The maximum depth will be about the same as the deepest part of the active river channel.
- This depth of pond will intercept sub-surface flows to keep the pond cool and clear and provide ideal aquatic habitat. "Drought Proofing" is provided where excavation is carried out 2-3 m below the general low water level.
- Natural river ponds tend to be relatively long and narrow. The maximum width is approximately the width of the active river channel at low flow.
- Floods greatly modify the abandoned channel form and develop extensive mud drape deposits, peninsulas and islands. Deep-water pools are retained, but tend to diminish in area with long term sediment deposition.
- The pond bed material will vary from exposed clean gravel sidebars and coarse gravel riffles to mud covered areas.

Ask yourself:

- Will I blend the overburden with gravel, use it to enhance farmland or riparian margins, or construct islands?
- Will the pond be created in one go or over several years?
- Who will supervise the gravel excavation and pond construction?
- What must be done to complete the pond once the gravel is excavated?

What should I do to create a Floodway Pond?

Select a suitable site

Habitat restoration programmes are self-funded so there has to be a market for the gravel and reasonable access to the site for the project to be financially viable. The challenge is to work with nature to construct a pond that can't be distinguished from a natural pond in a similar position in the river.

A good site will be one that:

- you would expect to find at that position and has similar ponds nearby.
- will behave like a natural pond when completed.
- you have permission to access the site, build a track, cart gravel or construct a stream crossing.
- has a good supply of quality gravel and room to screen, crush and stockpile the material.
- is secure from flooding, theft and vandals.

Plan before you dig

Before you start talk to Environment Southland staff about your design goals, site selection, technical viability and operational management.

If you plan to create a pond, you will need resource consent. Your application must show how you will avoid, remedy or mitigate significant adverse environmental effects such as bank instability, flooding problems, disturbing nesting sites and avoiding spawning times.





Guidelines to Backwater Construction

Backwater channels can be excavated along the edge of the floodplain (top channel previous page) and in the floodway (bottom channel previous page) where they would naturally occur.

1. Mark out and confirm the site position with Environment Southland staff.
2. Construct or use bunds to prevent the release of fine sediments during construction.
3. Remove the overburden and stockpile away from flowing water.



4. Start excavating from the downstream end and create a sinuous channel with a relatively uniform bottom;
 - use existing bank vegetation to provide shade, cover and food.
 - excavate gentle side slopes and grade the banks into the backwater.
 - leave tree trunks along the banks and place some in the backwater to provide food and cover for fish and birds.
 - let nature work on the details of the channel bed and banks.
5. Overburden can be used to create shallow water wading shelves and islands.
6. If an excavation is carried out in stages over several years then:
 - each stage should be completed as if you are not coming back.
 - a bund should be left between construction stages to stop dirty water entering the river.
 - finish the edges and bottom before the bunds are removed.
 - remove the bund to the adjoining backwater or river channel when the stage is completed.

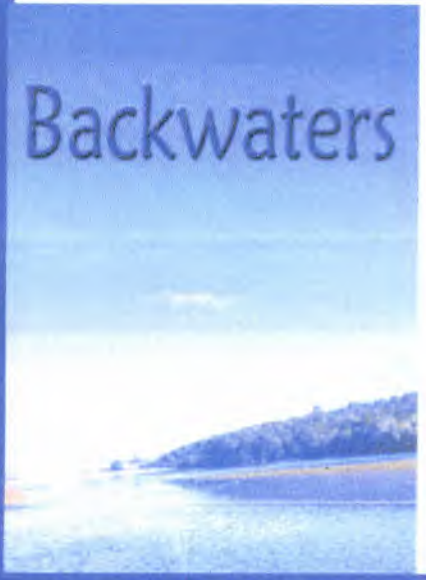
The End Result

Not only do backwaters provide high quality river gravel but they also reactivate and provide important habitat for birds feeding, nesting and loafing. The range of depths and edge forms provide deep and shallow water habitats for native fish and trout.



Contact Information	Catchment Management
Environment Southland Phone 03 215 6197 Toll Free 0800 76 88 45 Fax 03 215 8081 Email service@envirosouth.govt.nz Website www.envirosouth.govt.nz	Private Bag 90116, Invercargill 

Using Gravel Extraction To Restore A Backwater

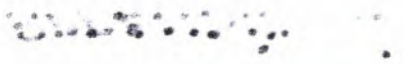


Backwaters

River Management and Flood Control



Restoring degraded or lost river habitats.



Backwater

What is a Backwater?

A backwater is an abandoned river channel that remains open to the river at the downstream end. During a flood, water can flow through the abandoned channel, but at low flows the gravel bars block the upstream end and prevent inflow except for some seepage.

Using gravel extraction to restore a Backwater

In the past, sediment starvation and riverbed degradation has limited the natural development of backwaters and have stranded or isolated many existing backwaters in the Southland lowlands. Backwater excavations will reactivate these important habitats.

Environment Southland promotes gravel extraction techniques which aim to restore river habitats degraded or lost by drainage, riverbank protection and flood control.

What should a Backwater look like?



- The width, depth, and cross section shape are based on adjacent river channels.
- The maximum depth is approximately the same as the deepest part of the active river channel.
- This depth of backwater will intercept sub-surface flows and keep the backwater cool and clear, as well as providing an ideal aquatic habitat. "Drought proofing" is provided where excavation is carried out 2 to 3 metres below the general low water level.

What should I do to create a Backwater?

Select a suitable site

Habitat restoration programmes are self-funded so there has to be a market for the gravel and reasonable access to the site for the project to be financially viable. The challenge is to work with nature to construct a backwater that can't be distinguished from a natural backwater in a similar position in the river.

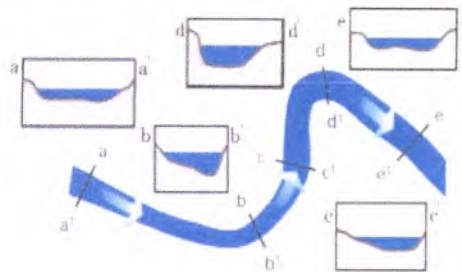
A good site will be one that

- you would expect to find at that position and has similar backwaters nearby.
- will behave like a natural backwater when completed.
- you have permission to access the site, build a track, cart gravel or construct a stream crossing.
- has a good supply of quality gravel and room to screen, crush and stockpile the material.
- is secure from flooding, theft and vandals.

Plan before you dig

Before you start talk to Environment Southland staff about your design goals, site selection, technical viability and operational management.

If you plan to create a backwater, you will need resource consent. Your application must show how you will avoid, remedy or mitigate significant adverse environmental effects such as bank instability, flooding problems, disturbing nesting sites and avoiding spawning times.



- The width is approximately the width of the active river channel at low flow.
- The cross sectional form will be the same as a natural channel. On a bend the outer bank is usually steep, and the inner bank is gradually sloping. In relatively straight sections the bed is more even.
- The backwater bed material will vary from exposed clean gravel sidebars to coarse gravel riffles and mud covered areas, which provide diverse habitats.

The illustrations above exaggerate the vertical scale and the variance in form that should be constructed.

Ask yourself:

- Will I blend the overburden with gravel, use it to enhance farmland or riparian margins, or construct backwater islands?
- Will the backwater be created in one go or over several years?
- Who will supervise the gravel excavation and backwater construction?
- What must be done to complete the backwater once the gravel is excavated?



South Island Riverine Birds – Breeding Timeframe

Prepared by: River Pathways Consulting for Te Anau Earthworks Ltd

Matrix 1 – Breeding periods – Months/Weeks

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Black-billed Gull									xxxx	xxx x	xxxx	xxxx
Black Fronted Tern										xxx x	xxxx	xxxx
Banded Dotterel								xxxx	xxxx	xxx x	xx	
Black Fronted dotterel	xxxx	xxxx							xxxx	xxx x	xxxx	xxxx

Matrix 2 – Egg incubation time periods - Days

Species	Days					Weeks						
Black-billed Gull	20-24											
Black Fronted Tern	25											
Banded Dotterel	26-27											
Black Fronted Dotterel	22-26											

Matrix 3 – Chick Fledge periods – Days/Weeks

Species	Days				Weeks							
Black-billed Gull	26											
Black Fronted Tern	1-3											
Banded Dotterel					5-6							
Black Fronted Dotterel	28											

Data Source: New Zealand Birds On Line in Partnership with Department of Conservation

APPENDIX 7

A Scoping Report prepared for key statutory agencies and Iwi. It is a draft document provided for information, discussion and consideration of possible revisions in advance of development of a formal application to Environment Southland for Resource Consent

Proposed Floodway Gravel Removal & Habitat Enhancement Activity By Te Anau Earthworks Ltd

Lower Mararoa River – Te
Anau Basin

Prepared by: River Pathways Consulting

1. Purpose

This Scoping Report (Report) provides the following listed statutory agencies and Iwi with data and information serving as a draft document relating to a proposal for a gravel mining activity on a section of the Lower Mararoa River by Te Anau Earthworks Ltd.

- Fish and Game – Southland Region
- Department of Conservation – Southland Conservancy
- Te Ao Marama Inc.
- Meridian Energy
- Land Information New Zealand
- Te Runanga o Ngai Tahu – Statutory Acknowledgements
- Environment Southland – Catchment Management Division

The proposed activity site is located along the outer edge of the cleared floodway path adjacent to the true right bank of the Lower Mararoa River some 3.60 km. downstream of the State Highway 94 Key Bridge.

This Report is specifically aimed as a 'Discussion Document' providing a partnership approach seeking positive input from key organisations to the activity proposed, in advance of preparation of a "Full Application" to Environment Southland (ES) for Land Use Consent permitting the activity.

Formal Written Approval and Sign-off following the formal identification process by ES of potentially affected parties, will form part of that process.

Prior to development of the Land Use Consent application, it may be beneficial and or necessary for each, or all of the key organisations to meet on-site to discuss and finalise possible areas of concern or needs identified following study and consideration of the proposed activity detail discussed in this Report.

2. Scoping Report - Feedback Sought

This Report being a discussion and feedback document only does not represent a formal application to ES for resource consent therefore, formal or informal approvals relating to the proposed activity discussed are not sought.

