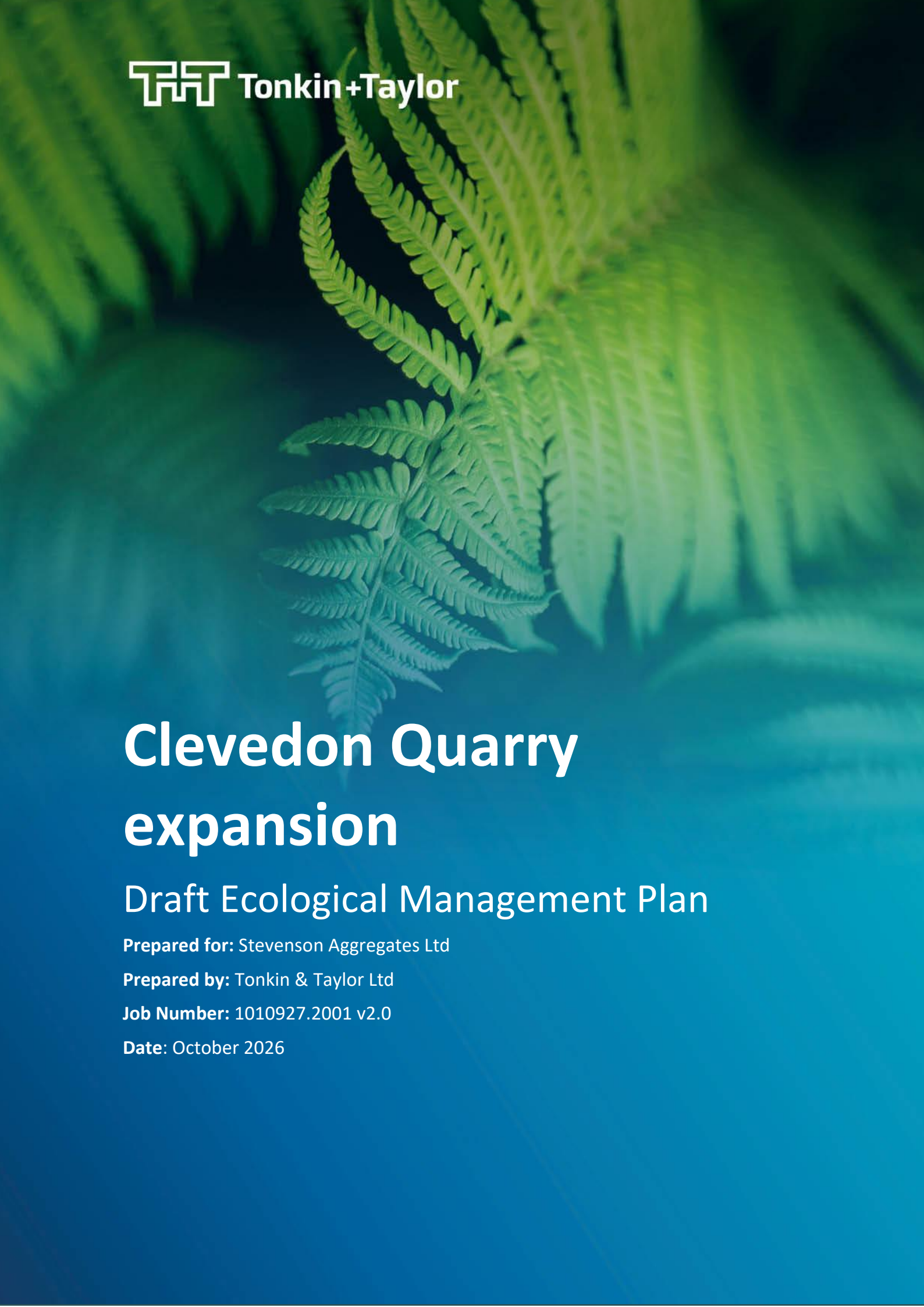


Clevedon Quarry expansion

Draft Ecological Management Plan

Prepared for: Stevenson Aggregates Ltd

Prepared by: Tonkin & Taylor Ltd

Job Number: 1010927.2001 v2.0

Date: October 2026

Document control and review

Title: Clevedon Quarry expansion - Draft Ecological Management Plan					
Date	**Version**	**Description**	**Prepared by**	**Reviewed by**	**Authorised by**
30 October 2026	2.0	Final draft for lodgement	C. Shearman K. Park J. Mackay	J. Markham J. Quinn J. Urquhart	A. Brabant

Quality management

To ensure alignment with our Quality Management System, technical review of differing elements within this report is documented below.

Quality management

Element	Prepared by	Reviewed by
Vegetation Management Plan	Cid Shearman	Jamie MacKay / Josh Markham
Avifauna Management Plan	Cid Shearman	Jamie MacKay / Josh Markham
Bat Management Plan	Cid Shearman	Jamie MacKay / Josh Markham
Freshwater Management Plan	Cid Shearman	Kylie Park / Justine Quinn
Residual Effects Management Plan	Cid Shearman	Jamie MacKay / Josh Markham

DRAFT

Table of contents

1 Introduction 1
1.1 Scope of this report 2
1.2 Plan purpose 3
1.3 Statutory context 3
1.3.1 Permits and authorities 3
1.4 Resource consent conditions [placeholder] 3
1.5 Proposed activity 4
1.6 Associated documents 4
1.7 Iwi input 4
1.8 Roles and responsibilities 4
1.8.1 Ecology induction procedure 7

2 EMP management and review 7
2.1 EMP review 8
2.2 At Risk or Threatened Species Discovery Framework 8
2.3 Reporting 9

3 Ecological values and effects 9

4 Vegetation Management Plan 10
4.1 Purpose and scope 10
4.2 Draft consent condition 10
4.3 Roles and responsibilities 10
4.4 Summary of ecological values and effects 10
4.5 Protocols for managing effects of vegetation clearance 10
4.5.1 Seasonal restrictions on vegetation clearance 11
4.5.2 Vegetation clearance protocols – before clearance 11
4.5.3 Vegetation clearance protocols – during clearance 12
4.5.4 Vegetation clearance protocols – after clearance 12
4.6 Reporting 12

5 Avifauna Management Plan 13
5.1 Purpose and scope 13
5.2 Draft consent condition 13
5.3 Roles and responsibilities 13
5.4 Summary of avifauna values and effects 13
5.5 Protocols for managing effects on avifauna 14
5.5.1 Approach 14
5.5.2 Seasonal constraints 15
5.5.3 Protocols for vegetation removal 15
5.6 Accidental discovery protocols 16
5.7 Accidental harm during vegetation clearance 17
5.8 Unplanned habitat removal 17
5.9 Reporting 18

6 Bat Management Plan 18
6.1 Purpose and scope 18
6.2 Roles and responsibilities 18
6.2.1 Bat competency requirements 18
6.3 Draft consent condition scope 18
6.4 Summary of bat values and effects 18
6.5 Vegetation Removal Protocols 19

DRAFT

6.5.1 Potential roost tree identification 19
6.5.2 Pre-felling bat surveys 20
6.5.3 Notification procedure 21
6.5.4 Vegetation removal 22
6.6 Incidental bat injury and mortality 23
6.6.1 Accidental Death 23
6.6.2 Liberation 24
6.7 Operational management 24
6.7.1 Lighting management 24
6.7.2 Overnight noise management 25
6.8 Reporting 25
7 Freshwater Management Plan 25
7.1 Purpose and scope 25
7.2 Roles and responsibilities 26
7.3 Draft consent conditions 26
7.4 Summary of freshwater values and effects 26
7.4.1 Staging of stream removal 26
7.5 Salvage and relocation protocols 27
7.5.1 Permits 27
7.5.2 Timing of works 27
7.5.3 Salvage footprint 28
7.5.4 Fish salvaging methodologies 28
7.6 Biosecurity 32
7.7 Relocation protocol 33
7.7.1 Handling, transportation and relocation 33
7.7.2 Relocation Sites 33
7.8 Accidental discovery protocols 34
7.9 Mortality observations 34
7.10 Native freshwater fauna recording and reporting 35
7.10.1 MPI Fish Permit Report 35
8 Residual Effects Management Plan 35
8.1 Purpose and scope 35
8.2 Effects addressed and ecological accounting 36
8.2.1 Terrestrial biodiversity offset accounting (BOAM) 36
8.2.2 Freshwater offset accounting (SEV/ECR) 37
8.2.3 Freshwater compensation 37
8.3 Restoration sequencing 38
8.4 Responsibilities and competencies 38
8.5 Site preparation 38
8.5.1 Pest plant control 38
8.5.2 Pest animal control 39
8.6 Restoration planting 39
8.6.1 Slope planting 39
8.6.2 Riparian planting 42
8.6.3 2018 Consent mitigation planting 43
8.6.4 Plant sourcing 43
8.6.5 General preparation 43
8.6.6 Planting timing 44
8.6.7 Performance standards 44
8.6.8 Ongoing maintenance 44
8.7 Monitoring 45

DRAFT

8.7.1 Vegetation plots and photo points 45
8.7.2 SEV monitoring 46
8.8 Reporting 47
9 Annual Report 47
9.1 EMP review 47
9.2 Slope and riparian planting update 47
9.3 SEV monitoring (Year 20) 48
9.4 BOAM monitoring (Year 25) 48
10 Applicability 49
11 References 50
Appendix A Figures

DRAFT

Glossary

Specific terms	
ABM	Acoustic Bat Monitor
AC	Auckland Council
AMP	Avifauna Management Plan
BMP	Bat Management Plan
BRP	Bat Roost Protocols
CEMP	Construction Environmental Management Plan
DBH	Diameter at Breast Height
DOC	Department of Conservation
DPP	Detailed Planting Plan
EcIA	Ecological Impact Assessment
ECR	Environmental Compensation Ratio
EIANZ	The Environment Institute of Australia and New Zealand
EMP	Ecological Management Plan
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
FMP	Freshwater Management Plan
FTAA	Fast Track Approvals Act
LoQ Extent	Life of quarry extent
MCI	Macroinvertebrate community index
NZTCS	National Threat Classification System
OBDA	Overburden disposal area
RMA	Resource Management Act
SAL	Stevenson Aggregates Ltd
SEA	Significant Ecological Area
SEV	Stream Ecological Valuation
VMP	Vegetation Management Plan

DRAFT

1 Introduction

Clevedon Quarry is a regionally significant aggregate resource within the upper Wairoa River catchment. Stevenson Aggregate Ltd (SAL) currently holds resource consent for aggregate extraction and is seeking approval under the FTAA for a staged quarry expansion covering approximately 74 ha of quarry extent and a 4.6 ha Overburden Disposal Area (OBDA) (hereafter "the Project"). The Project would provide access to additional aggregate resources and enable extraction of approximately 150 million tonnes of aggregate (Figure 1.1: Site context.

).

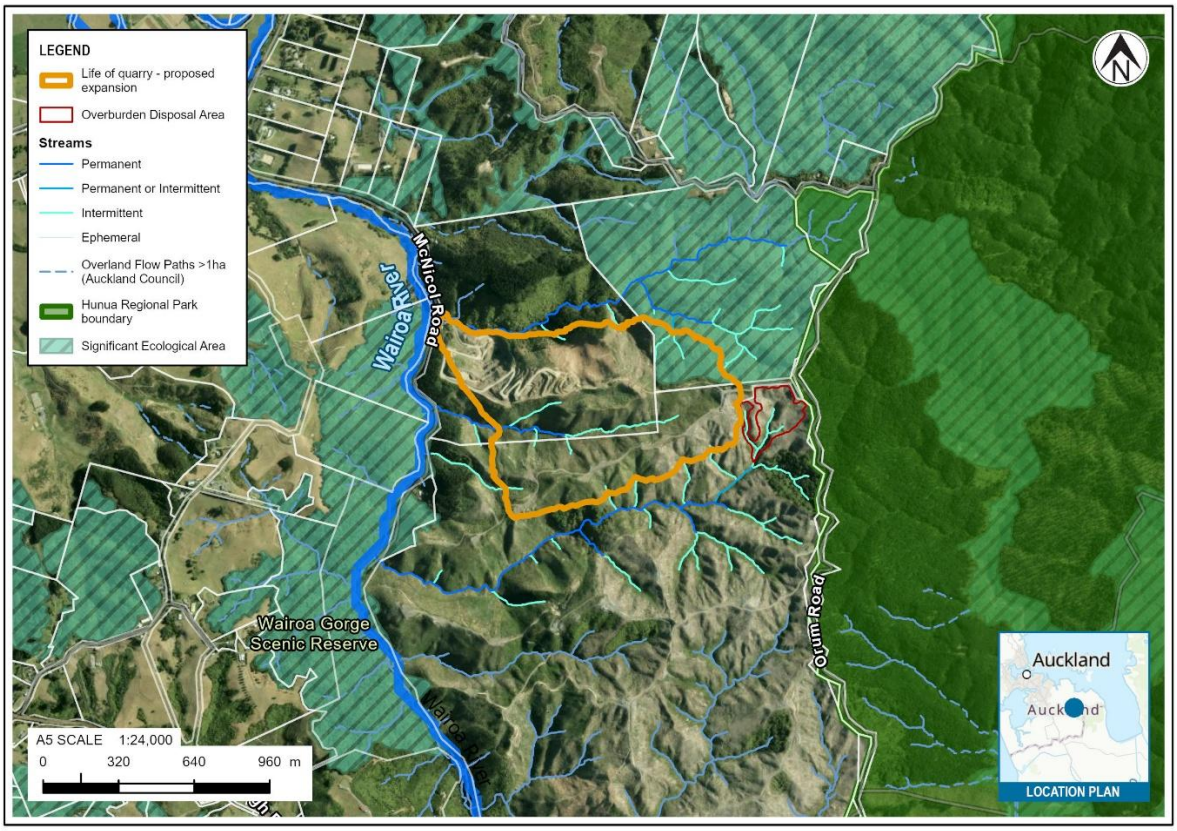


Figure 1.1: Site context.

The quarry is located within the Hunua Ecological District on the north-western edge of the Hunua Ranges Regional Park. Outside the active pit, the site comprises predominantly harvested and replanted pine forest, with areas of kānuka, broadleaved scrub and regenerating tree fern broadleaf forest. The site also contains Significant Ecological Area (SEA) vegetation and a network of tributaries draining to the Wairoa River. Works will be undertaken across five indicative stages over a 50-year period (Figure 1.2 below).

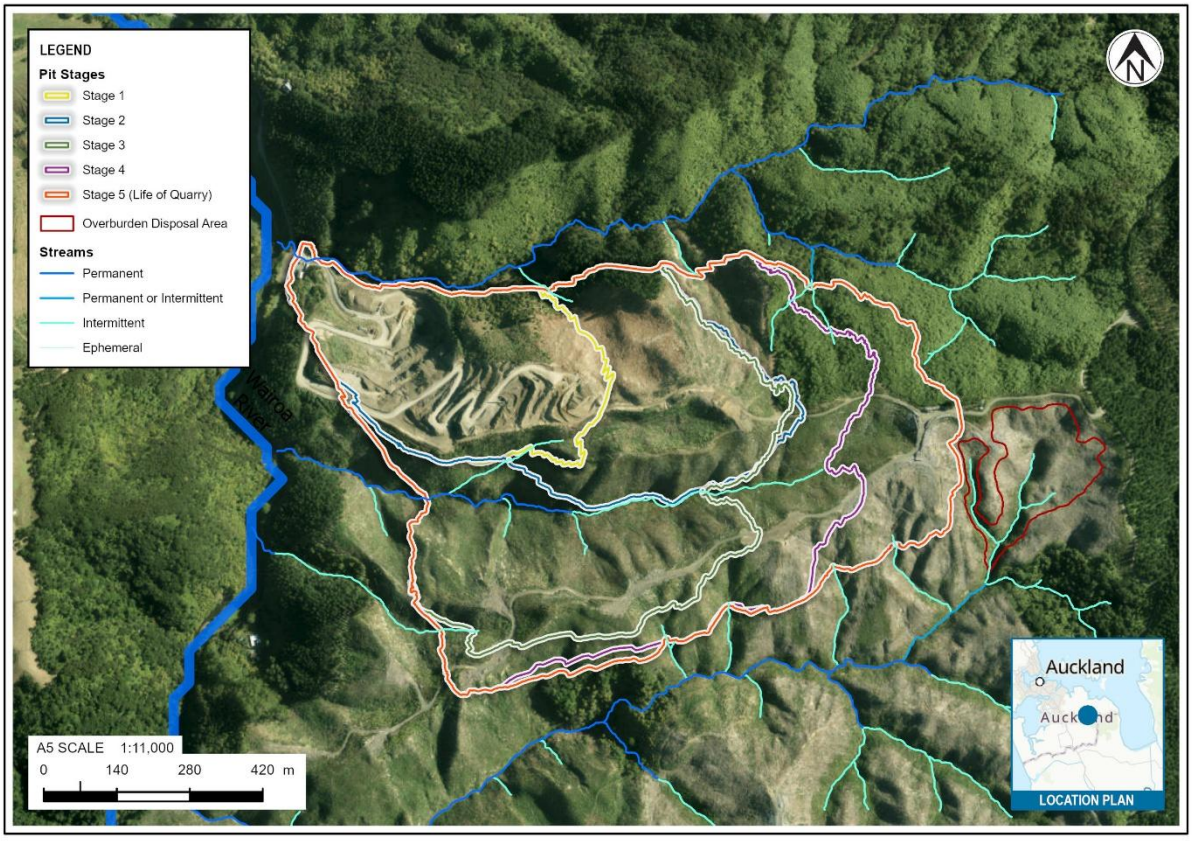


Figure 1.2: Overview of quarry expansion and indicative staging.

The Project has the potential to result in direct and indirect effects on terrestrial and freshwater ecological values. Further details of the Project, ecological values and effects are provided in the Ecological Impact Assessment for Clevedon Quarry (EcIA; T+T, 2026).

1.1 Scope of this report

Tonkin & Taylor Ltd (T+T) has been engaged by Stevenson Aggregates Ltd (SAL) to prepare an Ecological Management Plan (EMP) for the Project. This EMP has been prepared to accompany the Fast Track Approvals Act (FTAA) application and has been undertaken in accordance with our Letter of Engagement dated 4 November 2024 (T+T ref 1010927.2001) and subsequent Variation Orders.

