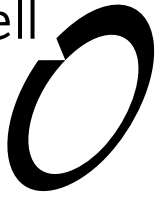


Appendix 9: Ecological Assessment

Boffa Miskell



Whitehall Quarry Long-Term Expansion

Assessment of Terrestrial Ecological Effects
Prepared for Winstone Aggregates

10 June 2025





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Executive Summary

Winstone Aggregates proposed to expand the footprint of the existing authorised extraction area of Whitehall Quarry by approximately 15.5 ha in a westerly direction (the “Long-Term (Stage) 3 Expansion”). The pit expansion will result in the removal of some 5.46 ha of mature broadleaf forest within Significant Natural Areas (SNAs) (District Plan reference SNA WP527 and SNA WP530) and some 0.22 ha of kanuka-scrub vegetation within 10 m of a ‘natural inland wetland’. The SNA areas have very high ecological value due to the vegetation type and presence of habitat and roosts for long-tailed bats. Accordingly, these SNAs meet the criteria for an area of significant indigenous biodiversity as defined in the Waikato Regional Council, Operative Regional Policy Statement (‘WRC RPS’). The 0.22 ha of kanuka scrub within 10 m of the gully containing a natural inland wetland, is of low ecological value.

The scope of this assessment is to identify the ecological values associated with the vegetation to be removed, provide an assessment of ecological effects and recommended effects management to support the resource consent applications for the Long-Term Expansion. It also provides an assessment against the relevant statutory considerations including the effects management hierarchy set out in the National Policy Statement for Indigenous Biodiversity (NPS-IB) and the Waipa District Plan (WDP).

The expansion results in the removal of high value indigenous vegetation and habitat for indigenous fauna, notably birds and bats. However, the loss is a small area of the overall available SNA habitat. Following the vegetation removal, similar habitat (including the same bat roost and bird nest availability) and in a similar setting (i.e., setting at the quarry margin) is retained and remains connected in the same way with remaining vegetation and habitats in the area. We also emphasise that the remaining SNAs and other vegetation provides an extent of similar quality habitat for nesting, roosting, refuge, foraging and mobility.

Winstone has applied the effects management hierarchy to the proposal as summarised below:

- **Avoidance:** Winstone is unable to avoid removal of native vegetation at Whitehall Quarry due to the constrained location of the aggregate resource. There is a functional need to continue quarrying at Whitehall Quarry, with no practical alternatives, therefore the loss of indigenous and exotic vegetation is unavoidable^[1]
- **Minimise:** Winstone has limited the total area of SNA clearance to 5.46 ha to minimise the loss of vegetation as much as possible (to 11.7% of the SNA areas), and to retain 88% of the SNA impacted areas. To further minimise disturbance, Winstone is also proposing to:
 - Stage the long-term expansion so the loss of vegetation in 2025-2026 as part of Stage 1 is limited to 2.6 ha (in SNA WP527) meaning the vegetation in SNA WP530 will remain in-situ until approximately 2041^[2]
 - Timing of vegetation clearance to minimise disturbance during bat maternity season (December - January) and bird breeding season (primarily August – March), or if works are required to occur during bird breeding season, undertaking nest checks prior to clearance,
 - Tree felling protocols for the removal of potential roost trees for long-tailed bats in accordance with a Bat Management Plan.

^[1] As demonstrated in the Economics Assessment for Whitehall Quarry prepared by Market Economics.

^[2] Approximate timing, subject to demand for aggregates

- **Remedy:** Measures proposed to remedy ecological effects include:
 - checks for geckos and relocation to designated area.
 - Comprehensive pest and weed management programme for the remaining SNAs for the protective benefit of indigenous fauna (especially long-tailed bats).
- **Offset:** establishment of an enhancement planting area:
 - planting an area of 12.5 ha with native vegetation (with long-term provision for habitat for fauna species) to remedy the loss of 5.68 ha of indigenous vegetation, to be fenced and cleared of stock, occur as soon as possible on the western slopes of the hill west of the quarry expansion.
- **Compensation:** Comprehensive pest and weed management programme for the replanting area and remaining SNAs to ensure successful rehabilitation and for the protective benefit of indigenous fauna (especially long-tailed bats).

The area selected for the rehabilitation planting includes to the west of the quarry and provides additional connectivity between existing SNAs. The area sits outside of the SMEZ overlay to avoid the possibility of future quarry activities impacting on this proposed enhancement planting area. As much as possible, the planting of this area will occur as soon as possible following the granting of the resource consent approvals being sought.

The enhancement planting includes actions for betterment of the environmental outcome through the rehabilitation planting of existing paddocks with forest species (representative of the tawa-dominated forest type), removal of stock, stock and deer-proof fencing, managing for invasion of pest plant species, predator control, and providing connectivity and linkages to and between existing forest areas.

In summary, the effects management for the proposed expansion requires adherence to fauna protocols that will not result in adverse effects or fatalities to the fauna, and an enhancement for the removal of vegetation and habitat is provided. The objective and policy requirements of the National Policy Statement-Indigenous Biodiversity, Regional Policy Statement and Waipa District Plan are met, will maintain, and will achieve no net loss of indigenous biodiversity and an overall net positive biodiversity outcome.

Overall, subject to the recommended effects management, the ecological effects associated with the long-term expansion will be less than minor.

1.0 Introduction

1.1 Background

Whitehall Quarry is an existing greywacke hard rock quarry operation situated some 9 km east of Cambridge in the Waikato region of New Zealand. Winstone Aggregates propose an expansion of Whitehall Quarry to meet the current and projected demand for supply of aggregate.

The quarry has been operating and supplying greywacke aggregate since the 1950s. Winstone have owned and managed the quarrying operations at Whitehall Quarry, since 1998.

Boffa Miskell have been commissioned to provide an assessment of ecological effects of the proposed long-term expansion, which is expected to provide resource for the next 35 years. This report is part of a suite of technical assessments prepared to inform the Assessment of Effects on the Environment (AEE) and to support the application for resource consents for the proposed expansion. Our assessment report addresses the actual and potential ecological effects arising from the Project and assesses the implementation and outcome of applying the effects management hierarchy to the proposal.

Winstone Aggregates propose to extend the pit in a westerly direction by approximately 15.5 ha in area. The pit expansion to the west will extend marginally beyond the Significant Mineral Extraction Zone and into Rural zoned land. The pit expansion will also result in the removal of 5.46 ha of vegetation within Significant Natural Areas (District Plan reference SNA WP527 and SNA WP 530).

1.2 Proposed activities

Existing quarrying operations at Whitehall Quarry will continue unchanged by this proposal. Activities that will continue to be undertaken at the site include:

- Exploration
- Water management
- Clearing of vegetation
- Stripping of topsoil
- Stockpiling of topsoil
- Removal of overburden
- Overburden disposal
- Drilling, blasting, excavation
- Aggregate transfer
- Aggregate processing
- Process fines disposal
- Aggregate storage, sale, distribution

We note that there are no significant changes to the existing operational requirements of Whitehall Quarry. The quarry operations will continue as present, there will be no changes to extraction volumes, hours of operation, or site access as a result of the proposed expansion.

1.3 Scope and approach

The scope of this report is the preparation of an assessment of effects of the proposed long-term quarry expansion on the ecological values at the location. A separate assessment has been prepared for the removal of natural inland wetlands and streams within the 15.5 ha long-term expansion footprint.

The scope requires the assessment of the ecological effects of vegetation clearance associated with the long-term expansion, and areas within 10 m of identified natural inland wetlands and 23 m of the stream within the expansion footprint as shown on Figure 1¹.

Our approach to assessing the effects of the quarry expansion on the ecological values falls into three main components:

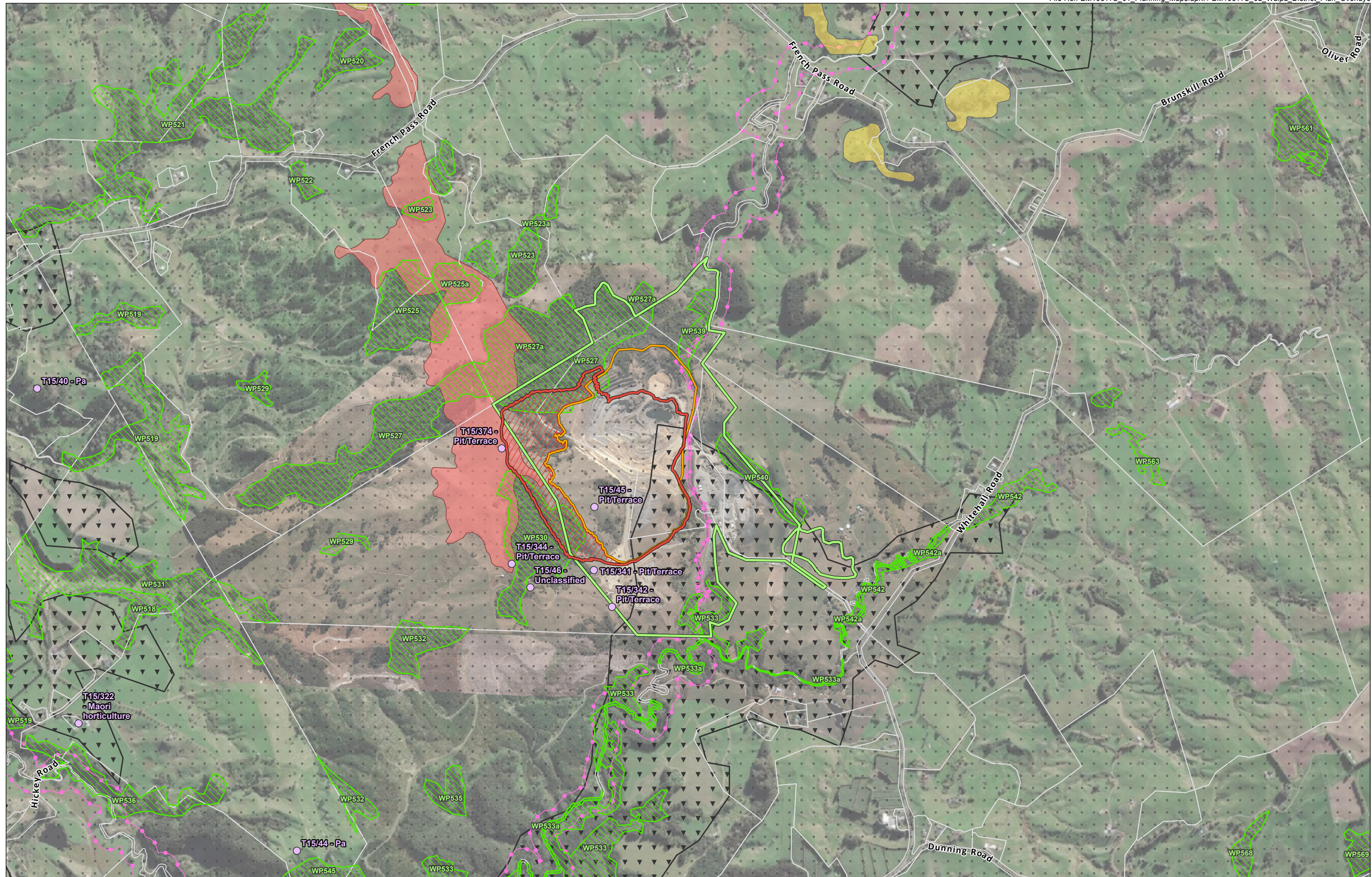
- Existing ecological values and their significance;
- Impact of proposed expansion on ecological values; and
- Recommendations to avoid, remedy or mitigate adverse effects on ecological values.

In more detail, our approach to the assessment of ecological effects of the proposed expansion has been to undertake:

- A desktop investigation of the known terrestrial ecological attributes of the location.
- Site walkover and investigations to understand the ecological values and its location in the ecological landscape.
- Investigations of the terrestrial ecological values of the proposed activities.
- Assessment of the effects of the direct and indirect (including cumulative effects) of the proposed activities on the terrestrial ecological values.
- Application of the 'Effects Management Hierarchy' including offsets as required.

We note that the proposed south-westward expansion area avoids loss of extent of permanent and intermittent streams.

¹ All other vegetation clearance within the expansion footprint is a permitted activity, and this vegetation does not form part of our assessment.



2.0 Ecological context

2.1 Ecological District

Whitehall Quarry sits within the Maungatautari Ecological District (MED), is in the Waikato basin and is surrounded by hill country and lowland townships of Cambridge, Morrinsville, Tirau and Matamata (Amoore & Denyer, 2005). It is estimated that in 1840, the MED was approximately 57% forest, 42% scrub and 1% wetland and other habitats (Deichmann & Kessels, 2013). Due to large scale deforestation, less than 10 percent of the original indigenous vegetation remains (Amoore & Denyer, 2005). Leathwick et al. (1995) calculated that the total loss of vegetation within the MED was 89.5% or 77,886 ha of its original cover, with forest cover decreasing to only 9% cover, and scrub and wetlands to less than 1% cover.

Additional details of the character of the MED is provided in the WRC planting guide². The formation of the land and vegetation has been greatly influenced by faulting and historic volcanic activity, and the evolution of the Waikato River system. Originally the district was covered in native vegetation, mainly forest of three types:

- Dense conifer (kahikatea or totara) forest on the flat to gently sloping river terraces.
- Rimu-tawa forest on the lower altitude hill country.
- Lowland steepland and montane conifer/broadleaved forest in the higher hill country and mountains.

2.2 Local context

The surrounding land is predominately farmland. There are several Significant Natural Areas (SNAs) and other small – large fragments of bush within the vicinity (< 5 km) of the quarry³. Of note are the bush/forested SNAs in the property of where the quarry is located. The ecologically significant Te Tapui Reserve (7 km to the west) and Maungatautari Mountain (12 km to the south) are present in the wider landscape. The quarry and the surrounding SNAs are within the Indigenous Forrest Corridor (IFC). The IFC has been identified as an important area to maintain and enhance indigenous vegetation. Prior to human arrival and vegetation clearance, the quarry and surrounding land would have been dominated by a rimu/tawa forest, native podocarp forest, and wetlands⁴.

² Environment Waikato local area planting guide series #1: What to plant in the Maungatautari ecological district. <https://www.waikatoregion.govt.nz/assets/WRC/Maungatautari-planting-guide-part-1.pdf>

³ Waipa District Council: Maps online: Waipa District Plan: https://eplan.waipadc.govt.nz/eplan/property/70264/0/52?_t=property: accessed on 18/07/2024.

⁴ Manaaki Whenua Landcare Research: Our Environment: Suitability for Arable Cropping » Maps » Our Environment (scinfo.org.nz), accessed 18/07/2024.

2.3 Significant Natural Areas

Several Significant Natural Areas (SNAs) occur within the Waipa District with a number occurring within the vicinity of the Whitehall quarry (Table 1).

We note that the inventory of SNAs is an indicative and provisional data set of SNAs in the Waipa District based on a desktop exercise literature review, analysis of recent aerial photography and other data, and use of existing in-house knowledge of the Waipa District⁵.

Most notable of the SNAs are the areas of mature native podocarp-mangeao-tawa-broadleaf forest (WP527, WP527a, WP530 and WP532), classified as Significant Natural Areas, and which meet at least one of the significance criteria in the WRC RPS (Figure 1). The SNAs are considered a 'local' significance in the WDP Schedule of SNAs.

Table 1: Significant Natural Areas (SNAs) occurring within or close proximity to Whitehall Quarry.
N = No protection, Y = Protected.

SNA Code	Site name	Level of Significance	Protection
<i>SNAs within the Significant Mineral Extraction Zone</i>			
WP527	Large tract of indigenous forest near Whitehall Road Quarry	Local	N
WP530	Forested area between Whitehall Road Quarry and B15J Surveyor Trig	Local	N
WP533	Karāpiro Stream, mid-stream unprotected scrub	Local	N
WP539	Small forest tract on eastern boundary of quarry	Local	N
WP540	Forest strip north of access road to quarry off Whitehall Road	Local	N
<i>SNAs alongside or close proximity to the Significant Mineral Extraction Zone</i>			
WP518	French Pass forest remnants	Local	N
WP527a	Protected area near Whitehall Road Quarry	Regional	Y
WP529	Three forest fragments near French Pass Road, 900km north-east, 800km east and 1.3km south-east of French Pass	Local	N
WP531	French Pass wetland remnant	Local	N
WP532	Whitehall Road scrub at the edge of and within pine forest	Local	N
WP533a	Karāpiro Stream, mid-stream protected scrub	In part, >50% protected	

2.4 Fauna and flora

The nationally critically threatened long-tailed bat (*Chalinolobus tuberculatus*) has been recorded in the north of the district, near Pirongia and in Kihikihi township (Deichmann & Kessels, 2013). The goldstripe gecko (*Woodworthia chrysosireticus*) and Auckland green gecko (*Naultinus elegans*) have been recorded at Kakepuku reserve, with the Auckland green gecko also recorded near Parawera township (Deichmann & Kessels, 2013). Within the district the forested peak of Kakepuku is the largest area of intact indigenous vegetation and provides habitat for several species of conservation interest.

⁵ 'It is important to recognise that the inventory produced for this study is an indicative and provisional data set of SNA in the Waipa district as at 2007 (based on the year of capture of the aerial photography used as the primary source for determining site boundaries), and it is expected to be updated periodically as new information becomes available. In particular, community consultation and data obtained from field surveys will provide valuable information which could be used to validate the data.'
<https://www.waikatoregion.govt.nz/services/publications/tr201316/>

2.5 Connectivity

Whitehall quarry sits in a proposed biodiversity corridor that links Maungatautari Ecological Island and the Te Miro, Te Tapui, and Maungakawa Reserves (Deichmann & Kessels, 2013) (Appendix 1). The main stem of the Karapiro Stream is also identified as a proposed main riparian corridor.

Ecological connectivity is the unimpeded movement of species and the flow of natural processes. This connectivity is established by movement corridors or linkages, and/or 'stepping stones' of supporting habitat across the landscape. Distribution requirements are extremely variable for individual species. The loss and fragmentation of habitat are key threats to indigenous fauna.

Providing or enhancing linkages across the landscape create opportunities for improvements as part of the 'effects management' for project.