However, Te Anau Earthworks Ltd (the applicant) does seek constructive input and indications of agreement in principal from key organisations providing confidence to the applicant that the proposed activity discussed in this Report is generally compliant with plans, mandates, specific organisational and legislative responsibilities, associated with each

of the statutory agencies and organisations listed above, through adopting a collaborative approach to the proposal.

The depth and level of data and information discussed in this Report is limited to the proposed activity location, scale, basic design, limited morphology data and consent duration proposed.

A greater level of data and detail describing the activity, how it will be carried out and consideration of the effects of the proposed activity on environmental matters, river morphology, riverine birds and aquatic animals will be provided in the Resource Consent application report.

The Resource Consent application report will also include observed consideration and compliance with Statutory Plans (RMA, National, District, Regional, Organisational, Iwi) along with mitigation measures proposed in relation to any negative effects on the receiving environment and other areas for consideration.

3. Feedback Timeframe

Keeping the process moving forward in a timely manner, Te Anau Earthmoving Ltd propose a 20 working day feedback timeframe following receipt of this Report.

It is considered a 20 working day timeframe allows for study and consideration of the proposed activity, site inspections as requested, development and presentation of alternative options should changes be considered necessary, concluding with delivery of Feedback responses.

4. Further Information

Requests for further information or clarification regarding the proposed activity discussed in this report should be directed to:

- Ken McGraw
- River Pathways Consulting
38 Pisa Moorings Road
RD 3
Cromwell 9383
- Phone: H. 03 445 0516 or M. 0221 909 982
- Email: wild.trout@xtra.co.nz

5. Feedback Delivery

On completion of Feedback please address responses to:

- Te Anau Earthworks Ltd

PO Box 218 Te Anau

9640 Te Anau

Attention: Hannah Otene

- Phone: 03 249 9375
- Email: admin@teanauearthworks.co.nz

6. Location of the Proposed Activity

The general central location of the proposed activity is positioned approximately 1.86 km. downstream of Lagoon Creek confluence (3.6 km. downstream of S.H 94 Key Bridge) and along the mid to outer edge of the cleared floodway adjacent to the true right bank of the Lower Mararoa River

The proposed activity is made up of four separate components being:

- Site 1 – Floodway Pond – Surface Area: 4.174 ha.
Map Reference: NZTM E: 1194135 N: 4944419
- Site 2 – Processing Site – Surface Area: 0.817 ha.
Map Reference: NZTM E: 1195822 N: 4944386
- Site 3 – Temporary Stockpile Site – Surface Area: 0.726 ha.
Map Reference: NZTM E: 1195487 N: 4944362
- Site 4 – Through Flow Backwater Pond – Surface Area: 3.1 ha.
Map Reference: NZTM E: 1195167 N: 4944324

7. Maps and Plans

- Appendix 1 – Activity Locality Map.
- Appendix 2 – Land Boundary Map.
- Appendix 3 – Site - 1 Floodway Pond.
- Appendix 3A/1 – Site 1 - Floodway Pond – Cross Section & Elevation Profiles.
- Appendix 3A/2 – Site 1 - Floodway Pond – Longitudinal Section and Elevation Profile.
- Appendix 4 – Site 2 - Processing, Site 3 - Temporary Stockpile, Site 4 - Flow Through Backwater Pond.
- Appendix 4A/1 – Site 4 – Flow Through Backwater Pond – Cross Section & Elevation Profiles.

- Appendix 4A/2 – Site 4 – Flow Through Backwater Pond – Cross Section & Elevation Profiles.
- Appendix 4A/3 – Flow Through Backwater Pond – Longitudinal Section & Elevation Profiles.

8. Proposed Term for Land Use Consent

The proposed term for Land Use Consent to be sought for all activities is **10 Years**.

The rationale for a 10 Year timeframe is that as stated in the Deliverables section of this report, it provides Te Anau Earthworks with a degree of certainty to operate the proposed site in a progressive manner while having regard to production and delivery of community aggregate needs within a variable commercial demand environment.

The 10 Year timeframe also matches sustainability of the volume sought in terms of abundance of bed load supply in the operational reach of river bed, re-supply and aggradational behaviours throughout the lower section of the Mararoa River extending from the S.H Key Bridge downstream the gorge entry section at Mt York.

9. Proposed Total Volume of Material

- Site 1 - Floodway Pond Volume: 107,000m³
- Site 4 – Flow Through Backwater Pond Volume: 77,500m³
- Total Volume: 184,500m³

Provides for a minimum extraction of 18,450m³ of gravel per year over the maximum 10 year life of the proposed Land Use Consent.

Due to the nature of the aggregate supply industry being totally market demand driven, it is anticipated that annual extraction volumes may vary in the order of between 12,000m³ to 20,000m³ per construction year.

10. Abstract

Rivers transport sediment from eroding uplands to depositional areas throughout river systems as they flow to the sea. If the continuity of sediment transport is interrupted by dams, natural or uncontrolled features such as growth of woody weeds and trees, typically crack willows in New Zealand river systems cause major interruption to bed load mobility leading to aggradation issues and instability of river form and shape.

Such features may cause river beds to develop a perched characteristic in relation to surrounding land levels thereby becoming prone to avulsion, loss of river length and meander forms causing constant damage to pastures and assets through river breakouts even from the effects of even relatively small flow increases.

These behaviours are strongly evident of Te Anau basin river systems, particularly the Mararoa River, and receiving Waiau River system.

In essence, steep river systems with interrupted sediment transport characteristics become prone to erosion of the channel bed and banks, producing sideways migration, channel incision and meander length instability resulting in a coarsening of bed cobbles. That relates to a loss of spawning gravels for salmon and trout (as smaller gravels are transported without replacement from upstream. Point bars become shallow and frequently over topped by minor flow increases providing little useful safe habitat values for riverine nesting birds, particularly the critically endangered Black-billed Gull.

11. Preamble

The following provides a short history of negative and positive issues that have impacted the bed and values of the section of Mararoa River downstream of the State Highway 94 Key Bridge.

Also briefly discussed is the abundance of locked up bed load, and range of major beneficial river restoration activities that are presently occurring throughout the section of the Mararoa River bed over which the Te Anau Earthworks Ltd proposed gravel extraction activity is located.

This Report also provides evidence of the synergies associated with the proposed gravel extraction activities discussed and the river process and environmental benefits provided by the five year Lower Mararoa River Restoration Project capital works and on-going maintenance programmes co-ordinated and managed by Environment Southland (ES).

Those synergies relate to provision of a significant range of values and opportunities to future floodway management programmes, while at the same time provide focus and delivery of public and environmental benefit in conjunction with the natural re-development of the former multi-braid river form of the Lower Mararoa River within a cleared functioning floodway corridor supporting a vibrant river system surrounded by highly value farmland.

Working within and supporting those synergies is the importance of providing for a range of quality aggregate products to meet the needs of the Te Anau Basin commercial construction industry, rural and urban community and wider Southland region needs. A significant advantage of the proposed activity relates to the Te Anau Basin centralised location and acknowledged surplus of river run gravel.

Evidence of a major surplus of bed load and re-charge values was identified by Environment Southland through commissioning of Opus International Consultants to undertake an extensive all of river survey, preparation of a set of Proposed Restoration Project Specifications and Options Report for Council consideration.

Ensuring community involvement in the proposed restoration project, a Working Party was formed. Membership of the Working Party included Te Anau Basin rural and urban representation, stakeholders, Iwi and Environment Southland Councillors supported by Catchment Management Division engineering staff.

Following receipt of the Opus Project Specification and Report that detailed three Options for restoration of the Lower Mararoa River, a Special Project Design team was formed to assess the findings and Options. Using that assessment process, develop the final engineering phase for the restoration project and provide those options including recommendations to Council.

Those options were then subjected to the scrutiny of a Value Engineering Workshop held in Te Anau on 16 & 17 June 2005. That workshop process was offered and organised by Meridian Energy Ltd because of a number of concerns regarding possible negative impacts of the proposed project on the Manapouri Lake Control structure positions at the confluence of the Mararoa River.

The workshop attended by Meridian Energy and Environment Southland staff, advisers and community members, particularly those representing local groups involved with the project, the workshop delivered a unique opportunity to bring together a diverse range of people with different skills and interests to work together to resolve project issues and add value to the project through a collaborative effort.

The outcome from the workshop process was a proposal acceptable to all participants essentially being 'Option Two' of the Opus Report, being a river restoration proposal in line with a set of river improvement objectives established by the Mararoa Working Party.

Essentially that option provided for an urgent need to develop, construct and maintain a central cleared fairway designed to pass unobstructed a design flow of 600 cumecs while restoring the values the community placed on environmental, wildlife, recreational, and landscape values of the former braided Lower Mararoa River.

The design (Option 2) required complete clearance of the original fairway out to widths in the order of 300m to 350m and to maintain that fairway free of woody vegetation and obstructions.

Option two fairway design was based on historic flood flow data and allowing the former braided meander form to re-establish and actively migrate channel length within the proposed fairway limits whilst lessening risk of continuing avulsion to the east during high flow events.

Major design considerations with respect to encouraging active channel migration also focused on the various reaches of the river system where major aggradations of bed load had been identified. The potential risks to the Manapouri Lake Control structure associated with a sudden mobilisation of substantial volumes of stored bed load assessed as being in the order of **three million cubic metres** with further annual deposition in the order 115,000 cubic meters identified a very significant issue that required constant and on-going assessment, change response management and potential resolution.

The decision made with regard to and understanding and management of this major stored gravel issue would be through establishment of an extensive monitoring programme that

determined stored gravel movement trends and risks during and following completion of the project capital construction phases as a project requirement extending into the future.

The monitoring programme involved establishment of base line river cross sections and transect survey work at pre-set sites with re-survey at each site triggered by any flow event that exceeded 300 cumecs.

Note: The annual median flow of the Mararoa River recorded at the Weir Road hydrological station is in the order of 30 cumecs. That data includes flow input from the Whitestone River.

It is a fundamental requirement that management and extraction of sand and gravel from active river systems must be done on a full understanding of all of catchment inputs and change (natural and unnatural) characteristics basis.