This EMP has been developed in accordance with the recommendations described in the EcIA and includes the following management plans:

- Vegetation Management Plan (VMP) (refer to Section 4);
- Avifauna Management Plan (AMP) (refer to Section 5);
- Bat Management Plan (BMP) (refer to Section 6);
- Freshwater Management Plan (FMP) (refer to Section 7); and
- Residual Effects Management Plan (REMP) (refer to Section 8).

A combined 'reporting' section is provided in section 10 which details the proposed reporting approach for all plans.

This EMP is a draft EMP prepared to be lodged with the FTAA and, should consent be granted, will be updated to incorporate recommendations from the panel decision and final consent conditions. Where appropriate, placeholder text or tables are provided.

1.2 Plan purpose

The EMP has been developed to outline protocols to address (in accordance with the effects management hierarchy) potential adverse effects on the ecological biodiversity values within the quarry expansion and OBDA footprints.

Each of the fauna management plans within this document include best practice methods for survey, salvage and vegetation removal that have been developed internally at T+T over time. The methods have been developed using project-based learning, are in general accordance with New Zealand fauna survey protocols (where applicable), and where necessary in line with current scientific literature.

1.3 Statutory context

Legislation in New Zealand affords protection to native fauna species and their habitats. These include:

- Wildlife Act 1953 which provides protection to all native bat, lizard, frog species and most native bird species;
- National Policy Statement for Freshwater Management 2020 (NPS-FM), the purpose of which is to ensure the sustainable management of freshwater resources in New Zealand by promoting improved water quality, ecological health, and the safeguarding of cultural values.
- National Policy Statement for Indigenous Biodiversity (NPS-IB), the purpose of which is to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date (Ministry for the Environment, 2023).
  - Native bats are also listed as 'specified highly mobile fauna' under the (NPS-IB).
- Resource Management Act 1991 (RMA) which affords protection to significant habitats of indigenous fauna.

1.3.1 Permits and authorities

No native bird, bat, lizard, or frog salvage is proposed under this EMP and as such, no approval under the Wildlife Act 1953 is required. As outlined in the AMP and BMP, we have included accidental mortality protocols and as such an approval under the Wildlife Act is not required and any accidental injury or mortality is covered under Animal Welfare regulations.

Permits in relation to freshwater fauna are detailed in the FMP (Section 7).

1.4 Resource consent conditions [placeholder]

The consent conditions relevant to this EMP are conditions **[TBC]** to **[TBC]** of consent **[TBC]** and provided in full in Table 1.1.

DRAFT

Table 1.1: [Placeholder TBC] Relevant conditions which relate to the management of native fauna, vegetation and streams

Consent No.	Condition working	Relevant section of the EMP or reference to related plans and documents

1.5 Proposed activity

A detailed description of the Project can be found in the EcIA (T+T, 2026). The proposed quarry expansion will be undertaken in five indicative stages over an estimated 50-year period (the proposed Life of Quarry (LoQ) Extent is approximately 74 ha, excluding an approximately 4.6 ha OBDA), as shown in Figure 1.2, and conducted in accordance with resource consent conditions (Section 1.4). The combined LoQ and ODBA are hereafter referred to as the "project footprint".

The timing and sequencing of the stages is indicative only and may vary over the life of the quarry. Table 4.1 shows the vegetation loss occurring with each indicative stage, and Table 7.1 shows stream removal proposed within each indicative stage.

1.6 Associated documents

This EMP should be read in conjunction with the EcIA for Clevedon Quarry (T+T, 2026). Also of relevance are the Groundwater Assessment (**reference TBC**), Surface Water Management Report, Landscape Plans **(reference TBC)**, and Erosion and Sediment Control Assessment Report **(reference TBC)**.

Other management plans have been, or will be, prepared as part of the consent conditions for the Project. Some of these plans will rely on the content of the EMP and equally, the implementation of the EMP will be informed by these plans. Some of the plans that may be relevant include an Erosion and Sediment Control Plan (ESCP), Groundwater and Surface Water Monitoring and Contingency Plan (GSWMCP) and Augmentation Regime Management Plan (ARMP).

1.7 Iwi input

<PLACEHOLDER>

Iwi engagement undertaken to date has informed the development of the Project and ecological management framework. Key outcomes include support for indigenous restoration planting, a preference for offsetting and compensation planting to occur on site where practicable, and the establishment of a native vegetation corridor linking the Wairoa River and the Hunua Ranges. Additional cultural input and any relevant outcomes from cultural assessments will be incorporated into this EMP where appropriate.

1.8 Roles and responsibilities

SAL is responsible for the implementation of this EMP. Delivery of, and compliance with, this EMP will be the responsibility of the Quarry Manager. They will coordinate with the Project Ecologist, who must be familiar with this EMP and will delegate to a Suitably Qualified Ecologist (SQE) under each management plan. Further management plan specific requirements are detailed in the respective management plans.

Responsibilities of parties involved in the implementation of the EMP are included but not limited to those outlined in Table 1.2.

All personnel working on site are responsible for alerting the Quarry Manager and Project Ecologist in the discovery of any At Risk or Threatened flora and fauna not otherwise identified in this EMP on the same working day as the discovery (per the requirements of Section 2.2).

Table 1.2: Responsibilities of those implementing the EMP

Title	Name	Responsibility
Stevenson Aggregates Ltd (SAL)	TBC	Consent holder
Quarry Manager Person responsible/oversees the day-to-day expansion of the quarry and implements consent compliant activities as required.	TBC	• Overall compliance with resource consents and other statutory approvals for the Project (e.g., DOC and MPI permit requirements). • Liaise with the Project Ecologist to determine construction works scheduling. Including, prior to construction starting at respective sites and on an ongoing basis. • Notifying the Project Ecologist of approximate staging timings, proposed construction methods for each site, and relevant design information that is required for the Project Ecologist to implement the EMP. • Delivery and compliance with this EMP. • Implementation of this EMP including: – Reading and understanding this EMP – Briefing new personnel about the Quarry Manager's responsibilities under this EMP. – Ensuring all parties have the up-to-date copy of this EMP. – Understanding which management actions can be completed on site without inspection by and presence of the Project Ecologist. – Implementing any Quarry Manager management actions in this EMP. – Identifying corrective actions. – Auditing compliance with this EMP and the resource consent conditions. – Updating this EMP where required and in consultation with the Project Ecologist. • To work collaboratively with the Project Ecologist so that the EMP can be successfully implemented. • Delegation to outside contractors as required.
Project Ecologist	TBC	• Is the lead ecologist tasked with supervising and overseeing the implementation of the EMP. • Delegate specialist tasks to suitably qualified and experienced terrestrial, freshwater, bat, avifauna or restoration ecologists.

DRAFT

Title	Name	Responsibility
		• Liaise with the Quarry Manager to determine construction works scheduling. Prior to construction starting and on an ongoing basis. • Lead the implementation of the EMP during the Construction Works including: – Comply with any relevant authorised consent conditions, and DOC and MPI permit requirements. – Determine appropriate methodologies to be applied/ implemented at each works area. – Oversee and supervise the implementation of this EMP. – Provide confirmation to Quarry Manager on the management measures that must be implemented, so that approved and consented Construction Works can proceed. – Undertake any reporting following completion of works where the EMP was implemented. – To work collaboratively with and provide oversight of the Quarry Manager and their staff.
Iwi		TBC in consultation with iwi.
Vet	Clevedon Veterinary Hospital	Provides advice where injured birds result from project works.
Planting Contractor	TBC	• Read and understand the REMP and DPP (when available) ensure planting works comply with its requirements. • Maintain communication with the Project Ecologist regarding programme changes and restoration requirements. • Undertake site preparation, including weed management and protection of existing indigenous vegetation where required. • Implement restoration planting in accordance with the approved Detailed Planting Plan • Undertake pest plant management where required to achieve restoration outcomes. • Carry out maintenance activities, including release spraying, infill planting, weed control, remediation of damage, and plant protection measures. • Maintain records of planting works, plant sourcing, planting quantities, maintenance activities, pest control, survival rates and infill planting. • Monitor restoration planting for the first five years after planting, including plant survival and establishment success. • Implement response measures where monitoring identifies risks to achieving restoration objectives.

DRAFT

Title	Name	Responsibility
		• Note: the Planting Contractor may also be responsible for any landscape planting required under other consent conditions.

Table 1.3: Contact details for personnel involved in the implementation of this EMP. [Placeholder]

1.8.1 Ecology induction procedure

Prior to the implementation of this EMP, the Project Ecologist shall provide a Project induction to the Quarry Manager [and Iwi - placeholder]. This induction shall include:

- An overview of the ecological values observed or potentially present in the Project area. This summary shall include the identification of species which have conservation and biodiversity value.
- A description of how the proposed quarry activities may impact on these ecological values.
- A summary of specific management measures and/ or actions that are required to be implemented to address the effects on these ecological values.

Further to the above, given the long-term staged nature of the quarry expansion, ecology inductions prior to the commencement of each stage of the quarry expansion works shall be completed by the Project Ecologist. This will involve:

- Identifying and delineating specific areas and / or species of ecological value within each site. Including the identification of any 'At Risk' or 'Threatened' species.
- Identifying the stage-specific construction activities which may impact on any ecological values known or potentially present at the site.
- Identifying the EMP management measures / actions that are to be completed within that stage and directing how these should be implemented.

If site conditions, ecological values, staff or roles change during the construction phase, then the Project Ecologist will undertake an ecology re-induction. This will also detail any changes to the EMP that may have occurred due to a change via the EMP review process (Section 2).

2 EMP management and review

This EMP will be updated as required over the life of the quarry to reflect changes in project design, site conditions, ecological information, or best-practice management, and to ensure the best outcomes for native fauna and vegetation.

A monitoring, review and response framework that enables management measures to be adjusted where monitoring identifies that performance standards, ecological objectives or trigger thresholds are not being achieved.

Management measures will be reviewed during each field season and updated as necessary. Triggers for review include:

- Detection of a previously unrecorded native fauna species.
- Survey or salvage methods proving ineffective.
- Unexpected impacts on native biodiversity values requiring management.
- Updates to best-practice management methods becoming available.

Any changes must be based on sound ecological practice, remain consistent with the objective of avoiding or minimising effects on native biodiversity, and be reviewed and approved by the Project Ecologist. Amendments that change how an adverse effect is managed require re-certification by Auckland Council in accordance with the resource consent conditions, with notice provided at least 20 working days before the relevant works commence. Minor updates that do not alter management outcomes will be documented and communicated to the Quarry Manager prior to implementation.

2.1 EMP review

The EMP will be reviewed by the Project Ecologist as follows:

- **Annually** — At the end of each field season where management measures outlined in this EMP were implemented, the Project Ecologist will review works undertaken and identify any amendments required. Any additional measures implemented during the season will be assessed for incorporation into the EMP.
- **Prior to each stage** — The EMP will be reviewed no more than six months before each new stage of quarry expansion to confirm that management measures remain current and appropriate for the proposed works.

Any amendment arising from either review process that changes how an adverse effect is managed must be re-certified by Auckland Council prior to the relevant works commencing. Amendments that alter a resource consent requirement must be managed through the relevant consent approval process.

2.2 At Risk or Threatened Species Discovery Framework

While every effort has been made to identify the ecological values of the Site through the EcIA, it remains possible that native fauna not previously detected may be encountered during the course of the project, particularly given its extended duration. Although accidental discovery protocols will apply regardless, targeted pre-construction surveys are proposed prior to each new stage of works to confirm the likely presence or absence of sensitive fauna and reduce the risk of programme delays associated with unexpected discoveries during construction.

To support this objective, targeted surveys will be undertaken by the Project Ecologist during the appropriate season prior to commencement of each stage of works, within that area of proposed works. Surveys will focus on native lizards and Hochstetter's frog, with methods tailored to the habitats proposed for disturbance and sufficient survey effort to provide confidence in the likely presence or absence of these species.

If native lizards or Hochstetter's frogs are detected, the Project Ecologist will determine appropriate management measures, which may include consultation with DOC where necessary.

An authority under the Wildlife Act 1953 (or relevant legislation at the time) may be required.

All personnel working on site will be appropriately trained (see Section 1.8.1 above) and are responsible for alerting the Quarry Manager and the Project Ecologist in the discovery of any At Risk or Threatened flora or fauna not otherwise identified in this EMP on the same working day as the discovery.

If an ‘At Risk’ or ‘Threatened’ flora or fauna species not otherwise identified in this EMP is discovered, the Quarry Manager and Project Ecologist shall develop an appropriate course of action. The Quarry Manager shall notify and consult with the DOC Local Area Manager (Tāmaki Makaurau / Auckland Office: 0800 275 362), Auckland Council, and relevant iwi representatives within 48 hours of the discovery. The agreed course of action shall be documented and submitted to DOC and

Auckland Council for certification. Following certification, the course of action shall be implemented on site and incorporated into the next revision of this EMP.

2.3 Reporting

EMP management, review, updates, and additional fauna survey reporting requirements are outlined in Section 9.

3 Ecological values and effects

This section provides a summary of the ecological values within the Project area and the potential ecological effects associated with the Project. Detailed descriptions of ecological values, potential effects are provided in the EcIA prepared for the Project (T+T, 2026).

Terrestrial ecological values within the Project footprint range from **negligible** to **very high** and include indigenous and exotic habitats, notably 6.1 ha of regenerating tree fern/broadleaf forest within a Significant Ecological Area, as well as cutover pine vegetation, kānuka–tree privet treeland and exotic shrubland. These habitats provide foraging, nesting and movement opportunities for native fauna, including long-tailed bats, Hochstetter's frogs, king fern, indigenous birds and potentially kākā, and contribute to an ecological corridor linking the Wairoa River and Hunua Ranges.

Terrestrial ecological values will be affected by the Project through permanent vegetation clearance and habitat loss, potential injury or mortality of native fauna during vegetation clearance, and potential operational disturbance effects. Overall, implementation of the proposed avoidance, mitigation, offsetting, monitoring, and response measures will reduce most terrestrial ecological effects to low or very low levels, with residual habitat loss effects addressed through ecological offsetting, and a net biodiversity gain anticipated for regenerating tree fern/broadleaf forest.

Freshwater ecological values within the Project catchments range from **low** to **very high** and include permanent and intermittent streams with varying habitat quality, ecological function and native riparian cover, as well as diverse macroinvertebrate communities and freshwater fauna, including At Risk and Threatened species. Stream catchments 1 and 3 support the highest freshwater fauna values, while Streams 2, 2a and 3 exhibit variable ecological function values influenced by forestry activities and sedimentation. The Wairoa River is the receiving environment for all catchments and remains an important regional waterway supporting diverse fish communities.

Freshwater values will be affected by the permanent removal of approximately 2,392 m of stream, reductions in stream baseflows, potential injury and mortality of freshwater fauna, as well as potential water quality, sediment discharge and scour and erosion effects. Residual adverse effects will be addressed through freshwater offsetting and compensation, while most other freshwater ecological effects will be managed to very low or low levels through mitigation, offsetting, monitoring, and response measures.

Potential and actual impacts addressed within this EMP include:

- Permanent loss of 6.1 ha of native regenerating tree fern/broadleaf forest.
- Permanent loss of 0.5 ha of tree privet-kānuka treeland.
- Loss of 'At Risk-Declining' king fern during vegetation clearance.
- Injury or mortality of native terrestrial and freshwater fauna.
- Disturbance of native fauna during vegetation clearance and quarry operation.
- Permanent loss and/or modification of stream habitat (removal of 2,392 m stream length across four catchments).

- Changes to stream flows in 1,533 m stream length due to loss of upstream contributing catchment area.

The detailed measures for addressing these effects are provided in the relevant management plans.

4 Vegetation Management Plan

4.1 Purpose and scope

This Vegetation Management Plan (VMP) sets out the methods that will be used to avoid or minimise adverse ecological effects on vegetation and associated habitats for flora and fauna during the expansion stages of the quarry.

4.2 Draft consent condition

<PLACEHOLDER>

This VMP has been developed in accordance with the [xxxx] resource consent conditions for Clevedon Quarry (consent number xxx).

4.3 Roles and responsibilities

Table 1.2 (Section 1) sets out the roles and responsibilities in relation to this VMP with the Quarry Manager holding overall accountability for implementation of and compliance with this plan. The Project Ecologist will be a suitably qualified with experience in vegetation mapping and delineation and native plant identification (see Table 1.2).

4.4 Summary of ecological values and effects

An estimated total of 65.7 ha of native and exotic vegetation will be removed in a staged approach over the duration of the project (see Table 4.1). Refer to the EcIA (T+T, 2026) for detailed information on potential effects of the vegetation clearance on native fauna and retained vegetation.

Section 4.5 of this VMP details the methods that will be followed to avoid or minimise/mitigate potential effects of vegetation clearance on native fauna and retained vegetation that may be adversely affected by the Project.

Permanent habitat-loss effects associated with vegetation clearance are addressed through the restoration, offset and compensation measures described in the REMP (Section 8). The primary focus of this VMP is to avoid or minimise direct effects on retained vegetation, flora and fauna during vegetation clearance activities and to manage king fern translocation where undertaken.

Cutover pine does not provide fauna habitat and the protocols outlined below do not apply to this vegetation type.

4.5 Protocols for managing effects of vegetation clearance

Vegetation removal will be undertaken in stages over the duration of the Project. Project stages are shown in Figure 1.2. Vegetation management is required for the following vegetation types (shown in Appendix A Figure 2):

- Regenerating tree fern broadleaf forest;
- Tree privet kānuka treeland; and
- Exotic shrubland vegetation.

Table 4.1: Indicative stages of vegetation clearance over the life of the quarry expansion

Pit expansion stage	Regenerating tree fern–broadleaf forest (ha)	Tree privet-kānuka treeland (ha)	Exotic shrubland (ha)	Cutover pine (ha)
Stage 1 – Years 0–10	0.0	0.5	2.0	2.8
Stage 2 – Years 10–30	0.2	0.0	0.0	16.2
Stage 3 – Years 10–30	0.0	0.0	0.0	15.9
Stage 4 – Years 30–40	3.0	0.0	0.0	11.8
Stage 5 – Years 40–50	2.9	0.0	0.0	5.9
Overburden area – Years 0–10	0.0	0.0	0.0	4.6
Total	6.1	0.5	2.0	57.1

4.5.1 Seasonal restrictions on vegetation clearance

The following seasonal restrictions apply to specific areas of vegetation clearance (see Appendix A Figure 2) where birds or bats could be present:

- AMP (Section 4) –vegetation clearance should be undertaken between March and August, outside of peak bird breeding season (September to February inclusive) unless bird management options are applied.
- BMP (Section 5) – vegetation clearance can be undertaken between 1 October and 30 April.