3.0 Definitions and statutory assessment criteria

3.1 Introduction

In this section we appraise the relevant definitions to be applied to ecological features of the Whitehall quarry site and appraise the criteria to be applied in assessing significant indigenous vegetation and/or habitats of indigenous fauna. We emphasise that this section is not a statutory assessment. In this section we make reference to:

- National Policy Statement for Indigenous Biodiversity
- Waikato Regional Council, Regional Policy Statement
- Waipa District Plan

3.2 National Policy Statement for Indigenous Biodiversity

3.2.1 Objective

The objective of the National Policy Statement for Indigenous Biodiversity (NPS-IB) is (s2.1):

to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date.

The NPS-IB provides local authorities with updated direction on how they should manage indigenous biodiversity under the Resource Management Act 1991 ('RMA'), including introducing a variety of policies or modifications to policies, as well as setting out specific tasks to be undertaken. The NPS-IB also directs that local authorities must engage with tangata whenua, people and communities (including landowners) to ensure that the decision-making principles inform, and are given effect to, when implementing NPS-IB in their regions and districts.

The NPS-IB sets out 17 policies (s.2.2) to achieve the NPS-IB objective. While all of the policies are relevant to the proposed quarry expansion, we draw particular attention to the following:

Policy 3: A precautionary approach is adopted when considering adverse effects on indigenous biodiversity.

Policy 4: Indigenous biodiversity is managed to promote resilience to the effects of climate change.

Policy 5: Indigenous biodiversity is managed in an integrated way, within and across administrative boundaries.

Policy 6: Significant indigenous vegetation and significant habitats of indigenous fauna are identified as SNAs using a consistent approach.

Policy 8: The importance of maintaining indigenous biodiversity outside SNAs is recognised and provided for.

Policy 9: Certain established activities are provided for within and outside SNAs.

Policy 10: Activities that contribute to New Zealand's social, economic, cultural, and environmental wellbeing are recognised and provided for as set out in this National Policy Statement.

Policy 13: Restoration of indigenous biodiversity is promoted and provided for.

Policy 15: Areas outside SNAs that support specified highly mobile fauna are identified and managed to maintain their populations across their natural range, and information and awareness of highly mobile fauna is improved.

The NPS-IB (at the time of writing) seeks to avoid adverse effects on SNAs (listed in 3.10(2) of the NPS-IB), except where the proposal is:

- *aggregate extraction that provides significant national or regional public benefit that could not otherwise be achieved using resources within New Zealand (Clause 3.11(a)(iii)); and*
- *there is a functional need or operational need for the new subdivision, use or development to be in that particular location (Clause 3.11.(1)(b)); and*
- *there are no practicable alternative locations for the new subdivision, use or development (Clause 3.11(1)(c)).*

Where the proposal meets all three of the above criteria, the effects management hierarchy applies (Clause 3.10(3) and (4) of the NPS-IB (explained further in Section 3.6 of this report).

The consistency of the proposal with these policies is assessed in the Statutory Assessment contained in the AEE.

3.2.2 Maintaining indigenous biodiversity

The NPS-IB directs maintaining biodiversity as (s1.7):

- (1) Maintaining indigenous biodiversity requires:
 - (a) the maintenance and at least no overall reduction of all the following:
 - (i) the size of populations of indigenous species:
 - (ii) indigenous species occupancy across their natural range:
 - (iii) the properties and function of ecosystems and habitats used or occupied by indigenous biodiversity:
 - (iv) the full range and extent of ecosystems and habitats used or occupied by indigenous biodiversity:
 - (v) connectivity between, and buffering around, ecosystems used or occupied by indigenous biodiversity:
 - (vi) the resilience and adaptability of ecosystems; and
 - (b) where necessary, the restoration and enhancement of ecosystems and habitats.

We note that the NPS-IB excludes land covered by water, water bodies and freshwater ecosystems (as those terms are used in the National Policy Statement for Freshwater Management 2020) and the coastal marine area.

The WRC RPS sets out the criteria for identifying areas of significant indigenous biodiversity and their characteristics as they exist at the time the criteria are being applied⁶. Criteria⁷ may be specific to a habitat type including water, land or airspace or be more inclusive to address connectivity, or movement of species across habitat types. The criteria are provided in Appendix 2.

⁶ Section 11A Indigenous Biodiversity.

⁷ Table 11-1 Criteria for determining significance of indigenous biodiversity.

3.3 Waipa District Plan

Section 24 (Indigenous Biodiversity) of the Waipa District Plan (WDP) sets out the identification of significant areas of indigenous vegetation and significant habitats of indigenous fauna of national, regional and local significance; as well as rules intended to protect or maintain and enhance significant natural areas and other remnant areas of indigenous vegetation and wetlands. Areas of significant indigenous vegetation and significant habitats of indigenous fauna that comply with the criteria in the Waikato Regional Council (WRC) Regional Policy Statement (RPS) have been identified, and those relevant to Whitehall Quarry are discussed in Section 3.3 above.

Objective 24.3.1 - Managing effects on district wide indigenous biodiversity

To maintain and enhance the existing level of biodiversity within the District.

Policy 24.3.1.1 To achieve the maintenance and enhancement of indigenous biodiversity values in the District by ensuring that removal of indigenous vegetation or disturbance of wetland areas only occurs where:

- a. Connectivity to link core habitats along biodiversity corridors is supported; and
- b. Sensitive sites remain buffered from intensive land use, development and subdivision; and
- c. Habitat is retained for at risk and threatened indigenous species; and
- d. Customary activities do not adversely affect at risk or threatened indigenous species; and
- e. Consideration has been given to opportunities that contribute to no net loss at a regional scale.

Objective 24.3.2 - Maintain and enhance indigenous biodiversity within the biodiversity corridors

To maintain and enhance indigenous biodiversity, ecological processes and connectivity within the biodiversity corridors as identified on Planning Map 49.

Policy 24.3.2.1 - Loss of indigenous biodiversity

The removal indigenous vegetation and habitat of indigenous species or the disturbance of wetland areas within the biodiversity corridors is discouraged.

Policy 24.3.2.2 - Promote enhancement of indigenous biodiversity

To recognise and promote the importance of maintaining and enhancing connectivity along biodiversity corridors, and indigenous vegetation and habitat of indigenous fauna within the biodiversity corridors.

Policy 24.3.2.3 - Encouragement of permanent protection in the biodiversity corridors

To encourage incentives that achieve permanent protection for the retention of features within the biodiversity corridors such as wetlands and kahikatea stands.

Objective 24.3.3 - Significant natural areas and bush stands

To protect the indigenous biodiversity values and the existing level of indigenous biodiversity within the significant natural areas listed in Appendix N5 and bush stands listed in Appendix N8 of the WDC plan.

Policy 24.3.3.1 - Limiting indigenous vegetation removal and other activities within identified significant natural areas and bush stands.

To protect the ecological sustainability, indigenous biodiversity values and characteristics of significant natural areas including wetlands, and bush stands by ensuring that:

- a. The removal of indigenous vegetation or habitat of indigenous species is discouraged and:
 - i. Only occurs in sustainable quantities in significant natural areas of local significance; and
 - ii. Only occurs in limited circumstances within internationally, nationally or regionally significant natural areas and bush stands.
- b. The health and functioning of significant natural areas including wetlands, and bush stands is maintained through appropriate land use practices.

Policy 24.3.3.2 - Identification of additional significant natural areas

Complete the identification and mapping of additional areas that meet the significant natural area criteria identified in the Waikato Regional Policy Statement, including wetlands that are identified by the Waikato Regional Council as significant.

3.4 Significant Mineral Extraction zone

The WDP identifies Significant Mineral Extraction Zones (SMEZ, section 4A). Each SMEZ provides for the development of a Quarry Management Plan (section 4A.4.2.1), which, amongst other things, requires:

Site rehabilitation and Protection measures for areas of ecological importance, outstanding natural features or archaeological sites.

Section 4A - Significant Mineral Extraction Zone

Policy 4A.3.1.2 To provide for the current authorised mineral extraction activities at Taotaoroa and Whitehall Quarries and the opportunities for reasonable growth and expansion to meet future demands, whilst managing the adverse effects on the environment.

Policy 4A.3.1.5 Where the removal of a significant natural area in whole or part is necessary to provide for mineral extraction activities, adverse effects should be remedied, mitigated or offset to achieve no net loss in biodiversity values.

The activity status of removal or clearance of indigenous vegetation within an SNA also requires that the assessment is restricted to the following matters:

- Proposals for the avoidance, remediation or mitigation of significant adverse effects, or the partial offsetting of residual adverse effects in the local area, including positive environmental benefits; and
- Scale, location, quality, significance and visibility of indigenous vegetation and habitats, including habitats for nationally at risk and threatened flora and fauna species; and
- Significant adverse effects on existing streams, wetlands, riparian margins and habitat; and
- Buffer areas between mineral extraction activities and remaining significant natural areas; and
- Whether the proposed mitigation measures implement the 'no net loss principle'; and
- The quality and significance of minerals to be extracted.

Criteria for assessment are set out in 21.1.4A.6 of the WDP.

Five SNAs occur within the Whitehall Quarry SMEZ in full or in part (as described in Table 1). The proposed expansion of the quarry will occur within two of the SNAs identified on the Site.

3.5 Landscape and site rehabilitation plan

Conditions 13 to 17 of the existing resource consent (WDC RC 3770) sets out the requirements for rehabilitation and landscaping. The conditions require the submission of a Landscape and Site Rehabilitation Plan. Amongst other requirements, condition 13 sets out that:

Indigenous vegetation removed as part of quarry extensions shall be replaced by an equal area of indigenous vegetation elsewhere on the quarry site.

A copy of conditions 13 to 17 of resource consent RC 3770 are provided in Appendix 3.

3.6 Effects management

The NPS-IB defines the effects management hierarchy as an approach to managing the adverse effects of an activity on indigenous biodiversity that requires that:

- (a) adverse effects are avoided where practicable; then
- (b) where adverse effects cannot be avoided, they are minimised where practicable; then
- (c) where adverse effects cannot be minimised, they are remedied where practicable; then
- (d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, biodiversity offsetting is provided where possible; then

- (e) where biodiversity offsetting of more than minor residual adverse effects is not possible, biodiversity compensation is provided; then
- (f) if biodiversity compensation is not appropriate, the activity itself is avoided.

We have applied this hierarchy in the stepwise manner laid out. We present the outcomes of applying the hierarchy in section 10 of our report.

4.0 Proposed activities

4.1 Aggregate expansion area

It is proposed to extend the pit in a westerly direction by approximately 15.5 ha in area. The pit expansion to the west will extend marginally beyond the Significant Mineral Extraction Zone and into Rural zoned land (Figure 2). The pit expansion will also result in the removal of 5.46 ha of vegetation within SNAs (District Plan reference SNA WP527 and SNA WP530), and 1.9 ha of kanuka scrub.

4.2 Proposed progression

It is proposed to undertake vegetation clearance and strip most of the area north of the pit terrace T15/45 in the first earthworks season 2025 to 2026 (Figure 3). For operational reasons the Stage 1 expansion area is required to progress initially in a westerly direction, then extend to the north in a series of campaigns. This will include removing remaining vegetation within the gully and within SNA WP527 (2.6 ha within the Significant Natural Area).

Stage 2 (south-western portion of the expansion area) would involve stripping the area to the west over a series of campaigns and removing the vegetation in Significant Natural Area WP530 (2.86 ha). Progression westwards and the removal of part of SNA WP530 is not expected to begin for a further 15 years or so (approximately 2041).





5.0 Methods

5.1 Terrestrial vegetation

Vegetation communities to be impacted by the proposed quarry expansion were surveyed over several site visits between March 2021 to April 2024. A walk-through survey of the site was used to assess the area. Vegetation communities were mapped using ArcGIS. A list of all native and exotic plant species observed was compiled, and a qualitative assessment of vegetation species and habitat diversity was also conducted.

To assist in the vegetation survey, a total of 10 RECCE plots were undertaken within the two tawa forests (high ecological value habitat – SNA WP527 & SNA WP530). One plot was visually examined from a vantage point given the area was too steep for a detailed assessment. Each plot was 20 x 20 m and followed the methods outlines within Hurst & Allen (2007) vegetation plot field protocol for capturing vegetation cover and composition information. The RECCE plot assessment included measuring the diameter at breast height (DBH) for each individual plant and tallying the number for each species.

To increase survey efficiency, the DBH was only measured for plants (woody tree species and tree ferns) with a DBH greater than 5 cm. There are numerous seedlings in the tawa forests, measuring the DBH of these very young seedlings would not be time efficient and provide little benefit to the assessment of vegetation composition/structure. Plants with a DBH below 5 cm were tallied.

The DBH of epiphytes and lianas was not measured, and these species were in general not included in the tally (though some were counted). The presence (or absence) of epiphytes and lianas was the key information recorded for these species. A summary of the vegetation plot assessments can be viewed in Appendix 4.

Formal vegetation description, where used, followed the convention of Atkinson (1985) as outlined in Table 2. Where appropriate, generic descriptors such as “exotic grasses”, “rank grasses”, or “pasture grasses” are used in place of species names as this allows a better description and assessment of the value of the vegetation compared to long strings of non-native species epithets of low vegetation cover classes.

For mapping, similar vegetation types were aggregated (based on species composition and habitat type).

Table 2: Key to vegetation descriptions (from Atkinson, 1985). Typically, descriptions are restricted to species with a cover greater than 20% are included in the name but conspicuous or emergent species may also be included.

Notation device and format	Interpretation
<u>Species</u>	>50% of total vegetation cover of underlined species in a particular tier
<i>Species</i>	20-49% of total vegetation cover of a species in a particular tier
(<i>species</i>)	10-19% of total vegetation cover of a bracketed species in a particular tier
[<i>species</i>]	1-10% of total vegetation cover of square bracketed species in a particular tier
<i>Species</i> 1/ <i>species</i>	Species 1 in a tier above species (e.g., species emergent above the canopy)
<i>Species-species</i>	Species occurring within the same tier

5.2 Terrestrial fauna

5.2.1 Herpetofauna

5.2.1.1 Survey

Two intensive lizard surveys have been undertaken using artificial cover objects (ACOs) and pitfall traps (plastic containers dug into the ground under ACOs) to determine presence of native lizards on site (Appendix 5 and Figure 4); in 2021 and 2024. In total, 154 ACOs have been deployed within Whitehall (targeting the higher quality lizard habitats – tawa forests), 87 in 2021 and 67 in 2024 (of which 64 contained pitfall traps in 2024⁸).

The 2024 ACOs with pitfall traps were set on 21 February 2024, roughly two months before being checked to allow any potential lizards on site to habituate to the equipment. During the setting phase, the pitfall traps were covered (with a lid) to ensure no animals were accidentally trapped. A day prior to the check (on 22 April 2024), the pitfall traps were opened (lid removed). Each pitfall trap was baited with a piece of banana to attract lizards. In addition, a small water-soaked sponge was placed into each pitfall trap to ensure any lizards present in the trap had enough water/moisture to keep hydrated. The survey involved three checks over three consecutive days from 23 – 25 April 2024 (i.e., one check per day to ensure lizards are not trapped for longer than 24 hours). Any native lizards caught were to be identified to species level and photographed. Handling is kept to a minimum to minimise lizard stress levels. Any lizards incidentally encountered were also recorded. Similar effort and timing was employed for the earlier 2021 survey.

We note that lizard survey methods currently available have poor detection rates because of typically low population densities, species' cryptic colouration, difficulty in surveying preferred habitats and elusive behaviour/activity patterns. Often lizard surveys cannot reliably detect a representative population within a given sample area and may fail to detect any of the lizards present. Accordingly, we carried out two intensive surveys (as well as habitat surveys) for lizards to provide a greater level of confidence in the findings.

5.2.1.2 Habitat assessment

Potential lizard habitats were qualitatively categorised from 'negligible habitat quality' to 'high quality' lizard habitats. Negligible quality referred to those lacking lizard habitats. Low quality

⁸ Three ACO locations in the 2024 survey had no pitfall traps as the ground in which the ACOs were deployed was very difficult to dig (hard soil, soil containing excessive rock and surface roots).

habitats had minimal (both in terms of abundance and diversity) lizard habitat features. High quality lizard habitats were those that contained several and/or high-quality micro-habitats such as:

- Dense undergrowth (understorey/ground cover species and/or leaf litter)
- Woody debris (branches, logs, bark)
- Artificial debris (e.g., tyres, roofing materials)
- Forests with good canopy cover
- Rock piles, rocky outcrops

In addition to the assessment of potential lizard habitats available on site, the threat status (following Hitchmough et al., 2021) of the likely and potential herpetofauna species present in the area (based on habitat preference, pest animal presence and site disturbance history) was considered when assessing ecological value for herpetofauna within the site.

Any herpetofauna species that were incidentally encountered on site were noted.



Figure 4: ACOs with pitfall traps placed in the Tawa forests at Whitehall Quarry.

5.2.2 Avifauna

Five-minute bird counts were undertaken on site over two days: 25 and 26 January 2024. The bird counts were undertaken in five separate locations within the northern tawa bush. Incidental recordings during site visits and a review of the New Zealand Bird Atlas database⁹ was also undertaken to gain an understanding of avifauna ecological values on site.

⁹ Grids searched within the New Zealand Bird Atlas database include AM73, AM74, AM75, AN73, AN74, AN75, AO73, AO74, AO75.

5.2.3 Bats

5.2.3.1 Background

Bats are the only native terrestrial mammals in New Zealand. There are two species of bats in New Zealand, the long-tailed bat (*Chalinolobus tuberculatus*) and the lesser short-tailed bat which is separated into three subspecies (*Mystacina tuberculata* spp.). The long-tailed bat is classified as Threatened – Nationally Critical and the central lesser short-tailed bat is classified as At Risk – Declining (O'Donnell et al., 2018) due to predation, habitat degradation and loss, and competition.

Long-tailed bats preferentially roost in small cavities of old, large trees, but have also been observed to utilise other features such as loose bark, hollow limbs, or epiphyte growth for roosting. They can fly long distances at night when they are commuting between roosts and / or foraging, for which they use echolocation to hunt for flying insects. Long-tailed bats are known to use linear habitat features (for example shelterbelts or edges of vegetation margins) to commute and forage (O'Donnell, 2000; Borkin & Parsons, 2009).

Short-tailed bats typically live within areas of mature native forest where they use hollow trees for roosting and ground hunting for foraging. No suitable habitat for short-tailed bats was identified within the Site and this species is not further considered in this assessment.

5.2.3.2 Desktop review

The Department of Conservation (DOC) bat database was reviewed for previous records of long-tailed bats within a 25 km radius of the Site¹⁰.