River bed located activities such as gravel extraction that assists in restoring overall continuity of sediment transport throughout the system, promotes development of a naturally stabilised river form and shape within the surrounding land from while including strong environmental and wildlife value needs is a positive outcome within a vibrant river system clearly restrained by boundaries associated with flood protection schemes, agricultural production and hydroelectricity generation.

It is promoted that the Te Anau Earthworks Ltd proposed gravel extraction activity discussed in this Report will work in tandem with Natural River processes assisting in a small way to addressing the identified negative effects of the excess overabundance of previously locked up bed load.

Clearly the above discussions, survey and assessments regarding gravel over supply through unnatural factors plus further annual recruitment in the order of 150,000 cubic meters provides assurance that the proposed gravel extraction activity will provide a number of beneficial outcomes without negative impacts to channel morphology and wildlife habitat.

12. The Proposed Activity

The primary functions and purpose of the proposed activity discussed in this Report are:

- Provide Te Anau Earthworks Ltd with a commercial quantity of locally centralised sourced gravel and isolated processing and temporary stockpile site over a 10 year period.
- Provides security of supply of quality aggregate products to meet the needs of the Te Anau Basin community and wider regional needs.
- Provides elements of Floodway capacity maintenance and management at a no cost advantage to key stake holders and community river ratepayer groups.
- Provide elements of enduring habitat values for a range of riverine dwelling birds, waterfowl trout/salmon and aquatic animals.

- Provide elements associated with the on-going maintenance of the access road network thereby ensuring continuance of all-weather vehicle/cycle/foot access for recreation to the Lagoon Creek confluence reach of Lower Mararoa River.

13. Objectives

Undertake a bed load excavation and processing activity in a manner that complies with agreed conditions of consent while ensuring positive objectives discussed in the purpose of the activity are delivered.

14. Deliverables

The proposed activity will provide a number of benefits through delivery of the following:

- Provide for the continuing social, cultural and economic well-being of the community and construction industry through access to a reliable yield of quality river run aggregates.
- Provide a positive river management outcome with regard maintenance of an unobstructed and naturally functioning flood pathway.
- Provide new areas of improved habitat values for riverine dwelling birds, waterfowl and aquatic animals.
- Through a professionally managed gravel extraction and processing operation, work in synergy with natural river processes to enhance unique braided river character.

15. Management Statement

All components of the proposed activity discussed in this Report will be managed and delivered by Te Anau Earthworks Ltd.

Te Anau Earthworks are a well-established Te Anau based company. Owner Mr David Smith and staff employed by the company all being residents of Te Anau district.

Additionally Te Anau Earthworks is a company that continually demonstrates a sound understanding of the finite and fragile nature of sustaining sought after Valuable River based gravel supplies required for business continuance and community needs. Mr Smith also possess a strong belief in the value of sincere partnerships in terms of community and organisational focused beneficial outcomes provided by gravel extractive activities and its effects on water quality, environmental matters and riverine dwelling animals, particularly endangered species through working genuinely with key partners such as Fish and Game Southland, Department of Conservation, Land Information, Te Ao Marama representing Iwi and Environment Southland.

16. How the Works will be Carried Out

Provision of raw material via the proposed activity will be based on construction of two outer floodway margin ponds providing enduring habitat values on completion with an average depth of 3 meters.

The base of the ponds will be irregular and sloping outwards providing shallower edge margins for reason of providing a variable depth habitat for aquatic insects and fish.

All excavation will be carried out using hydraulic excavators. Excavated gravel will be loaded onto trucks for transport to the processing and temporary processing site, or immediate delivery to client markets.

Equipment located on the processing site will consist of a fully transportable screening and crushing plant and wheeled loader. No permanent structures will be placed on any part of the proposed activity site.

Note: The screening/crushing operation is a dry process, consequently no water take or discharge will be sought for the proposed activity.

Days/hours of work will be driven by market demands, but as a maximum the following is suggested.

- Monday to Friday – 7.00 am to 6.00 pm
- Saturday 8.00 am to 5.00 pm

Further ensuring mitigation of potential negative effects to the public enjoyment of the river system, work will not occur on the following days.

- Sunday
- Days of National significance
- Through the official Christmas holiday period.

The above Days/Hours of work are compliant with the Southland district Plan – Section 2.11 – Noise, Rural Zone – Section 3.1.

In terms of the habitats associated with Mararoa based riverine birds, should Black-billed Gulls, Banded Dotteral and Black Fronted Tern adopt the modified proposed activity site as providing favourable roosting and nesting habitat, the following protection is suggested:

- Cease gravel extraction operations within that extraction area;
- Mark out a 100 meter buffer zone around the nesting site;
- Cease all gravel extraction activities on Ste 1 - Floodway Pond and Site 4 - Flow Through Backwater Pond if a buffer zone of 100 meters cannot be established.

It is proposed that extraction will commence with construction of the Site 1 - Floodway Pond as Stage 1. See Appendix 1 and Appendix 3.

Construction of the Site 4 - Flow Through Backwater Pond will not commence until all extraction volumes and pond batter slope shaping at Site 1 have been completed.

That approach will ensure that habitat values and opportunities associated with 50% of the proposed activity will be fully realised within a 4 - 5 year time frame. Following completion of Stage 1 it is suggested that monitoring of habitat values be undertaken so that possible improvements to those values may be incorporated into construction of the Site 4 Pond.

17. Mararoa River Setting

The Mararoa, Whitestone and Upukerora Rivers rise in the National Park to the east of Lake Te Anau and the Waiau River.

RJ Hall GHD {24 February 2009 Briefing Paper: Environment Southland, Gravel Management, Te Anau Basin Rivers} describes these rivers as having a form which is characterised by a mobile gravel bed, which has both braiding and meandering tendencies. Since the close of the Otiran Glaciation some 10,000 years ago they have cut down through lateral moraines and piedmont gravel deposits so that over a significant part of their course they are entrenched. Elsewhere, beyond the entrenched reaches the rivers are lodged on alluvial plains formed from the erosion of these old moraines and piedmont gravel deposits.

Gravel sources for these rivers are essentially bed and bank deposits within and immediately adjacent to the active river beds. Episodic erosion processes result in non-uniform passage of material through the river systems. This type of activity results in a slow migration of the active river system across the valley floor.

RD Sutherland {1995 Mararoa & Whitestone Catchments Sediment Source & Management Opportunities Report} {Ref 12.} describes in some detail the erosion processes operating in the two catchments included in this study. The processes he describes are equally relevant in the Upukerora River catchment. It is notable that a distinction is made in the Sutherland study between the sources and behaviour of coarse bed load materials as opposed to the suspended sediment component. He attributes high suspended sediment yield to out of river sources rather than in river sources.

Appendix 1 of this briefing paper provides a review of this earlier work by G. Williams and RD Sutherland and places it in an expanded sediment source context which looks at sediment generating mechanisms on a Te Anau Basin wide basis with reference to driving mechanisms such as seismic and aseismic phenomena.

The sands and gravel historically won by commercial operators in these three river systems have been favoured over out of river deposits because of the ease of extraction, proximity to end use, aggregate quality {strength, grading, durability} and its relatively clean composition. Whilst out of river sources have been used in the past this has tended to be an option of second choice and quality.

Out of active/flowing river extraction has been favoured by agencies such as Southland Fish and Game Council because it avoids interference with the active river bed and can provide quality riparian habitat for both fish {refuges where river reaches are ephemeral} and game birds for example. {End}

Steven Leddington, Environment Southland Water Resources Scientist, in his 2007 Overview of Gravel Extraction in Southland Section 2.6 discusses River Restoration and Rehabilitation through carefully managed gravel extractions.

Extracting gravel away from the active river channel means active channel gravel bars and channel stability can be maintained or enhanced (Hudson 1997a). The restoration of lost riverine features also allows for the creation of new habitat for aquatic species and also waterfowl. Aesthetical and recreational values can also be enhanced with these projects.

Restoring riverine features using gravel extraction projects away from point bar skimming/re-shaping can be difficult as it is obviously harder to assess underlying aggregate volume and quality compared to recent surface beach and bar deposits. This and the issue of excessive overburden are the major problems when mining away from the active riverbed. Conditions such as the suitability of material, location (how close the extraction site is to where the material will be processed and used), and of course the amount of material available, all affect where it is decided to mine.

The following riverine features are examples of habitats that can be restored or rehabilitated in conjunction with gravel extractions away from the active river channel (Hudson, 1999).

Floodway Ponds: These are excavated as deep water habitats, generally on inner river bends (e.g. gravel point bars) Floodway ponds are prone to flood several times a year. They can also be constructed higher on the floodplain where flooding is infrequent. Ponds may be connected with a cut to the river channel or stream.

Floodway pond habitat, although prone to change due to frequent flood inundation, can provide loafing areas for waterfowl and wading birds. Fish species are provided with areas of refuge in times of very low flow, especially if a pond is well connected to the active river channel.

Oxbow Lakes/Ponds: These provide deep still water or slow flowing pond habitat in an abandoned meander loop. Oxbow lakes are naturally formed through the meandering nature of a riverbed, but many oxbow lakes have been lost from lowland Southland rivers. Oxbows are excavated in abandoned river channels along the floodplain margin or in the floodway and can be inundated several times a year. These habitats are often connected to the river by a small channel or marshy depression.

Restored oxbow lakes and ponds can provide ideal habitat for various fish species, game birds and wading birds. As oxbow habitats are less frequently flooded, surrounding vegetation is more prominent and plantings can be undertaken to further enhance the habitat.

Backwaters: These form as point bars build up and migrate downstream and with channel shifts cutting of a loop in the river. In Southland, much backwater habitat has been lost or diminished through sediment starvation and bed degradation. Backwaters are connected to the active river via a downstream channel and are frequently flooded.

Various forms of backwaters cater for a range of wildlife forms. Backwaters on floodplains provide ideal habitat for wading bird species. Well established oxbow backwaters also present ideal habitat for waterfowl species. The deep and shallow characteristic of backwaters generates a productive habitat for both native fishes and trout.