4.5.2 Vegetation clearance protocols – before clearance

4.5.2.1 Physical delineation

All native vegetation areas to be cleared within the project footprint have been identified during the design process (see Appendix A Figure 1). These areas of native vegetation will be physically delineated. Individual mature native trees or bat roost trees located in close proximity to, but outside, the project footprint will also be identified by the Project Ecologist and marked by flagging tape or fencing to avoid inadvertent clearance and to minimise potential damage to branches and roots.

4.5.2.2 Sediment and erosion control

Removal of vegetation can expose soil making it more prone to erosion, resulting in increased sedimentation into streams. Prior to vegetation clearance, sediment control measures will be undertaken to avoid or minimise effects on water quality. Procedures for minimising the area and duration of soil exposure from vegetation clearance will be undertaken in accordance with the ESCP.

4.5.2.3 Species surveys and salvaging

Procedures to avoid impacts to fauna (birds, bats and fish) prior to vegetation clearance through surveys (birds only) or salvage and relocation operations are addressed in detail in the respective plans.

Prior to clearance of native vegetation, an ecologist will inspect areas of indigenous vegetation proposed for removal and identify any king fern plants present. King fern plants of between 0.3 and 0.5 m height and with a cluster diameter greater than 0.3 m will be assessed to determine their suitability for translocation. Where translocation is practicable, and suitable receiving habitat is available outside the impact footprint, king fern plants will be salvaged and transplanted into retained indigenous vegetation or restoration areas within the site. Transplanted plants will be recorded and photographed following relocation. No ongoing monitoring is proposed unless otherwise recommended by the Project Ecologist.

4.5.3 Vegetation clearance protocols – during clearance

Vegetation clearance will only commence after all pre-clearance management measures have been undertaken or are in place and has been confirmed by the Project Ecologist. During vegetation clearance activities, construction methodology refinements, maintenance of physical delineation barriers and erosion and sediment control measures as described in the ESCP, will be ongoing. In addition to the above, measures to further reduce effects during vegetation clearance includes:

- Vegetation will only be cleared immediately prior to construction works, beginning in the quarry project footprint, to reduce habitat effects and reduce the potential for erosion and sediment generation.
- Vegetation will be directionally felled away from the physically marked edge (quarry footprint boundary), to prevent damage to the vegetation immediately adjacent to the footprint, unless deemed to be unsafe.
- Methods for undertaking vegetation removal will be site specific and commonly will include use of an excavator, grapple and chainsaw on suitable land, and directionally felling trees using experienced tree-fellers.
- Vegetation removal will be managed by experienced arborists to reduce tree damage and to accommodate construction.
- Within native regenerating forest, native mature forest vegetation clearance/habitat loss activities will be overseen by a suitably qualified ecologist.

4.5.4 Vegetation clearance protocols – after clearance

4.5.4.1 Mulching

For practical reasons, some vegetation may be coarsely mulched on site and stockpiled for later use or removed from the site. The Project Ecologist will work with the Quarry Manager to determine what vegetation is mulched or retained according to ecological and operational requirements. Mulching will be undertaken in a manner that prevents mulch or wood chips from entering streams or other receiving environments. Where necessary, this will involve manually chipping vegetation into the back of a truck or removing any vegetation that falls within 10-20 m of a stream and mulching it at a suitable location. Mulch stockpiles will be stored in clearly delineated areas where material cannot enter streams or drainage features.

4.6 Reporting

VMP reporting requirements are outlined in Section 9.

DRAFT

5 Avifauna Management Plan

5.1 Purpose and scope

This Avifauna Management Plan (AMP) sets out the methods that will be used to avoid or minimise the potential loss of native bird values that could be adversely impacted by vegetation clearance and earthworks associated with the quarry expansion.

5.2 Draft consent condition

<PLACEHOLDER>

This AMP has been developed in accordance with the [xxxx] resource consent conditions for Clevedon Quarry (consent number xxx).

5.3 Roles and responsibilities

Delivery of, and compliance with the AMP will be the responsibility of the Quarry Manager who will liaise with the Project Ecologist to implement this AMP. The Project Ecologist will be suitably qualified and experienced ecologist or ornithologist (see Table 1.2).

5.4 Summary of avifauna values and effects

Twelve native bird species that may use habitats within the project footprint for nesting have been recorded within or close to the site. All except Kākā[1] (*Nestor meridionalis* – At Risk - Recovering) are classified as 'Not Threatened' (Roberston et al., 2021). All 'Not Threatened' species are considered of **low** ecological value (Roper-Lindsay et al., 2018), except for the kereru (*Hemiphaga novaeseelandiae*) which is considered of **moderate** ecological value (Roper-Lindsay et al., 2018) due to being an important seed disperser. Table 5.1 summarises the species that may nest in habitats within the project footprint.

Table 5.1: Bird species that may nest in habitats within the project footprint

Common name	Māori name	Scientific name	Peak breeding season	Nesting habitat
Kaka	Kākā	*Nestor meridionalis*	October-February	Tree cavities
Bellbird	Korimako	*Anthornis melanura*	September-February	Trees
Swamp Harrier	Kāhu	*Circus approximans*	October-February	Low bushes, scrub, long grass
Kereru	Kererū	*Hemiphaga novaeseelandiae*	September-February	Trees
Tomtit	Miromiro	*Petroica macrocephala*	September-February	Thick vegetation
Shining cuckoo	Pīpīwharauroa	*Chrysococcyx lucidus*	November-February	Grey warbler/riroriro nests
Fantail	Pīwakawaka	*Rhipidura fuliginosa*	October-February	Trees

[1] While kākā nesting habitat is not currently present within the Project area, the site forms part of the wider habitat network used by kākā within the Hunua Ranges

Common name	Māori name	Scientific name	Peak breeding season	Nesting habitat
Grey warbler	Riroriro	*Gerygone igata*	September-January	Trees
Morepork	Ruru	*Ninox novaeseelandiae*	September-February	Tree cavities, broken logs, epiphytes
Silvereye	Tauhou	*Zosterops lateralis*	September-February	Trees, tree ferns. Typically more than 8 m off the ground
Tūī	Tūī	*Prosthemadera novaeseelandiae*	September-January	Trees
Spur-winged plover		*Vanellus miles*	September-February	Ground

Note: no nesting habitat for kākā or ruru is currently present within the impact area; however, suitable cavities may develop in the regenerating tree fern/broadleaf forest once it matures.

Birds may be directly or indirectly impacted by the loss of vegetation and construction works within the Project area. Without management measures, effects on avifauna as an immediate result of construction include potential disturbance, injury and/or mortality during vegetation removal.

Refer to the EcIA (T+T, 2026) for detailed information on effects to native birds.

Section 5.5 of this EMP details the methods that will be followed to avoid or minimise the risk to native birds from vegetation clearance for the Project.

Although introduced birds are not protected under the Wildlife Act 1953, it can be difficult to distinguish native and introduced bird nests during vegetation clearance. Accordingly, active nests will be managed as native bird nests until confirmed otherwise by the Project Ecologist.

5.5 Protocols for managing effects on avifauna

5.5.1 Approach

Best practice measures to avoid or minimise potential adverse effects of the works on native bird are summarised below.

- Provision of maps showing delineation of bird habitat to be cleared.
- Pre-construction and vegetation clearance briefing with Project Ecologist and contractor personnel.
- Seasonal restrictions on the timing of vegetation clearance where practical.
- Pre-vegetation clearance checks for native bird species during the peak breeding/nesting season when vegetation clearance activities are required (and if peak bird breeding season cannot be avoided).
- Incidental discovery and harm protocols. These protocols include best practice methodologies commonly used on construction projects and adapted in this AMP for local site conditions.
- Habitat remediation (refer to Section 8).

Avifauna management is summarised in the flowchart below (Figure 5.1), with detailed information provided in the subsequent sections.

DRAFT

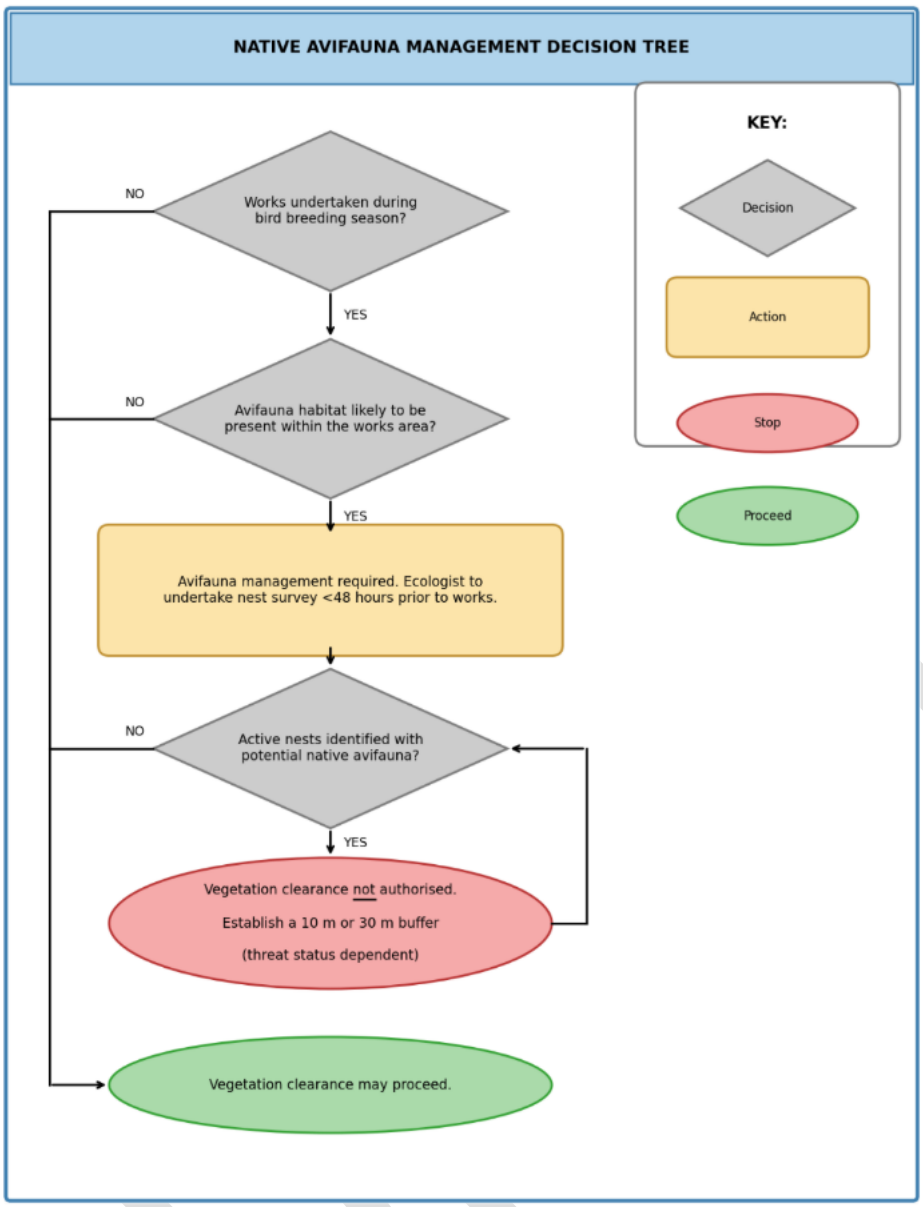


Figure 5.1: Avifauna management decision tree.

5.5.2 Seasonal constraints

During the breeding season there is the potential for direct harm to nests, eggs and chicks during vegetation clearance activities. To avoid or minimise effects on native birds, vegetation clearance outside of the peak bird breeding season is recommended. Where vegetation clearance must be undertaken the forest bird peak bird breeding season (September to February inclusive), protocols for vegetation removal (5.5.3) must be adhered to.

5.5.3 Protocols for vegetation removal

Prior to any vegetation clearance occurring a pre-clearance briefing will be held with the Project Ecologist and Planting Contractor. The required area of vegetation clearance will be physically marked out prior to any effects management measures being undertaken.

To enable programme delivery, vegetation clearance may need to be undertaken during bird breeding season for species potentially on site. However, to avoid the loss of native bird nests, eggs and chicks associated with this clearance, the following protocols will be followed:

- The Quarry Manager to notify the Project Ecologist at least three weeks prior to any bird habitat clearance during the peak bird breeding seasons.
- Placeholder – iwi to comment
- Pre-construction briefing with Project Ecologist and contractor personnel.
- Prior to bird nest surveys, a surveyor will mark out the required area of vegetation clearance.
- The Project Ecologist or suitably qualified ecologist will undertake the following to identify breeding birds, nests and eggs prior to vegetation clearance:
  - Bird behaviour will be observed from a distance to determine bird nest presence.
  - Careful and thorough transect walks will be undertaken within potential bird nesting habitat areas within the project area (and 10 m buffer to the boundary) searching for breeding birds, nests, and eggs.
  - If no active nests are found, vegetation clearance in the searched area may proceed (within three days, otherwise an additional nest check is required).
  - Where active nests are found, then individual trees and/or immediate surrounding habitat (within 10 m for nationally 'Not Threatened' species and 30 m for nationally 'At Risk' or 'Threatened' species) are to be left in situ, clearly marked, and cordoned off from any works or machinery until nesting birds have fledged or nests are naturally abandoned. Following confirmation that the area is free of active nests by the Project Ecologist, vegetation clearance or works may occur within three days of the area being checked.
- Climbing arborists may be required to assist with bird nest surveys where trees are too tall or dense to effectively assess from the ground. A climbing arborist may also be required to check tree cavities for ruru or kāka nests.
- Where work ceases for more than three consecutive days, the site must be re-inspected for bird breeding and nesting activity.

5.6 Accidental discovery protocols

If a bird nest, eggs and/or chicks are discovered during vegetation clearance by site contractors, the following protocols will be followed:

- The contractor will contact the Project Ecologist immediately.
- If a nest is found and deemed to be active, then individual trees and immediate surrounding habitat (within 10 m for nationally 'Not Threatened' species and 30 m for nationally 'At Risk' species) are to be left in situ, clearly marked, and cordoned off from any works and machinery until nesting birds have fledged or nests naturally abandoned.
- No works or personnel are to enter within the exclusion zone until chicks have fledged or the nest has been naturally abandoned, as confirmed by the Project Ecologist.
- Climbing arborists may be required to assist with bird nest checks where vegetation is too tall or dense to properly assess.
- Once the area is deemed free of active nests by the Project Ecologist, vegetation clearance or works may continue.

5.7 Accidental harm during vegetation clearance

In the event of finding a dead or injured native bird during vegetation removal or works, the following procedures will be implemented:

- Injured native birds will be placed in a cool, dark, material-lined box or bag by or under the direction of the Project Ecologist to ensure the bird is handled appropriately.
- Any accidental bird injuries and/or mortality will be reported to the Project Ecologist and Cultural Advisor/iwi representative no longer than two hours after the injured or dead bird is found.
- Injured native birds will be taken immediately to a suitably qualified vet for assessment.
- The local DOC office or DOC hotline (if after hours) will be contacted no more than 24 hours after the injured or dead bird is found. The DOC hotline is 0800 DOCHOT (0800 362 468).

DOC and veterinary advice will be sought in conjunction with the Project Ecologist when considering the rehabilitation requirements of any injured native birds (for example, legislative requirements will need to be considered). If the bird is dead or euthanised by the vet, it must be taken to the local DOC office as soon as practicable if requested by the local DOC office. Following assessment by DOC, the bird may be returned to mana whenua for appropriate tikanga to be followed.

Table 5.2: Contact details in event of bird injury or death

Wildlife Veterinary Specialist	
Name	Clevedon Veterinary Hospital
Contact details	09 292 3039
Address	29 Papakura-Clevedon Road, Clevedon, Auckland 2582
Local DOC office	
Name	Tāmaki Makaurau / Auckland Office
Contact details	0800 275 362
Address	Level 19, Te Wharau o Tāmaki/Auckland House, 135 Albert Street, Auckland 1010
After hours	0800 DOC HOT (0800 362 468)

5.8 Unplanned habitat removal

Where bird habitat is removed without compliance with the protocols in this AMP, the Quarry Manager shall be notified immediately and, in turn, shall notify the Project Ecologist. The following actions will then be undertaken under the direction of the Project Ecologist:

- The affected area will be quantified and described through a field investigation.
- The habitat assessment will include the suitability of the habitat for native birds and the likely species present.
- Photographs will be taken of the affected habitat and the area subject to clearance.

- The cause of the incident and the reasons for non-compliance will be documented.
- Recommendations will be developed to prevent similar incidents from occurring in the future.

5.9 Reporting

AMP reporting requirements are outlined in Section 9.

6 Bat Management Plan

6.1 Purpose and scope

This Bat Management Plan (BMP) sets out the methods that will be used to avoid or minimise the risk of injury or death for long-tailed bats (*Chalinolobus tuberculatus*) from vegetation clearance associated with the quarry expansion.

At the time of writing the EMP, only one potential bat roost was identified within the Project area; however, there is potential for vegetation retained for later quarry stages to develop suitable roost habitat before it is eventually cleared.

6.2 Roles and responsibilities

Delivery of, and compliance with the BMP will be the responsibility of the Quarry Manager who will liaise with the Project Ecologist to implement this BMP.

The Project Ecologist will be suitably experienced and certified by DOC to undertake roost felling (NZ DOC Bat Recovery Group, 2023) under the current Bat Competency framework (NZ DOC Bat Recovery Group, 2023, Table 6.1).

6.2.1 Bat competency requirements

The Project Ecologist undertaking bat management will be certified by DOC Bat Recovery Group as competent for the tasks undertaken (Table 6.1).

Table 6.1: Relevant competencies from the DOC Bat Competency framework (NZ DOC Bat Recovery Group, 2023)

Competency	Type
3. High risk activities (risk of disturbance and/or injury to bats)- Roost felling	3.1 Assessing roost tree use using Automatic Bat Monitors (ABMs)
	3.2 Roost watches/emergence counts
	3.3 Roost tree identification

6.3 Draft consent condition scope

<PLACEHOLDER PENDING CONSENT CONDITIONS>

This BMP has been developed in accordance with the [xxxx] resource consent conditions for Clevedon Quarry (consent number xxx).