5.2.3.3 Acoustic bat survey

Two acoustic bat surveys have been carried out at Whitehall Quarry, in 2021 and 2024. In both surveys, acoustic bat survey was undertaken using automatic bat monitors (ABMs), manufactured by DoC, which passively record both long-tailed bat (at 40 kHz) and short-tailed bat (at 28 kHz) echolocation calls on two concurrently operating frequency channels. The ABMs operate remotely by recording and storing each series of potential echolocation calls (one bat pass) along with the date and time.

The 2021 bat survey was carried out over 18 consecutive nights from 5 March 2021 to 22 March 2021. The 2024 bat survey was conducted over 17 consecutive nights from 24th January to 10th February 2024. Additional nights were recorded but not included in this report. The 2021 informed that bats were particularly prevalent in the vicinity, and the information was used to design the 2024 survey. Accordingly, sixteen ABMs were deployed across the targeting habitat features preferred by long-tailed bats for roosting, commuting, and foraging in 2024. Thirteen ABMs were deployed within the proposed northern expansion zone and three within the western expansion zone. Habitat features preferred by long-tailed bats for roosting, commuting, and foraging were targeted (Figure 1). In our results we focus on the results of the 2024 bat survey.

Long-tailed bat activity is influenced by overnight weather conditions such as temperature, rainfall, wind speed, and in some circumstances, moonlight. Weather data from the survey period was analysed to ensure conditions were suitable for bats to be active and hence detectable via acoustic monitoring. Suitable conditions are henceforth referred to as 'suitable survey nights'. Suitable conditions are defined for the purpose of this survey report are as follows:

- Air temperature does not drop below 10°C from sunset until four hours after sunset;
- Rainfall of no more than 2.5 mm occurs in the first two hours after sunset;

¹⁰ Department of Conservation bat database ranging from 1980 to 14 January 2021.

- Mean overnight wind speed does not exceed 20 km/h;
- Overnight wind gusts do not exceed 60 km/h;

Hourly weather data from the survey period was sourced from the nearest weather station available in New Zealand's National Climate database and included temperature, rainfall, relative humidity and wind speed¹¹.

The number of suitable monitoring nights within a survey are used as a measure of survey effort. However, all data, including recordings during non-suitable survey nights were analysed.

All ABMs were set to have the same date and time settings and programmed to monitor from one hour before sunset to one hour after sunrise¹². All ABM recordings were downloaded and acoustic data from all nights were analysed using BatSearch 3.12, a programme designed by DOC for use with their ABMs. This software converts the potential bat echolocation calls (bat passes) into spectrograms that are visually analysed.

Each spectrogram showing calls was recorded as a separate bat pass. The average number passes per night was calculated to compare activity levels across the site and with comparable sites. There is no standardised definition of high, medium and low activity levels for long tailed bats.

Long tailed bats usually emerge within the first hour after sunset (O'Donnell & Sedgeley, 2001), and often within the first 30 minutes, and this species is known to frequently switch roosts (O'Donnell & Sedgeley, 1999; Sedgeley & O'Donnell, 1999).

5.2.3.4 Habitat assessment

A visual survey of roosting habitat was carried out on 24th January 2024. Areas of habitat containing potential bat roost trees were noted but not every tree within the proposed expansion zone was separately assessed.

Trees more than approximately 4 m in height with a diameter at breast height (dbh) of ≥ 15 cm that were encountered during the ABM deployment were visually assessed from the ground (as per DOC guidance on bat roosting potential of trees), including using binoculars (Vortex Diamondback 10 x 42 mm) where needed.

The trees were assessed based on their potential to support roosting bats. Features that indicate roost potential include:

- Cavities
- Hollows
- Knot holes
- Cracks
- Flaking and peeling of bark
- Epiphytes
- Broken or dead branches or trunk

There is no formal guidance for categorising the roost potential of trees for New Zealand bats therefore the categories below are based on the experience of the bat specialist and studies

¹¹ The National Climate Database, [Database Query Form \(niwa.co.nz\)](https://www.niwa.co.nz/database-query-form)

¹² Sunset and sunrise times were taken from the closest available location on the LINZ Sunrise/Sunset tables, see <https://www.linz.govt.nz/sea/nautical-information/astronomical-information>.

that have been undertaken on roosting behaviour and roost selection by long-tailed bats (O'Donnell & Sedgeley, 1999; Sedgeley, 2001; Sedgeley & O'Donnell, 1999, 2004). Features of potential suitability of a roost for bats are set out in Appendix 6.

We note that the majority of long-tailed bat roost-selection studies have been undertaken in pristine forest where roost trees are not such a limiting resource compared to the highly modified landscape of the Waikato. A comparison study undertaken with a long-tailed bat population in rural Canterbury has shown that bats utilise a wider range of roost types in response to the limited availability of preferential roost characteristics (Sedgeley & O'Donnell, 2004).

5.2.3.5 Landscape assessment

Both species of New Zealand bat are found in native forest from sea level to the treeline. Their natural habitat is mature forest with numerous hollows in large trees. Long tailed bats also roost in caves at times, and some have become established in mature pine (*Pinus radiata*) forests.

Long tailed bats have also been found to utilise highly modified landscapes and have been recorded within agricultural land and exotic vegetation. They have been shown to use waterways, gullies, shelterbelts and hedgerows to cross the landscape and reach foraging sites up to 19 km from their roost.

Features on site that could provide connectivity and foraging opportunities were recorded. These were assessed in the context of the wider landscape, noting habitats and features outside of the site boundary that could support roosts or provide extended connectivity to suitable habitat.

The presence of potential roost features and the suitability of foraging and commuting habitats were considered together to assess the overall suitability of the site to support bats.

6.0 Survey findings

6.1 Terrestrial vegetation

The terrestrial habitats impacted by the proposed quarry expansion include tawa forests, kanuka scrub habitats, gorse patch, and pasture. A map of the impacted terrestrial habitats is provided in Appendix 7 and a list of species found during the site surveys are provided in Appendix 8. The At risk or Threatened species detected were rata (climbing rata – *Metrosideros perforate*, white rata – *Metrosideros colensoi*, and rata – *Metrosideros fulgens*) and kanuka (*Kunzea robusta*), which have a threat status of Threatened – Nationally Vulnerable (de Lange et al., 2018).

Detailed descriptions of the vegetation communities assessed are as below:

The naming convention of each vegetation community is as follows: Name of vegetation type mapped in Appendix 7 – Formal vegetation description as per Atkinson (1985).

Tawa forests – *Beilschmiedia tawa* – (*Laurelia novae-zelandiae*) – (*Litsea calicaris*) / (*Laurelia novae-zelandiae*) – (*Cyathea dealbata*) / [*Piper excelsum*].

Two large tawa forests within the proposed quarry expansion zone are SNAs: SNA WP527 (northern) and SNA WP530 (western). Tawa (*Beilschmiedia tawa*) is the dominant species in the canopy (Figure 4). Pukatea (*Laurelia novae-zelandiae*), mangeao (*Litsea calicaris*), and silver fern (*Cyathea dealbata*) also form dominant components within the upper height tiers (canopy and sub-canopy). Other species such as rimu (*Dacrydium cupressinum*), rewarewa (*Knightia excelsa*), miro (*Pectinopitys ferruginea*), mahoe (*Melicytus ramiflorus*), nikau (*Rhopalostylis sapida*), mamaku (*Cyathea medullaris*), and kanuka (*Kunzea robusta*) are present in the upper height tiers, but at low densities (Figure 5).

The understorey in general is limited, often void of vegetation due to the browsing pressure from mammal pests, primarily deer (and potentially goats)¹³. Small pockets of dense undergrowth remain, largely dominated by kawakawa (*Piper excelsum*) and small ferns (Hen and chicken – *Asplenium bulbiferum*, thread fern – *Icarus filiformis*). Occasional basket grass (*Oplismenus hirtellus* subsp. *imbecillis*), pigeonwood (*Hedycarya arborea*), and hangehange (*Geniostoma ligustrifolium*) are also scattered in the understorey. Numerous seedlings (< 10 cm) of native vegetation, including of tall canopy trees (rewarewa, mangeao, pukatea) were noted. These young seedlings overall make up a tiny fraction of the vegetation cover in the tawa forests. Due to ongoing browsing pressure from mammalian pests, the native seedlings are unlikely to reach maturity.

Several epiphytes and lianas¹⁴ are growing in the tawa forests, of which supplejack (*Ripogonum scandens*) and white rata are the most common. Certain locations contained dense entanglements of supplejack. The very large mature trees at times had a few (more than one individual) *Astelia* (*Astelia* sp.) growing epiphytically on the trees. White clematis (*Clematis paniculata*), a liana was observed once, climbing up native vegetation in a small open canopy gap.

¹³ Several deer were noted within the bush and other signs included numerous deer droppings and hoof prints. Goats are present within the quarry and have previously been observed within the tawa forests.

¹⁴ Epiphytes are rooted to another plant, liana (or climbers) are rooted to the ground.

Note, the south-eastern boundary (adjacent to the quarry) of the northern tawa forests has more canopy gaps. In these locations, mature and young kanuka are present in higher densities, mixed amongst silver ferns and remnant old growth native trees. Pasture grass is common along the exposed edge, however, quickly disappears under the existing well-developed canopy (in the interior).

Exotic species are rare, and only two pest plants were identified within the tawa forests: inkweed (*Phytolacca octandra*) and pampas (*Cortaderia selloana*). Pampas was noted along the more exposed edge of the northern tawa forest, adjacent to the quarry boundary. Inkweed was scattered throughout the two tawa forests, mostly growing in small light gaps (where light penetrates the forest).

Kanuka scrub – *Kunzea robusta* / Pasture grass

A kanuka scrub is present within the proposed quarry expansion zone (Figure 6, Appendix 7). Kanuka (c. 3 – 4 m tall) dominates the canopy and sub-canopy. Mahoe and kawakawa are occasionally present in the upper height tiers. The canopy is incomplete as there are several gaps present throughout the kanuka scrub. Natural regeneration of native vegetation is limited to a few species occurring in low densities. Creek fern (*Cranfillia fluviatilis*), rasp fern (*Doodia australis*), bracken (*Pteridium esculentum*), kanuka, silver fern, basket grass, and kawakawa were the only native understorey/ground cover species recorded. Native species diversity and abundance is limited in the kanuka scrub habitats.

The exotic pasture grass is abundant, covering majority of the ground within the kanuka scrub. Other exotic species recorded included kikuyu (*Cenchrus clandestinus*), soft rush (*Juncus effuses*), creeping buttercup (*Ranunculus repens*), blackberry (*Rubus fruticosus*), ragwort (*Jacobaea vulgaris*), gorse (*Ulex europaeus*), water pepper (*Persicaria hydropiper*), and inkweed. Soft rush, creeping buttercup, and water pepper were mostly confined along the western boundary (where there is likely a water seepage) and steep gully area.

Gorse patch – *Ulex europaeus* – (*Kunzea robusta*) / Pasture grass

A large patch of gorse is present adjacent to the kanuka scrub. Species diversity is limited as gorse makes up most of the vegetation cover. Within gaps, pasture grass was common, and other species such as kanuka and rasp fern were occasionally noted.

Pasture grass – Pasture grass

Pasture grass dominates with little species diversity. Occasional growth of other species such as kanuka, ragwort, and gorse was noted.



Overview photo of the tawa forest showcasing a healthy canopy cover.



The canopy within the tawa forest is predominately tawa.



Pukatea stand in the tawa forest with limited understorey.



Silver fern forms a dominant vegetation cover component within the tawa forest.



Dense stand of kawakawa within the understorey of the tawa forest.



Young rewarewa seedlings were scattered throughout the tawa forest.



Dense entanglement of supplejack in the tawa forest.



The south-eastern boundary of the northern tawa forest is exposed and contains a developing canopy.

Figure 5. Characteristics of the tawa forest vegetation.



Kanuka scrub with kanuka dominant canopy. Below the kanuka, pasture grass dominates.



Kanuka scrub with incomplete canopy. Small but dense patch of bracken was noted below the kanuka.

Figure 6. Characteristics of the kanuka vegetation.

6.2 Terrestrial fauna

6.2.1 Herpetofauna

6.2.1.1 Desktop review and background information

A review of the DOC Herpetofauna Bioweb database found numerous copper skink (*Oligosoma aeneum*) records within 10 km radius of the site, including several in vegetated habitats along or near to State Highway 1. Within a 10 km radius, the only other native herpetofauna recorded were forest geckos (*Mokopirirakau granulatus*), identified in the ecologically significant Te Tapui Reserve. The exotic plague skink has also been recorded within the vicinity of the quarry (< 5 km).

A habitat survey of the proposed expansion area was undertaken during the April 2021 site visit. During the site survey, no lizards or lizard signs (e.g., scat, slough) were observed.

6.2.1.2 Quarry expansion Stage 1 and 2 search and salvage

Recent lizard survey and salvage operations in compliance with condition 6 of resource consent AUTH143593.02.01 were undertaken and revealed no lizards present within the boundary of the stage 1 western expansion (Ecology New Zealand Ltd, 2021). Visual encounter searches across understorey habitat areas and peripheral areas were undertaken and passive scanning was also undertaken around the peripheral canopy of subject trees to detect basking and active arboreal gecko. No lizards were documented during these efforts (Ecology New Zealand Ltd, 2021).

Immediately following the above detailed efforts, all trees and shrubs were felled and manually searched through by herpetologists. This involved peeling back pieces of bark, scanning trunks and branches, and systematically inspecting through areas of foliage. A high vantage point was also taken in areas and binoculars were used to scan felled vegetation for lizards attempting to escape. No lizards were documented during these efforts (Ecology New Zealand Ltd, 2021).

6.2.1.3 2024 survey

From the 2024 survey, no lizards (native or exotic) were caught or recorded within the ACOs or pitfall traps. In addition, no lizards were incidentally recorded during the survey (including the several times Boffa Miskell ecologists have surveyed the bush).

The lack of lizards on site is likely due to the presence of mammalian predators such as rats, possums, and mustelids. Due to the ongoing risk of predation, any native lizards that may be present on site are likely to be below detectable levels. The extent and repeat of surveys undertaken to date provide confidence that lizards are not present within the area of investigation.

Potential available micro-habitats for native lizards within the project footprint are detailed in Appendix 9.

6.2.2 Avifauna

During the five-minute bird counts and incidental observations¹⁵, a total of 14 avifauna species were recorded. The only species with a higher threat status recorded was falcon (*Falco novaeseelandiae*: Threatened – Nationally Vulnerable). Two falcons were incidentally observed (and heard) numerous times within the northern tawa forest (including on separate days between March – April 2024). The remaining species identified were either Not Threatened or Introduced and Naturalised avifauna. Avifauna species identified during the bird counts and incidental observations can be viewed in Appendix 10.

A desktop assessment found no records of At Risk or Threatened bird species on site. Several avifauna species with higher threat status¹ have been recorded in the surrounding land. The avifauna assemblage within the quarry expansion zone is expected to be dominated by a mix of introduced and naturalised species and common native birds. Introduced and naturalised species such as house sparrow (*Passer domesticus*) and starling (*Sturnus vulgaris*) which are common in rural landscapes are expected to be present onsite. Disturbance tolerant native species such as silvereye (*Zosterops lateralis*), or indigenous avifauna that prefer dense forested habitats such as kereru (*Hemiphaga novaeseelandiae*) and fantail (*Rhipidura fuliginosa*) are also likely to be present.

There are records of North Island robin (*Petroica longipes*: At Risk – Declining), yellow-crowned parakeet (*Cyanoramphus auriceps*: At Risk – Declining), and kaka (*Nestor meridionalis*: At Risk – Recovering) within the surrounding. Several kaka have been noted within the nearby vegetated habitats and along the Waikato River, and North Island robin and yellow-crowned parakeet recorded near Te Tapui Reserve (roughly 7 km west of the quarry). These species are more likely to utilise the larger fragments of bush within the surrounding landscape. (e.g., Maungatautari Mountain, Te Tapui Reserve). However, when considering their nearby sightings and suitable available habitats, North Island robin, yellow-crowned parakeet, and kaka may potentially make use of the tawa forests, or transit through the site when dispersing between higher quality habitats.

There have been several long-tailed cuckoo (*Eudynamys taitensis*: Threatened – Nationally Vulnerable) recordings in the wider landscape, with the nearest record being 10 km west of the quarry (near Te Tapui Reserve). This species is migratory, and its distribution is closely tied to their host species (brood parasitism), which in the North Island of New Zealand are whiteheads (*Mohoua albigilla*: Not Threatened). There is a noticeable gap of whitehead recordings between Hamilton and the Kamia Range (New Zealand Bird Atlas database), which may be due to lack of available large native forests habitats. As a result, it is unlikely that whiteheads, and therefore long-tailed cuckoo are present on site, though this species may traverse the quarry.

New Zealand pipit (*Anthus novaeseelandiae*: At Risk – Declining) are widespread in rough open habitats (e.g., tussocks), but can also occupy a wide range of habitat types. Areas of tall exotic

¹⁵ Incidental observations include the numerous site visits undertaken by Boffa Miskell, and by other ecologists from RMA Ecology and Ecology NZ.

grass (including un-grazed pasture) within the quarry expansion zone may attract this species to the area.

Fernbird (*Poodytes punctatus*: At Risk – Declining) are unlikely to inhabit the wetlands which are generally small/narrow, exposed, degraded habitats dominated by low-growing species.

Avifauna such as stitchbird (*Notiomystis cincta*: Threatened – Nationally Vulnerable), North Island kokako (*Callaeas wilsoni*: Threatened – *Nationally Increasing*), North Island saddleback (*Philesturnus rufusater*: At Risk – Relict)¹⁶ are present within Maungatautari Mountain, a predator proof sanctuary c 12 km south of the quarry. On the mainland the distribution of these species is restricted to high-quality habitats such as Maungatautari Mountain, and therefore, are unlikely to be present on site¹⁷.

Water-associated species¹⁸ that usually prefer coastal, lake, riverine, or large intact wetland habitats have been recorded in the surrounding landscape, such as grey duck (*Anas superciliosa*: Threatened – Nationally Vulnerable) and South Island pied oystercatcher (*Haematopus finschi*: At Risk – Declining). Given that such habitats do not exist within the project footprint, the likelihood of these avifauna utilising the site is rare (though at times may traverse the site).

6.2.3 Bats

6.2.3.1 2021 bat survey

Previous acoustic bat surveys have identified high levels of bat activity on site and this report identifies the subsequent survey work (2024) which has been undertaken to assess the potential impact of the Long-Term expansion.