Channels: There are a variety of channel forms (channels, side channels, river engineering channels and floodway channels) that can be excavated for differing purposes. Channel cuts can be made to produce particular habitats, such as protected breeding colonies for riverbed nesting bird species or create ideal habitat for fish species. Channel cuts are also made to rectify river engineering problems, such as diverting a river course to reduce erosion on vulnerable banks, or protect infrastructure.

Channel excavations often produce three distinct benefits: providing aggregate, protecting infrastructure and also creating habitat. {End}.

Best Management Practice (BMP): Environment have developed a series of BMP's in pamphlet format providing valuable information for contractors and farmers, specifically in relation to gravel extraction from riverbeds. It is proposed that the recommendations and information provided by those BMP's will be used as guiding material for development of the floodway pond construction relating to the Te Anau Earthworks Ltd proposed activity discussed in this Report.

The Proposed Activity: It is considered the proposed activity in terms of description closely fits with Floodway Ponds positioned at a higher level along the outer margin of the floodway and some distance (30 – 40 meters) away from the active channel.

Construction of the proposed activity ponds also provides a mix of the various styles, configuration and habitat opportunities/values of all four gravel extraction styles described above.

As both of the proposed activity ponds sit within historic abandoned river channels, a series of old former flood gutters and flow break-out channels run longitudinally through both sites. In terms of river flows these can be best described as Ephemeral with intermittent flows only present during increased river flow values. This feature provides opportunities for possible through pond refresh flows and natural connection with the main river flow thereby providing a number of increased habitat values.

Generally flow into both ponds will be provided by through gravel flow with pond levels fluctuating in response to river flow levels.

The position of the two pond extractive proposal delivers all of the environmental attributes associated with enduring fish and water fowl habitats away from flowing water and without

disruption to existing habitat for riverine birds, particularly the critically endangered Black-billed Gull, Banded Dotterel and Black-fronted Tern.

It is noted none of the above riverine bird species have historically been or, are currently present in the vicinity of the proposed gravel extraction ponds or processing and temporary stockpile sites. That is possibly due to the proposed sites being positioned a significant distance from active flowing braids and clean gravel bars. Instead located along the outer edge of the cleared floodway where ground cover consists of thick tall grasses being habitat unsuitable for riverine birds.

Historically a very large colony of Black-billed Gulls of 1,000 + adults have annually been observed and studied during nesting on a series of centre of flow clean gravel bars immediately downstream of the SH 94 Key Bridge.

This significant colony was officially counted as part of 2004 – 2006 research carried out by Rachel McLellan as part of her PhD Thesis on the Ecology & Management of Southlands Black-billed Gulls.

This research included assistance, funding and involvement of Department of Conservation, Environment Southland and the Waiau River Catchment Liaison Committee.

With exception of a large breeding colony of Black-billed Gulls annually using Meridian Energy developed nesting habitats located at the Waiau and Mararoa Rivers delta immediately upstream of the Lake Manapouri Control structure, no other colonies of Black-billed Gulls have been observed as nesting on the various reaches of the Lower Mararoa River.

18. Effects on Rural Residents and Recreation

Since completion of the Lower Mararoa River Restoration Project, recreation values over the river environment downstream of the SH 94 Key Bridge are held in high regard due to establishment of access of a standard suitable for family cars and the riverbed free of impenetrable woody vegetation and crack willows thereby providing for a wide range of family focused activities including:

- Kayaking
- Swimming
- Picnics
- Jet Boating
- Angling
- Hiking
- Water fowl hunting

The Mararoa River in particular is known for its world class fly fishing for large wild rainbow and brown trout within an 360 degree backdrop of stunning scenery and world class wilderness experience.

In terms of potential visual effects on nearby residents and tourists using the areas highway networks, all phases of the proposed activity are totally out of site being immediately below a 30 + meter high terrace riser to the west and expansive river plain linking to productive farmland along the base of the Takitimu Mountain Range to the east.

The nearest rural residence to the east is some 3.2 km. and a distance of 2.2 km. to the west of the proposed activity.

The closest community activity is the Mararoa School with a roll of 44 year 1 – 8 students, 5 teachers and office support. The school is located some 800 meters east of the Key Bridge and adjacent to SH 94.

The distance of the Mararoa School from the Southerly located proposed activity site is 6.5 km.

Generally effects from the proposed activity on the surrounding environment and rural residents can be best described as fully positive particularly with regard to on-going improvements and maintenance of the already present quality of river access established as part of the Lower Mararoa River Restoration Project.

19. Noise

Noise will be generated by machinery working on site. This will include hydraulic excavators, loaders, processing (screening/crushing) and truck movements entering and exiting the site.

All machinery units are of modern design in terms of age and noise suppression equipped being fully compliant with commercial machinery noise limits when operating close to urban and rural residential environments.

Specifically noise generated by machinery operating at the proposed activity will comply with the noise rules defined by the Southland District Plan (Appeal Version – September 2016) Section 2.11 – Noise, Rural Zone – Section 3.1.

Objective NSE.1 – To control the adverse effects of noise emissions and manage the potential for conflict between land use activities.

Policy NSE.2 – Avoid, remedy or mitigate reverse sensitivity affects arising from noise emissions.

Due to the below terrace riser position of the proposed activity, all noise generated will be muffled to the immediate vicinity of the activity.

20. Landscape Values

The Mararoa River although generally occupying a wide modified floodplain upstream and downstream of the proposed activity site, the river remains largely a natural and reforming

natural meandering form without the high levels of intervention work associated with erosion control, flood banking schemes and river control works found in the mid to lower reaches closer to large rural towns and Invercargill City.

With exception of the 18 km. reach extending downstream from the SH 94 Key Bridge to the gorge at Mt York, restraints to river form are generally limited to natural elements associated with geology and landform.

Although surrounded by intensive beef, sheep, deer and dairy farming operations, the landscape is spectacularly scenic, a natural place that gives a feeling of being barely touched by civilisation and wild at heart.

The proposed activity site sitting within this landscape requires a significant degree of care to ensure natural values of the river landscape are not spoilt while at the same time providing a district needed resource.

Having regard to the location of the proposed activity within the environment discussed above, Mr Smith fully understands his obligations to respect and care of such a special environment.

21. Legal Status of Land within the Activity Area

Land tenure at the proposed activity site is Crown Land is shown on Appendix 2 as being:

- Extraction ponds – Hydro managed by Land Information New Zealand
- Processing and Temporary Stockpile site – Land managed by Department of Conservation
- Access Road – Special reserve managed by Department of Conservation

22. Status of the Proposed Activity

The proposed activity discussed in this Report is not new. Persons and organisations who have been approached by commercial, casual contractors and farmers seeking gravel from river based sources, and having consulted with Environment Southland Catchment Management Division river managers about gravel extraction activities and how they may be linked to beneficial outcomes for river management, and in most instances generally promoted as providing enduring environmental outcomes will be familiar with them.

The type of activity discussed in this Report requiring authorisation, are based on the provisions of the Resource Management Act 1991 (the Act) and Regional, National, Iwi Plans specifically:

- RMA Section 13 – Restrictions on certain uses of the beds of lakes and rivers
- Regional Water Plan for Southland 2010
- Southland Water and Land Plan 2018

- Southland Regional Policy Statement 2017.
- Regional Air Quality Plan 1999 and Revisions. Stage 1-2016 and Stage 2-1999.
- Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007.
- Conservation Act 1987.
- The Cry of the People Tai Tangi a Tauira – Ngai Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008.

23. References

- Hall RJ. Of GHD Ltd. February 2009 - *Briefing Paper: Gravel Management, Te Anau Basin Rivers* - Environment Southland.
- Leddington S. February 2007 - *An Overview of Gravel Extraction in Southland* Environment Southland Publication No. 2007-01. 20 pages.
- Hawkes R. April 2013 – *Briefing Paper Mayoral Forum – Topic: Aggregate Supplies Te Anau Basin Area* - Environment Southland Regional Services Committee September 2013 Meeting Paper.
- Williams G. 1990 – *Whitestone River Management Study* – Environment Southland.
- Sutherland RD. 1995 – *Mararoa & Whitestone Catchments Sediment Source & Management Opportunities Report* – Environment Southland.
- Environment Southland – Best Practice Pamphlet – *Using Gravel Extraction to Restore Floodway Ponds*.

24. Conclusion

It is hoped this Report provides a clear description of the gravel extraction activity proposed by Te Anau Earthworks Ltd, potential impacts and beneficial outcomes with regard to community values and environmental footprint within a need for provision of a commercial supply of quality gravel products instrumental in the well-being and growth of the Te Anau Basin community and wider Southland region.

Working within a strong desire to a genuine partnership and consultative approach to the proposed activity discussed in this report, Te Anau Earthworks Ltd looks forward to receipt of constructive feedback providing the platform for achievement of positive outcomes as a result of the activity.

It is also hoped that provision of this Scoping Report assists in a smoother balanced formal resource consent application process.

David Smith

Owner/Operator

Te Anau Earthworks Ltd

Report Dated: 15 February 2019

wild.trout@xtra.co.nz

From: Jacob Smyth <jacob.smyth@southlandfishgame.co.nz>
Sent: Monday, 25 February 2019 12:19 PM
To: wild.trout@xtra.co.nz
Cc: Bill Jarvie
Subject: Te Anau Earthworks - Gravel extraction from Lower Mararoa River bed

Good afternoon Ken

I hope this message finds you in good health and spirits.

Thank you for your recent letter (received 22 February 2018) enclosing a scoping report on behalf of Te Anau Earthworks to extract gravel from the Lower Mararoa River bed. In response, I have passed a copy of the scoping report onto Bill Jarvie to get his feedback on the matter in the first instance with a view to us providing written feedback within 20 working days as sought. As you will be aware, there is a long history of gravel extraction and catchment management reports / issues in relation to the Lower Mararoa River catchment.