6.4 Summary of bat values and effects

The presence of long-tailed bats (Threatened – Nationally Critical; O'Donnell et al. 2023) was confirmed within the Project area through Acoustic Bat Monitor (ABM) surveys undertaken between

11 March and 2 May 2025. No bat activity indicative of roosting (e.g. social calls, high activity levels at dusk and/or dawn) was recorded on any ABM, including one placed in the single potential roost tree identified within the Project area. Other than this tree, no trees considered to provide roosting habitat are currently present. However, vegetation currently assessed as having low or negligible roost potential may develop suitable roost features over time.

Long-tailed bats are considered of **very high** ecological value (Roper-Lindsay et al., 2018) due to their conservation status.

Long-tailed bats may be directly or indirectly impacted by the loss of vegetation and construction works within the Project area. Without management measures, potential adverse effects to long-tailed bats were identified as injury or mortality associated with the removal of occupied roost trees during vegetation clearance, along with loss of foraging and commuting habitat and disturbance from lighting and noise.

Section 6.5 of this report details the methods that will be followed to avoid or minimise the risk to long-tailed bats from removal of potential roost trees for the Project. These methods are adapted for the local site conditions based on best practice management of bats (NZ DOC Bat Recovery Group, 2024).

Clearance of trees containing potential bat roost features can only be undertaken between 1 October to 30 April inclusive, as bats are more likely to be active and easier to detect if present during warmer weather.

6.5 Vegetation Removal Protocols

Prior to each stage of vegetation clearance, potential roost trees within the proposed clearance area shall be assessed by the Project Ecologist no more than six months before clearance commences. This assessment can be undertaken at any time of the year. Where vegetation clearance does not commence within six months of the assessment, the Project Ecologist re-assess trees before further vegetation clearance proceeds.

Vegetation removal protocols (VRP) are to be implemented prior to the removal of trees identified as providing potential bat roosting habitat at the discretion of the Project Ecologist.

6.5.1 Potential roost tree identification

As detailed above only one potential roost tree was identified within the project area; however, due to the long life of the Project, there is potential for roost opportunities to develop over time and periodic reassessment will be required.

Prior to vegetation clearance, the Project Ecologist will select and physically mark trees over 15 cm DBH that exhibit potential bat roost features including, but not limited to:

- Cracks, crevices, cavities, fractured limbs, or other deformities, large enough to support roosting bat(s).
- Sections of loose flaking bark large enough to support roosting bats.
- A hollow trunk, stem or branches.
- Deadwood in canopy or stem of sufficient size to support roost cavities or hollows.
- Guano, grease marks and/or urine staining around cavity entrances.
- Trees with high epiphyte loading of sufficient density to support bat roosting.

Potential roost features will be assessed by the Project Ecologist to assess their suitability and to determine whether vegetation removal protocols are required. Removal of any vegetation identified

by the Project Ecologist as suitable potential bat roost trees must follow the procedures in Section 6.5.2.

All vegetation not identified by the Project Ecologist as containing potential bat roost features can be felled any time within the following six months.

6.5.1.1 Weather parameters

Weather parameters for different VRP methods are outlined below for easy reference and repeated within each protocol.

6.5.2 Pre-felling bat surveys

For any trees identified as potential roost trees, the following protocols will be followed.

6.5.2.1 Acoustic Bat Monitors

To determine if trees or other types of vegetation are active roosts, they will be monitored overnight from one hour before sunset to one hour after sunrise between 1 October and 30 April using ABMs for a minimum of two consecutive 'valid' nights immediately before felling. ABM survey results will only be considered 'valid' for nights when the following conditions are met:

- Temperature 8°C or greater for the first four hours after official sunset time.
- Precipitation <2.5 mm in the first 2 hours after official sunset and <5 mm in the first 4 hours after official sunset.
- No to light wind within the first four hours after official sunset.

Prior to the commencement of surveys ABMs will be checked for correct operation using the phone app 'DOC Bat Recorder Tester'. Faulty or suspect ABMs are not to be deployed:

- ABM data from each pre-felling survey will be reviewed without unnecessary delay.
- The ABM(s) will be placed so that all potential roost trees are within 30 m of at least one ABM to maximise detection of bats if they are using the potential roost.
- ABM data will be analysed and interpreted by the Project Ecologist to determine whether observed activity is indicative of roosting behaviour. If bat activity on either monitoring night meets one or more of the following criteria the tree should be considered a possible active roost:
  - Clustered passes (5 or more passes within 5 minutes) within 2 hours prior to dawn or immediately prior to heavy rain.
  - Social calls at any time of night.
  - More than 20 passes over the entire night.
- Bat activity parameters that are not considered indicative of an active roost:
  - No clustering of passes in the 2 hours before dawn.
  - Passes either faint or inconclusive.
  - No social calls.
  - Fewer than 20 passes over the entire night.
- If it is not possible to determine roosting activity using ABMs alone, the visual confirmation methods outlined in Section 6.5.2.2 will be followed.
- In the event ABM data indicates possible roosting activity, acoustic bat surveys must continue on subsequent nights until no activity suggesting roosting behaviour is recorded. Alternatively, visual confirmation following the protocol in Section 6.5.2.2 will be applied.

6.5.2.2 Visual confirmation

If it is not possible to rely on ABM data to determine whether a potential roost is active, visual confirmation methods will be used, at the discretion of the Project Ecologist.

Climbing inspections

- Climbing inspections can only be undertaken when the temperature at sunset the night before was 8°C or greater.
- To undertake a climbing inspection, the arborist or trained climber will relay any potential evidence of bats (e.g. staining, cavities, guano) by way of live audio-visual equipment and/or photographs for review by the Project Ecologist prior to removal. The arborist or trained climber will also check for signs of bats using a bat detector (to detect social and echolocation calls from roosting bats, under supervision of the Project Ecologist).
- If potential roost locations are within tree ferns or other 'fragile' vegetation, climbing should only be undertaken if it is safe to do so for the climber and will not unduly disturb any bats present. All climbing must take place under the careful supervision of the Project Ecologist to prevent roost damage.

Roost watches

If a potential roost site has been identified and it is considered highly likely to contain a roost but could not be confirmed using ABMs or it isn't safe to climb the tree to check for bats, roost watches for bats leaving or entering their roosts may be undertaken.

Roost watches can only be undertaken by a person accredited with Competency 3.2 (roost watches/emergence counts). If more than one person is required for a roost watch, a minimum of one person accredited with Competency 3.2 must be present on site for the duration of the roost watch to supervise. Roost watches are undertaken using the following methodology:

- The following weather conditions define a 'valid' night for roost watches:
  - Temperature greater than 8°C all night between official sunset and sunrise.
  - Precipitation < 2.5 mm for each two-hour period between official sunset and sunrise.
- ABMs should be deployed during roost watches and the data analysed following the conclusion of the re-entry watch.
- The aim of emergence watches is to identify whether potential roost features are being utilised by bats:
  - Each tree must be watched initially from sunset until it becomes too dark to see by sufficient people to observe all potential exit points.
  - Observers must return the next morning and watch the tree from two hours prior to official sunrise until one hour after sunrise to determine whether bats return to the potential roost feature.
- Emergence watches will be supported by the use of handheld bat detectors. Additionally, night vision aids such as a hunting night vision scope or a thermal camera may be used as a supplementary tool to detect bats when it is too dark to see.

6.5.3 Notification procedure

Following pre-felling bat surveys the following notification will be given:

- **No activity**: If no activity indicating bat roosting is detected on ABMs, and/or no bats are sighted or detected during visual confirmation survey, the Project Ecologist will inform the

Quarry Manager that the affected tree(s) and/or vegetation can be cleared prior to dusk the same day.

- **ABM activity**: If activity considered indicative of bat roosting is detected on ABMs (see Section 6.5.2) the Project Ecologist will inform the Quarry Manager that follow up visual confirmation surveys will be required before vegetation clearance can proceed.
- **Visually detected bat roost**: If a roosting bat is sighted or detected during visual checks, the Project Ecologist will immediately inform the Quarry Manager (who will be responsible for informing arborists), that the affected vegetation cannot be cleared.

6.5.4 Vegetation removal

The following sets out the different scenarios in which vegetation removal can occur.

No bat roost features

- Trees assessed by the Project Ecologist as having no bat roosting features may be removed at any time of the year without ecological supervision, provided the assessment was completed no more than six months before removal.

Bat roost features identified

- No trees or vegetation identified as potential roosts can be felled or cleared without the approval of the Project Ecologist.
- Potential or confirmed roost trees can only be felled between 1 October and 30 April, inclusive**.** Potential or confirmed roost trees must not be removed from 1 May to 30 September (inclusive) when bats could be hibernating or in torpor.
- All potential or confirmed roost trees to be removed must be clearly marked and labelled by the Project Ecologist.
- If there is no evidence of bats roosting in potential roost trees following the completion of pre-felling surveys, the trees may be felled. Tree removal must occur before dusk on the same day as the survey and the Project Ecologist must be on site for the duration of vegetation removal operations. The Project Ecologist will inspect each felled tree or vegetation for signs of bat roosts.

Bats present in tree

- If bats are confirmed to be present in a tree, then that tree will not be felled until the tree is deemed clear of bats. Roost confirmation methods (Section 6.5.2) must continue to be implemented until the Project Ecologist is satisfied the tree is no longer an active roost.
- If bat activity is observed during vegetation removal, then works must stop immediately and must not recommence until further monitoring confirms that the bats have left the roost. Trees and vegetation will be marked and site staff briefed immediately to indicate a roost is present.
- If bats are detected while felling of a tree is in progress, felling must stop immediately. Felling must stop long enough to allow any uninjured bats to escape. Felling will not recommence until the Project Ecologist is satisfied that all bats have either escaped, leaving the tree clear of bats, or all dead or injured bats have been removed and adequately treated.
- The Project Ecologist will advise the Quarry Manager should bats be detected during vegetation removal.

6.6 Incidental bat injury and mortality

In the event of finding injured bat(s) during vegetation clearance or quarry activities the following should be implemented:

- Works will cease immediately on sighting of bat(s), and the Project Ecologist must be contacted immediately for guidance.
- The injury will be reported within 24 hours to DOC (Table 5.2).
- Bats should be placed in a cool dark material-lined bag/box with one corner of the bag moistened. Handling should be undertaken by the Project Ecologist, or under the guidance of the Project Ecologist.
- Injured bats should be immediately taken to local vet for assessment (Table 6.2).
- Bats confirmed as injured by the vet should be treated and rehabilitated. Suitability for release will be determined by the vet responsible for treating the bat(s). If it's considered suitable to release the bat(s), it will be released in similar or better habitat within 500 m from the capture location in accordance with the liberation protocols (Section 6.6.2).
- DOC and veterinary advice will be sought in conjunction with the Project Ecologist when considering the rehabilitation requirements of any injured bat(s) (e.g. legislative requirements will need to be considered). Once the vet has made an assessment the Project Ecologist and vet will determine any rehabilitation action required and the longer-term future for the bat(s).
- If the animal is dead (see Section 6.6.1), or is euthanised by the vet, it must be taken to the local DOC office as soon as practicable. The bat must be stored in a fridge at <4°C until delivered to DOC. Following assessment by DOC, the animal may be returned to mana whenua to allow appropriate tikanga to be followed.
- A review of the activities leading to the injury will be undertaken, and process to minimise the risk of further injury agreed and implemented, prior to works recommencing.

6.6.1 Accidental Death

In the event that any bat(s) are killed during construction the following will occur:

- Works will cease immediately on sighting of bat(s).
- The death will be reported within 48 hours to DOC (Table 6.2).
- The dead animal must be taken to the local DOC office as soon as practicable. The bat must be stored in a fridge at <4°C until delivered to DOC. Following assessment by DOC, the animal may be returned to mana whenua to allow appropriate tikanga to be followed.
- A review of the activities leading to the killing will be undertaken, and process to minimise the risk of further killing agreed and implemented, prior to works recommencing.

DRAFT

Table 6.2: Contact details in event of bat injury or death

Wildlife Veterinary Specialist	
Name	Clevedon Veterinary Hospital
Contact details	09 292 3039
Address	29 Papakura-Clevedon Road, Clevedon, Auckland 2582
Local DOC office	
Name	Tāmaki Makaurau / Auckland Office
Contact details	0800 275 362
Address	Level 19, Te Wharau o Tāmaki/Auckland House, 135 Albert Street, Auckland 1010
After hours	0800 DOC HOT (0800 362 468)

6.6.2 Liberation

Bats taken to the vet clinic following the protocols above and deemed healthy may be immediately liberated provided that the bat(s) are:

- Only liberated where works are not occurring;
- Liberated into an appropriate habitat within 500 m of the capture location at least 1 hour after dusk and before midnight; and
- Liberated in appropriate environmental conditions which include little to no rain and temperatures are >12°C.

6.7 Operational management

Lighting and noise controls detailed in Sections 6.7.1 and 6.7.2 will be maintained for the operational life of the quarry. Before each expansion phase commences, and before implementing any material change to site conditions, quarry operations, lighting or overnight noise-generating activities, the Quarry Manager will consult the Project Ecologist. The Project Ecologist will review the proposed phase or change against the measures in this section, including any new information on bat roosting, commuting and foraging habitat, and confirm whether those measures remain appropriate or require amendment. Any necessary amendments will be documented and implemented before the relevant phase or change proceeds, in accordance with applicable consent requirements.

6.7.1 Lighting management

Artificial lighting associated with quarry operations, security, access and maintenance activities will be designed and operated to minimise adverse effects on bats. The following measures will apply:

- Lighting will be directed only to areas requiring illumination;
- Light spill into retained indigenous vegetation, habitat corridors, streams and restoration areas will be minimised;
- Known or potential commuting routes will not be illuminated where practicable;

- Lighting will be switched off when not required;
- Timers, motion sensors or other controls will be used where practicable;
- Appropriate shielding and luminaire selection will be used;
- Significant changes to lighting will be reviewed against current DOC guidance; and
- Lighting performance will be reviewed periodically by the Project Ecologist.

6.7.2 Overnight noise management

Overnight quarry activities have the potential to temporarily alter bat behaviour, particularly through avoidance of habitat immediately adjacent to the quarry pit. The effects of noise will be managed by controlling the frequency, duration and intensity of overnight activities.

The following measures will apply:

- Overnight works will occur only when required for quarry operations and within the limits of the relevant resource consents.
- The anticipated frequency of overnight works will be limited to approximately **[INSERT NUMBER] nights per year**, subject to operational requirements and consent conditions.
- Where practicable, overnight activities will be planned to avoid unnecessary consecutive nights of elevated noise.
- Plant and equipment will be maintained in good working order to minimise unnecessary noise generation.
- Quarry personnel and contractors will avoid unnecessary engine idling, vehicle movements, reversing alarms and other avoidable sources of noise during overnight operations.
- Where practicable, noisy activities will be located or scheduled to minimise exposure of retained native vegetation and potential bat habitat.
- Where operationally practicable, activities generating the highest levels of noise will be limited in duration during the overnight period.
- The duration and frequency of overnight works will be recorded as part of normal quarry operational records and the Project Ecologist will review.

6.8 Reporting

BMP reporting requirements are outlined in Section 9.

7 Freshwater Management Plan

7.1 Purpose and scope

This FMP sets out the measures to avoid, minimise and manage adverse effects on native freshwater fauna associated with the Clevedon Quarry Expansion. If works in watercourses (streamworks) are required throughout the construction period, these measures will be applied.

For the purposes of this FMP, freshwater fauna includes indigenous freshwater fish, kōura and any other freshwater macrofauna encountered during streamworks or dewatering activities.

The FMP provides a framework for freshwater fauna salvage and relocation and compliance with applicable resource consent conditions. It has been developed with reference to the EcIA, the NPS-FM (2020), relevant national guidance and current industry best practice.

This FMP has been prepared at the resource consent stage. Detailed construction methodologies and streamworks methods have not yet been finalised and may be refined through detailed design. Accordingly, the FMP establishes the ecological outcomes, performance standards, monitoring requirements and adaptive management framework that must be achieved regardless of the final construction methodology adopted.

7.2 Roles and responsibilities

Table 1.2 in Section 1 sets out the roles and responsibilities in relation to this FMP with the Clevedon Quarry Manager holding overall accountability for implementation of and compliance with this plan. The Project Ecologist will be suitably qualified and experienced in freshwater fauna management.

Specific to this FMP, the Quarry Manager is responsible for the installation of exclusion fences and appropriate mesh/screens on pumps (detailed in Section 7.5.4).

7.3 Draft consent conditions

<PLACEHOLDER>

This FMP has been developed in accordance with the [TBC] resource consent conditions for Clevedon Quarry (consent number TBC).

7.4 Summary of freshwater values and effects

Freshwater fauna ecological values and effects are summarised in Section 2 of this EMP and detailed in Section 4.2 of the EcIA. A summary is also provided below.

The Project area spans four catchments (Stream catchments 1, 2, 2a and 3; Appendix A Figure 2). Streams within these catchments comprise small intermittent headwater systems through to second order streams, all of which drain to the Wairoa River. The reaches to be removed within the quarry expansion and OBDA footprints are predominantly located within the felled pine forestry area.

Stream catchments 1, 2 and 3 support longfin eel (*Anguilla dieffenbachii*), banded kōkopu (*Galaxias fasciatus*) and shortfin eel (*Anguilla australis*). These are the most likely species present within the upper stream reaches to be removed within these catchments. Kōaro (*Galaxias brevipinnis*) may also be present in the upper reaches of Stream 3 within the OBDA footprint, if suitable habitat exists. The lower reaches of Streams 1 and 3 support further species including torrentfish (*Cheimarrichthys fosteri*) and redfin bully (*Gobiomorphus huttoni*). The freshwater fish species detected in Stream 2a were limited to shortfin eel.

Kōura (*Paranephrops planifrons* or *Paranephrops* sp.) were detected in all four catchments.

Based on the national and regional threat classification status of the species present within each catchment (refer to Dunn et al. 2025, Grainger et al., 2018 and Bloxham et al., 2023), the freshwater fauna values range from High to Very High.

The FMP describes measures to salvage and relocate freshwater fauna that are likely to be adversely affected by the quarry expansion. As outlined in the EcIA, the implementation of this FMP is intended to minimise potential effects on freshwater fauna and reduce the overall level of effects so that injury and mortality effects on freshwater fauna can be suitably managed.