As part of a broader survey of bat activity in the vicinity of the Whitehall quarry, acoustic bat monitors (ABMs) were deployed at several locations. The records show that bats make extensive use of the broad landscape with records of activity alongside the quarry margin and local SNAs. This reflects the connectivity that occurs across the local landscape and how extensively it is utilised.

One ABM was deployed in the proposed pit expansion area. The ABM was deployed for a period of 17 consecutive nights from 5 March 2021 to 24 March 2021. The weather remained fine for all 17 nights.

Bat passes were recorded at the proposed expansion area with a mean number of bat passes over the survey period of 140.5 per night (but notably amongst the lowest for feeding or sunrise/sunset recorded activity). This represents a high level of bat activity, and as indicated above, reflective of the bat activity throughout the ecological and other features of the broader landscape and environment.

We note that the application of the bat tree felling protocols in compliance with condition 5 of resource consent AUTH143593.02.01 (for expansion area#1) and the Bat Management Plan (Boffa Miskell 2021) as included in the Quarry Management Plan was undertaken for the stage 1 and 2 western expansions.

In accordance with the plan, approximately 20 kanuka trees bearing potential roosting features were investigated. Respective features of the trees were able to be carefully inspected and on

¹⁶ North Island saddleback are also known to frequent scrubby regenerating areas. However, apart from Maungatautari Mountain, there have been no records of this species within 50 km radius of the site (New Zealand Bird Atlas).

¹⁷ North Island brown kiwi (*Apteryx mantelli*) which has a Not Threatened threat status is also present within Maungatautari Mountain. This species is unlikely to be found within the quarry site.

¹⁸ For the purpose of this report, avifauna that rely primarily upon aquatic habitats (e.g., foraging, habitat, reproduction, and/or rely on water to land and take-off) such as waterfowl are considered water-associated species.

confirmation of bat absence, all trees were immediately felled under the supervision of bat ecologists. Once felled, handheld bat detectors were used to scan felled vegetation to listen for any distressed bats. No bats were documented as present (Ecology New Zealand Ltd, 2021).

6.2.3.2 Desktop review

The Department of Conservation database show records of long-tailed bats approximately 1.8 km to the north west of the site (Figure 7). This is well within the documented distance this species can travel in a night. The extent of records is a reflection of the intensity of sampling for bats.

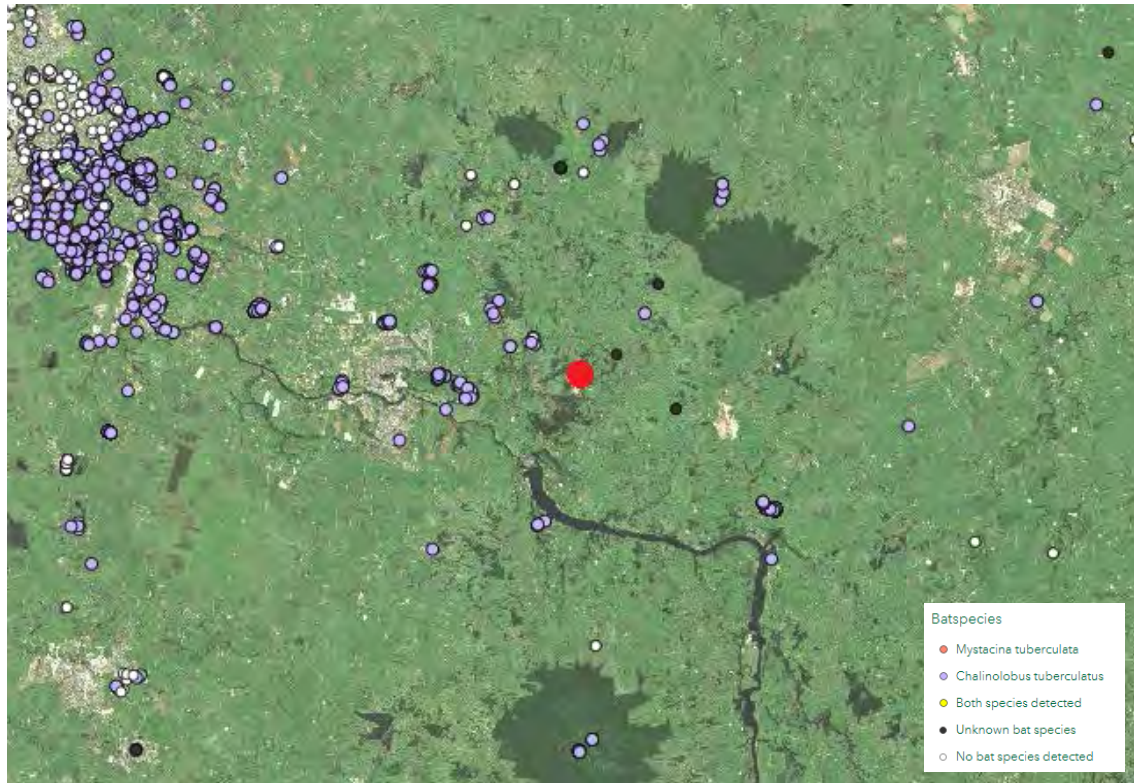


Figure 7. Local records of bats.

6.2.3.3 2024 acoustic bat survey results

Bat passes

Bat passes were recorded at all the surveyed locations (Figure 8). All locations, except for location 1, had bat recording for every night of the survey (100%). Location 1 had bat activity recorded on 94.4% of survey nights. Weather conditions were suitable throughout the survey. We note that Detectors 9 and 10 encountered faults and did not record. Records of bat activity and passes are provided in Appendix 11.

The highest levels of bat activity were recorded at locations 14 and 15, with 392.4 and 315.6 mean bat passes per night, respectively. These are very high levels of bat activity. The lowest average number of nightly passes was a mean of 11.7 at location 2, which is still a high level of activity.



Figure 8. Location of bat recorders at Whitehall Quarry, January-February 2024.

Timing of bat passes

When the times of recorded passes are plotted against sunset and sunrise times (Appendix 11) activity consistently occurs within an hour of sunrise and sunset, with some calls within 16 minutes of sunset. This is consistent with what would be expected if recorded bats were roosting near the detectors. As an example, the dusk and dawn times of bat call records for location 14 (high level of bat activity) are shown in Appendix 11 and this pattern is repeated across the site.

Bats emerging from roosts that were not within approximately 50 m of a detector would not necessarily have been identified if their route did not pass a detector soon after emergence. Bats leaving a communal roost do not commute to a single foraging location as a group, and therefore scattered individual recordings could relate to bats from a single larger roost or several smaller roosts.

Activity levels were consistently very high throughout the night between dusk and dawn, suggesting that bats either remained within the site, or repeatedly travelled in and out of it on a nightly basis. Numerous acoustic files contained multiple bats and foraging calls.

Given the consistently high levels of activity across the site, the forests are considered to be a single area of high importance to bats.

6.2.3.4 Bat habitat survey results

6.2.3.4.1 Northern forest (ABMs 1 – 13) SNA WP527 and WP527a

WP527 is a moderately large (34.5 ha) area of indigenous forest in two segments separated by a protected area (WP527a). Tributaries pass through both segments. There is a moderate sized patch of pine present in the western segment. The terrain of these sites, particularly the segment to the west, is steep (Figure 4). The northern section of the vegetation clearance zone is healthy tawa forest as described above.

6.2.3.4.2 Western forest (ABMs 14 – 16) SNA WP530

WP530 is also a reasonably large area (12 ha) of indigenous forest (Figure 9). The terrain is quite steep in places. A tributary of the Waiarumu Stream passes through this SNA.

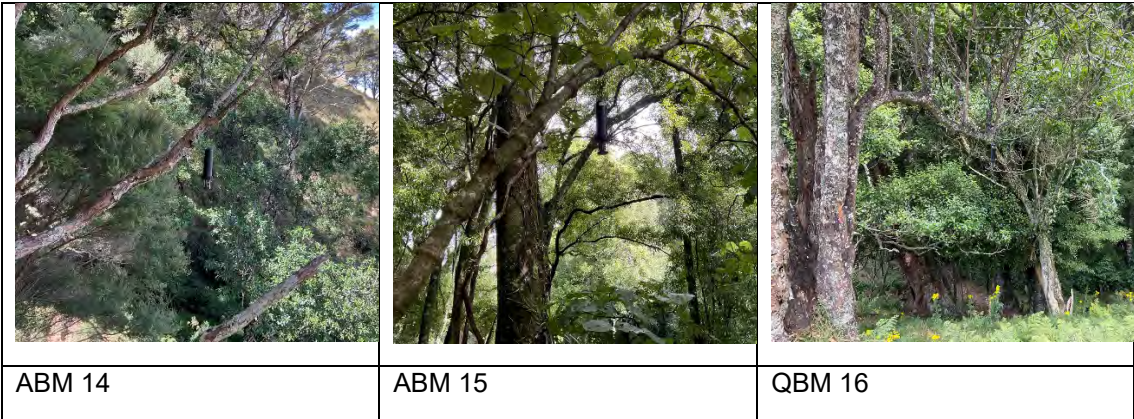


Figure 9. Habitats present at a selection of ABM locations, Whitehall Quarry

6.2.3.5 Roost potential

The indigenous vegetation of both SNAs contain numerous trees with potential roost features throughout. Figure 10 shows are a small selection of the features that were observed and are typical of many of the trees present. Long-tailed bats are known to switch roosts frequently and therefore require a high number of suitable tree features within their range. A forest such as this which provides multiple potential roost features is of high value for bats. The habitats in both the SNAs are assessed as being of High roosting suitability for bats.

6.2.3.6 Summary

The presence of the nationally critical threatened long-tailed bat means that this location meets criterion 3 of the criteria for identifying areas of significant indigenous biodiversity in the WRC RPS. We also note the extensive use of the features of the landscape and the connectivity and occupancy that exists within the broader landscape and environment.



Figure 10. Examples of potential roost features on site at Whitehall Quarry.

7.0 Ecological values

7.1 Terrestrial vegetation

The kanuka scrub, gorse patch, and pasture areas are of limited value and typical of habitats within a rural landscape. The only terrestrial vegetation habitat of note are the tawa forests, which are native, mature secondary forests (and SNAs).

We note that the native vegetation species present are not listed as threatened in the DOC Threat classification lists (DOC 2023).

The tawa forests are SNAs and areas of mature tawa forests are rare in the current modified landscape. As a result, the tawa forests are of Very High ecological value. With the exception of the tawa forests, the ecological value of the remaining vegetation within the project footprint is assessed as Low. A summary of the criteria for assessing the ecological value of terrestrial vegetation (tawa forests and the rest of the vegetation on site) are provided in Tables 3 and 4.

7.2 Terrestrial fauna

7.2.1 Herpetofauna

The habitats available within the project footprint provide a variety of micro-habitats that could be utilised by native lizards. Of particular importance are the mature tawa forests. However, due to lack of lizard sightings, and predation by mammalian predators, the presence of native lizards on site is likely to be at very low densities (below detectable limits). As a result, the ecological value for native lizard habitats on site has been assessed as Low-moderate.

7.2.2 Avifauna

The proposed quarry expansion zone provides habitat which may be utilised by bird species with greater threat status (e.g., North Island robin, kaka, and New Zealand pipit). Therefore, the potential avifauna ecological value on site is assessed as High. We note that the two large tawa forests within the proposed quarry expansion zone are SNAs: SNA WP527 (northern) and SNA WP530 (western).

The kanuka scrub, gorse patch and pasture areas are habitats that are readily available in the surrounding landscape, and are unlikely to provide permanent habitat, or habitats of specific importance for any At Risk or Threatened avifauna. The tawa forests which have a healthy canopy cover and may be inhabited or utilised by At Risk or Threatened avifauna, although we note that there are numerous SNAs present in the vicinity of the site (< 5 km), including larger bush fragments (which mobile avifauna could readily disperse to). Therefore, by taking these factors into account, the ecological value of habitats on site for avifauna has been assessed as Moderate.

Table 3: Representativeness, rarity/distinctiveness, diversity/pattern, and ecological context of the tawa forests (SNAs) on site.

Ecological Feature	Matter	Ecological Value
Tawa forests	<u>Representativeness</u> Tawa forests are representative of secondary native habitats that remain post European colonization.	High
	<u>Rarity/distinctiveness</u> Mature tawa forests are not a common habitat type in the current modified landscape. The SNAs are considered a 'local' significance in the WDP Schedule of SNAs.	High
	<u>Diversity & Pattern</u> Moderate level of diversity within the tawa forests, however, this habitat is lacking vegetation structure (i.e., minimal understory growth). Diversity also likely impacted by ongoing mammalian browsing pressures.	Moderate
	<u>Ecological Context</u> May play a role in acting as a 'stepping-stone' to facilitate movement of indigenous fauna within the area. The vegetation present is an important habitat for threatened long-tailed bats, and potentially other species with higher threat status' (e.g., native lizards, birds).	Very High
Overall Ecological Value for Vegetation		Very High

Table 4: Representativeness, rarity/distinctiveness, diversity/pattern, and ecological context of terrestrial vegetation on site (excluding tawa forests).

Ecological Feature	Matter	Ecological Value
All vegetation (excluding tawa forests)	<u>Representativeness</u> Mix of native and exotic species composition that reflects the sites long history of land use disturbance. Remaining vegetation on site is highly modified and not representative of the native podocarp forest that once would have been present within this location. Nor is it representative of any successional/secondary habitats that remain (post European settlement) in modified landscapes. The kanuka scrub is native dominated, however, the kanuka are relatively young with an incomplete canopy cover.	Low – Moderate
	<u>Rarity/distinctiveness</u> The available habitat types and vegetation present (with the exception of kanuka) on site are all common and not threatened within the surrounding landscape.	Low
	<u>Diversity & Pattern</u> Overall, there is a low level of biodiversity on site. The level of biodiversity is generally reflective of a modified rural landscape. The available habitat features contain a mix of native and exotic species and typically degraded. There is a lack of vegetation structure (i.e. lacking understory and sub-canopy level species).	Very Low – Low
	<u>Ecological Context</u> May play a role in acting as a 'stepping-stone' to facilitate movement of indigenous fauna within the area. The vegetation present could also be habitat for threatened native species such as copper skinks and long-tailed bats.	Low – Moderate
Overall Ecological Value for Vegetation		Low

7.2.3 Bats

The proposed long-term expansion area including the SNA areas provides habitat which is highly utilised by bats. We note that bats are highly mobile and utilise the broader area but including the two large tawa forests within the proposed quarry expansion zone (SNA WP527 and SNA WP530). Given the presence of the SNAs, the kanuka scrub, gorse patch and pasture areas are habitats that are readily available in the surrounding landscape, are less likely to provide preferred habitat for bats. Though, there are numerous SNAs present in the vicinity of the site (< 5 km), including larger bush fragments. The ecological value of habitats on site for bats has been assessed as Very High.

7.2.4 Summary of ecological values

The levels of ecological value across the site are summarised in Table 5.

Table 5: Overview of terrestrial ecological values within and adjacent the project footprint.

Ecological feature	Ecological value
Tawa forest	Very High
Vegetation (excluding tawa forests)	Low
Herpetofauna (native lizards)	Low
Herpetofauna habitat	Low-Moderate
Avifauna species	High
Avifauna habitat	Moderate
Bat species	Very High
Bat habitat	Very High

8.0 Assessment of ecological effects

8.1 Approach

In this section we provide an assessment of the proposed activities on ecological values based on:

- The effects that would be experienced without effects management
- The effects that will be experienced with effects management (e.g., mitigation) in place, without offsetting, and lastly
- The effects that will be experienced with the effects management and offsetting proposed.

8.2 Terrestrial vegetation

In total, 5.68 of predominantly indigenous vegetation is proposed to be cleared (excluding areas of pasture) as part of the quarry expansion. Vegetation proposed to be cleared include the following:

- Tawa forest (5.46 ha): SNA WP527 (northern tawa forest) – 2.6 ha and SNA WP530 (western tawa forest) 2.86 ha
- Kanuka scrub (0.22 ha)

Mature tawa forest are rare in the landscape of the Waipa District region. Clearing 5.46 ha of a portion of mature tawa forest reduces available habitats for native fauna, including those with a higher threat status' (i.e., long-tailed bats). We emphasise that the quarry expansion does not result in the loss of all of the tawa forest habitat, but a margin alongside the existing quarry edge (Figure 11). The quarry expansion will result in the creation of a new and fresh quarry edge much as present now. The length of the forest edge changes from the present 557 m to an estimated 549 m for SNA WP527, and from present 562 m to an estimated 500 m for SNA WP530.

We also note that the proportion of vegetation loss in each SNA ranges from 7.5% (of a total of 34.5 ha in SNA WP527), to 23% (of a total of 12 ha in SNA WP530).

Without effects management, and given the low scale of loss, and the extent and high value of the remaining vegetation, we assess the effects of the proposed quarry expansion on terrestrial indigenous vegetation as moderate.

The removal of the kanuka vegetation is a permitted activity as described above with only the removal of kanuka within 10 m of a natural inland wetland requiring resource consent (Figure 11). Given that removal of the surrounding vegetation the impacts of the loss of 0.22 ha of the remaining terrestrial vegetation (i.e., excluding tawa forests) ecological values is assessed as Low.



8.3 Terrestrial fauna

8.3.1 Herpetofauna

Without appropriate measures, vegetation clearance and associated works have the potential to injure or kill any herpetofauna within the development footprint. Native lizards that could be on site are not very mobile, and in the modified landscape may have a small home range. As a result, there is a possibility that any native lizards present may remain on site and not move away from vegetation clearance/earthwork activities. However, we note that over several site visits and surveys, no lizards were recorded (including incidentally).

We note that similar lizard habitat exists in close vicinity of the project footprint (e.g., tawa bush unaffected by quarry expansion, other SNAs). However, we also note that native lizard species may not readily disperse to or from these areas (i.e., lizards are not very mobile and have potential small home ranges).

During quarrying, excess noise and vibration disturbances may increase stress levels on any native lizards present nearby. The impact of noise and vibration disturbances on native herpetofauna is not well understood but these disturbances can degrade the adjacent herpetofauna habitat value and may have a detrimental effect on natural behaviours such as feeding and mating. However, an existing operational quarry is present nearby; therefore, it is likely that any native lizards present are used to potential disturbances related to quarrying activities (e.g., occasional blasting), or indeed may be absent because of the quarrying activities. However, any lizards present within adjacent land that are exposed to excessive and constant noise and vibrations disturbances can disperse away to more sheltered areas (e.g., deeper into tawa forest) most of which is retained, and we emphasise that no lizards were recorded throughout the surveyed areas. We also note the absence of any existing pest control measures and the likelihood of pest pressures on the fauna.