Regards

Jacob Smyth
Fish & Game - Southland

From: Bill Jarvie <bill.jarvie@southlandfishgame.co.nz>
Sent: Tuesday, 12 March 2019 3:20 PM
To: Hannah Otene
Cc: Jacob Smyth; Ken McGraw
Subject: Proposed Floodway Gravel Removal & Habitat Enhancement – Lower Mararoa River

Hello Hannah
Any feed back from our response would be welcome.
Cheers
Bill

Te Anau Earthworks Ltd
PO Box 218
TE ANAU 9640

Attention Hannah Otene

Proposed Floodway Gravel Removal & Habitat Enhancement – Lower Mararoa River

Thank you for the opportunity comment on the Scoping Report prepared by River Pathways Consulting with regard to Te Anau Earthworks' proposed gravel excavation and habitat creation in the lower Mararoa River.

The scoping report indicates to us that Te Anau Earthworks has looked for options to work with the dynamic river environment, identify appropriate sites, and tailor its operation to fit. We would welcome the opportunity to provide practical input to refine the proposed excavations and increase the likelihood of valuable 'enduring' habitat creation being realised.

We anticipate that the professional approach that Te Anau Earthworks has previously displayed would continue when exercising any consent issued for this activity. We would however seek stringent, enforceable conditions regarding the ongoing state and extent of operational areas (excavations, and storage and processing), and public river access throughout the period of any consent.

In anticipation of being able to contribute to developing greater detail we will restrict our comments to the following:

- Site 1: Floodway Pond
This site will most likely be subject to periodic inundation from river flooding requiring an excavation/management strategy to be developed in anticipation of this.
The site is bisected by a slow moving stream which will influence how excavations will be undertaken.
- Site 4: Flow Through Backwater Pond
The Scoping Report states that excavation at Site 4 will not commence until Site 1 has been completed and finished. We agree with the benefits the Scoping Report identifies with this approach. Larger flood flows will likely inundate this site. As per comments for Site 1, strategies to accommodate these would be necessary.
The report does not describe what connection the permanent stream channel that bounds the northern edge of Site 4 would have with the excavation, both during excavation and when completed. It will be important to maintain the existing values of this stream.

We look forward to being able to contribute to the development of the 'greater level of detail' referred to in your Scoping Report. In particular 'the effects on environmental matters, river morphology' etc.

Yours sincerely
Bill Jarvie

Bill Jarvie

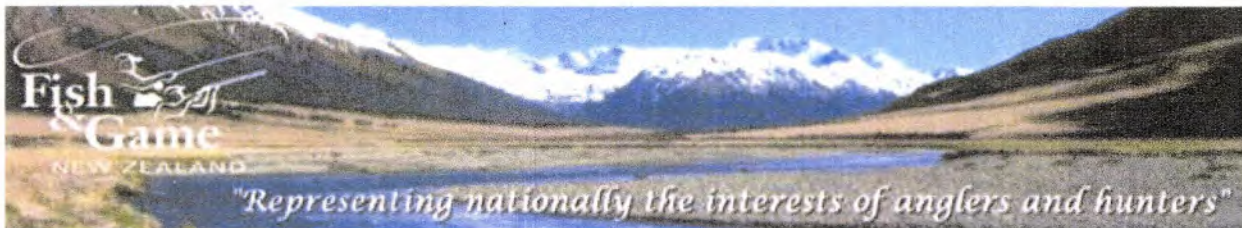
Southland Fish & Game (Te Anau Office)
Fish & Game New Zealand



178 Te Anau – Manapouri Highway | RD1, Te Anau 9679

P +64 3 249 8249 | M 021 540 821 | F +64 3 249 8249

E bill.jarvie@southlandfishgame.co.nz | W <http://southland.fishandgame.org.nz/>



wild.trout@xtra.co.nz

From: Phoebe Shaw <pshaw@doc.govt.nz>
Sent: Wednesday, 15 May 2019 9:45 AM
To: wild.trout@xtra.co.nz
Cc: admin@teanauearthworks.co.nz
Subject: RE: RC 000149 Te Anau Earthworks Limited (Pre-application)

Kia ora Ken,

Thanks for the update. Sorry for my delayed response – I have been out of the office quite a bit this last couple of weeks!

That all sounds reasonable to us.

Re matters relating to access across Conservation Land or any activity taking place on Conservation land, please get in touch with a Permissions Advisor in Dunedin regarding how best to progress that requirement – local office will input any local/operational context for them during the process. Sometimes affected party approval is put on hold, so the two processes line up, so best get that ball rolling.

Permissions Advisor (Support)
Ph +64 3 477 0677
Email: permissionsdunedin@doc.govt.nz

Any questions, please let me know.

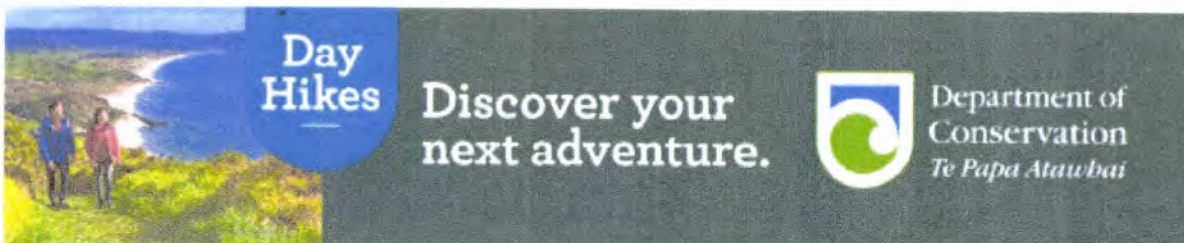
Ngā mihi,

Phoebe Shaw
Ranger, Community - *Kaitiaki, Ao Hāpori*
Department of Conservation—*Te Papa Atawhai*
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From: wild.trout@xtra.co.nz <wild.trout@xtra.co.nz>
Sent: Wednesday, 1 May 2019 10:58 a.m.
To: Phoebe Shaw <pshaw@doc.govt.nz>
Cc: admin@teanauearthworks.co.nz
Subject: RE: RC 000149 Te Anau Earthworks Limited (Pre-application)

Hello Phoebe

Thank you for the valuable feedback.

I am now in the process of finalising the formal application and supporting report to Environment Southland and distribution with Affected Party Approval forms to key stakeholders.

Regarding the departments preferred design of the floodway ponds, unfortunately investigations of the site in advance of the current design found that the area does not lend its self to development of a true oxbow shape pond that are generally residual former cut off river bed. That being the case, Environment Southlands Brochure 'Guidelines to Floodway Pond Construction' has been utilised to develop the proposed ponds that will end with a soft shape that best fits with the surrounding environment, but needing to remain within the pond layout plan dimensions and volumes. David Smith (Te Anau Earthworks) has indicated that he is very happy to work with key stakeholders regarding the desired final shape of the ponds as part of the consent process.

Your comments regarding culverts over ephemeral waterways dry or otherwise is very valid. Approval for placement/removal of the necessary culverts will be included in the consent application.

Matters relating to access across Conservation Land will be dealt with separately and outside of the Environment Southland consent process. I suggest that as soon as the consent application is lodged with Environment Southland, David Smith and myself will contact you regarding how best to progress that requirement.

For information – Allowing Te Anau Earthworks to occupy Crown Land administered by Land Information New Zealand a Section 165 Licence (licence to occupy) will be required. LINZ request that application for the S165 licence be made on receipt of the consent for the activity.

Best Regards
Ken McGraw
River Pathways Consulting

From: Phoebe Shaw <pshaw@doc.govt.nz>
Sent: Tuesday, 30 April 2019 2:43 PM
To: 'Kenneth McGraw' <wild.trout@xtra.co.nz>; admin@teanauearthworks.co.nz
Subject: RE: RC 000149 Te Anau Earthworks Limited (Pre-application)

Kia ora,

I have some additional feedback from our Biodiversity Rangers and also some feedback from one of our RMA planners.

It looks like the proposal is heading along the right track, and we are mostly pretty happy with the application. Planning comments were to make sure you have culverts over ephemeral waterways or only cross them when they are dry. The concern is around access and how the applicant will manage stream crossings and ephemeral streams when they emerge.

Preferred design of the floodway pond is of an oxbow shape – it would be preferable for it to form a natural oxbow shape.

Other than this we think the provisions for birds and other biodiversity appear acceptable.

Regarding access across any Conservation Land, have you looked into what is required for this re additional Concession requirements eg. an Easement?

We shall await the full final application for any final comments, and be in touch then re Affected Party Approval.

Hope this finds you well.

Ngā mihi,

Phoebe Shaw

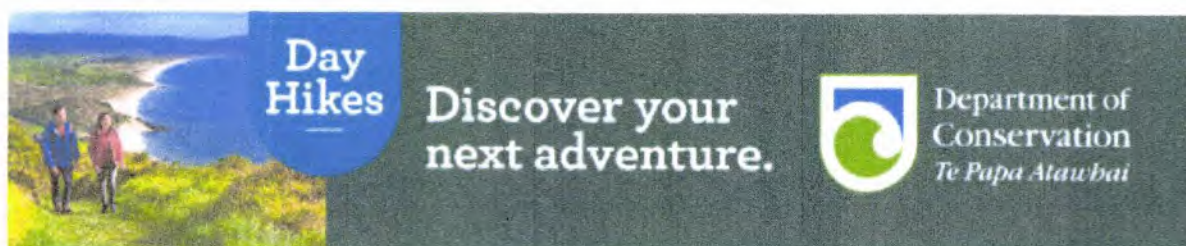
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Te Anau District Office

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From: Phoebe Shaw

Sent: Friday, 29 March 2019 1:21 p.m.

To: admin@teanauearthworks.co.nz; 'Kenneth Mcgraw' <wild.trout@xtra.co.nz>

Subject: RC 000149 Te Anau Earthworks Limited (Pre-application)

Kia ora David,

Just touching base as we had a meeting to discuss the scoping report this week.

I understand you're seeking feedback from DOC on the content of the report and the assessment of environmental effects.

At this stage we really do require a more detailed proposal and Assessment of Environmental Effects so we can provide some more concrete feedback.

We provided initial comments last year from district office and advice from a freshwater advisor. One of our Biodiversity Rangers is going to provide some additional feedback early next week, but we cannot provide agreement in principal etc until we have more information.

A thorough Assessment of Environmental Effects/EIA, an assessment of the application against the planning mechanism that has required the activity to have a consent and any proposed conditions will help us in this review.

I will get back to you with any additional comments next week.