7.4.1 Staging of stream removal

The proposed quarry expansion, including establishment of the OBDA, will be undertaken in five indicative stages over an estimated 50-year period (see Appendix A Figure 2). The proposed length and area of stream removal within each stage is detailed in the EcIA, and a summary provided in Table 7.1 below.

Table 7.1: Stream loss across overburden site establishment and pit expansion stages

	Stream length (to nearest m) removed	Streambed area (to nearest m^2) removed
Overburden disposal area (~Stage 1)	543	205
Stage 1	69	21
Stage 2	104	32
Stage 3	966	670
Stage 4	507	208
Stage 5	204	47
Total	2,392	1,182

7.5 Salvage and relocation protocols

7.5.1 Permits

The FMP must be implemented by suitably qualified and experienced ecologists and in accordance with relevant permits and approvals, which include:

- A Ministry for Primary Industries (MPI) Special Permit to catch fish for the purpose of relocating aquatic life; and
- An approval from MPI pursuant to section 26ZM (2)(a) of the Conservation Act 1987 to transfer any freshwater aquatic life to a location where they already occur (normally within the same catchment).

7.5.2 Timing of works

Salvage will occur immediately before streamworks, following isolation of the work area and before dewatering or stream infilling. The timing of freshwater fish salvage work will depend on the construction schedule and weather conditions. The Project Ecologist will consult with the Quarry Manager to plan the staging and sequence for work area isolation (fish exclusion screens), freshwater fauna salvage and dewatering.

At the time of preparing this EMP, some stream catchments had been replanted in exotic forestry. Depending on the stage of growth of trees within these catchments at the time the FMP is implemented, the Project Ecologist and Quarry Manager will discuss the preference for the FMP to be implemented prior to or after trees are harvested. Implementing the FMP prior to harvest will likely result in a higher success rate for fish salvage compared to post-harvest when slash restricts access and stream habitats may be damaged.

Salvage is anticipated to be undertaken during the summer months when intermittent streams are expected to be dry or flowing only intermittently. This timing reduces the likelihood of freshwater fauna being present within affected headwater reaches, improves the effectiveness of salvage operations and reduces potential mortality and injury effects.

Where construction staging results in a work area remaining isolated for an extended period, the Project Ecologist will determine whether additional checks or repeat salvage are necessary before the next stage of works proceeds.

DRAFT

7.5.3 Salvage footprint

Salvage will be undertaken within permanent and intermittent streams within the quarry expansion and OBDA footprints that contain suitable habitat for freshwater fauna.

The areas to be impacted are predominantly located within recently harvested forestry areas and include steep terrain, forestry slash and variable ground conditions, which present constraints on access and salvage operations. Specific requirements related to the four stream catchment areas are therefore detailed below.

Detailed construction and streamworks methodologies and staging and have not yet been finalised. However, as the streams to be removed comprise headwater tributaries, it is generally preferable for salvaging to progress from the most upstream extent of the reach, working in a downstream direction.

For long stream reaches, salvage may be undertaken in 'sub-reaches' of approximately 150 m at a time, using the salvaging protocols described below.

Intermittent stream requirements: Stream catchment 1, 2a and 3

- All streams to be removed within these catchments are headwaters that likely flow intermittently (see Appendix A Figure 2).
- Salvage will be undertaken on intermittent tributaries in these catchments where access is safe and practicable. However, it is expected that intermittent tributaries will contain minimal habitat for freshwater fauna if salvage is undertaken during summer months when those streams will be dry.

Stream 2 catchment requirements

- Based on the quarry expansion staging, it is anticipated that fauna salvage will occur within Stage 2 in the upper main channel intermittent reach and its associated intermittent tributaries, and in Stages 1 and 2 in the large intermittent tributary to the north of the permanent main channel (see Appendix A Figure 2). This will allow freshwater fauna salvage in these areas to proceed in an upstream to downstream direction and will provide for freshwater fauna habitat within the Stream 2 permanent reach to remain into Stage 3. Fauna salvage in these intermittent reaches will be implemented as described above for intermittent streams in other catchments.
- Fauna salvage within the remaining Stream 2 reaches, namely the main channel permanent reach, is anticipated to occur within Stage 3, in line with the anticipated quarry staging (see Appendix A Figure 2). This permanent reach will be the main focus of freshwater fauna salvage efforts within this catchment. In this location:
  - prior to commencing salvage on each sub-reach, the Project Ecologist and Quarry Manager will arrange for a safe access track down to and along the sub-reach. An arborist or land clearing contractor may be required to assist in this access preparation stage, cutting and removing vegetation or forestry slash as required.
  - some small portions of the permanent reach could be inaccessible for salvage due to physical constraints or obstacles preventing appropriate and safe access, including old forestry slash that cannot be safely cleared.

7.5.4 Fish salvaging methodologies

The implementation of the fish salvage methods described in the following sections will reduce the potential effects of mortality or injury during the construction activities associated with the project. It will not be possible to completely avoid the mortality of all freshwater fish; however, the objective

of the salvage approach will be to minimise mortality as much as practical in line with the expectations of the EcIA.

Salvaging will include a range of methodologies (described in subsequent sections below) and following good practice with reference to the standard survey protocols for New Zealand freshwater fish where appropriate as they relate to trapping and electric fishing machine (EFM) techniques (e.g., Joy et al, 2013). However, it is recognised that these survey protocols are designed to collect reproducible data rather than maximise the capture of aquatic life and it would therefore not be appropriate to strictly adhere to them during fish salvage operations.

The specific salvage methodologies implemented will be confirmed once the detailed construction and streamworks methodologies have been finalised. Additionally, each individual stream will have its own access constraints, stream characteristics, hydraulic conditions, habitat type and species present. This will influence the practicality and suitability of the salvage methods presented in the sections below, alongside current industry best practice at the time the works are undertaken. Notwithstanding this, due to the small size of most of the streams to be removed, it is likely that electric fishing will be used in preference over trapping.

Freshwater fauna salvage will be undertaken immediately before disturbance and will be overseen by a suitably qualified Project Ecologist. The method statement below establishes the minimum process to be followed, while allowing the Project Ecologist to adjust the sequence and level of effort in response to site conditions.

Once the work area is isolated, salvage will generally occur as a two-stage process, starting with trapping and/or electric fishing, followed by dewatering and muck out where site constraints allow.

7.5.4.1 Work Area Isolation

Prior to engaging salvage methods for fauna capture, streams affected by works are to be isolated using fish exclusion screens to prevent fish moving into the designated works area. This means isolating both upstream and downstream extents of the works area, unless the full upstream extent is to be affected. The locations of the exclusion screens will be agreed with the Quarry Manager and Project Ecologist once the streamworks staging plan and implementation programme has been prepared.

Construction of fish exclusion screens is the responsibility of the Quarry Manager, with the direction provided by the Project Ecologist. They are intended to be temporary and therefore will be installed immediately prior to fish salvage and streamworks commencing. This reduces the risk of the screens being compromised, for example due to a wet weather event.

Fish exclusion screens will:

- Be installed to minimise the ability of fish to swim under, or around the screen, but will not impede water flow. If practicable and dependent on stream bed composition, the exclusion screens will be embedded in the stream bed and banks and firmly secured.
- Extend well above the water surface to allow for increases in water level.
- Preferably be constructed from fine (4 mm) mesh, although larger mesh (e.g. 8 mm) may be used if there is a risk of the mesh blocking due to instream organic debris. If the mesh used in the construction of the exclusion screen is to be shade cloth the percent shade should range between 50 – 70 %. The mesh material will be supported by wire netting, with construction like a super silt fence.
- Be inspected and, where required, maintained daily by the Quarry Manager to ensure the screen's structural integrity is maintained until the fish salvage in that section is completed.

- If an exclusion screen fails or becomes overtopped with water, the methodology outlined within this FMP will need to be repeated.
- Allow the Project Ecologist to implement fish capture and relocation from within the area prior to streamworks beginning.

7.5.4.2 Trapping

Depending on the water depth and area of wetted habitat, the trap density used will nominally be nine fyke nets and 18 Gee's minnow traps per 150 m stream reach. This is a higher density than recommended in the New Zealand native fish sampling protocols (Joy et al., 2013) because the objective of this exercise is fauna salvage rather than monitoring.

The actual trap density used in each reach will be determined by the Project Ecologist and will depend on the available habitat, channel size and water depth. For example, fewer traps will be set in the reach if channel width is narrow and pool habitats are small. Only Gee's minnow traps will be deployed where there is insufficient water depth or channel width to deploy fyke nets. All fyke nets used will have an internal exclusion system to separate larger fish from smaller fish and reduce the risk of predation.

Where there is a risk of night-time anoxia, traps will not be fully submerged to allow the fish to have the ability to surface breathe. Each trap will be checked the following morning, with any captured fish, held and relocated according to the relocation protocol below.

Trapping effort for each sub-reach of approximately 150 m will be set to a minimum of one night per reach and will then proceed, until all of the below conditions are met (refer to Dunn et al., 2025 for national conservation status and Bloxham et al., 2023 for regional conservation status documents):

- If native fauna with a national or regional conservation status of 'Threatened' are captured, trapping will continue until no further 'Threatened' individuals are captured.
- If native fish with a national or regional conservation status of 'At Risk' are captured, then further trapping will be undertaken until the catch numbers are ≤5 individuals for each 'At Risk –Declining' species.
- If native freshwater fish without national or regional 'Threatened' or 'At Risk' conservation status are captured at densities of greater than 10 individuals of each species per 150 m reach, then trapping will continue until a reduction of >50 % between the highest and the lowest number of individuals captured on any one night is achieved or ≤10 individuals of each species are captured.

In all cases, traps will be deployed for a maximum of four nights, even if all of the above conditions cannot be met. This is because further nights trapping increases the risk of exclusion screen failure during rain events, and we consider four nights will be sufficient to capture the majority of individuals present across the life stage/population spectrum.

If the Project Ecologist considers the site suitable, then the second or third night of trapping prior to dewatering may be done after partial dewatering has occurred in accordance with the dewatering protocol (Section 7.5.4.2).

Reduction rates are based on our experience undertaking freshwater fauna salvage for other development projects.

7.5.4.3 Electric fishing

Electric fishing may be undertaken where water depths are between approximately 100 mm and 600 mm, and where stream conditions are suited to this method (consideration will be given to

conductivity, water clarity, visibility, water velocities, macrophyte cover and whether site access provides for safe operation of the EFM).

In brief, the electric fishing protocols for each sub-reach of approximately 150 m are:

- Electric fishing will occur for a minimum of three passes. Following that, electric fishing will continue until all of following conditions are met:
  - If native fish with a national or regional conservation status of 'Threatened' are captured, then further electric fishing passes will be undertaken until no further 'Threatened' individuals are captured.
  - If native fish with a national or regional conservation status of 'At Risk' are captured, then further electric fishing passes will be undertaken until the catch numbers are ≤5 individuals of each species.
  - For native freshwater fish without national or regional 'Threatened' or 'At Risk' conservation status, if the number of fish captured between any two consecutive passes decreases by <50% then further electric fishing passes will be undertaken until the decrease is >50%, or ≤10 individuals of each species is captured in a pass within the isolated area (note these reduction rates do not apply to non-threatened juvenile gobiidae[2]).
- If after multiple passes the specific reduction rates have not been meet, at the discretion of the Project Ecologist the stream reach can begin to be dewatered and the salvage work shift to dewatered reach searches as set out in the following section.

7.5.4.4 Hand-netting and Manual Searching

Hand-netting may be undertaken throughout the salvage process, including immediately after electrofishing, during progressive dewatering, around pools and refuge habitats, and during final habitat inspections.

Manual searches will target areas likely to provide refuge for freshwater fauna, including undercut banks, root masses, woody debris accumulations, large cobbles and boulders, residual pools, dense aquatic vegetation, seepages and low-flow refuge habitats

7.5.4.5 Dewatering and Muck-Out

Following completion of active capture methods, isolated work areas may be progressively dewatered where required by the final construction methodology. Dewatering will proceed gradually to encourage aquatic fauna to move into areas where they can be captured, concentrate fauna into accessible locations and minimise fish and kōura stranding.

During dewatering, pools and remaining wetted areas will be inspected regularly. Stranded individuals will be captured and relocated, refuge habitats will be searched, and any additional fauna encountered will be recovered. Following dewatering, the exposed substrate and remaining habitat will be inspected before streamworks or muck-out commence.

In brief, the dewatering protocol is as follows:

- A fish exclusion screen (pump screen) will be installed on all pumps used during dewatering activities (refer to subsection below).
- If the isolated section does not need to be pumped then fauna may be allowed to swim downstream, outside of the impact reach, as water recedes. This is less damaging to the fauna

[2] Determined to be gobiidae species ≤ 40 mm in size

than catching them with hand nets or electric fishing. As the water level recedes the downstream fish exclusion screen will be removed to allow the fauna to escape.

- In streams with dense aquatic macrophytes, a channel / pools may need to be formed to assist fauna movement. Any macrophytes or instream sediment moved to create the channel will remain in the stream during dewatering.

Where muck-out of soft sediment is required, the Project Ecologist will supervise the process. Fine sediment will be removed carefully and spread in a safe location where it can be searched for eels, kōura or other freshwater fauna before disposal. Plant movement, spoil placement, communication between the machine operator and ecologist, and exclusion zones will be managed to address health and safety risks associated with working near machinery.

Once stream dewatering (and muck out, if required) is complete and the Project Ecologist is satisfied with the level of fauna capture effort, approved and consented streamworks can commence.

Pump inlet fish screens

Installing and checking the pump during operation is the responsibility of the Quarry Manager. To prevent fish impingement or entrainment any pump used during streamworks (including to temporarily over-pump a stream during on-line streamworks) must be designed to protect fish that could be present at the pump inlet area and stream habitat in the pump outlet area.

The pump inlet must include a 3 mm mesh screen to ensure fish do not enter the pump. If a soft material, like shade cloth, is used this will need to be supported by a strong wire mesh within a frame. This will provide strength and support to the screen material with minimal reduction in cross-sectional area relative to flow.

The pump inlet will be placed in a drum with holes to minimise the possibility of sucking sediment from the bottom of the channel. The pump outlet will be directed to the downstream channel bed and, if the Project Ecologist determines it is required, with small riprap boulders or thick layer of slash to dissipate the energy.

Once installed, the pump screen must be checked by the Project Ecologist prior to commencing any works. Once satisfied that the screen is effective, approved streamworks can commence. The Quarry Manager will regularly check (e.g., 2 – 3 times per day) that the pump inlet has not been damaged or failed in any way and to remove any collected debris.

If any pump screen becomes regularly clogged with debris, then the Quarry Manager will install an additional screen upstream of the original pump screen to trap larger debris. This will facilitate easier cleaning and minimise damage/blocking of the screen around the pump.

Depending on site conditions, more frequent checks of the pump inlet by the Quarry Manager may be needed, for example when water velocities or risk of erosion and screen failure is greater, or there is a lot of organic debris that may clog the screen.

A pump screen checklist is recommended to be completed regularly by the Quarry Manager during the instream works period.

7.5.4.6 Kōura

All kōura captured during fish salvage activities will be relocated following the protocols in Section 7.7. Specific reduction rates are not considered necessary for kōura.

7.6 Biosecurity

Unless being redeployed in the same stream catchment (i.e. each of the Stream 1, 2, 2a and 3 catchments), all equipment used will be cleaned, sterilised and allowed to dry for no less than one

week prior to use ensuring that all plant material (seeds or plant material that is able to regenerate) and freshwater fauna (e.g., planktonic larvae) is either removed or dead, reducing the risk of transferring freshwater pest plants or animals to new locations.

Any pest fish caught will be humanely euthanized using clove oil (50 mL per 10 L of water) or benzocaine (3.3% solution in ethanol, 50 mL per 10 L of water). All euthanized pest fish will be buried within the riparian margin of the stream in which they were caught.

For some relocation programmes, it is necessary to recycle stream water to reduce the risk of transporting unwanted organisms. For this Project, it is not considered necessary.

It is expected that no unwanted organisms will be introduced to the proposed relocation sites (Section 7.7.2) when freshwater fauna are relocated from upstream to downstream within the same stream catchment. The exception will be if fauna are relocated to the Wairoa River. As there is existing connectivity and the Wairoa River is downstream of the affected reaches, unwanted organisms are not likely to be introduced from the salvage locations to the Wairoa River. Notwithstanding this, containers containing fauna to be released will be screened for any unwanted organisms prior to relocation.

7.7 Relocation protocol

7.7.1 Handling, transportation and relocation

Following capture, all freshwater fauna will be relocated in a lidded container of an appropriate volume of clean stream water for the number caught. An aerator will be installed into the container and any freshwater fauna will be transferred to the relocation site within approximately two hours of capture.

Access constraints within the stream catchments may mean that fauna relocation within the time frame specified above. If freshwater fauna have to be held for longer than two hours, holding containers will be insulated to maintain suitable water temperatures and water will be either changed or filtered to maintain water quality.

Whilst contained, freshwater fauna will be constantly monitored and if any individual shows signs of stress (e.g. loss of righting response, and for fish gulping air, and/or gaping) the water will be changed to provide more oxygen and/or the fish will be moved to the relocation site immediately. Sensitive fish species, e.g. galaxiidae or gobiidae species, will be kept in a separate bucket to eels and kōura, to avoid any further disturbance to these species.

Large eels (> 500 mm) will be contained separately within separate holding bins or alternatively in wetted mesh sacks and kept hydrated to avoid injury to other smaller captured fish.

Fish will be handled with wet hands and/or equipment at all times to minimise potential injury. As a general principle, any handling of all freshwater fauna will be minimised in order to reduce potential stress. When freshwater fauna are being released into relocation sites, care will be taken to ensure that the temperature differential between the transportation container and the receiving environment does not noticeably differ. The water temperature will be equilibrated by gradually mixing water from the receiving water body into the transport container over a minimum of five minutes.

7.7.2 Relocation Sites

Relocation sites will be selected and approved by the Project Ecologist before salvage activities commence. Final relocation sites are likely to be Streams 1 and 3 [TBC once construction methods are available] downstream of the any reaches to be impacted, and/or the Wairoa River. This will be

reviewed once the detailed construction methodology, salvage footprint and expected capture results are available.