8.3.2 Avifauna

The bird species present at the site are all likely to be mobile. The noise and movement associated with vegetation removal and construction works is likely to act as a deterrent, preventing birds from getting harmed. However, injury/mortality of native birds could occur (to adult birds, chicks or eggs) if nesting vegetation is cleared during the breeding season. There is potential for cavity dwelling species such as morepork to avoid detection and additional survey is required prior to felling for these species.

The loss of potential avifauna habitat within the site represents a moderate shift away from baseline conditions (particularly given the proposed loss of 5.46 ha of tawa forest). Given that the bird species likely to be present on site are highly mobile and that there are several pockets of SNAs present in the surrounding landscape, the proposed removal of vegetation is unlikely to have a major impact or limit dispersal and movement of avifauna.

During times of excess noise and vibration, any avifauna present in the surrounding area are likely to be able to disperse away from the disturbances. As the existing operational quarry has been present for many years, it is likely that any native avifauna present are used to potential disturbances related to quarrying activities (e.g., occasional blasting). The effects of the proposed quarry expansion on avifauna is expected to be minimal.

8.3.3 Bats

The potential effects on bats, from the felling and loss of indigenous vegetation without the recommended effects management or mitigation measures in place, could include:

- Mortality and / or injury of bats during vegetation clearance. Tree felling has the potential to injure/kill bats if they are present and roosting at the time of felling (especially for the high value bat roosting trees).
- Removal of foraging and roosting habitat currently used by what is likely to be a considerable number of bats based on the simultaneous high activity levels recorded across the site.
- Potential reduction in habitat.
- Habitat within the remaining native vegetation will be retained and includes existing roosts and a relocated but similar forest margin extent.

We consider that it is highly likely that bats are roosting within the forests where clearance is proposed. Clearance would therefore be likely to remove some potential roost trees that are available to the local population of bats. We emphasise that the habitat loss is a small portion of the available roosts and a large portion of the indigenous forests remains which contain similar existing roost trees (92.5% of SNA WP527), and 77% of SNA WP530.

The recorded activity levels cannot be directly converted into an estimate of the actual number of individual bats. However, the consistently very high levels of activity across the quarry landscape indicates use by multiple individuals and that the overall quarry site is likely to be an important resource for a local population.

As outlined above, we emphasise that it is a small portion of the SNAs that is being removed, and a larger portion of the SNAs remains (92.5% and 77% respectively for SNA WP527 and SNA WP530). In addition, the forest edge of mature indigenous vegetation (as currently occurs) will be retained at the quarry margin, although relocated in each of the SNAs. Accordingly, the quarry margin will be similar in structure to as it occurs now. The forest/quarry edge continues to form a movement and foraging corridor for bats.

Nevertheless, we consider that felling of the portion of indigenous vegetation, without sufficient mitigation in place, will result in a minor reduction in habitat availability for bats, although the tree removal is staged (WP530 will not be cleared for some 15 years following the quarry expansion into WP527). Although replanting would eventually provide replacement habitat, this would take many years over decades to mature to a point where potential roost features become available, although sheltered forest edges and habitat for food will occur earlier. We also note that a functional ecosystem (e.g., food production, forest edges, migratory routes) will occur much earlier.

The population(s) of bats that are currently present exist adjacent to the Whitehall Quarry, are subject to existing quarry operations (i.e., occasional blasting and regular excavation). The bat activity suggests that the bat population is habituated and live in accordance with the quarry operations. We do not consider that the continued quarry operations would have a detrimental effect on bats. Overall, given the low scale of effect, and the extent and suitability of the remaining habitat, we assess the effects of the proposed quarry expansion on bats as moderate.

8.4 Level of ecological effects

The level of ecological effects on the site before effects management are summarised in Table 6. The quantum of effects described below are those as assessed before considering the beneficial ecological outcomes proposed as part of the project (with mitigation and no offset, and then with mitigation including offset).

Table 6: Overview of the level of ecological effect from vegetation clearance and quarry expansion on terrestrial ecological values.

Ecological feature - Activity	Ecological value of feature being impacted.	Level of ecological effect – before effects management.
Tawa forest clearance (SNAs)	Very High	Moderate
Vegetation clearance (Other)	Low	Low
Herpetofauna mortality/injury during vegetation clearance	Low	Moderate
Herpetofauna habitat loss during vegetation clearance	Low-Moderate	Moderate
Avifauna mortality/injury during vegetation clearance	High	Moderate
Avifauna habitat loss during vegetation clearance	Moderate	Moderate
Bats - Tree felling causing bat mortality/injury during vegetation clearance	Very High	High
Bats - removal or modification of bat habitat connectivity, foraging, and roosting.	Very High	Moderate

8.5 Cumulative effects

As noted above, the area surrounding the Whitehall Quarry comprises existing SNAs or improved pasture. The proposed expansion area is mostly comprised of improved pasture although the SNAs currently within and outside of the broader Whitehall SMEZ form part of the proposed indigenous forest biodiversity corridor (Appendix 1), the vegetation within the proposed expansion area comprises a small component of the overall vegetation available in the landscape and the majority (88%) of the affected SNAs remain.

9.0 Effects management with no offset

9.1 Ecological setting

The expansion results in the removal of high value indigenous vegetation and habitat for indigenous fauna, notably birds and bats. However, we emphasise that the loss is a small area of the overall available and SNA habitat, especially the stage 1 loss at SNA WP527. Following the vegetation removal, similar habitat (including the same bat roost and bird nest availability) and in a similar setting (i.e., setting at the quarry margin) is retained and remains connected in the same way with remaining vegetation and habitats in the area. We also emphasise that the remaining SNAs and other vegetation provides an extent of similar quality habitat for nesting, roosting, refuge, foraging and mobility.

9.2 Purpose of the effects management

The purpose of the effects management (excluding offset) is to remedy any effects and to strengthen the protective measures for local populations of indigenous vegetation and indigenous fauna, including habitat for refuge, foraging, breeding and rearing to contribute to a broader Waikato regional strategy for indigenous biodiversity and ecosystems.

9.3 Effects management

9.3.1 Overview

Here we set out the avoidance, minimisation and remediation of the potential and actual effects of the proposed quarry expansion.

The effects management will avoid and minimise the bird and bat breeding season to maximise the success of the recruitment of the generation of the next generation prior to the loss of the habitat. Multiple intensive pest suppression 'pulsed' applications will be implemented before the main bat and bird breeding season, especially the season before the removal of the SNA vegetation. This will also maximise the success of the recruitment to future generations of the indigenous flora and fauna.

Tree felling protocols will also be observed to avoid fatalities of individuals although we emphasise, as set out above, that the purpose of the mitigation to strengthen the protective measures for local populations of indigenous vegetation and indigenous fauna.

Pest and weed management programme for remaining SNAs within the quarry management area will be implemented that further enhances the habitat for indigenous flora and fauna.

Given the components of the effects management as described above, we assess the effects of the loss of the terrestrial ecological values in the absence of offset as no more than minor.

9.3.2 Herpetofauna salvage and relocation

We recorded no lizards during our surveys within (and outside) the proposed quarry expansion areas. Similarly, no lizards were observed or captured during the implementation of the existing

LMP for the stage 2 western expansions. Accordingly, we recommend amendments to the existing LMP (as detailed in the current QMP) as follows:

- No additional lizard surveys are undertaken.
- Destructive manual searches are undertaken at the time of tree felling, especially for arboreal geckoes.
- Salvage and relocation occur as set out in the current LMP.

We also recommend that the LMP also includes an incidental detection protocol for other At Risk or Threatened species detected during the works (but not identified in this report). By following the recommendation of the LMP, we consider that the potential effects on herpetofauna injury/mortality will be reduced to no more than a Negligible – Low magnitude of effect. Therefore, the level of ecological effect on herpetofauna injury/mortality is assessed as no more than minor.

9.3.3 Avifauna nest checks

It is unlikely native birds (being mobile) are going to be impacted by works onsite. However, there is a greater risk nesting birds may be affected if vegetation removal is undertaken during breeding season. Particularly given the possibility of native species with higher threat status such as North Island robin, kaka, and New Zealand pipit being present. To minimise encountering nesting birds, where possible, vegetation removal should occur outside bird breeding season (primarily August – March). If vegetation removal is during the breeding season, all areas to be impacted by proposed vegetation clearance (including areas of long grasses which may be utilised by New Zealand pipit) will be searched for nesting birds by a suitably qualified ecologist.

The survey should be carried out on the day of proposed vegetation clearance to ensure no birds are nesting within the vegetation removal areas. If birds are found to be nesting, an exclusion zone (e.g., 5 – 10 m radius) should be established. Within the exclusion zone, vegetation clearance and any other construction related activities shall stop. Vegetation clearance and any other construction related activities will cease within the exclusion area. Works can commence once nesting is complete (i.e., chicks are fledged and have left the nest permanently) or nests are naturally abandoned. Nesting completion will be determined by periodic survey by the site ecologist.

A check for bird nests should be incorporated during bat tree felling and vegetation clearance protocol, where a qualified ecologist will inspect trees prior to clearance. This survey will include a visual survey for nests as well as observations of bird activity in the tree felling area to determine whether any individuals are showing site fidelity or indicators of potential nesting where otherwise nests may be inconspicuous.

To manage for the potential of cavities nesting/roosting birds such as morepork, in larger trees that are observed to have cavities or tree forks large enough for moreporks to use (or where there is potential for such cavities or potential nesting platforms that are not seen from the ground), tree fell protocols should include visual searches into cavities. In effect this would mean implementing best practice tree fell protocols for bats as required below in Section 9.3.3 that involve climbing of the tree rather than acoustic surveys or emergence surveys to also manage for the potential of cavity roosting birds.

These requirements for managing the potential for direct impacts on avifauna present, or potential present onsite can be provided by consent condition. Following these

recommendations will result in a negligible effect on avifauna present onsite during vegetation removal.

9.3.4 Bats

9.3.4.1 Background

The vegetation within the SNAs forms a significant habitat for long-tailed bats, notably the presence of potential (including maternity) roost trees. There is a high likelihood of multiple roost trees being present, although we note that most of the of the indigenous forests remains and retains existing roost trees.

There is the potential for significant impact on bats in the absence of effective management. It is not possible to avoid the removal of trees for access to the aggregate resource. Accordingly, we have developed a management strategy based on the effects management hierarchy and providing protective benefit for the population of bats that occupies the area of Whitehall Quarry.

We acknowledge that a single method is unlikely to achieve the expectations of effects management and remedy the effects of the expansion on bats; rather an integration of methods across all the levels of the effects management hierarchy is preferable as follows:

- Avoidance of tree removal breeding season (and maternity roosts during this time).
- Application of tree felling protocols for the removal of potential roosts (as set out in the QMP).
- Extensive and long-term pest management in the remaining SNAs on the property owned by Winstone Aggregates.
- Monitoring of local bat activity.

We note that a Bat Management Plan (BMP) for the Whitehall Quarry exists as part of the current Quarry Management Plan. We have drawn on the provisions of the BMP in establishing our strategy for management of bats and their habitat as part of the proposed Long-Term expansion.

9.3.4.2 Avoidance of breeding season

Tree felling will not occur during the bat breeding (maternity) period, typically December-January. We recommend that all felling occurs after this period in any one year (thus also having the advantage of avoiding most of the bird breeding season). The Bat Management Plan included as part of the Quarry Management Plan provides for the avoidance of vegetation removal during the maternity roost season.

9.3.4.3 Tree felling protocols

Vegetation removal will follow the tree felling protocols as set out in the Bat Management Plan included as part of the Quarry Management Plan. The plan provides for:

- Marking trees with potential roost features.
- Checking for absence of bat activity prior to tree felling
- Tree inspections by a competent bat worker and experienced tree- climber (e.g. an arborist) working with an approved bat expert to determine the presence/absence of bats.
- Removing and relocating the roost tree.

The tree felling protocols are set out in the BMP as provided in the QMP and are repeated in Appendix 13 of our report.

9.3.4.4 Pest management

A comprehensive pest management will be implemented as part of the Quarry Management Plan. A high level overview of the proposed pest management is set out in section 11.3.

9.4 Summary of effects management (without offset)

In Table 7 we summarise the effects management (avoid, minimise, remedy) in the absence of offset. With the implementation of the effects management, we assess the effects of the proposed quarry expansion as no more than minor.

Table 7: Summary of effects management (avoid, minimise, remedy) in the absence of biodiversity offset.

Effects management	Ecological Feature			
	Terrestrial vegetation	Herpetofauna	Avifauna	Long-tailed bats
Ecological values	Tawa forest – Very High Vegetation (excluding tawa forest) – Low	Fauna - Low Habitat – Low-Moderate	Fauna – High Habitat – Moderate	Fauna – Very High Habitat – Very High
Avoid	Unable to avoid removal of native vegetation.	Unable to avoid removal of habitat.	Avoid disturbance during bird breeding season. Unable to avoid removal of habitat.	Avoid disturbance during bat maternity season. Unable to avoid removal of habitat.
Minimise	The loss of vegetation will be minimised as much as possible.		Minimise disturbance during bird breeding season. Application of tree felling protocols.	Minimise disturbance during bat maternity season. Application of tree felling protocols.
Remedy	Pest and weed management programme for remaining SNAs.	Tree fell checks for geckoes and relocate to alternative SNA areas as needed.		

10.0 Effects management with offset

10.1 Ecological enhancement planting

10.1.1 Background

The constrained location of a quarry means that alternative options for quarry expansion are unavailable and thus the effects of the pit expansion on the loss of indigenous (and exotic) vegetation are unavoidable.

We recommend enhancement planting of a pasture area to offset the loss of the indigenous vegetation. We have applied the Biodiversity Offset Accounting Model (BOAM) to help inform the quantum of enhancement planting to remedy the loss of vegetation.

Our recommended enhancement planting for the unavoidable loss of tawa forests and kanuka scrub is for the planting of 12.5 ha of predominately open pasture to the southwest of the site (Figure 12). We have recommended a preferred area for the planting. The preferred area contains occasional mature exotic and native trees (including small stands), wetlands (mostly exotic dominated), and headwater of tributaries. The selected areas sit outside of the SMEZ to ensure it is not impacted by any future quarrying activities.

The proposed enhancement planting actions includes (but not limited to) the planting of existing paddocks with suitable forest species (representative of the tawa-dominated forest type), removal of stock, stock and deer-proof fencing, managing for invasion of pest plant species, predator control, and providing connectivity and linkages to and between existing forest areas (establish or enhance a link between SNAs – SNA WP257, SNA WP530, SNA WP532).

We have used the area calculations within the “impact site” (i.e., vegetation extent) to inform the proposed area required for planting but have not relied on the quantifications alone.

Improvements to biodiversity follow a set of generally accepted principles adopted for use in New Zealand (Maseyk et al., 2018) and listed in Appendix 3 of the NPS-IB.

10.1.2 Approach to calculating enhancement planting area

10.1.2.1 Biodiversity attributes

Five biodiversity attributes were selected to reflect and calculate the biodiversity present at the impact (tawa forests and kanuka scrub) and enhancement planting locations. These attributes (and their units) which form the currency we used to input to the BOAM were:

- Native:exotic species composition (% native species in forest plots) (weediness)
- Plant diversity (no. species in forest plots)
- Canopy cover (% canopy cover in forest plots)
- Tawa height (height from forest plots¹⁹)
- Understorey (% from forest plots and walkthrough survey)

¹⁹ On average, the mature tawa in the tawa forests are roughly 10 m or taller. In the offset model, the ‘Measure prior to impact’ assumes mature tawa are 10 m or taller.

For the model we used RECCE plots from Maungatautari Mountain as a reference point²⁰. Maungatautari Mountain is a large ecologically significant sanctuary that is an example of a more 'natural' habitat that currently remains in the MED. A total of six RECCE plots within the Maungatautari Mountain, acquired from the New Zealand National Vegetation Survey Databank (NVS) was assessed to inform on the 'benchmarks' for plant diversity and native vs exotic species composition (weediness)^{21,22}.

10.1.2.2 Benchmarks

Our benchmarks in the model were set as follows²³:

- Native:exotic species composition (weediness) – the benchmark is set to 100% native species to reflect a 'natural' or 'pristine' environmental state.
- Plant diversity – the average number of vascular plant species (native and exotic) in six plots from Maungatautari Mountain.
- Canopy cover – the benchmark is set to 80% canopy cover for forest ecosystems, which is a common goal for restoration planting to achieve within five years.
- Tawa height to maturity – the benchmark is set to 10 m. Tawa is a common canopy species in forest types that remain in the modified landscape. Presence of tawa is indicative of ecosystem health, and this species is recommended to be planted within the enhancement planting area. Maturity here is considered as time to fruiting and thus available for foraging species to utilise.
- Understorey cover – we estimate a benchmark of 70% cover of native species in the understorey is a healthy representation of a regenerating forest.

We note that the calculations use the same biodiversity attributes and benchmarks for the tawa forest and kanuka scrub. Although the kanuka scrub is of lower ecological value (limited species diversity, lacking vegetation structure, dominated by shorter stature species), the goal is to remedy the loss of the native habitats (tawa forest and kanuka scrub) by establishing a healthy tawa dominated forest (a forest type that once would have been common here). Therefore, in our approach, we have kept the biodiversity attributes and benchmarks consistent between the tawa forest and kanuka scrub habitats²⁴.