Ngā mihi,

Phoebe Shaw

Ranger, Community - *Kaitiaki, Ao Hāpori*
Department of Conservation—*Te Papa Atawhai*
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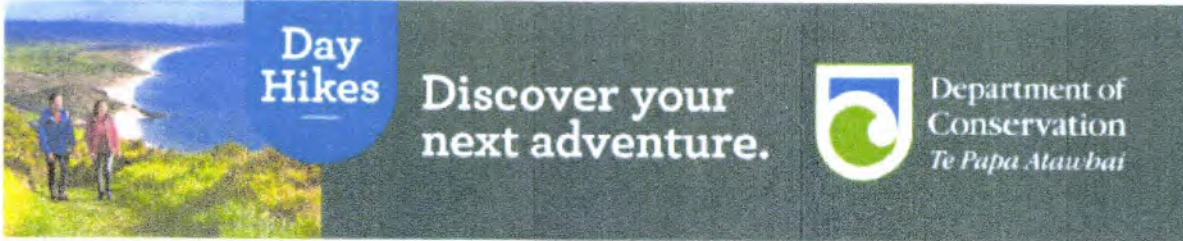
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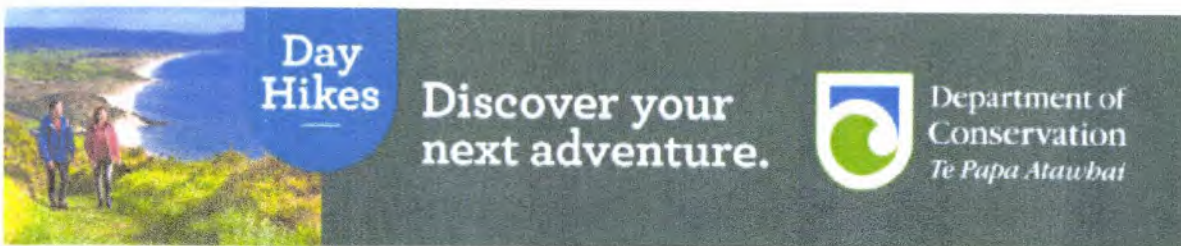
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Phoebe Shaw

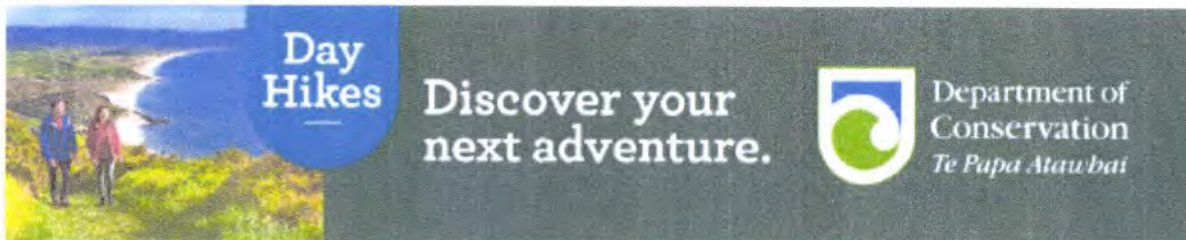
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meridian

26 March 2019

Te Anau Earthworks Ltd
PO Box 218
Te Anau 9640
Attention: Hannah Otene

Dear Hannah,

Proposed Gravel Extraction Project – Lower Mararoa River – Te Anau Earthworks Ltd.

Thanks for the opportunity to provide feedback on the proposed application prepared for Te Anau Earthworks, prior to lodging. The document has been reviewed by Meridian's Tim Mills, a qualified Civil Engineer, who has oversight of Meridian's structures and activities in close proximity to Meridian's structures.

Meridian provides the following feedback to the proposed gravel extraction for Te Anau Earthworks Ltd in the Lower Mararoa River.

1. Regarding the information provided, the details of the activity are helpful, but it would be beneficial if the proposed areas are labelled with regularly used terms, for example the 'floodway pond' and 'flow through backwater pond' are proposed 'gravel mining areas'. In addition, more information is needed on the excavation depths of Site 1 and 4, and stockpile volumes should be provided. There is no indication of how long 'temporary' is for the processing and temporary stock piling and the appendices are difficult to follow.
2. Regarding the activity, Meridian's feedback is focused on the impact of the gravel extraction on the downstream Manapouri Lake Control Structure. The key considerations are in relation to the implications of sediment and the release of particulates, the mobilisation of mined/processed gravels in time of flood, and any possible oil or other contaminant releases or spills.
3. Meridian has to comply with resource consent conditions in relation to turbidity readings of the Mararoa River that have implications on flow levels or releases through the Manapouri Lake Control Structure (MLC). Careful consideration needs to be given to the proposed works in relation to affecting or increasing the turbidity readings of the Mararoa River at Cliffs site (above the Weir bridge and MLC). There needs to be close management of the proposed works, so that there is no effect on turbidity readings at this site.
4. Meridian notes that all proposed activities are within the riverbed or fairway. The stockpiles and mined gravels are at risk of back flow and mobilising during flood events and causing implications for MLC and Meridian's operations. A high-level management plan, which covers day-to-day operations, activities in river fairway and management between working periods needs to be included. This should also address matters, including but not limited to, minimisation of exposed working areas, the restoration of the works areas, how the site will be left between mining activities (including but not limited to machinery locations), and storage and management of hazardous substances.

Meridian's Tim Mills and I are happy to be contacted to discuss any of the matters above. Tim's contact details are tim.mills@meridianenergy.co.nz, Phone; 03 435 9317, Mobile; 021 408 201 and mine are at the bottom of this letter.

Kind Regards,

Catherine Bryant
Environmental Specialist

cc: Chris Thomson (chris.thomson@meridianenergy.co.nz)

Meridian Energy Limited

287 – 293 Durham Street
PO Box 2146
Christchurch 8140
New Zealand

Phone +64-3 345 9039

Mobile 027 416 1126

catherine.bryant@meridianenergy.co.nz

APPENDIX II

wild.trout@xtra.co.nz

From: admin@teanauearthworks.co.nz
Sent: Tuesday, 19 March 2019 9:09 AM
To: wild.trout@xtra.co.nz
Subject: FW: Proposed Gravel Extraction Project - Lower Mararoa River

Good morning

Please see below.

Thanks

Hannah Otene



From: Catherine Bryant <Catherine.Bryant@MeridianEnergy.co.nz>
Sent: Tuesday, 19 March 2019 8:42 AM
To: admin@teanauearthworks.co.nz
Cc: Chris Thomson <Chris.Thomson@MeridianEnergy.co.nz>
Subject: Proposed Gravel Extraction Project - Lower Mararoa River

Good Morning Hannah,

I am writing to inform you that Meridian Energy is providing feedback on the proposed gravel extraction project in the Lower Mararoa River.

I was hoping to have this feedback to you by the 20 working day period (requested in the feedback letter) but with the recent events in Christchurch and a couple of staff away, I unfortunately haven't managed to get the feedback completed by today.

However the feedback is close to completion and I should hopefully have it to you by Thursday at the latest.

Please let me know if there are problems with this and I will be in touch shortly with the feedback.

Kind Regards,
Catherine.

Catherine Bryant – Environmental Specialist

Meridian Energy Limited

287 to 293 Durham Street, Christchurch 8013.

wild.trout@xtra.co.nz

From: Stevie-Rae Blair <stevie@tami.maori.nz>
Sent: Tuesday, 19 March 2019 3:24 PM
To: 'wild.trout@xtra.co.nz'
Subject: Te Anau Earthworks application

Kia ora Ken,

Thank you for sending through the proposed activity on the Lower Mararoa River by Te Anau Earthworks.

I have had this with rūnanga and we have some feedback for you. Rūnanga are in principle okay with the proposed activity. We would ask that we would see the consent application when it is ready to be lodged and potentially a site visit would be undertaken. One thing pointed out was that the sites that are historic channels – I assume that they will be worked backwards when developing? As this will limit any sediment discolouration if there was rainfall that makes the channels run with freshwater?

I look forward to hearing from you.

Kia tū tō mana,

Stevie-Rae Blair

Māori Environmental Advisor

Ph: (03) 9311242

E: stevie@tami.maori.nz

Please note I work Monday, Wednesday, Thursday and Friday from 9am-3pm and Tuesday 9am-5pm



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wild.trout@xtra.co.nz

From: Simpson-Wells, Poppy <Poppy.Simpson-Wells@colliers.com>
Sent: Thursday, 21 February 2019 4:03 PM
To: wild.trout@xtra.co.nz
Subject: Proposed Gravel Mining Project, Lower Mararoa River - Te Anau Earthworks

Hi Ken,

We received the 'scoping report' for Te Anau Earthworks limited.

It appears that 1.5 of the sites are located on part bed of Mararoa River which is Crown land administered by Land Information New Zealand.

A Section 165 Licence is required prior to extracting on LINZ land. This usually aligns with the term of the associated Resource Consent. There is an annual fee of \$195 associated with a Section 165 Licence along with an annual fee which is calculated based on the quantity of gravel removed, expanse of area occupied and general impact of the activity on the land.

We do not see any obvious reasons at present why your client would not be able to obtain a Section 165 Licence, however we are required to consult with DoC on all applications who assess whether the land has any conservational values that should be protected.

Please let me know if you have any queries.

Kind Regards,

Poppy Simpson-Wells

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wild.trout@xtra.co.nz

From: Jim Veint <jim.veint@es.govt.nz>
Sent: Monday, 18 March 2019 8:59 AM
To: 'Kenneth Mcgraw'
Subject: Te Anau Earthworks - Proposed Gravel Extraction - Mararoa River.

Hi Ken.

I took a look at the gravel sites on Friday, and don't have any great problems with them.

I do wonder however as to why you are going so far down the river, when there is piles of material out at the originally proposed site opposite the stockpile area [where KDM later put a bloody picnic site notice].

I would just hope that Smithy doesn't get started, and some clever person applies for – and gets a handier site.

Jim Veint.