The proposed relocation sites are considered suitable for fish translocation as they are located within the Wairoa River catchment, support existing populations of the target species, provide suitable habitat conditions and ecological connectivity, and can be safely accessed for release and monitoring. The proposed relocations are not expected to adversely affect existing fish populations at the recipient sites.

Potential receiving habitats include permanent stream reaches downstream of the works area, retained sections of the affected catchment or other suitable locations approved under the relevant permits and authorisations. Where salvage occurs over multiple days, the Project Ecologist may review and modify relocation-site selection based on field observations, habitat conditions and capture results.

7.8 Accidental discovery protocols

It is unlikely that freshwater fauna species beyond those identified in the EcIA will be present on-site, as identified species were informed by freshwater fauna surveys completed within each of the four stream catchments. However, exact community assemblages are not always known, particularly the presence of cryptic species. As such, if any species additional to those in the EcIA are discovered on site at any time during the construction period, the process outlined in Section 2.2 will be followed. Specifically in respect of freshwater fauna:

- works will cease immediately and the individuals returned to the stream (where it is safe for them to be returned), and
- the Quarry Manager and Project Ecologist notified.

The Project Ecologist will identify the specific species and will communicate with the Auckland Council Ecologist to determine appropriate management actions. The individual/s are not to be handled or relocated until consultation with the Auckland Council Ecologist has concluded, to ensure species specific protocols are followed. Following agreement on the appropriate management of any discovered species, written confirmation will be sought from Auckland Council as to the course of action and where appropriate, this FMP will be updated.

7.9 Mortality observations

If mortality occurs during the implementation of the handling, transportation, and relocation protocols described in Section 7.7, in the first instance the water in the holding tanks/bins will be cycled with fresh stream water to provide more oxygen to the captured freshwater fauna. Then the salvage and handling protocols will be reviewed and any updates to protect captured freshwater fauna within the protocols will be made to the FMP (following the EMP management and review process outlined in Section 2).

Any mortality of freshwater fauna while in holding tanks/bins will be recorded with species identified, length and any physical signs of stress/harm (e.g. reddening of the gills, skin abrasion, loss of/tears in fins) detailed.

Furthermore, within the vicinity of each relocation site, a minimum of 10-minutes will be spent observing the relocation site once freshwater fauna have been released to identify any mortality. This observation period must include walking upstream and downstream of the relocation site.

Any mortality will be recorded, with species identified, length and any physical signs of stress/harm (e.g. reddening of the gills, skin abrasion, loss of/tears in fins) detailed. If during the 10-minute observation period, mortality is observed to be high (i.e. mortality of released fauna > 30 %), any

further relocation attempts to that site will be halted, dead fish removed from the site, and the cause of the high mortality investigated (e.g. through collecting relocation site water quality information) and a review of the handling and relocation protocols within the FMP will be completed and if needed any updates to the protocols will be made (following the review process outlined in Section 0).

7.10 Native freshwater fauna recording and reporting

For all native freshwater fauna the following information will be recorded:

- Date and time of capture and release;
- Capture method;
- Capture and release locations (GPS coordinates); and
- Number and size of individuals of each species released.

When sizing relocated fish, the first 50 fish of each species will have their total length (nose to distal end of caudal fin) measured. If more than 50 of a particular fish species is captured, either a sub-sample of an additional 10 individuals per effort is also measured, or alternatively individual fish are measured to nearest 10 mm.

All records of aquatic fauna captured and translocated will also be forwarded to MPI, DOC, and uploaded to the New Zealand Freshwater Fish Database in accordance with conditions attached to any permits or authorities.

Refer to Section 9 for further reporting that may be required.

7.10.1 MPI Fish Permit Report

Following completion of freshwater fauna salvage and relocation activities, reporting required under the MPI permit shall be prepared and submitted in accordance with permit conditions. The report shall summarise capture methods, survey effort, species captured, numbers relocated, relocation sites, any mortality observed, and measures undertaken to minimise adverse effects on freshwater fauna. The report shall also document compliance with all relevant permit requirements and any lessons learned for future salvage operations.

8 Residual Effects Management Plan

8.1 Purpose and scope

The purpose of this REMP is to address the residual ecological effects identified in the EcIA through a programme of terrestrial biodiversity offset, freshwater offset and freshwater compensation measures. The REMP provides the framework for the restoration, enhancement, protection, management, monitoring and maintenance measures recommended to achieve the ecological outcomes relied upon by the Project.

The terrestrial biodiversity offset addresses residual effects associated with the loss of approximately 6.1 ha of regenerating indigenous forest and is intended to achieve a no-net-loss outcome. Freshwater offset and compensation measures address residual effects associated with stream loss and changes to freshwater ecological values that cannot be fully avoided, minimised or mitigated.

All biodiversity offset, compensation and restoration planting areas, together with existing native treeland, will be legally protected in perpetuity through an appropriate legal mechanism to ensure the long-term achievement of restoration outcomes.

This REMP should be read in conjunction with the EcIA, FMP, VMP and relevant consent conditions. Table 8.1 summarises the primary ecological outcomes and measures addressed by this REMP.

Table 8.1: Restoration objectives and outcomes.

Outcome area	Restoration outcome	Primary measure
Terrestrial biodiversity offset (slope planting)	No net loss of affected terrestrial biodiversity values associated with approximately 6.1 ha of forest clearance	Stream 3 catchment and OBDA planting, including enrichment planting where necessary to reach target ecosystem (WF9 – taraire, tawa, podocarp forest)
Freshwater offset (riparian restoration)	Improved shading, bank stability, connectivity and freshwater habitat condition, to partially address residual effects associated with stream removal	Riparian planting along approximately 4,510 m of stream length, to a width of 20 m on each bank.
Freshwater compensation (slope planting)	Address remaining residual effects associated with stream removal, as well as changes to stream flow	Stream 3 upper and lower catchment restoration planting to provide 'ridge to river' connectivity between Wairoa River and the Hunua Ranges
Stream 1 mitigation (2018 consent mitigation planting)	Address residual vegetation and riparian effects	Approximately 600 m² of planting on the true left bank of Stream 1
Long-term protection	Maintain offset and compensation outcomes in perpetuity	Legal protection in perpetuity

The methods outlined in subsequent sections are indicative only and will be refined in a Detailed Planting Plan (DPP), which will sit alongside the REMP.

8.2 Effects addressed and ecological accounting

The terrestrial biodiversity offset, freshwater offset and freshwater compensation measures described in this REMP address the residual ecological effects identified in the EcIA following application of the effects-management hierarchy.

The following sections summarise the ecological accounting undertaken for the Project and identify the restoration measures that will deliver the outcomes described in Section 8.1.

8.2.1 Terrestrial biodiversity offset accounting (BOAM)

The EcIA assessed the permanent loss of approximately 6.1 ha of regenerating tree fern-broadleaf forest as a residual adverse effect requiring biodiversity offsetting. A Biodiversity Offset Accounting Model (BOAM) assessment was undertaken to determine the quantum of restoration required to achieve a no-net-loss outcome for the affected terrestrial biodiversity values.

Two BOAM calculations were completed:

- *BOAM 1* assessed restoration of the approximately 4.6 ha Overburden Disposal Area (OBDA) following completion of filling activities. The assessment determined that restoration of the full OBDA area would offset approximately 2.0 ha of the affected regenerating tree fern-broadleaf forest.

- *BOAM 2* assessed restoration planting within the Stream 3 catchment. The assessment determined that approximately 6.0 ha of restoration planting within the Stream 3 catchment would offset the remaining 4.1 ha of affected regenerating tree fern-broadleaf forest.

Together, the two BOAM assessments demonstrate that approximately 10.6 ha of restoration planting is sufficient to address the residual effects of the loss of 6.1 ha of regenerating tree fern-broadleaf forest and achieve the no-net-loss outcome recommended in the EcIA.

Full BOAM assumptions, calculations and results are provided in the EcIA appendices.

8.2.2 Freshwater offset accounting (SEV/ECR)

The EcIA identified residual freshwater effects due to the permanent removal of approximately 2,392 m of permanent and intermittent stream habitat across the Stream 1, Stream 2, Stream 2a and Stream 3 catchments. The SEV and ECR methodologies were used to determine the quantum of freshwater offset required to address those effects.

Riparian restoration of stream reaches was identified as the primary freshwater offset mechanism. Approximately 4,510 m of permanent and intermittent stream within the Stream 3 catchment was identified as suitable for restoration (planting of riparian margins to 20 m on each bank), representing approximately 4,420 m² of streambed area (Appendix A Figure 3). Application of the SEV/ECR methodology indicated that this riparian restoration package would offset approximately 38% of the residual stream-loss effects.

8.2.3 Freshwater compensation

Following allocation of all available offset stream length within the Stream 3 catchment, residual freshwater effects remained. These effects relate to stream loss within the quarry expansion footprint that could not be fully addressed through the like-for-like offsetting described above, and residual effects due to changes in contributing catchment area and associated stream flow reductions. These residual effects are addressed through freshwater compensation planting within the Stream 3 catchment.

A total freshwater compensation area of approximately 40.4 ha is proposed in addition to the freshwater offset planting. This compensation planting forms part of the wider river-to-ridge restoration corridor and will contribute to reductions in sediment inputs, improvements in riparian condition through reduced edge effects, enhancement of ecological connectivity and long-term freshwater ecosystem function.

In addition to the above planting measures, the freshwater compensation package includes protection of the existing area of native vegetation within the Stream 3 catchment (Appendix A Figure 3). This will provide for the riparian margins of a total of 393 m of the Stream 3 main channel and one of its tributaries to be protected in perpetuity.

Table 8.2: Offset and compensation summary table

Outcome	Measure	Quantum
Terrestrial biodiversity offset	Stream 3 catchment and OBDA restoration planting	10.6 ha
Freshwater offset	Riparian restoration within Stream 3 catchment	Planting of 4,510 m stream length (4,420 m² streambed area) to 20 m on either bank
Freshwater compensation	Additional restoration planting within Stream 3 catchment	40.4 ha

Outcome	Measure	Quantum
	Protection in perpetuity of an existing area of native vegetation within Stream 3 catchment	

8.3 Restoration sequencing

Impacts on terrestrial and freshwater habitats as a result of the project will occur in stages over a 50 year period. However, the bulk of the restoration planting will be undertaken following commencement of consent. This means that the ecological gains associated with the restoration planting will be realised well in advance of impacts.

8.4 Responsibilities and competencies

The Quarry Manager is responsible for ensuring that all restoration and planting works are designed, implemented, protected, maintained, monitored and reported in accordance with this REMP and the relevant consent conditions.

The consent holder will identify a suitably qualified and experienced Planting Contractor who will be responsible for delivery of, and compliance with this plan, liaising with the Project Ecologist where necessary. The Planting Contractor must read and understand this section so that the protocols are adhered to correctly during planting works. The responsibilities of the Planting Contractor include, but are not limited to:

- Reading and understanding this REMP.
- Facilitating a project start-up meeting with the Project Ecologist before planting works begin. The objective of this meeting will be to confirm the scope, timing and objectives of the planting.

Maintaining clear lines of communication with the Project Ecologist regarding changes in the project schedule.

The Quarry Manager will be responsible for ensuring that restoration planting meets the BOAM targets provided below.

8.5 Site preparation

8.5.1 Pest plant control

The restoration areas are predominantly located within recently harvested forestry areas and, at the time of restoration establishment, are generally expected to comprise forestry slash, exposed soils, and pest plants. Regenerating native vegetation may be present within gullies and riparian margins. Given the size of the restoration areas and the challenging terrain, large-scale pre-planting weed control will be undertaken through aerial spraying. Targeted ground-based control may be undertaken in more accessible areas and in riparian margins. Prior to planting, restoration areas will be assessed by the Project Ecologist or Planting Contractor to identify any localised weed infestations that may affect establishment success. Where necessary, targeted weed control may be undertaken to address specific infestations or to facilitate planting and natural regeneration.

Management may include release spraying or hand weeding around planted specimens, control of invasive grasses and herbaceous weeds, targeted removal of woody weeds and vines, and follow-up treatment of localised infestations identified through monitoring.

Pest plant management will be undertaken in a manner that avoids unnecessary damage to indigenous vegetation, natural regeneration, and sensitive freshwater environments. Herbicide use

adjacent to streams will comply with all relevant statutory requirements and best-practice guidance and will only be undertaken by suitably trained personnel using methods appropriate to the receiving environment.

Restoration areas will be inspected regularly throughout the establishment and monitoring period to assess weed abundance, distribution and potential effects on restoration outcomes. Where monitoring identifies that pest plants are preventing achievement of restoration objectives, plant survival targets, natural regeneration or development of the target ecosystem, additional weed-control measures may be implemented through the management and review process outlined in Section 2.

8.5.2 Pest animal control

Possums were recorded during ecological surveys and rabbit sign was observed. While no evidence of feral ungulates was recorded during baseline surveys, goats, pigs, deer and other browsing animals may occur intermittently within the surrounding landscape.

Pest animal management will be undertaken as required to protect restoration planting from animal damage. Control measures will be implemented on a targeted basis where monitoring identifies that pest animal activity is adversely affecting restoration outcomes. Potential target species may include possums, rabbits, feral ungulates, or other animals causing damage to restoration plantings.

Any pest animal control will comply with relevant animal welfare, biosecurity and statutory requirements.

8.6 Restoration planting

The restoration programme described in this REMP will deliver the terrestrial biodiversity offset, freshwater offset and freshwater compensation outcomes identified in Section 8.1. While individual restoration areas contribute to different offset or compensation requirements, restoration measures are grouped into two broad categories: slope planting (51.6 ha) and riparian planting (16.6 ha). Restoration planting will increase native vegetation cover within the restoration area, provide enhanced freshwater and terrestrial fauna habitat, increase connectivity between the Wairoa River and the Hunua Ranges, and contribute to long-term ecological restoration outcomes.

The restoration target for slope planted areas is WF9 Taraire, Tawa and Podocarp Forest (Singers et al 2017). This forest type is already present in the quarry landholdings (protected native forest remnant, Appendix A Figure 1) and is considered appropriate for the northern Hunua Ranges (Auckland Council, 2023). Riparian margins will be planted with a standard pioneer planting mix and allowed to regenerate naturally into a suitable ecosystem.

All species will be eco-sourced from the Hunua Ecological District in accordance with Auckland Council guidelines.

An overview of proposed restoration planting methods is provided in the following sections. At this stage, a detailed assessment of microhabitats within the Stream 3 restoration area has not been undertaken and this will be required before a full planting plan can be prepared. Full planting methods including plant schedules and plant spacings will be provided in the DPP following a full assessment of the restoration area.

8.6.1 Slope planting

“Slope planting” refers to any planting areas outside of the 20 m riparian margin, including the OBDA (Appendix A Figure 3). These planting areas provide all terrestrial biodiversity offset and freshwater compensation requirements.

The objectives of slope planting are to:

- Restore indigenous forest vegetation consistent with the WF9 ecosystem;
- Improve ecological connectivity between the Wairoa River corridor and the Hunua Ranges;
- Improve catchment condition and reduce sediment inputs to freshwater systems;
- Reduce edge effects on riparian restoration planting; and
- Provide long-term habitat for indigenous flora and fauna.

The Stream 3 catchment already contains two areas of mature native vegetation totalling approximately 8.3 ha in area (Appendix A Figure 1). These remnants, together with the extensive native forest present in the Hunua Ranges, provide an excellent seed source that will enhance natural regeneration within the restoration areas. As such, dense planting across the entire restoration area may not be required to meet restoration targets (see Section 8.2). Within some areas of the 68.2 ha restoration area, it may be appropriate to increase spacing of individual pioneer plants or to plant small groups of plants at wide spacing. Other areas, such as on ridges and steep slopes, planting at 1.4 m may be required to meet restoration targets. Similarly, enrichment planting may only be required across some areas where species characteristic of the WF9 target ecosystem have not arrived naturally.

8.6.1.1 Initial establishment planting

Initial establishment planting will be based on the indigenous forest revegetation approach (Auckland Council, 2023) and is intended to rapidly establish indigenous cover, shelter and a developing canopy on open or highly modified sites, creating the conditions required for subsequent WF9 forest development. Planting will be dominated by hardy, light-demanding pioneer and nurse species such as kānuka, mānuka, māhoe and karamū, with a smaller proportion of structural and early-successional species to increase habitat and vertical diversity. The objective at this stage is not to replicate mature WF9 forest, but to establish a resilient indigenous canopy that progressively improves shelter, soil conditions and microclimate for later enrichment planting if required. An indicative establishment species mix is provided in Table 8.3 below.

Table 8.3: Initial establishment planting schedule.

Botanical Name	Common Name	Ecological Function	Shade Tolerance	Typical Restoration Role	Mature Height / Width (m)
Kunzea robusta	Kānuka	Shelter, erosion control, succession initiation	Low	Nurse canopy	8-15 / 4-8
Leptospermum scoparium	Mānuka	Rapid establishment, pollinator habitat	Low	Nurse species	3-5 / 2-4
Melicytus ramiflorus	Māhoe	Early canopy development	Moderate	Pioneer	6-10 / 4-6
Coprosma robusta	Karamū	Bird food resource, rapid cover	Moderate	Pioneer	4-6 / 3-5
Pseudopanax arboreus	Five-finger	Bird habitat and vertical structure	Moderate	Early successional	5-8 / 3-5
Veronica stricta	Koromiko	Pollinator habitat	Low	Edge species	1-3 / 1-2
Myrsine australis	Māpou	Structural diversity	High	Understorey	4-8 / 3-5

DRAFT

Botanical Name	Common Name	Ecological Function	Shade Tolerance	Typical Restoration Role	Mature Height / Width (m)
Cordyline australis	Tī kōuka	Habitat structure	Low	Structural species	6-12 / 2-4
Hoheria populnea	Houhere	Nectar resource, shelter	Moderate	Pioneer tree	5-10 / 3-5

8.6.1.2 WF9 enrichment planting

WF9 enrichment planting is intended to progressively transition the established pioneer canopy toward the structure and composition of taraire–tawa–podocarp forest. Enrichment planting will be undertaken in areas where the canopy species characteristic of the WF9 ecosystem have not colonised naturally. Species will be selected from the indicative list in Table 8.4 in response to local microsite conditions, including shade, soil moisture, fertility and topography, with priority given to taraire, tawa, pigeonwood, kohekohe and appropriate podocarp species.