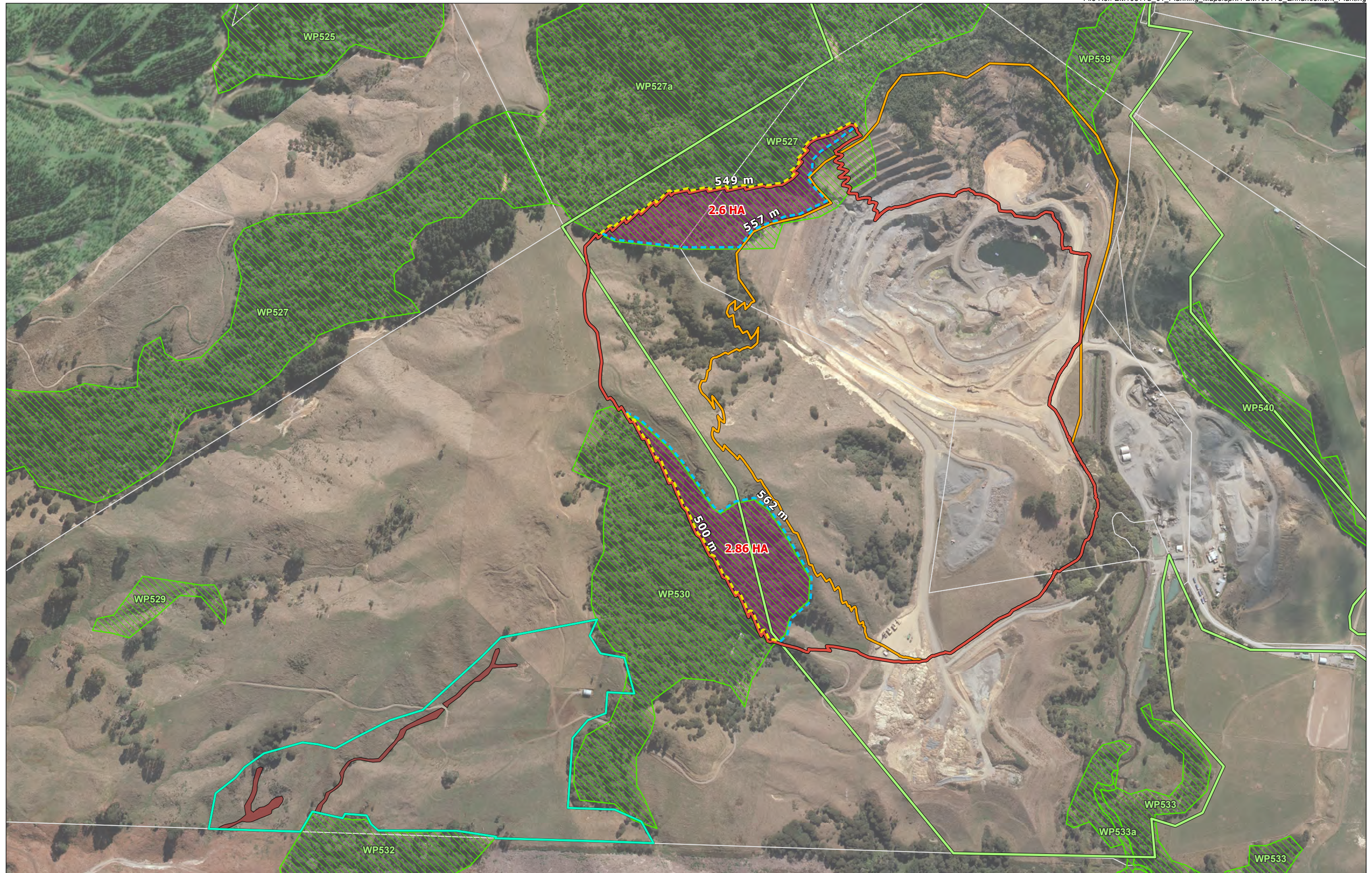
²⁰ There is limited quantifiable data of plant diversity and composition within smaller pockets of regenerating secondary forests in the surrounding landscape. Therefore, Maungatautari Mountain was used as a suitable reference point for the offset model.

²¹ The Maungatautari Mountain plots were 20 x 20 m and surveyed in 2014. Plot ID: M4, M5, NC3, NC4, SC1, and SC2.

²² For suitable comparison, only plots below 500 m in elevation within Maungatautari Mountain were assessed (forest composition changes as elevation increases).

²³ The benchmarks for the biodiversity attributes are a target used to quantify whether the planting area can provide similar, if not greater ecosystem services to the vegetated habitats being lost (i.e., vegetation does not need to be of old/large specimens to provide suitable resources for fauna such as food and shelter).

²⁴ In Appendix 5, we have used biodiversity attributes reflective of a kanuka scrub habitat to show a net positive value can also be achieved if restoration focuses on creating/replicating an area of kanuka scrub (to offset the kanuka scrub habitat being lost).



10.1.2.3 Timeframes

The timeframes to reach the biodiversity outcome at the enhancement planting area for the attributes of weediness, native diversity, and a measure of canopy cover is expected to take five years. We apply this as a standard minimum management timeframe for restoration planting so as the canopy maturity acts to shade out some of the weed presence. The timeframes to achieve tawa height maturity and understorey cover is expected to take 20 years. This reflects the longer timeframe for canopy species to reach maturity and a suitable cover of understorey species to develop (higher quality habitat and biodiversity benefits of more mature forest/habitats). We acknowledge that this time to maturity does not necessarily meet the requirements of all ecosystem functions.

10.1.2.4 Discount

A standard discount rate of 3% was applied to the model to account for time delays before these biodiversity outcomes are realised in the planting area. However, for the western tawa forest, a discount rate of 1% was applied to the model. The clearance of the western tawa forest (SNA WP530) is not expected to begin until 2041 – at least 15 years after the northern pit expansion. Although there is a 15-year gap between the loss of the two tawa forests, Winstone Aggregates is willing to begin the enhancement planting for the tawa forests concurrently. Therefore, to account for the (at minimum) 15 years of restoration (and management) expected to be undertaken within an enhancement planting area prior to the clearance of the western tawa forest, we have reduced the discount rate to 1%^{25,26}.

10.1.2.5 Confidence

Our confidence of achieving species diversity and canopy cover in the planting area is assessed as very high (>90% confidence) due to the frequency with which replanting, and restoration is undertaken and is successful based on similar measures. Diversity will naturally increase as species (including non-planted lianas and epiphytes) overtime colonise the planting area. Furthermore, there is already an existing seed source of native species in the immediate landscape. Our confidence of achieving tawa height is lower (75 – 90%), however, this is a relatively hardy species, and with maintenance should continue to grow and mature in well-considered planted areas. Confidence in achieving suitable native composition (high % of native species) and understorey cover is lower (75 – 90%), given the ongoing risk of pest animals and pest plants within the site and surrounding landscape²⁷. Furthermore, there is a risk of deer and goats gaining access into the planting area if these pests are not controlled or the site is not adequately fenced. Deer and goats (along with other animals such as cattle, sheep) can deplete the understorey (as observed in the tawa forests). However, with ongoing maintenance, these biodiversity attributes should achieve (or come close to²⁸) the designated benchmarks.

10.1.2.6 Actions

The tasks and actions required to ensure the planting area results in a net positive biodiversity outcome includes planting, fencing, removal of stock, and pest plant and pest animal management. Such actions will need to be detailed in management plans. Note, pest animal control much also considers deer and goats which are known to be present within the site and

²⁵ Greater biodiversity outcomes are likely to be achieved when offsetting measures are implemented prior to habitat loss, compared to offsetting during or after habitat loss. 15 years of planting growth with ongoing management (stock exclusion and pest plants and pest animal control) will result in greater biodiversity outcomes (achieved sooner) when offsetting for the western tawa forest.

²⁶ The native vs exotic species composition, native species diversity, and canopy cover biodiversity attributes are expected to reach their benchmarks prior to the clearance of the western tawa forest (see Appendix).

²⁷ During the initial stages of restoration, greater management efforts and care are typically employed. Growth improvers, replacement planting as required and weed management all contribute to a healthy and advantageous start for the planting enterprise. Therefore, it is likely that species diversity and canopy cover benchmarks will be achieved.

²⁸ There is a high level of plant diversity within Maungatautari Mountain. It may take several decades (> 50 years) for the offset area to reach the same level of biodiversity as Maungatautari Mountain.

surrounding land. Supplementary (after initial planting of pioneering species) will be necessary to add canopy species which may take some time to colonise the site.

10.1.2.7 Biodiversity values

We note that there are no accepted standard approach/model to measure biodiversity values (loss and gain). There are also limitations of both restoration and rehabilitation that need to be explicitly recognised; reaching the quality of benchmark forest habitat, and potentially the quality present at the impact site, is extremely difficult, given the time required to achieve the structure and functioning of mature native forests (which are not fully understood). Therefore, estimates of biodiversity value calculations in this report should be interpreted conservatively.

10.1.3 Biodiversity model outcomes

We estimate that a total of 12.5 ha of revegetation/restoration is required to remedy and achieve an overall net positive biodiversity gain for the quarry expansion. This includes 12 ha to enhance the tawa forests (7 ha for northern tawa forest and 5 ha for the western tawa forest) and 0.5 ha to remedy the kanuka scrub surrounding wetlands expected to be removed by the development²⁹.

The calculated area of impact and enhancement planting area required is provided in Table 8, and the biodiversity losses and gains for each attribute are in Table 9. The full model workings are provided in Appendices 3 and 4. The enhancement planting area required equates to a ratio of approximately 2x the impact area of the tawa forests and a ratio of 2x the impact area of the kanuka scrub habitat.

10.2 Terrestrial vegetation

To manage against the loss of 5.68 ha of native vegetation communities (5.46 ha tawa forests and 0.22 ha of kanuka scrub), we recommend planting 12.5 ha of predominately pasture to the southwest of the quarry site.

The planting will focus on eco-sourced fast growing native pioneer species (mix of native shrubs and trees) appropriate for the location. Once a suitable canopy cover is established, canopy enrichment planting can commence as part the long-term enhancement of the area. The planning specifications is to be provided in an Enhancement Planting Plan (EPP). The EPP will include a species list and maintenance of the planting area, fencing requirement, and pest plant and pest animal control recommendations and follow the provisions in the Quarry Revegetation Plan (as set out in the QMP). It is important that pest animal control is undertaken, targeting pests such as possums, rodents, and mustelids to ensure successful establishment of the planting area and reduce effects of predation on native fauna.

We do not expect there to be a significant lag time for the planting area to replace the kanuka scrub given these areas are currently still young growth. However, there will be a greater lag time to replace the tawa forests, particularly the northern tawa forest. Although it may take several decades for the planting to reach the tree heights and age of the existing forest, a functioning forest can occur much earlier. This can occur because of careful sourcing and sizing of new plantings, the boost of soil and fertiliser benefits, greater care given in the early stages of growth, weed and pest management, and replacement of failures.

²⁹ 15.5 ha of planting to be established as one planting block (i.e., not two sperate planting blocks).

Table 8: Area of impact and planting area calculated for terrestrial biodiversity types impacted by the Whitehall Quarry expansion.

Biodiversity component	Area of impact (ha)	Area of rehabilitation planting (ha)
Biodiversity type 'habitat'		
Northern tawa forest	2.6	7
Western tawa forest	2.86	5
Kanuka scrub	0.22	0.5
Total area	5.68	12.5

Table 9: Terrestrial biodiversity rehabilitation model with biodiversity value calculated at the impact and rehabilitation sites, and the Net Present Biodiversity Value for the proposed remediation of forest clearance.

Biodiversity attribute ³⁰	Biodiversity (after rehabilitation) value at rehabilitation planting site	Biodiversity value at impact site (after impact)	Attribute Net Present Biodiversity Value
Northern tawa forest			
Native:exotic ratio (weediness)	4.23	-2.55	1.69
Vascular plant diversity	2.51	-0.96	1.55
Canopy cover	5.62	-2.60	3.02
Tawa height to maturity	3.20	-2.60	0.60
Understorey cover	3.20	-0.37	2.83
<i>Average Net Present Biodiversity Value</i>			1.94
Western tawa forest			
Native : exotic ratio (weediness)	3.51	-2.80	0.70
Vascular plant diversity	2.08	-1.06	1.02
Canopy cover	4.66	-2.86	1.80
Tawa height to maturity	3.92	-2.86	1.06
Understorey cover	3.92	-0.41	3.52
<i>Average Net Present Biodiversity Value</i>			1.62
Kanuka scrub			
Native : exotic ratio (weediness)	0.30	-0.17	0.14
Vascular plant diversity	0.18	-0.03	0.15
Canopy cover	0.40	-0.21	0.20
Tawa height to maturity ³¹	0.23	0.00	0.23
Understorey cover	0.23	-0.02	0.21
<i>Average Net Present Biodiversity Value</i>			0.18

³⁰ Discount rate of 1% was applied to the model for rehabilitation of the western tawa forest. The standard 3% discount rate was applied to the model for the northern tawa forest and kanuka scrub offset calculations.

³¹ There is no tawa within the kanuka scrub, therefore, biodiversity value at impact site (after impact) is 0.

Accordingly, to account for greater replacement lag time, we have increased the area of planting: 12.5 ha planting area is twice the area of loss of the tawa forests proposed to be cleared (5.68 ha), and 0.5 ha enhancement planting area is twice times greater than kanuka scrub proposed to be cleared (0.22 ha). Larger forested areas (such as the proposed planting) are more resilient to disturbances and provide greater ecological benefit (regarding ecosystem services they provide). Once the planting has matured planting (once mature) will not only improve the terrestrial vegetation ecological value on site, but also provide benefit to native fauna present in the area (e.g., food, habitat, commuting corridor).

To demonstrate that there will be no net loss, and a positive Net Gain is achieved, we have applied the Biodiversity Offset Accounting Model to inform the rehabilitation planting (see Section 9.1.3) (Appendix 12). Accordingly, the protection and enhancement of the planting area will have a Positive magnitude of impact on vegetation values. Consequently, contributing to a Net Gain in terrestrial vegetation values on site.

10.3 Terrestrial fauna

10.3.1 Herpetofauna

10.3.1.1 Lizard salvage

We have set out the proposal for lizard salvage and relocation above. Below we set out the proposal for the enhanced lizard habitat integrated into the offset planted area.

10.3.1.2 Habitat creation

The proposed enhancement planting area to the southwest of the quarry will enhance lizard value on site by providing mix of available micro-habitat (e.g., leave litter, canopy trees/cover with dense foliage). In addition, logs and woody debris cleared from the vegetation removal process can be re-located to the planting zone to further enhance lizard habitats on site. Similarly, the proposed pest management for the existing remaining areas of SNAs will enhance the existing habitat and provide additional protective benefit for all populations of fauna present

The planting and habitat enhancement recommendations (including pest animal control) for the site should overtime have a Positive magnitude of impact on herpetofauna habitat value. As a result, contributing to a Net Gain in herpetofauna habitat value on site.

10.3.2 Avifauna

10.3.2.1 Nest checks

We have set out the proposal for nest checks for birds above. Below we set out the proposal for the enhanced forest bird habitat integrated into the offset planted area.

10.3.2.2 Habitat creation

The recommended planting of the enhancement area (including pest animal control) will likely overtime have a positive benefit on avifauna habitat value, resulting in increased habitat connectivity and available resources such as fruits, flowers, nectar as well as reducing predator pressure. We expect this to result in a Net Gain in avifauna habitat value on site.

10.3.3 Bats

10.3.3.1 Bat management

We have set out the proposal for bat management above. Below we set out the proposal for the enhanced forest habitat integrated into the offset planted area as biodiversity offset.

10.3.3.2 Regional Bat Strategy

An important objective of the proposed bat management is to provide for a strengthening of protective measures for local population of long-tailed bats, and to contribute to a broader Waikato regional strategy for enhancing bat populations and habitat. This will be achieved through:

- Enhancement planting to increase extent of habitat for bats.
- Enhancement planting to connect existing areas of vegetation.
- Appropriate mix of plant species to maximise roost and foraging potential.
- Appropriate pest management measures to improve protections for bats (and other fauna).

10.4 Planting Plan

A comprehensive planting plan has been prepared and is provided as part of the application: Whitehall Quarry Long-Term Expansion Planting Plan prepared by Boffa Miskell, May 2025.

10.5 Pest management

A comprehensive pest management programme is proposed and will be set out in a detailed Pest Management Plan. An outline of the Pest Management Plan is provided in section 11 of our report.

10.6 Connectivity

The potential for the proposed enhancement planting to enhance the linkages with existing SNAs and thus improve the connections within the indigenous forest biodiversity corridor is strong. Whilst we note that the provisions of the SMEZ allow for the clearance of vegetation subject to enhancement planting of an equal area of planting and the requirements of the existing land use consent (Condition 13), the proposed enhancement planting covers a much larger area. We also note that the connectivity amongst forest remnants achieved by the planting contributes to the WDC biodiversity corridor (see Appendix 1). Accordingly, the effects management hierarchy has been applied to the actual effects and the potential future connectivity benefits of the location are a positive effect.

10.7 Summary: Application of effects management

Here we provide a summary of how the application responds to the effects management hierarchy for management of the potential and actual ecological effects of the proposed quarry expansion (Table 10).

Table 10: Summary of application of the effects management hierarchy to the ecological outcomes for the proposed long-term expansion at Whitehall Quarry.

Effects management	Ecological Feature			
	Terrestrial vegetation	Herpetofauna	Avifauna	Long-tailed bats
Ecological values	Tawa forest – Very High Vegetation (excluding tawa forest) – Low	Fauna - Low Habitat – Low-Moderate	Fauna – High Habitat – Moderate	Fauna – Very High Habitat – Very High
Avoid	Unable to avoid removal of native vegetation.	Unable to avoid removal of habitat.	Avoid disturbance during bird breeding season. Unable to avoid removal of habitat.	Avoid disturbance during bat maternity season. Unable to avoid removal of habitat.
Minimise	The loss of vegetation will be minimised as much as possible.		Minimise disturbance during bird breeding season. Application of tree felling protocols.	Minimise disturbance during bat maternity season. Application of tree felling protocols.
Remedy	Pest and weed management programme for remaining SNAs.	Tree fell checks for geckoes and relocate to alternative SNA areas as needed.		
Offset	Offset 12.5 ha of native vegetation for the loss of 5.7 ha. Pest and weed management programme for offset area and remaining SNAs. Fencing and protection of enhancement planting area.	Long-term provision of refuge, foraging and breeding habitat through native vegetation offset.	Long-term provision of refuge, foraging and nesting habitat through native vegetation offset.	Long-term provision of roost and foraging habitat through native vegetation offset.
Compensation	N/A	Pest and weed management programme for planted offset area and	Pest and weed management programme for planted offset area and remaining SNAs.	Pest and weed management programme for planted offset area and remaining SNAs.

		remaining SNAs.		
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10.8 Conclusion: Assessment of effects

With the effects management hierarchy satisfied, including the proposed enhancement planting and pest and weed management, we assess the effects of the proposed quarry expansion on terrestrial ecological values are less than minor.

11.0 Pest Management Plan

11.1 Introduction

Comprehensive and appropriate pest animal management is a key component of the overall effects management for the proposed expansion works. A Pest Animal Management Plan is therefore required which includes a Pest Animal Baseline Monitoring Plan, the latter being a priority first stage deliverable. Ongoing pest animal monitoring (beyond the baseline monitoring) will be planned for and implemented within the overall Pest Animal Management Plan.