Jim Veint

Works Supervisor

Environment Southland *Te Taiao Tonga*

P 03 211 5115 | DDI 03 211 5417 | M 027 223 4840

Cnr Price St & North Rd, Private Bag 90116, Invercargill 9840

jim.veint@es.govt.nz | www.es.govt.nz | facebook.com/enviromentsouthland

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Application for Resource Consent (PART A)



This application is made under Section 88 of the Resource Management Act 1991

The purpose of this Part A form and the relevant Part B 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 Environment Southland reserves the right to request additional information.

To: Environment Southland
Private Bag 90116
Invercargill 9840

Full name, address and contact details of applicant (in whose name consent is to be issued)

Name: Te Anau Earthworks Limited

Address: PO Box 218, Te Anau, 9640
Attention: Hannah Otene

Email: admin@teanauearthworks.co.nz

Phone: 03 249 9375 0275 249 025 Fax: _____
Preferred Additional

Date(s) of birth: _____

Consultant contact details (if different from above)

Contact name/agent: River Pathways Consulting

Address: 38 Pisa Moorings Road, RD3, Cromwell, 9383
Attention: Ken McGraw

Email: wild.trout@xtra.co.nz

Phone: 0221 909 982 03 445 0516 Fax: _____
Preferred Additional

Please tick the box for the consent(s) you are applying for and complete the relevant Part B form(s) where available:

Land Use	Discharge	Coastal
<input type="checkbox"/> Bore/well	<input type="checkbox"/> To air	<input type="checkbox"/> Whitebait stand
<input type="checkbox"/> New or expanded dairy farming	<input type="checkbox"/> To water	<input type="checkbox"/> Structures/occupation of space
<input type="checkbox"/> Effluent storage	<input type="checkbox"/> To land	<input type="checkbox"/> Removal of natural materials
<input type="checkbox"/> Cultivation	Water	<input type="checkbox"/> Disturb foreshore/seabed
<input type="checkbox"/> Tree planting	<input type="checkbox"/> Take and use surface water	<input type="checkbox"/> Discharge/deposit substances
<input checked="" type="checkbox"/> Gravel extraction	<input type="checkbox"/> Take and use groundwater	<input type="checkbox"/> Commercial surface water activity
<input type="checkbox"/> Feed-pad, wintering pad, calving pad or silage pad	<input type="checkbox"/> Dam water	<input type="checkbox"/> Reclaim/drain foreshore/seabed
<input type="checkbox"/> Riverbed activity	<input type="checkbox"/> Divert water	<input type="checkbox"/> Marine farming
<input type="checkbox"/> Bridges and culverts		<input type="checkbox"/> Other coastal activities

1 Are there any **current** or **expired** consents relating to this proposal?

Yes No

If yes, please provide consent number(s) and description:

2 Are any other consents required from Environment Southland or **other authorities**?

Yes No

If yes, please state the relevant authority and the type of consent(s) required:

3 For what **purpose** is this consent(s) required: (e.g. discharge of effluent, gravel extraction etc.)

Gravel Extraction

4 **Location** of proposed activity

Address: Mararoa River, Lagood Creek Confluence

Legal Description: Crown Land LINZ - Floodway Extraction Ponds

Crown Land DOC - Access, Processing, Stockpile sites

Map Reference (NZTM 2000): 1194135 E 4944419 N Site 1

1195167 E 4944324 N Site 2 (4)

5 The name and address of the **owner /occupier**: (if other than the applicant)

Name: LINZ Phone: 03 371 3300

Address: c/- Colliers International, PO Box 416, Queenstown, 9348

DOC, PO Box 29, Te Anau, 9640. Phone - 03 249 0200

6 Please attach a map or a coloured aerial photograph, showing at a minimum, the location of the proposed activities.

7 Assessment of effects on the environment (AEE)

Please complete the applicable Part B form(s) for the proposed activities. For those activities where no Part B form is available, please attach a written statement that assesses the effects that your activities may have on the environment. An assessment of effects **must** include the following information:

- (a) *if it 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 (safeguards and contingency plans where relevant) to be undertaken to help or 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 persons 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).*

You should also include:

- (a) *an assessment of the activity against any relevant provisions of any relevant objectives, policies, or rules;*
- (b) *any information specified to be included in the application in accordance with the relevant regional plan;*
- (c) *for an application to replace an existing consent, an assessment of the value of the investment of the existing consent holder;*

An assessment of effects **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.*

8 Affected Parties

Please attach written approval from parties who may be affected by your activity. *Written Approval of an Affected Party* forms are available on the Environment Southland website. During the processing of your application, Council may determine that additional approvals are required.

9 Correspondence from Council when using a consultant

It is standard practice that both you and your consultant are copied into all correspondence relating to the consent process. This is so that you know what is going on with your application. Please let us know below if you would like us to only contact your consultant. This means you will only hear from us when your application is/is not accepted, when a decision is made or if we feel that you need to be contacted.

I want all correspondence about my application to go to my consultant only Yes No

10 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

11 How much will it cost to process my application?

The cost of a consent depends on the complexity of the activities. Staff time is charged out at a rate of \$145/hr and vehicle use for site visits is charged at \$0.73/km (inclusive of GST).

The fees shown below under section two are **deposits to be paid at the time of application**. Due to the complexity of these activities, this deposit will not usually cover the full cost of processing the application. **Further costs may be incurred** relating to staff time, disbursements, legal charges, consultation fees, and hearing commissioner fees. Environment Southland’s User Charges and Fees document is available at:

www.es.govt.nz/fees-and-charges

When the consent has been processed you will receive an invoice for an additional fee, or for a refund.

The Council’s user charges are fixed under Section 36 of the Resource Management Act 1991. Our fee schedule is:

1. Fixed fee:	
Bores and wells	\$290
Whitebait stand	\$220
2. Deposit:	
All other non-notified applications including: <ul style="list-style-type: none"> • Certificates of compliance • Changes to consent conditions (variations) • Change of lapse date 	\$1,500
Applications that require notification or limited notification	\$2,000

How to pay

Environment Southland accepts payment in the forms of cash, Eftpos, cheque, or electronic transfer. All electronic transfers must include the applicant’s name and “consent application” as a reference. Please make electronic payments to: Environment Southland, 01-0961-0018998-00.

User Charges

Please note that additional Annual User Charges will apply to all consents. These are payable in advance on the first day of July each year. Tables 4, 5 and 6 of the Environment Southland User Charges and Fees Schedule outlines the fees associated with Annual Administration Charges and Annual Consent Monitoring and Inspection Charges. Table 7: Annual Research and Monitoring Charges applies only to surface and groundwater takes and comprises the following:

- **Surface water takes (per consent, for volumes up to 50,000 m³/day):**
 - A charge of **\$1.89** per year per cubic metre authorised as a maximum daily take.
 - Minimum of **\$138**, maximum of **\$7,585**.
- **Surface water takes (per consent, for volumes over 50,000 m³/day):**
 - **\$0.0031** per cubic metre authorised as a maximum daily take.
- **Groundwater takes (per consent):**
 - A charge of **\$0.89** per year per cubic metre.
 - Minimum of **\$162**, maximum of **\$1,782**.

Municipal and stock water discount (of 50%) no longer applies.

12 Checklist: Have you included the following?

- Payment of the required deposit (*see fee schedule*)
- Written approval from all potentially affected parties (*forms available from the Environment Southland website*)
- Site plan/location map/sketch of the proposed activity
- A copy of the Certificate of Incorporation (*where applicant is a company*)
- Part B form(s) specific to your activity and/or a separate assessment of environmental effects (AEE)

Note:

(a) *If your application does not contain the necessary information and the appropriate fee, Environment Southland must return the application.*

Signature of applicant

I hereby certify that to the best of my knowledge and belief, the information given in this application is true and correct.

I undertake to pay all actual and reasonable application processing costs incurred by Environment Southland.

Name (block capitals) DAVID SMITH

Signed  **Date** 06/06/2019

(Signature of applicant or person authorised to sign on behalf of applicant)

Application for Gravel Extraction (PART B)

This application is made under Section 88 of the Resource Management Act 1991



The purpose of this Part B form is to provide you with guidance on information that is required under the Resource Management Act 1991. These forms are to act as a guide only and Environment Southland reserves the right to request additional information.

How much will it cost to process my application?

The cost of a consent depends on the complexity of the activities. The deposit for this application is \$1,500. Staff time is charged against this deposit at a rate of **\$145/hr** and vehicle use for site visits is charged at **\$0.73/km** (inclusive of GST). When the consent has been processed you will receive an invoice for an additional fee, or for a refund.

User Charges

Annual User Charges will apply to all consents. These are payable in advance on the first day of July each year¹. For the extraction of gravel this is **\$0.55/m³**. This charge covers the supervision, inspection/monitoring and administration of all activities associated with gravel extraction in the beds of rivers.

Please don't forget to include:

- Part A application form and the consent fee.
- A completed Gravel Extraction Evaluation Form. This form can be found on our website www.es.govt.nz
- If your extraction could affect navigational safety then please include a completed Technical Comment form from the Harbourmaster. This form can be found on our website. www.es.govt.nz
- Site plan/location map/sketch of the proposed activity.
- Photographs of the proposed extraction sites, looking both upstream and downstream.
- Evidence of any consultation undertaken.

If your application does not contain the necessary information and the appropriate fee, Environment Southland must return the application.

¹ Tables 4, 5 and 6 of the Environment Southland User Charges and Fees Schedule outlines the fees associated with Annual Administration Charges and Annual Consent Monitoring and Inspection Charges.