Table 8.4: WF9 enrichment planting schedule

Botanical Name	Common Name	Ecological Function	Shade Tolerance	Typical Restoration Role	Mature Height / Width (m)
Beilschmiedia tarairi	Taraire	WF9 canopy formation	High	Primary canopy	15-25 / 8-12
Beilschmiedia tawa	Tawa	WF9 canopy formation	High	Primary canopy	20-30 / 8-12
Didymocheton spectabilis	Kohekohe	Broadleaf canopy development	High	Canopy	10-15 / 5-8
Knightia excelsa	Rewarewa	Nectar source, canopy diversity	Moderate	Canopy	15-25 / 6-10
Dacrydium cupressinum	Rimu	Long-term podocarp component	Moderate	Emergent canopy	20-35 / 6-10
Podocarpus totara	Tōtara	Long-term forest structure	Moderate	Emergent canopy	15-25 / 6-10
Dacrycarpus dacrydioides	Kahikatea	Moist-site podocarp habitat	Moderate	Emergent canopy	25-35 / 8-12
Vitex lucens	Pūriri	Fruit resource for birds	Low-Moderate	Canopy	15-20 / 8-10
Melicytus ramiflorus	Māhoe	Structural diversity	Moderate	Mid-storey	6-10 / 4-6
Myrsine australis	Māpou	Forest understorey	High	Understorey	4-8 / 3-5
Geniostoma ligustrifolium	Hangehange	Understorey habitat	High	Understorey	2-4 / 2-3

DRAFT

Botanical Name	Common Name	Ecological Function	Shade Tolerance	Typical Restoration Role	Mature Height / Width (m)
Hedycarya arborea	Porokaiwhiri	Bird habitat and mid-canopy recruitment	High	Mid-storey	10-15
Coprosma lucida	Shiny karamū	Bird food, shrub-layer development	Moderate	Shrub / understorey	~3 m
Hoheria populnea	Houhere / lacebark	Canopy development, nectar resource	Moderate	Pioneer / canopy transition	~8 m
Coprosma rhamnoides	Twiggy coprosma	Shrub-layer diversity	High	Understorey / shrub	~2 m
Corynocarpus laevigatus	Karaka	Canopy and bird food resource	High	Canopy	~10 m

8.6.2 Riparian planting

Riparian planting will comprise a 20 m buffer on either side of approximately 4,510 m of stream length within the Stream 3 catchment (Appendix A Figure 3) and will deliver the freshwater offset requirements described in Section 8.2. The purpose of this planting is to improve stream shading, bank stability, freshwater habitat quality, riparian ecological condition and ecological connectivity, while establishing a dense, structurally diverse indigenous vegetation corridor that protects waterways, intercepts sediment and nutrients, and supports the long-term development of indigenous riparian vegetation communities.

Planting design will be tailored to local site conditions and may include stream-edge, lower-bank, permanently wet and outer-riparian zones. Species selection, density, layout and planting proportions will reflect stream size, hydrology, topography, soils, existing vegetation, shading, flood disturbance, erosion risk, soil moisture, natural regeneration patterns and restoration objectives.

Stream-edge areas will comprise species adapted to periodically inundated conditions, with sedges and other ground-layer species providing initial bank protection and sediment interception, while shrubs, ferns and tree species progressively increase habitat complexity, bank stability and stream shading. Indicative species include tī kōuka, koromiko and mānuka, although final species selection will be confirmed during detailed restoration design in accordance with local ecological conditions, microhabitats and the eco-sourcing requirements. Particular care should be taken on active stream banks, where species susceptible to uprooting during flood events (such as harakeke) should be avoided. Enrichment planting will not be undertaken in riparian planting areas as it is anticipated that appropriate species will arrive naturally from nearby native forest.

An indicative riparian plant species list is provided in Table 1.2 below.

Table 8.5: Riparian planting schedule.

Botanical Name	Common Name	Ecological Function	Shade Tolerance
Carex geminata / C. lessoniana	Rautahi	Bank stabilisation, sediment interception	Moderate
Carex virgata	Pūkio	Erosion control, habitat complexity	Moderate
Carex dissita	Forest sedge	Ground cover and bank protection	High

Botanical Name	Common Name	Ecological Function	Shade Tolerance
Blechnum novae-zelandiae	Kiokio	Moist bank cover and habitat complexity	High
Phormium tenax	Harakeke	Habitat structure and bank stability	Low
Austroderia fulvida	Toetoe	Erosion protection and habitat structure	Low
Cordyline australis	Tī kōuka	Vertical structure and habitat diversity	Low
Carpodetus serratus	Putaputawētā	Invertebrate and bird habitat	Moderate
Veronica stricta	Koromiko	Pollinator habitat and bank cover	Low
Leptospermum scoparium	Mānulka	Vertical structure, pollinator habitat, and habitat diversity	

8.6.3 2018 Consent mitigation planting

As detailed in the EcIA, Conditions 50 and 51 of the 2018 Consent required the planting of 600 m² of native vegetation along the true left riparian margin of Stream 1. This was to mitigate the effects of the removal of 0.5 ha of tree privet-kānuka treeland which has not yet been undertaken. The 2018 mitigation planting will be undertaken on the true left bank of Stream 1 (Appendix A Figure 3) to increase indigenous vegetation cover, strengthen connectivity with adjacent indigenous vegetation, enhance stream shading and contribute to localised bank stability. Planting will be undertaken in accordance with the initial establishment planting approach described in Section 8.6.1.1. Species selection may be refined by the Project Ecologist to reflect local site conditions and restoration requirements.

8.6.4 Plant sourcing

All plants used for restoration planting will be eco-sourced from the Hunua Ecological District and sourced from reputable nurseries operating appropriate biosecurity management systems.

8.6.5 General preparation

The DPP will provide detail on plant delivery, setting out the plants and planting holes and placement; however, prior to planting, restoration areas will be assessed to determine the most appropriate establishment approach. Site preparation may include targeted weed management, vegetation management, protection of existing indigenous regeneration, erosion stabilisation and preparation of planting locations where required. The extent of site preparation will vary according to terrain, slash cover, natural regeneration, accessibility and restoration objectives.

Plant placement, spacing and species selection will take account of site conditions, natural regeneration, access constraints, long-term forest development and the need to maximise establishment success. Plants shall be grouped informally to produce a natural, random appearance.

The set out shall recognise the growth and spread of all planting. Where appropriate, protective measures may be used to assist establishment and reduce damage from environmental factors or animal browse.

Planting holes shall be excavated to a suitable size and depth to accommodate the plant's root system without bending or compressing the roots, with compacted ground loosened as required. Plants shall be positioned centrally within the planting hole, with the root collar set approximately level with the surrounding ground surface, and backfilled with suitable soil free of large stones, roots, or other debris. Care shall be taken to ensure plants are upright, firmly seated, and not

planted too deeply, with the surrounding soil lightly firmed to eliminate air pockets and provide good root-to-soil contact.

8.6.6 Planting timing

Planting is best undertaken between autumn and spring, following sufficient rain for soil moisture to increase after the summer dry period. Planting season generally runs from April to September. Where possible it is better to plant earlier in the planting season so roots can establish deep enough before the season changes and soils dry out. Planting works should only be undertaken on suitably mild, moist days when the ground is sufficiently workable. No planting will occur when persistent rain, drought, wind, frost, or similar unsuitable weather conditions are present. All planting Contractors will be sufficiently qualified to identify suitable environmental conditions for the positioning and planting out of plant material. Should the Contractor not be sufficiently qualified, assistance should be sought from the Project Ecologist to assist with plant layout.

8.6.7 Performance standards

8.6.7.1 Slope planting

Slope planting requires a minimum five-year contract maintenance period to ensure the successful establishment of the new plantings. By the end of the five-year period the slope planting must have achieved:

- Minimum survival rate of 90% of the original density of plants throughout the planting area.
- All invasive pest plants and pest animals controlled at the time of initial planting and until the end of the maintenance period.

No canopy closure target is provided for the end of the five year maintenance period because this target is addressed under BOAM monitoring (Section 8.7.1). If the minimum specifications are not met the contract maintenance period will be extended until such time as the specifications are met. The Planting Contractor is responsible for ensuring the planting meets the minimum specifications.

8.6.7.2 Riparian planting

Riparian planting requires a minimum five-year contract maintenance period to ensure the successful establishment of the new plantings. By the end of the five-year period the riparian planting must have achieved:

- 80% canopy closure.
- Minimum survival rate of 90% of the original density of plants throughout the planting area.
- All invasive pest plants and pest animals controlled at the time of initial planting and until the end of the maintenance period.

If the minimum specifications are not met the contract maintenance period will be extended until such time as the specifications are met. The Planting Contractor is responsible for ensuring the planting meets the minimum specifications.

8.6.8 Ongoing maintenance

Maintenance will be undertaken to support the establishment and long-term development of the restoration planting areas. Maintenance activities will include:

- Releasing new plantings by removing weeds and competing vegetation from around each plant, either by careful spraying around native plants or by mechanical means such as hand

pulling, releasing or digging. Regular releasing will promote faster establishment and growth, increasing the spread of ground cover.

- Pest plant control undertaken in conjunction with releasing, twice annually during October and February for the first 3 years, and once annually during November in the last 2 years.
- Annual monitoring for five years following planting, with infill planting as required. All dead or dying plants will be replaced during the five-year maintenance period to achieve at least 90% of the original planting density and, for the riparian plantings, a minimum of 80% native cover within five years of planting. Failed plants will be replaced with like-for-like species unless environmental conditions are unsuitable, in which case an alternative native species will be confirmed by a suitably qualified ecologist.
- Pest animal control if damage to plants is recorded (as per Section 8.5.2).
- Assessment of damage resulting from natural events or other disturbances, followed by proportionate remediation where practicable and appropriate to the scale and nature of the damage.

Restoration areas will not be fenced as no livestock will be present anywhere on the quarry landholdings. Planting areas and native vegetation outside of the project footprint will be protected from disturbance through appropriate site management measures.

8.7 Monitoring

Restoration planting will be maintained and monitored by the Planting Contractor for the first 5 years after planting (8.6.8). Records will be kept of pest plant and animal control undertaken, plant survival rates, and any infill planting conducted, which will be reported to Council annually for the first 5 years (see Section 9.2).

Monitoring using vegetation plots (RECCE plots) will be undertaken by the Project Ecologist to confirm that restoration planting areas are on an appropriate trajectory to meet the ecological benefits predicted under the BOAM. The vegetation plots will be established within 12 months after planting of each area and re-surveyed once each area reaches Year 25 to assess against the BOAM targets.. SEV monitoring will be undertaken to confirm the expected outcomes used in SEV and ECR calculations have been met.

8.7.1 Vegetation plots and photo points

Up to 10 permanent 20 m × 20 m vegetation plots will be installed across the restoration area before planting commences. These will comprise:

- Eight plots within slope planting areas. Two of these will be placed within the OBDA, which won't be planted until approximately 10 years after commencement of consent.
- Two plots within riparian planting areas.

At least two photo points will be established at each vegetation plot to allow changes in vegetation composition over time to be visually assessed.

Quantitative vegetation composition data will be collected using the RECCE method (Hurst et al 2022). As discussed above, vegetation plots will be established within 12 months after planting of each area and re-surveyed once each area reaches Year 25 to assess against the BOAM targets which are provided in Table 8.6. The Year 25 monitoring is to ensure that all BOAM targets have been achieved and it is acknowledged some of the BOAM targets will be achieved well before Year 25. For clarity, it is intended that the BOAM targets apply to restoration planting considered 'offset' and 'compensation'.

Table 8.6: BOAM attributes measure after offset and time until endpoint

Biodiversity component	Biodiversity attribute	Measure after offset	Time until endpoint	Measure after offset justification
Indigenous canopy	Canopy cover (%)	80	10	10 years is considered an appropriate time to establish a closed canopy.
	Average height of indigenous canopy (m)	5	15	Based on the growth rates of common broadleaf species, including kohekohe.
	Basal area (m^2/ha)	30	20	Basal area expected to increase rapidly between 0 and 20 years and level off once vegetation begins to mature and canopy closure occurs.
Indigenous diversity	Diversity of native vascular plants	25	20	The impacted ecosystem has a relatively low diversity due to being a regenerating ecosystem. As such, it is likely that a similar diversity will be achieved within the 20 year restoration period, with species diversity likely to increase towards benchmark as vegetation matures.
Indigenous understory	Percentage cover of indigenous understory vegetation (%)	25	20	A moderate cover of understory vegetation is expected at 20 years. Understorey cover will continue to develop beyond the modelled timeframe.
Fauna habitat provision	Coarse woody debris (m^3/ha)	20	25	Coarse woody debris forms naturally within a forest ecosystem over an extended time period to varying densities depending on the ecosystem type.
	Average leaf litter depth (mm)	25	25	It is expected that nutrient recycling and leaf litter fall in the restored ecosystem will be occurring to a reduced extent compared to a benchmark ecosystem at 25 years.

8.7.2 SEV monitoring

Freshwater offset monitoring will be undertaken using the SEV method as a basis. Two representative monitoring locations will be established, one on a permanent stream and one on an intermittent within the Stream 3 catchment. The monitoring locations will be two of those assessed in the EcIA, being:

- ‘Stream 3 Main Stem (DS_4)' (representative permanent stream); and
- 'Stream 3 East (ET)' (representative intermittent stream).

The baseline SEVs will be those presented in Appendix F of the EcIA (SEV ‘current’ scores for the freshwater offset sites, excluding biotic indices) (Table 8.7).

Table 8.7: Stream 3 SEV monitoring locations, baseline and predicted SEV values

Monitoring location	Stream type	Baseline SEV "current" score from EcIA (excl. IFI and FFI)	Expected 20-year SEV score (excl. IFI and FFI)
Location 1: 'Stream 3 Main Stem (DS_4)'	Permanent stream	0.58	0.76
Location 2: 'Stream 3 East (ET)'	Intermittent stream	0.70	0.81

A full SEV will be undertaken at each of the two SEV locations 20 years after commencement of consent, when the benefits of offset actions are expected to be realised.

The Quarry Manager must maintain the monitoring locations, or suitable equivalent monitoring reaches agreed in writing with the Council, for the duration of the monitoring.

8.8 Reporting

REMP reporting requirements are outlined in Section 9.

9 Annual Report

This section outlines annual report requirements associated with implementation of the EMP and its supporting management plans. This annual report is intended to demonstrate compliance with consent conditions, statutory approvals, and permit requirements throughout the life of the Project. Given the long-term, staged nature of the quarry expansion, the annual report will also be used to track ecological outcomes, assess the effectiveness of management measures, and identify where improvements or refinements are required (if necessary).

The annual report shall be prepared by the Project Ecologist and provided to SAL by the 30 June each year. The report shall include, where relevant, the content outlined in each of Sections 9.1 through 9.4. For additional reporting requirements associated with the FMP, refer to Section 7.10.

Where none of the activities outlined in Sections 9.1 to 9.4 have been undertaken within the preceding 12 months, no annual report will be prepared.

9.1 EMP review

An annual EMP review shall be prepared by the Project Ecologist and shall summarise ecological management activities undertaken during the preceding 12 months, assess compliance with the EMP and any relevant consent conditions, review the effectiveness of management measures, and document any incidents, monitoring results, additional actions undertaken.

The EMP review shall identify any recommended updates to the EMP, including changes required to reflect new ecological information, monitoring outcomes, construction methodologies, regulatory requirements, or opportunities to improve environmental outcomes.

9.2 Slope and riparian planting update

The Project Ecologist must undertake an annual audit of planting areas and prepare an update on the terrestrial slope planting and riparian planting undertaken.

This update shall be included in the Annual Report and must include:

1 A plan of the planting undertaken to date and the period(s) of planting;

2 Description of planting (species, numbers, grade and spacing) and pest animal and pest plant management undertaken during the previous 12 months;

3 Identification of any replacement planting or additional planting required, and the timing of any remedial planting where necessary;

4 Identification of any additional pest plant or pest animal management required; and

5 Recommendations on any changes required to the REMP.

The auditing of terrestrial planting and riparian planting area must be undertaken annually and continue for a period of five years from when an area of restoration or riparian planting has been completed.

9.3 SEV monitoring (Year 20)

A Stream Ecological Valuation (SEV) monitoring at Year 20 update shall be prepared to assess the effectiveness of the freshwater restoration works and verify the ecological gains achieved within offset areas. This update shall be included in the annual report and shall compare actual SEV outcomes against those predicted in the EcIA (Table 8.7), as a means to evaluate stream habitat condition, riparian vegetation establishment, shading, ecological function, and other relevant freshwater indicators.

Recommendations for further management or enhancement measures shall be provided where necessary.

9.4 BOAM monitoring (Year 25)

A BOAM monitoring report will be prepared within 12 months of the Year 25 monitoring having been completed. This report shall demonstrate that the required offset outcomes have been achieved and shall include supporting monitoring data, vegetation assessments, and evidence of compliance with the approved restoration objectives. The report shall also confirm any ongoing management and protection requirements if necessary to maintain the achieved outcomes.

DRAFT

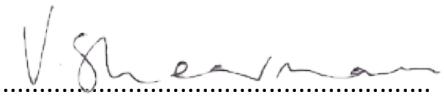
10 Applicability

This report has been prepared for the exclusive use of our client Stevenson Aggregates Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application under the Fast-Track Approvals Act 2024 and the appointed panel will use this report for the purpose of assessing that application

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:



.....

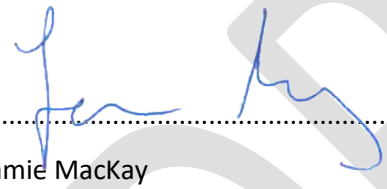
Cid Shearman
Ecologist



.....

Kylie Park
Aquatic Ecologist

Report prepared by:



.....

Jamie MacKay
Senior Ecologist

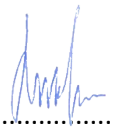
Authorised for Tonkin & Taylor Ltd by:



.....

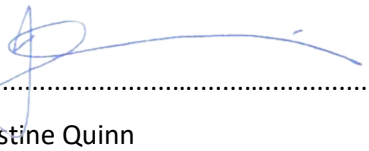
Andrea Brabant
Project Director

Reviewed by:



.....

Josh Markham
Principal Ecologist



.....