Here we set out the purpose and key components of the proposed Pest Animal Management Plan.

11.2 Purpose

The purpose of the pest management is to strengthen the protective measures for local populations of indigenous vegetation and indigenous fauna, including habitat for refuge, foraging, breeding and rearing to contribute to a broader Waikato regional strategy for indigenous biodiversity and ecosystems.

11.3 Pest management plan

The pest management will include:

- Baseline monitoring of current pest species present in the SNAs (especially WP527, WP530 and WP532).
- Multiple intensive pest suppression 'pulsed' applications prior to main bat and bird breeding season, especially the season before the removal of the SNA vegetation.
- Continuous intensive suppression pest management (control and monitoring).
- Establishment of pest management within an appropriate and accessible buffer around the SNAs, and the proposed planting area.
- Establishment of ungulate prevention fence within and around the SNAs WP527, WP530 and WP532, and the proposed planting area.
- Continuing monitoring of pest presence and densities.
- Inclusion (where proven successful) of new technologies that reduce servicing requirements, increasing efficiencies and pest captures/identifications.

11.4 Indicative contents of pest management plan

The pest animal management plan for this project will provide an overview of the project, the specific detail for operational planning, delivery and reporting of pest control and pest monitoring activities, as well as any necessary project management requirements.

11.4.1 Project overview

The project overview will include:

- Relevant background information.
- Map of the pest management area.
- Previous pest management within the project area (if any).
- Key pest species information.
- Roles and responsibilities.
- Pest suppression best practice.
- Pest targets and thresholds, response to exceedance of thresholds.

11.4.2 Pest monitoring

Pest monitoring for the pest management programme is a two-stage process. The first stage involves conducting baseline pest monitoring, which is collected prior to any works within or near the pest management area(s), and prior to the pest animal control delivery. Baseline pest monitoring will provide valuable pre-project data on pest presence and abundance. This information will be used to develop an effective pest management plan that is tailored to the unique characteristics and behaviours of those pests present and will also guide pest suppression targets.

The second stage of the pest monitoring will involve programmed continuing monitoring at set frequencies throughout each year of the project to ascertain the effectiveness of pest control within the pest management area(s). The data collected will also provide project managers with information that can be used to adapt the pest management programme if required.

The baseline pest monitoring plan and the ongoing pest monitoring plan will sit within the overall pest management plan and will include:

- An overview of the monitoring programme.
- Monitoring Map(s).
- Monitoring methodology table with key industry best practice/protocol information links.
- New monitoring tools/technologies for potential efficiency gains.

11.4.3 Pest Control

In order to effectively deliver protective measures for local populations of indigenous vegetation and indigenous fauna a specialised pest control plan outlining highly detailed operational activities and guiding information is required. The pest control plan for this project will provide the pest control delivery practitioners/contractors with a succinct operational programme of activities and reporting requirements from which to work from. The pest control section will include:

- Pest control Map(s).
- Trapping methodology table with key industry best practice/protocol information links.

- Vertebrate toxin agent (VTA) methodology table with key industry best practice/protocol information links.
- Ungulate deterrent fencing options and construction details.
- A table of all necessary equipment and devices required.
- A tabled schedule of activities.
- Signage requirements.
- Data management and reporting.
- Pest management plan review information.

12.0 Assessment against the NPS-IB

As outlined above the purpose of the NPS-IB requires the maintenance of indigenous biodiversity with no overall loss. By following the management recommendations outlined in Section 10, the provisions for the maintenance of indigenous biodiversity as set out in the NPS-IB are met. Overtime, there is likely to be a net benefit of indigenous biodiversity values (improved from current state) (Table 11).

Table 11: Proposed effects management and the maintenance of indigenous biodiversity (IB) following effects management.

Indigenous biodiversity maintenance	Vegetation	Herpetology	Avifauna	Bats
Ecological values	Tawa forest – Very High Vegetation (excluding tawa forest) – Low	Fauna - Low Habitat – Low-Moderate	Fauna – High Habitat – Moderate	Fauna – Very High Habitat – Very High
Population size	Overtime, increase in IB after planting and restoration measures implemented.	No lizards recorded so minimal effect on population. Salvage and relocation methods implemented only if required.	No reduction after seasonal avoidance and/or bird nest check protocols applied (effects management). No fatalities to breeding population.	No reduction after effects management. No mortality to breeding population.
Occupancy	Occupancy of native plants will not be impacted.	Occupancy of native lizards will not be impacted in their natural range – none recorded from SNA and other habitats.	Occupancy of native avifauna will not be impacted in their natural range.	Occupancy of bats will not be impacted in their natural range. Majority of mature indigenous vegetation, which includes roost trees remains. Similar length and type of forest edge remains.
Ecosystem function	Improved ecosystem functioning after planting and restoration measures implemented as well as pest and weed management.	No reduction in function of herpetology habitats. Overtime, after planting and restoration measures, and implementation of pest management measures, the function of habitats for native lizards is	No reduction in function of avifauna habitats. Overtime, after planting and restoration measures, and implementation of pest management measures, function of habitats for native avifauna is	Majority of mature indigenous vegetation, including roost trees and forest edge remains. Roost features salvaged and relocated. Overtime, after planting and restoration

		expected to improve.	expected to improve.	measures, and implementation of pest management measures, function of habitats for bats is expected to improve.
Range and extent	Increase in range and extent of native terrestrial vegetation.	No reduction. Range and extent of native lizard movement maintained and enhanced.	No reduction. Range and extent of native avifauna movement maintained and enhanced.	Minimal reduction. Majority of mature indigenous vegetation, including roost trees and forest edge remains. Range and extent of bat activity and movement with habitat is maintained and enhanced over time with enhancement planting and improved connectivity.
Connectivity	Increase in vegetation connectivity once planting area established.	Increase in extent and habitat connectivity once planting area established.	Increase in extent and habitat connectivity once planting area established.	No reduction. Range and extent of habitat connectivity for bats maintained. With enhancement planting and restoration measures, connectivity of habitats for native bats is expected to improve.
Resilience and adaptability	Increase in resilience and adaptability after planting and restoration measures implemented. Resilience improved through implementation of pest and weed management.	Increase in resilience and adaptability after planting and restoration measures implemented. Resilience improved through implementation of pest management.	Increase in resilience and adaptability after planting and restoration measures implemented. Resilience improved through implementation of pest management.	Retention of majority of mature indigenous vegetation of SNA which includes roost trees and forest edge. Increase in resilience and adaptability after planting and restoration measures, and the implementation of pest management.
Summary	IB is maintained and enhanced.	IB is maintained and enhanced.	IB is maintained and enhanced.	IB is maintained and enhanced.

13.0 Assessment against WDC Plan criteria

As set out in section 4.5 of our report above, the WDC set out specific criteria to meet the requirements of policy S21.1.4A.6 (Table 12).

Table 12: Assessment of ecological effects and outcomes of the proposed long-term expansion at Whitehall Quarry against the WDP provisions and criteria.

Criterion	Action	Outcome
S21.1.4A.6 Removal or clearance of indigenous vegetation within a significant natural area		
a. Whether the proposed measures, including staging and rehabilitation, will minimise or mitigate significant adverse effects, partially offset residual adverse effects, or provide for positive environmental benefits through:		
i.Actions undertaken in advance of vegetation removal; and	Avoid bird and bat breeding season. Intensive pest management prior and during bird and bat breeding season	No loss of bird and bat population recruitment. No bat or bird mortality.
ii.Areas of indigenous planting; and	Enhancement indigenous forest planting of 12.5 ha.	No net loss of indigenous forest.
iii.The ratio, quality and type of new indigenous planting in relation to the established vegetation to be removed; and	Enhancement planting at a ratio of 2:1 is provided.	No net loss of indigenous forest.
iv.The translocation of any indigenous plant and animal species; and	Translocation of native lizards is provided for.	No lizard mortality.
v.The opportunity to establish ecological linkages with existing vegetation and/or habitats; and	Enhancement planting provides links with and between SNAs and other vegetation patches.	Improved connected indigenous vegetation in the landscape.
vi.Ongoing programmes of weed and pest control; and	Ongoing pest management within SNAs and enhancement planting areas. Weed management in enhancement planting areas whilst establishing.	Enhanced vegetation and ecosystem viability.
vii.Fencing and stock removal; and	Enhancement planting areas and SNAs are fenced.	Enhancement planting area and SNAs WP527 (northern) and SNA WP530 (western) protected from stock.

viii. Monitors and develops contingencies to ensure the on-going recovery and sustainability of the mitigated area; and	Planting and maintenance plan provides for sustainability of the enhancement planting areas.	Sustainable enhancement planting areas.
ix. Provides mechanisms for legal permanent protection of the mitigated area.	Enhancement planting areas protected through legal mechanism.	Protected enhancement planting areas.
b. Whether the vegetation proposed to be removed protects or provides habitats for nationally at risk or threatened plant or animal species and whether the activity will significantly adversely affect these values.	Vegetation to be removed is habitat for nationally threatened long-tailed bat. The proposed quarry expansion will not affect ecological values after effects management is applied.	Habitat for bats is expanded and protected.
c. Whether the vegetation proposed to be removed forms part of an ecological corridor, or is adjacent to a natural water body and acts as a filter for sediment and water runoff, or protects threatened plants or animal species and whether the activity will significantly adversely affect these values or will significantly adversely affect water quality or quantity and the habitat value of natural rivers, streams, lakes or wetlands.	The vegetation to be removed forms part (7%) of an SNA that itself forms part of the WDC biodiversity corridor (see Appendix 1). After effects management the quarry expansion will not cause significant adverse effects on ecological values or significantly adversely affect water quality or quantity and the habitat value of natural rivers, streams, lakes or wetlands.	No loss of connectivity of the WDC corridor. Linkages of corridor are expanded and enhanced.
d. The effects of vegetation removal on the adjoining significant natural areas and the need for the creation of buffer areas between the area of the mineral extraction activities.	The quarry expansion will not result in effects on adjoining significant natural areas and there is no requirement for the creation of buffer areas between the area of the mineral extraction activities.	Linkages of corridor are expanded and enhanced.
e. Whether the proposed mitigation measures implement the 'no net loss principle'.	After effects management, the proposed mitigation and enhancement planting measures meet the 'no net loss' principle.	No net loss of ecological values.
f. The extent to which the extraction of the <u>mineral</u> resource provides positive benefits to people and communities.	After effects management the positive gains for ecological values provide positive benefits for people and communities.	Benefits for people and communities through enhanced ecological values.

14.0 Conclusion

Winstone Aggregates plan to extend the Whitehall Quarry pit in a westerly direction by approximately 15.5 ha in area. The pit expansion will also result in the removal of 5.46 ha of vegetation within SNAs (District Plan reference SNA WP527 and SNA WP530), and 0.22 ha of kanuka scrub.

The presence of the nationally critical threatened long-tailed bat means that this location meets the criteria as significant indigenous biodiversity in the WRC RPS. The activity of bats in the vicinity of the quarry, and the presence of suitable roost and foraging habitat elevated the ecological values to very high. The mature Tawa forests (SNAs) also provide high ecological values.

The effects management hierarchy was applied to the proposed expansion including adherence to fauna protocols that will not result in adverse effects or fatalities to the fauna. Enhancement planting for the removal of 5.46 ha of mature tawa forest (SNAs) and 0.22 ha of mixed kanuka-exotic scrub is proposed resulting in 12.5 ha of indigenous forest planting.

A key focus of the ecological outcomes for the mitigation is the prevention of fatalities and to improve the protective benefits for indigenous fauna. A strong emphasis will be placed on benefits for long-tailed bats and will include (but not limited to): increasing extent of habitat for bats, improved connectivity existing areas of vegetation within WDC biodiversity corridors, planting species to maximise roost and foraging potential and appropriate long-term pest management measures.

In summary, the effects management for the proposed expansion requires adherence to fauna protocols that will not result in adverse effects or fatalities to the fauna, and enhancement planting to extend indigenous vegetation and habitat for fauna. This, combined with a comprehensive pest management programme will provide for a strengthening of protective measures for local population of indigenous fauna, and especially for long-tailed bats, and to contribute to a broader Waikato regional strategy for enhancing bat populations and habitat. The objective and policy requirements of the NPS-IB, RPS and WDP are met, and the proposal will achieve no net loss of indigenous biodiversity and an overall net positive biodiversity outcome.

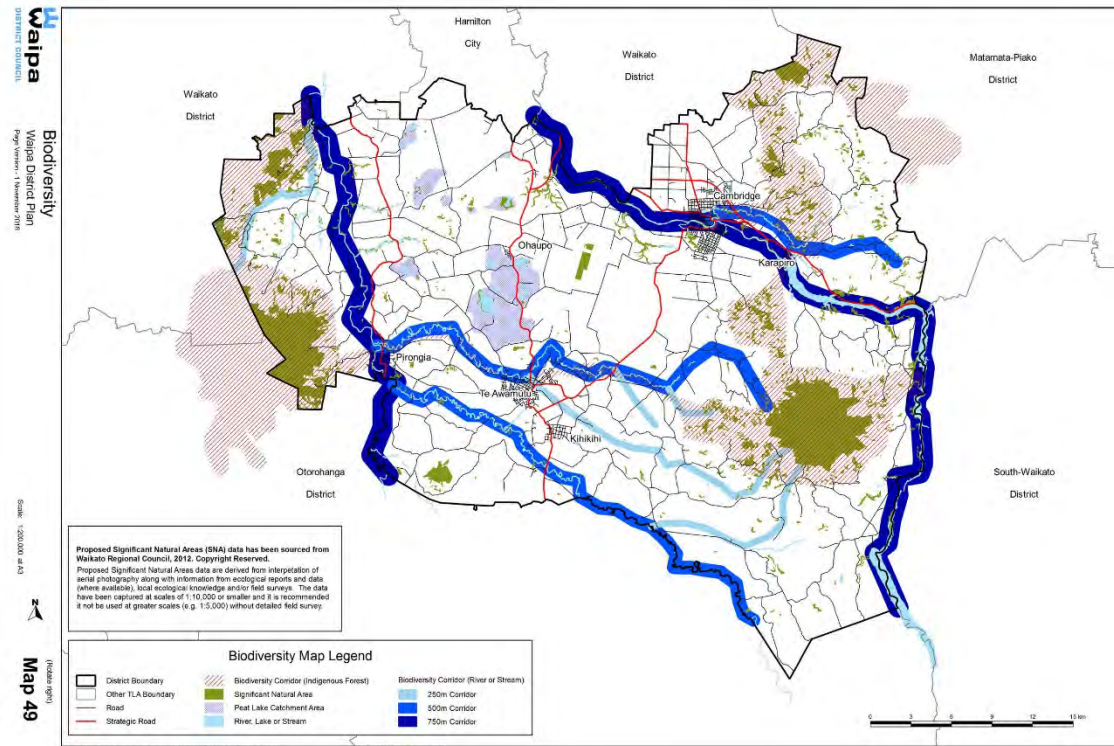
Overall, subject to the implementation of the recommended effects management, we conclude that the ecological effects associated with the long-term expansion at Whitehall Quarry will be less than minor.

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Appendix 1: WDC Biodiversity Corridors



Appendix 2: Criteria for determining significance of indigenous biodiversity (WRC RPS)

Table 11-1: Criteria for determining significance of indigenous biodiversity

Previously assessed site	
1.	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.
Ecological values	
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.
3.	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: • classed as threatened or at risk, or • endemic to the Waikato region, or • at the limit of their natural range.
4.	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.
5.	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.
6.	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: • waste treatment; • wastewater renovation; • hydro electric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; unless in those instances they meet the criteria in Whaley et al. (1995).
7.	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.
8.	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.

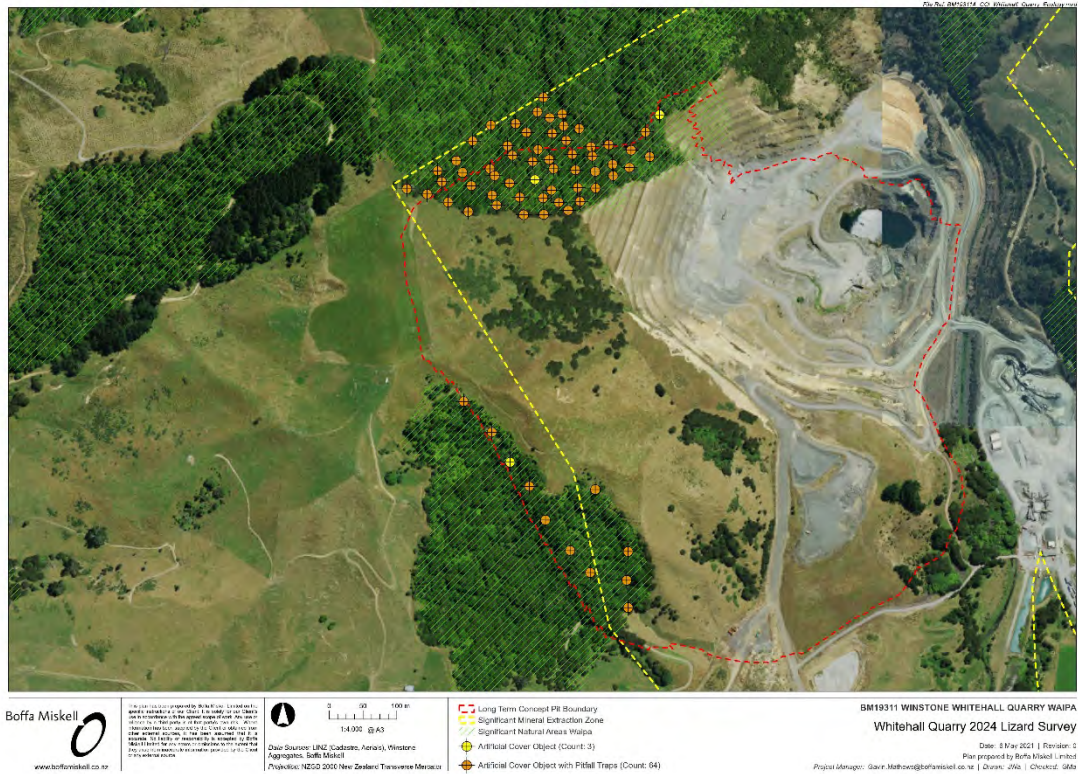
9.	It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because: • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.
10.	It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.
Role in protecting ecologically significant area	
11.	It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.