1 What is this application for?

a new gravel extraction consent the renewal of existing consent ref no: _____

2 What duration of resource consent is sought? _____ 10 years

3 Which river(s) do you propose to take gravel from?

Mararoa River

4 For what purpose(s) will the gravel be extracted?

Commercial supply, primarily for the Te Anau Basin needs

5 Details of the contractor (or any other person) who will undertake the proposed extraction work.

Contracting company name: Te Anau Earthworks Limited

Contact person: Hannah Otene

Phone number: 03 249 9375

6 GPS co-ordinates of the site(s) you propose to extract gravel from

Site 1: NZTM 2000 1194135 E 4944419 N Site 1 - Floodway pond

Site 2: NZTM 2000 1195167 E 4944324 N Site 4 - Through flow backwater pond

7 Please provide the following details for the extraction site(s)

Site 1: Length: 472 m Width: Varies m (as attached plan)

Area: 40174 m² Depth: Variable - 2.5-4 m

Site 2: Length: 468 m Width: Varies m (as attached plan)

Area: 30100 m² Depth: Varies - 2.5-4 m

8 What is the maximum volume of gravel that you propose to extract each year?

Site 1: 10700 m³ per year Site 2: 7750 m³ per year

9 What is the total volume of gravel that you propose to extract?

Site 1: 107000 m³ Site 2: 77500 m³

10 **Between what hours of the day will the gravel be taken between?**
This is required to assess if public access to the river bed will be impacted. For example, between 9am and 5pm.
Hours: 7am and 6pm

11 **Will machinery or vehicles be stored on the river bed when not in use?** Yes No

If yes, please provide details about where they will be stored.

12 **What will you do to prevent any spills of fuel from the machinery taking the gravel entering water?**
For example, machinery will not be refuelled on the riverbed.

Refuelling of machines on site will not be undertaken on the floodway area. Refuelling process is described in Report section 16 - Management of Hazardous Substances.

13 Please describe the proposed method for extraction.

- Will the work involve beach skimming or pond/pit methods of excavation?
- Will the work require access through flowing water?
- Will gravel be extracted only from the dry bed of the river?
- What buffer distances will be maintained between the extraction points and flowing water?

Gravel extraction will be via excavation of two floodway ponds. Refer to Report Sections 1 - Introduction, 12 - How the activity will be carried out, 13.2 - Activity Sequence.

No vehicle will access the works sites across flowing water. A temporary culvert will be installed across an ephemeral (infrequently flowing) channel as necessary. Refer to Report sections 13.2 - The Activity Sequence, 25 - Access.

Excavation of the Floodway Ponds will be carried out on the dry historical gravel deposits and the right bank edge of the floodway. Refer to Report sections 9 - Total Volumes of Gravel Sought, 12 - How the Proposed Activity will be Carried Out, 13 - Floodway Ponds - Proposed Activity Timing and Sequence of Excavation Methodology.

No extraction will be undertaken within 20 metres of flowing water. Refer to Report sections 24 - Statutory Considerations, 24.3 - Regional Water Plan for Southland, 24.3 - Proposed Southland Land and Water Plan.

14 **The extraction of gravel often involves stock piling, washing², crushing and screening. Please tell us**

- where the gravel will be stockpiled;
- the size of stockpiles;
- the intended duration of any stockpiles;
- how the gravel will be washed; and
- where the gravel will be crushed and the rate the gravel will be crushed.

Excavated gravel will be carted to a dry screening and crushing processing site located outside of the floodway. Refer to Report section 14 - Processing and Temporary Stockpile. No wash water takes or discharge consent is required.

No discharge/loss of suspended sediment discharge to flowing water will occur for reason the floodway ponds are not connected to flowing water as part of the excavation process. Refer to Report section 13.2 - The Activity Sequence.

Storage of hazardous substances (fuel, oil, fluids) will not occur on any of the proposed activity sites. Refer to Report section 16 - Management of Hazardous Substances.

The temporary stockpiling of raw and processed gravel will occur at a site (see Appendix 1 - Locality Plan) outside of the floodway as described in Report section 14 - Processing and Temporary Stockpile.

15 **What measures will you use to stop the spread of pest organisms such as Didymo?**

For example, machinery will be cleaned before it goes on site.

Refer to Report section 27 - Assessment of Environmental Effects

² Note: the washing of gravel refers to the removal of any excess sediment from the gravel. Further consents to discharge contaminants (silt & sediment) to water may be required (please refer to the relevant Part B form).

Existing Environment

16 Are any of the following features found within the existing environment of the proposed activity? Describe these features in the space below, along with details of the assessment undertaken to determine the presence of these features.

- (a) Signs of instream life (e.g. fish, eels, bullies, crayfish, native birds, frogs)?
- (b) Areas where food is gathered from a water body (e.g. watercress, eels, wildfowl)?
- (c) Wetlands, wildlife habitats or bird nesting habitats (e.g. swamp areas)?
- (d) Areas of particular aesthetic, cultural, heritage or scientific value (e.g. archaeological sites)?
- (e) Waste discharges, water takes and/or monitoring sites?
- (f) Any other gravel extractions?
- (g) Other activities occurring in the area (e.g. commercial activity, fishing, swimming, boating)?

Yes	No
✓	
✓	
	✓
	✓
	✓
	✓
✓	✓

Refer to Report section 27 - Assessment of Environmental Effects

Please also include relevant photographs of the proposed extraction sites, looking both upstream and downstream of the extraction sites.

Please also include a map and/or site plan showing the above mentioned features and the following:

- roads, property boundaries and neighbouring properties, along with the names of adjacent landowners;
- buildings;
- rivers, streams creeks, drains or any other water bodies; and
- structures, stop banks and other flood protection works

Assessment of Effects

- 17 Will the extraction of gravel alter river flows during flood or low flow events?

No, there will be no negative impact on the river form during flood flows or low flow events.

- 18 Will the extraction of gravel cause significant riverbed erosion, either at the site or downstream? If yes, please provide a discussion of the potential risks.

No, the proposed activity is completely outside of the active river channel regime. The supporting report discusses river form at length.

- 19 Are there any structures or flood protection works in the vicinity of the proposed works? If yes, will the works have any effect on these structures? Please provide specific details.

No structures exist within the river reach where the proposed activity is located.

20 Please discuss what effects the proposed activity will have on the following³:

- (a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects

The proposed activity will not negatively impact the neighbouring community. Refer to Report section 27 - Assessment of Environmental Effects, 27.8 - Effects on Heritage and Cultural Values.

- (b) any physical effect on the locality, including any landscape and visual effects

The proposed activity will not negatively impact on locality, landscape of visual effects. Refer to Report section 18 - Environmental Setting, 24.7 - Effects on Recreation, Landscape and Rural Character.

- (c) any effect on plants or animals and any physical disturbance of habitats in the vicinity

No - the proposed activity is located within an area formerly infested by crack willows, gorse and broom. Habitats for animals consisted of cover for pest species such as rabbits, hares and possum.

- (d) any effect on natural and physical resources having visual, recreational, historical, or cultural value

³ Pursuant to Schedule 4 of the Resource Management Act, 1991, there are a number of matters that must be addressed by an assessment of environmental effects.

(e) any discharge of contaminants into the environment

Discharge of contaminants via the proposed activity into the environment will not occur for the reason the gravel extraction is via an enclosed habitat pond system and the processing and temporary stockpile areas are located outside of the floodway and having no connection to flowing water. These matters are discussed at length through Report sections 12 - How the Activity Will be Carried Out, 13 - Floodway Ponds Proposed Activity timing and Sequence of Excavation Methodology, 13.3 - Activity Sequence, 27 - Assessment of Environmental Effects.

(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards

Neighbourhood and wider community risk associated with Natural Hazards in the area surrounding the proposed work site are those relating to a major flood even impacting adjacent property and the SH94 Key Bridge. All are outside of any influence with the proposed activity.

21 Please include a description of the monitoring or mitigation measures to be undertaken to help avoid, reduce or remedy effects on the environment.

Potential effects on the environment are considered to be limited to the proposed floodway ponds being overrun by a major flood event through the river system. Those effects and mitigations proposed are discussed through Report sections 13.2 - The Activity Sequence, 27 - Assessment of Environmental Effects. The location of the processing and temporary stockpile area being outside of the floodway and managed to avoid any potential effects on the environment associated with site sediment runoff from the work area. Management of hazardous substances (fuels, oils and fluids) is detailed in Report section 16 - Management of Hazardous Substances.

22 Please describe how you will minimise the release of silt, sediment and other contaminants into water.

As described in 21 above.

23 Policy assessment

Please read these carefully and tick where you agree. These policies are available in full on Environment Southland's website. It is recommended you read these in full.

Assessment against the Proposed Southland Water and Land Plan (pSWLP), 2018

Relevant provisions	Assessment	Agree?
<i>Objective 6 – land use and water quality</i>	My mitigation measures show an understanding of the connection between land use and freshwater and seek to manage any effects on water quality. These will ensure that water quality is maintained.	✓
<i>Ngai Tahu policies – 1, 2 and 3</i>	My activity should not affect Taonga species and I have looked at the Iwi management plan.	✓
<i>Water quality – 15A and B: maintain and improve</i>	I am not discharging contaminants to water and there is a buffer distance between the site and the water.	✓
<i>River management – 28, 29 and 32</i>	There are no black fronted tern, black billed gulls, dotterels, stilts or oyster catchers nesting and/or roosting in the vicinity of the proposed operation. No work will occur within the wetted channel, reducing effects on instream ecology.	✓

Assessment against the Operative Regional Water and Land Plan (2010)

Relevant provisions	Assessment	Agree?
<i>Policies 25 and 26 –discharges and groundwater quality</i>	The extraction site is located away from flowing water and my mitigation measures will mean that I will not discharge contaminants to water.	✓
<i>Policy 32 – manage structures and bed disturbance activities</i>	My mitigation measures mean that in taking the gravel I will avoid and mitigate adverse effects on water quality, habitats and ecosystems and river morphology.	✓
<i>Policy 33 – provide for the extraction of gravel</i>	Taking the gravel will maintain or enhance the riverine environment, erosion control and flood protection and there will be no net loss of habitat in the river channel.	✓

Assessment against Te Tangi a Tauria (Iwi Management Plan)

Relevant provisions	Assessment	Agree?
<i>Earthworks – 3.5.8.1, 3.5.8.6 and 3.5.8.9</i>	An accidental discovery protocol will be added to my consent, the site is not near any known cultural artefacts and contaminants will not enter the river. I recognise the cultural importance of the river, fish passage will not be impeded, habitat will be created and I am taking biosecurity precautions.	✓
<i>Rivers and water quality – 3.5.11.7, 3.5.11.10, 3.5.11.15 and 3.5.11.19</i>		
<i>River bed activities – 3.5.15.1, 3.5.15.3,3.5.15.5 and 3.5.15.8</i>		

END OF FORM