Justine Quinn
Technical Director Freshwater Science & Ecology

\\ttgroup.local\corporate\auckland\projects\1010927\1010927.2001\issueddocuments\20261029 ecia and emp\clevedon_emp_final draft.docx

DRAFT

11 References

Auckland Council (2023). Te Haumanu Taiao: Restoring the Natural Environment in Tāmaki Makaurau. Available at: www.tiakitamakimakaurau.nz

Bloxham, M., Woolly, J., Dunn, N., Chaffe, A., Tutt, C. and Melzer, S. (2023). Conservation Status of Freshwater Fishes in Tāmaki Makaurau / Auckland. Auckland Council Technical Report TR2023/13.

DOC Bat Recovery Group (2023). Bat Competency Framework.

DOC Bat Recovery Group (2024). Bat Roost Protocols: Protocols for Minimising the Risk of Felling Bat Roosts.

Dunn, N.R., Allibone, R.M., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M., Jack, D.C., Ling, N., Waters, J.M. and Rolfe, J.R. (2018). Conservation Status of New Zealand Freshwater Fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington.

Grainger, N., Harding, J., Drinan, T., Collier, K., Smith, B., Death, R., Makan, T. and Rolfe, J. (2018). Conservation Status of New Zealand Freshwater Invertebrates, 2018. New Zealand Threat Classification Series 28. Department of Conservation, Wellington.

Hurst, J. M., Allen, R. B., & Fergus, A. J. (2022). The Recce method for describing New Zealand vegetation: Expanded manual. Manaaki Whenua Landcare Research.

Joy, M.K., David, B.O., Lake, M.D., O'Brien, L.K., Boubée, J.A.T., Osbourne, M.W. and Rowe, D.K. (2013). New Zealand Freshwater Fish Sampling Protocols Part 1: Wadeable Rivers and Streams. Massey University and Department of Conservation.

Ministry for the Environment (2023). National Policy Statement for Indigenous Biodiversity.

O'Donnell, C.F.J., Borkin, K.M., Christie, J.E., Lloyd, B. and Parsons, S. (2023). Conservation Status of Bats in Aotearoa New Zealand. New Zealand Threat Classification Series. Department of Conservation, Wellington.

Robertson, H.A., Baird, K.A., Elliott, G.P., Hitchmough, R.A., McArthur, N.J., Makan, T.M., Miskelly, C.M., O'Donnell, C.F.J., Sagar, P.M., Scofield, P. and Michel, P. (2021). Conservation Status of Birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington.

Roper-Lindsay, J., Fuller, S.A., Hooson, S., Sanders, M.D. and Ussher, G.T. (2018). Ecological Impact Assessment Guidelines for Use in New Zealand: Terrestrial and Freshwater Ecosystems. 2nd Edition. Environment Institute of Australia and New Zealand.

Singers, N., Osborne, B., Lovegrove, T., Jamieson, A., Boow, J., Sawyer, J., Hill, K., Andrews, J., Hill, S. and Webb, C. (2017). Indigenous Terrestrial and Wetland Ecosystems of Auckland. Auckland Council Technical Report.

Tonkin + Taylor (2026). Ecological Impact Assessment for Clevedon Quarry Expansion.

DRAFT

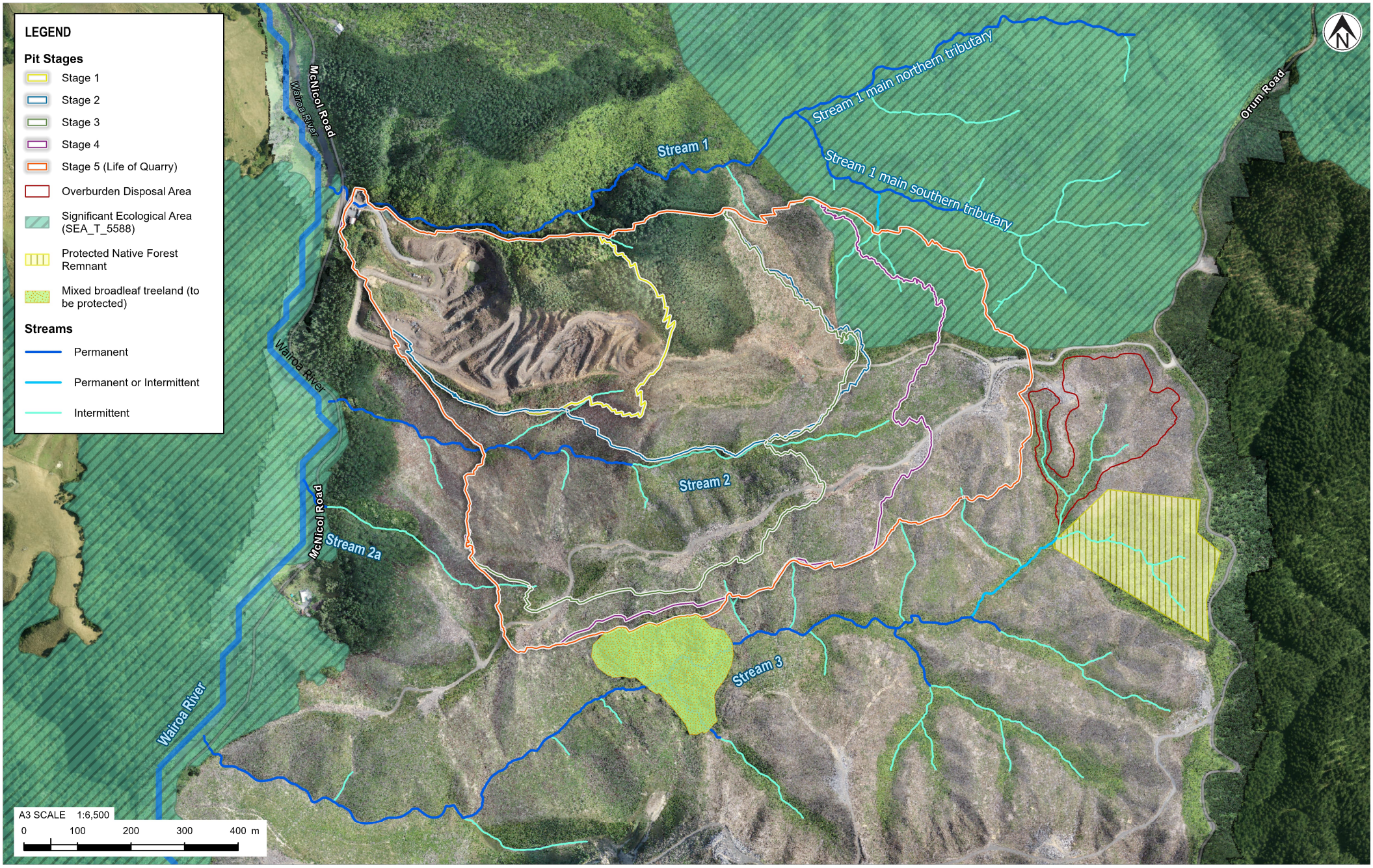
Appendix A Figures

- **Appendix A Figure 1 Project overview**
- **Appendix A Figure 2 Ecological effects management**
- **Appendix A Figure 3 Residual effects management**

DRAFT

COPYRIGHT ON THIS FIGURE IS RESERVED DO NOT SCALE FROM THIS FIGURE.

T:\Auckland\Projects\1010927\1010927.2001\WorkingMaterial\03 GIS\Map_Documents\P1010927.2001_EMP\1010927.2001_EMP.aprx Layout: Clevedon EMP - Fig 1 Overview 2026-Oct-15 7:55 pm Drawn by CISH



Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

NOTES:

Basemap Aotearoa New Zealand Hillshade - Alpha: Eagle Technology, Land Information New Zealand. Hybrid Reference Layer: Esri Community Maps Contributors, LINZ, Stats NZ, Esri, TomTom, Garmin, METI/NASA, USGS. World Imagery: Auckland Council, NIWA, Vantor. NZ Topographic Relief (Vector): Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors..
TTE_1010927_ClevedonQuarry_10cmAerials:

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	CISH	JORB	23/09/26



LOCATION PLAN

PROJECT No.	1010927.2001	
DESIGNED	CISH	OCT.26
DRAWN	CISH	OCT.26
CHECKED	JORB	OCT.26

APPROVED DATE

CLIENT **STEVENSON AGGREGATES LTD.**

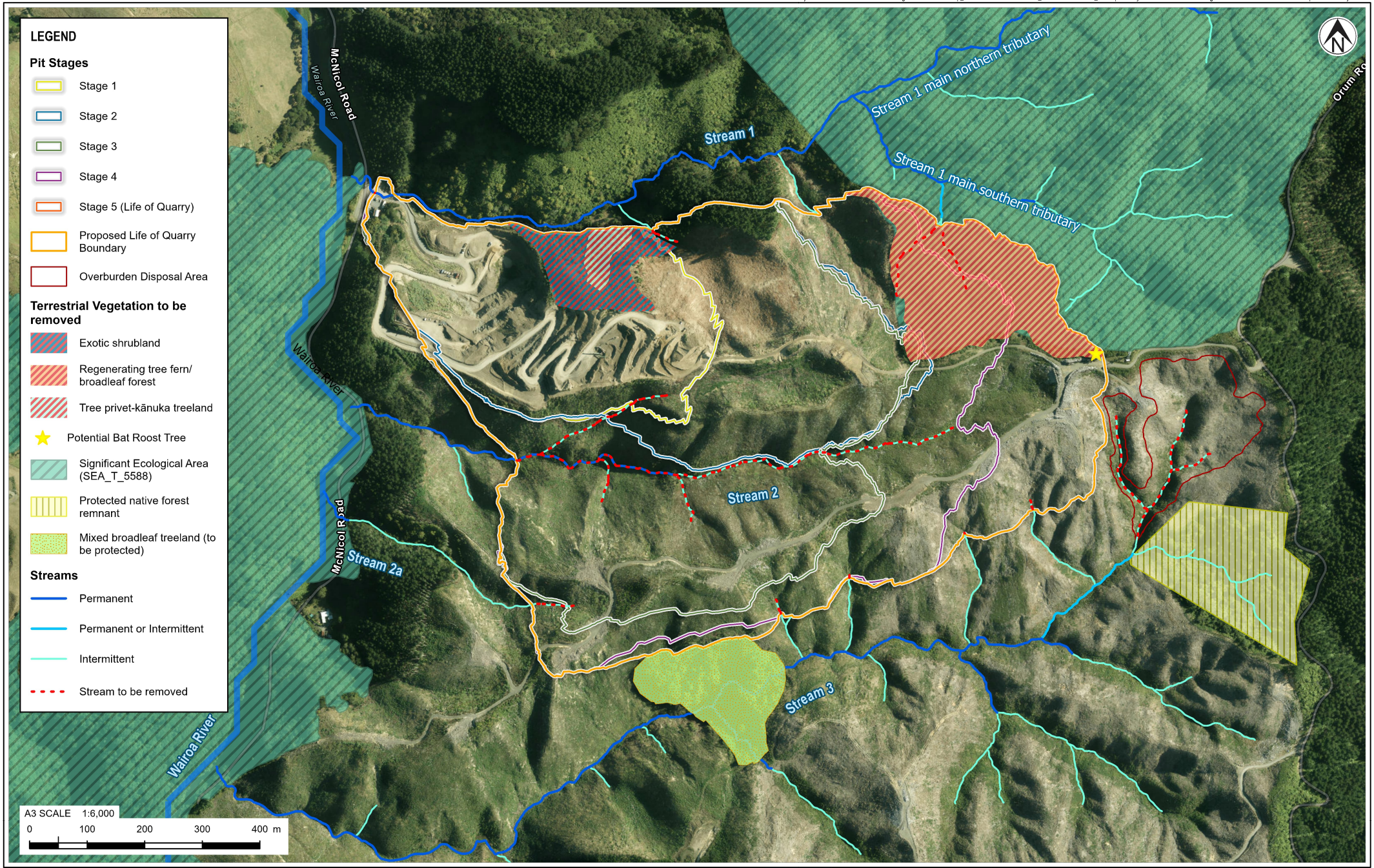
PROJECT **CLEVEDON QUARRY - ECOLOGY**

TITLE PROJECT OVERVIEW

SCALE (A3) 1:6,500 FIG No. FIGURE 1 REV

COPYRIGHT ON THIS FIGURE IS RESERVED DO NOT SCALE FROM THIS FIGURE.

T:\Auckland\Projects\1010927\1010927.2001\WorkingMaterial\03 GIS\Map_Documents\P1010927.2001_EMP\1010927.2001_EMP.aprx Layout: Clevedon EMP -Ecological Constraints 2026-Oct-15 9:19 pm Drawn by CISH



Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

NOTES:

Basemap Aotearoa New Zealand Hillshade - Alpha: Eagle Technology, Land Information New Zealand. Hybrid Reference Layer: Esri Community Maps Contributors, LINZ, Stats NZ, Esri, TomTom, Garmin, METI/NASA, USGS. World Imagery: Auckland Council, NIWA, Vantor. NZ Topographic Relief (Vector): Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors.

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	CISH	JORB	23/09/26



LOCATION PLAN

PROJECT No.	1010927.2001	
DESIGNED	CISH	OCT.26
DRAWN	CISH	OCT.26
CHECKED	DSMI	OCT.26

APPROVED DATE

CLIENT **STEVENSON AGGREGATES LTD.**

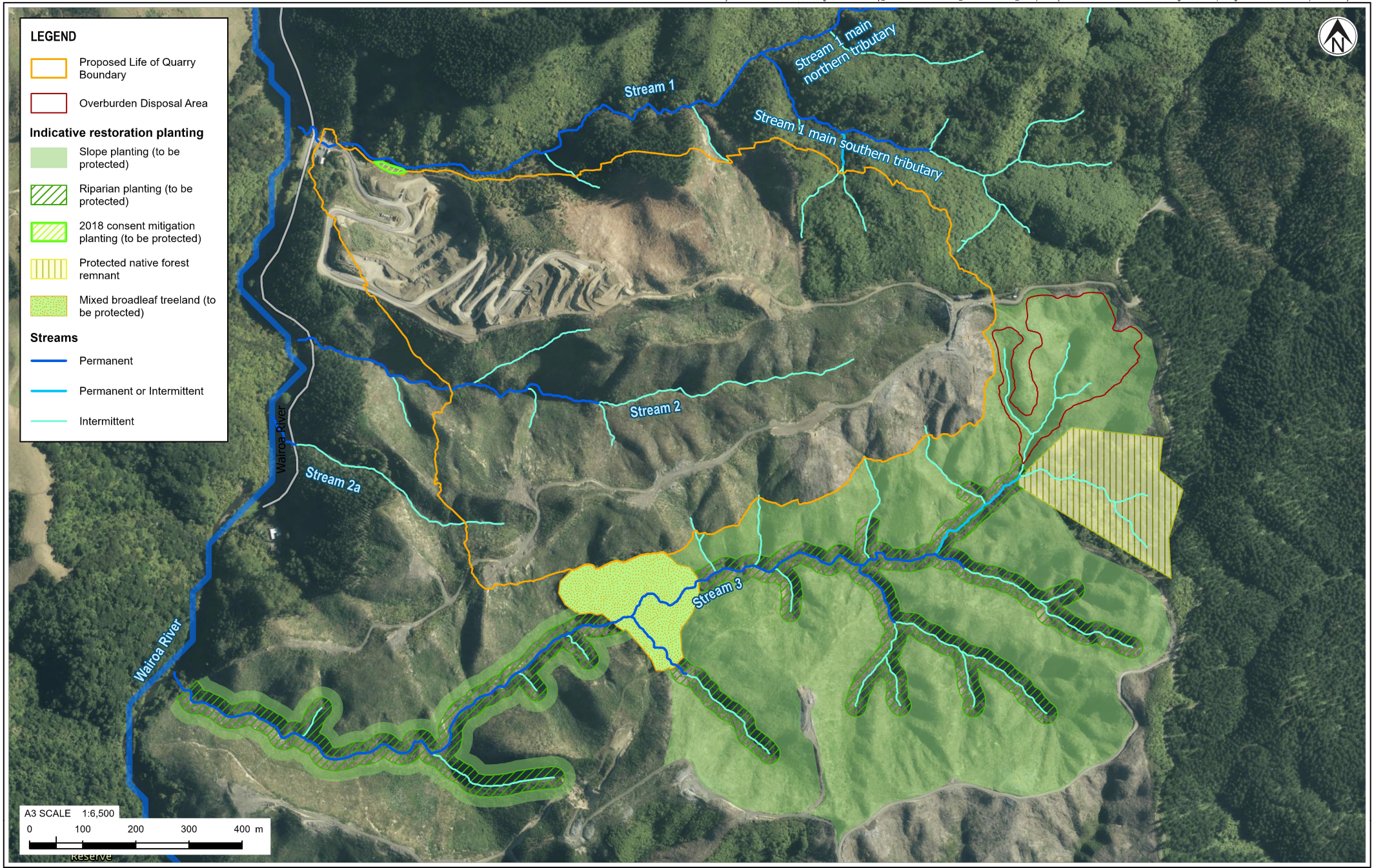
PROJECT **CLEVEDON QUARRY - ECOLOGY**

TITLE ECOLOGICAL EFFECTS MANAGEMENT

SCALE (A3) 1:6,000 FIG No. FIGURE 2 REV

COPYRIGHT ON THIS FIGURE IS RESERVED DO NOT SCALE FROM THIS FIGURE.

T:\Auckland\Projects\1010927\1010927.2001\WorkingMaterial\03 GIS\Map_Documents\P1010927.2001_EMP\1010927.2001_EMP.aprx Layout: Clevedon EMP - Residual Effects Management Plan - planting areas 2026-Oct-15 9:19 pm Drawn by CISH



Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

NOTES:

Basemap Aotearoa New Zealand Hillshade - Alpha: Eagle Technology, Land Information New Zealand. NZ Hybrid Reference (Vector): Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors.. NZ Topographic Relief (Vector): Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors.. NZ Imagery: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	CISH	JORB	23/09/26

LOCATION PLAN



APPROVED DATE

PROJECT No.	1010927.2001	
DESIGNED	CISH	OCT.26
DRAWN	CISH	OCT.26
CHECKED	DSMI	OCT.26

CLIENT **STEVENSON AGGREGATES LTD.**

PROJECT **CLEVEDON QUARRY - ECOLOGY**

TITLE RESIDUAL EFFECTS MANAGEMENT

SCALE (A3) 1:6,500 FIG No. FIGURE 3 REV



Together we create + sustain a better world