Appendix 3: Rehabilitation and Landscaping Operations (Resource consent WDC RC 3770)

Rehabilitation and Landscaping Operations

13. Within 12 months of approval of the resource consent, the consent holder shall submit a Landscape and Site Rehabilitation Plan to the Waipa District Council for review and certification.
14. This plan shall be based on (but not limited to) the following objectives:
 - The consent holder shall stage the establishment of the final bund surface around the overburden disposal areas with appropriate permanent screening vegetation to mitigate the long-term visual impact of the quarry operation on the surrounding area.
 - The consent holder shall provide appropriate visual and noise mitigation measures around the site of the relocated processing plant prior to processing operations commencing.
 - the area of bare soil/earthen surfaces is kept to a minimum at all times; measures to include revegetation all disturbed areas which are not being worked in a current construction season.
 - Indigenous vegetation removed as part of quarry extensions shall be replaced by an equal area of indigenous vegetation elsewhere on the quarry site.
 - Contouring of overburden areas and visual and any noise mitigation bunds will be undertaken so as to create a natural looking landform.
15. This plan shall include a planting plan and maintenance plan (including replacement planting) for the overburden disposal area around the relocated processing plant and the realigned portion of the Karapiro Stream.
16. The consent holder shall provide Waipa District Council with an annual report for the period ending 30 August each year, which outlines the rehabilitation activities undertaken during the previous year, and the works planned for the subsequent year. The report shall be forwarded to Waipa District Council by 15 October each year.
17. Prior to the end of the life of the quarry, the consent holder shall prepare and submit an End-Use and Rehabilitation Plan to Waipa District Council, which addresses the permanent use, and rehabilitation of the site. The scope and requirements of this plan shall be determined at the last review of conditions (required under condition 2) carried out prior to the cessation of quarrying. The plan shall incorporate amongst other things details on the nature and timing of the proposed rehabilitation work including the landscape rehabilitation measures proposed.

Appendix 5: Whitehall Quarry lizard survey map



Appendix 6: Potential suitability of a site to support roosting bats

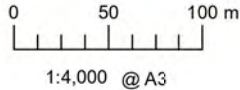
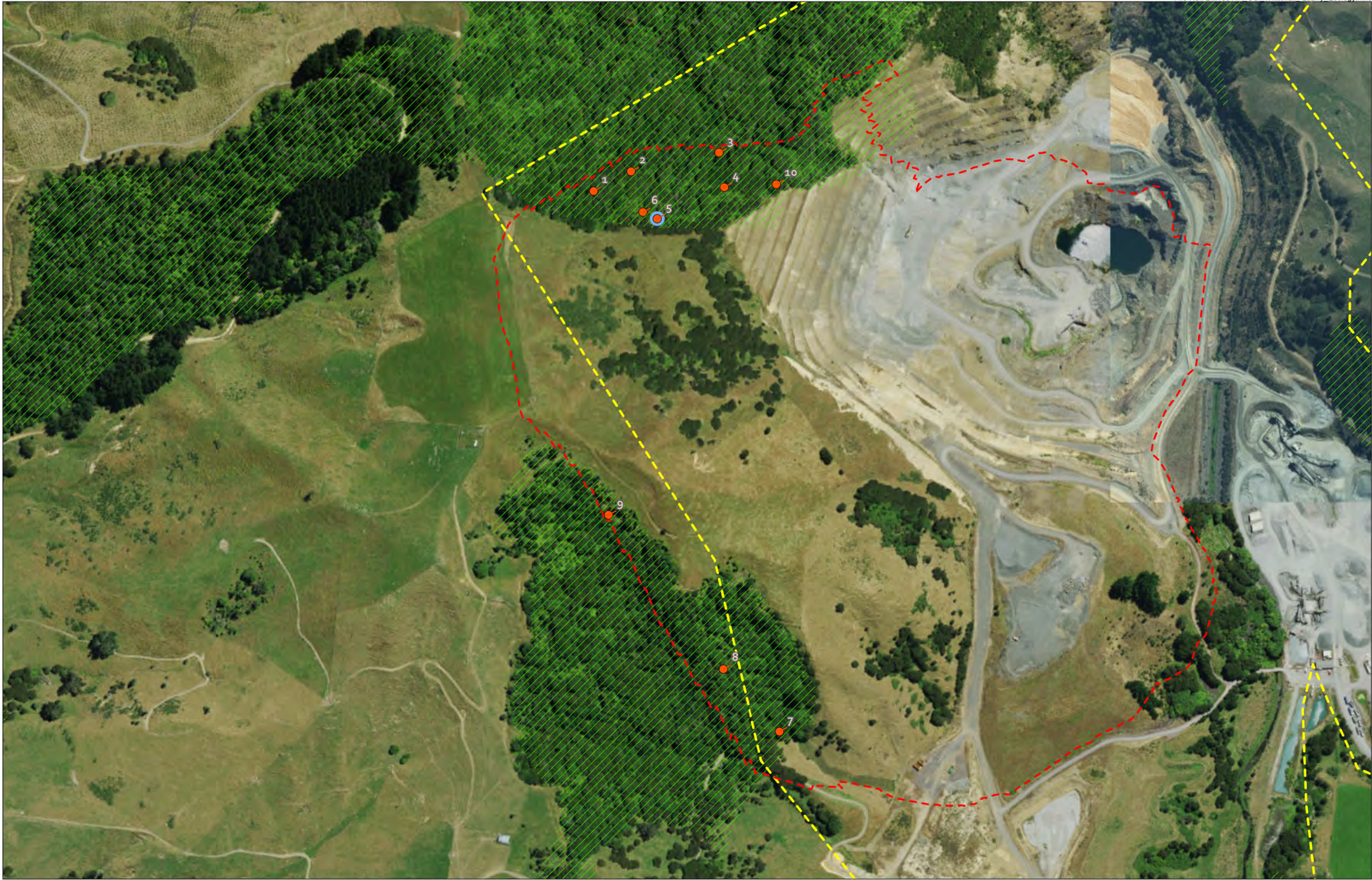
Suitability	Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by bats	Negligible features on site likely to be used by commuting or foraging bats. No bats have been recorded within 25 km if surveys have been undertaken.
Low	A tree of sufficient size and age to contain potential roost features (PRFs) but with none seen from the ground, or features seen with only very limited roosting potential, such as a small void with space for only a single bat.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. Not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree or patch of scrub.
Moderate	A tree with one or more potential roost sites that could be used by bats due to their size ³² , conditions ³³ and surrounding habitat, but unlikely to provide optimal conditions for a large or maternity roost.	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water. Bats have previously been recorded within 25 km if surveys within this area have been undertaken.
High	A tree with one or more potential roost features that are suitable for use by larger numbers of bats due to their size, conditions and surrounding habitat, such as a large, thermally stable cavity, high in a mature tree.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting and foraging bats such as rivers, vegetated gulleys, shelterbelts, forests and edge features. Site is close to and connected to known roosts ³⁴ .

³² Size – Long tailed bats have been shown to prefer cavities which had medium sized entrances and internal cavities. (Sedgeley and O'Donnell 1999). These usually occur in trees over 4m in height with a dbh >15cm. Smaller features, such as gaps under bark are often used by single bats.

³³ Conditions – e.g., temperature and exposure, moisture and humidity, height above ground, light levels, canopy density, level of disturbance

³⁴ A lack of records does not necessarily imply absence, as bats are highly mobile species and survey coverage is incomplete.

Appendix 7: Whitehall Quarry vegetation map



- Long Term Concept Pit Boundary
- Significant Mineral Extraction Zone
- Significant Natural Areas Waipa
- RECCE Plot Number
- RECCE Plot Number - Assessed from vantage point

Appendix 8: Whitehall Quarry plant list

Common	Species	Status
Rata	<i>Metrosideros fulgens</i>	Threatened – Nationally Vulnerable
Climbing rata	<i>Metrosideros perforata</i>	Threatened – Nationally Vulnerable
Kanuka	<i>Kunzea robusta</i>	Threatened – Nationally Vulnerable
White rata	<i>Metrosideros colensoi</i>	Threatened – Nationally Vulnerable
Titoki	<i>Alectryon excelsus</i>	Native - Not threatened
Hen and chicken fern	<i>Asplenium bulbiferum</i>	Native - Not threatened
Hanging spleenwort	<i>Asplenium flaccidum</i>	Native - Not threatened
Shining spleenwort	<i>Asplenium oblongifolium</i>	Native - Not threatened
Sickle spleenwort	<i>Asplenium polyodon</i>	Native - Not threatened
Astelia	<i>Astelia sp.</i>	Native - Not threatened
Tawa	<i>Beilschmiedia tawa</i>	Native - Not threatened
White clematis	<i>Clematis paniculata</i>	Native - Not threatened
Karamu	<i>Coprosma robusta</i>	Native - Not threatened
Cabbage tree	<i>Cordyline australis</i>	Native - Not threatened
Creek fern	<i>Cranfillia fluviatilis</i>	Native - Not threatened
Silver fern	<i>Cyathea dealbata</i>	Native - Not threatened
Mamaku	<i>Cyathea medullaris</i>	Native - Not threatened
Kahikatea	<i>Dacrycarpus dacrydioides</i>	Native - Not threatened
Rimu	<i>Dacrydium cupressinum</i>	Native - Not threatened
Fragrant fern	<i>Dendroconche scandens</i>	Native - Not threatened
Wheki	<i>Dicksonia squarrosa</i>	Native - Not threatened
Rasp fern	<i>Doodia australis</i>	Native - Not threatened
Bamboo orchid	<i>Earina mucronata</i>	Native - Not threatened
Kiekie	<i>Freycinetia banksii</i>	Native - Not threatened
Hangehange	<i>Geniostoma ligustrifolium</i>	Native - Not threatened
Broadleaf	<i>Griselinia sp.</i>	Native - Not threatened
Pigeonwood	<i>Hedycarya arborea</i>	Native - Not threatened
Filmy fern	<i>Hymenophyllum sp.</i>	Native - Not threatened
Thread fern	<i>Icarus filiformis</i>	Native - Not threatened
Rewarewa	<i>Knightia excelsa</i>	Native - Not threatened
Pukatea	<i>Laurelia novae-zelandiae</i>	Native - Not threatened
Mangeoa	<i>Litsea calicaris</i>	Native - Not threatened
Mahoe	<i>Melicytus ramiflorus</i>	Native - Not threatened
Pohuehue	<i>Muehlenbeckia australis</i>	Native - Not threatened
Basket grass	<i>Oplismenus hirtellus subsp. imbecillis</i>	Native - Not threatened
New Zealand jasmine	<i>Parsonsia heterophylla</i>	Native - Not threatened
Miro	<i>Pectinopitys ferruginea</i>	Native - Not threatened
Kawakawa	<i>Piper excelsum</i>	Native - Not threatened
Totara	<i>Podocarpus totara</i>	Native - Not threatened
Bracken	<i>Pteridium esculentum</i>	Native - Not threatened
Nikau	<i>Rhopalostylis sapida</i>	Native - Not threatened
Supplejack	<i>Ripogonum scandens</i>	Native - Not threatened
Hound's tongue	<i>Zealandia pustulata</i>	Native - Not threatened
Kikuyu	<i>Cenchrus clandestinus</i>	Exotic
Pampas	<i>Cortaderia selloana</i>	Exotic
Cocksfoot	<i>Dactylis glomerata</i>	Exotic
Yorkshire fog	<i>Holcus lanatus</i>	Exotic
Ragwort	<i>Jacobaea vulgaris</i>	Exotic
Soft rush	<i>Juncus effusus</i>	Exotic
Rye grass	<i>Lolium perenne</i>	Exotic
Lotus	<i>Lotus pedunculatus</i>	Exotic
Paspalum	<i>Paspalum dilatatum</i>	Exotic
Water pepper	<i>Persicaria hydropiper</i>	Exotic

Common	Species	Status
Inkweed	<i>Phytolacca octandra</i>	Exotic
Narrow-leaved plantain	<i>Plantago lanceolata</i>	Exotic
Creeping buttercup	<i>Ranunculus repens</i>	Exotic
Blackberry	<i>Rubus fruticosus</i>	Exotic
Broad-leaved dock	<i>Rumex obtusifolius</i>	Exotic
White clover	<i>Trifolium repens</i>	Exotic
Gorse	<i>Ulex europaeus</i>	Exotic

Appendix 9: Lizard distribution and habitat

Based on regional species distributions and the available habitats within the site, the site may have been expected to provide suitable habitat for a variety of native lizards and these are listed below. We note that none were recorded in our surveys.

Common name	Species name	Threat status (Hitchmough et al., 2021)	Habitat preferences
Pacific gecko	<i>Dactylocnemis pacificus</i>	Not Threatened	A nocturnal arboreal and terrestrial species that can occur in a broad range of habitats such as forest, creviced rock outcrops, scree slopes, scrubby areas, and in any dense vegetation.
Forest gecko	<i>Mokopirirakau granulatus</i>	At Risk – Declining	A nocturnal (although often discovered basking during the day) arboreal species which lives in forest and scrubland. Generally, found on trunks and branches of trees and can be found nearer to the ground in shrubs, ferns, and crevices.
Elegant gecko	<i>Naultinus elegans</i>	At Risk – Declining	A diurnal arboreal species which lives in forest and scrub. Generally, found amongst dense foliage in the canopy.
Copper skink	<i>Oligosoma aeneum</i>	At Risk – Declining	A diurnal but cryptic species that inhabits a wide range of habitats such as grassland, forest, scrubland, agricultural land, and urban gardens. Often found amongst leaf litter, under logs, and in flax/dense vegetation.
Ornate skink	<i>Oligosoma ornatum</i>	At Risk – Declining	A very secretive crepuscular species which lives in forest or open areas that provide stable cover such as deep leaf litter or rock piles. This species seldom emerges from cover.
Striped skink	<i>Oligosoma striatum</i>	At Risk – Declining	Typically inhabits dense native lowland podocarp forest and assumed to be primarily arboreal. However, can be found as relict populations in farmland that was once forested where it typically inhabits moist humid sub habitats found amongst shelterbelts, dense weed field such as pampas, under logs and in rank grass.
Plague skink	<i>Lampropholis delicata</i>	Introduced and Naturalised	Non-native and invasive to primarily open habitats.

Habitat assessment

In general, the tawa forests are of high potential lizard habitat quality. The tawa forests provide potential habitat for arboreal lizard species given the presence of mature trees, and ground dwelling skinks due to abundant leaf litter. Pockets of dense understorey within the tawa forests may also be utilised by ground dwelling skinks. The kanuka scrub and gorse patch are assessed as being low lizard habitat value, given these are exposed habitats with incomplete canopy cover and minimal undergrowth and natural debris. The pasture areas are of limited value for native lizards.

Lizard habitat types identified within the project footprint. Habitat quality and breakdown of the available suitable micro-habitats within the different habitat types is also provided. Note the habitat types are the same as the vegetation habitats identified on site. Pastured areas also included within the lizard habitat quality descriptions.

Habitat type	Available native Pacific gecko micro-habitat	Potential Habitat quality
Tawa forests	The tawa forests contain mature trees with good canopy cover. Although understorey is limited, there are pockets of dense undergrowth. The undergrowth is quite thick, with mix of taller native and exotic grasses, and dense patches of other species such as inkweed and gorse. Plenty of leaf litter and occasional woody debris (fallen dead trees and branches with crevices). Some epiphytic and liana plants were also noted in the forest, increasing habitat complexity. The stand of trees with good canopy cover (including epiphytes) may provide suitable habitat for arboreal lizard species such as forest gecko, elegant gecko, pacific gecko, and striped skink. Areas of dense undergrowth and/or debris (such as leaf litter and woody debris) are also likely to be of higher habitat quality for copper skink, ornate skink, and pacific gecko. Though ornate skink prefer generally prefers stable environments such as deep leaf litter or rock piles (Van Winkel et al., 2018) which was not observed in the forests (shallow leaf litter in the forests).	High
Kanuka scrub	Dense stand of kanuka trees, however, has an incomplete canopy (consistent gaps in the canopy). Pasture grasses dominate the understorey, with occasionally undergrowth of other species such as bracken. Minimal leaf litter and woody debris. The kanuka may provide habitat for arboreal lizard species such as forest gecko, elegant gecko, pacific gecko, and striped skink. Though, given the younger and smaller nature of the kanuka, they are not expected to be of greater habitat quality (for arboreal lizard species) than the native tree stand. Limited understorey with minima leaf litter and woody debris which are unlikely to provide shelter for lizard species that inhabit the ground.	Low
Gorse patch	Area predominately gorse and likely to be of limited value to any native lizards. Lizards may seek refuge under the gorse but are more likely to utilise the large, vegetated areas in the surrounding.	Low
Wetlands	Wetland habitats contain some dense cover of undergrowth. However, the lizards identified in this report are unlikely to inhabit the wetlands as they are not adapted to wetter conditions.	Negligible
Pasture areas	The remaining habitat surveyed within the site is pasture. Some of the pasture areas had long exotic grasses which may provide some habitat for copper skink and striped skink.	Negligible – Low

Appendix 10: Avifauna species list

Avifauna likely to be present or potentially present on site. * indicates bird species identified incidentally and during bird counts.

Common name	Species name	Threat status (Robertson et al., 2021)
Long-tailed cuckoo	<i>Eudynamys taitensis</i>	Nationally Vulnerable
New Zealand falcon*	<i>Falco novaeseelandiae</i>	Nationally Vulnerable
New Zealand pipit	<i>Anthus novaeseelandiae</i>	At Risk - Declining
Yellow-crowned parakeet	<i>Cyanoramphus auriceps</i>	At Risk - Declining
North Island robin	<i>Petroica longipes</i>	At Risk - Declining
Fernbird	<i>Poodytes punctatus</i>	At Risk - Declining
Kaka	<i>Nestor meridionalis</i>	At Risk - Recovering
Shining cuckoo	<i>Chrysococcyx lucidus</i>	Not Threatened
Swamp harrier	<i>Circus approximans</i>	Not Threatened
Grey warbler*	<i>Gerygone igata</i>	Not Threatened
Welcome swallow	<i>Hirundo neoxena</i>	Not Threatened
Morepork	<i>Ninox novaeseelandiae</i>	Not Threatened
Pukeko	<i>Porphyrio melanotus</i>	Not Threatened
Tui*	<i>Prosthemadera novaeseelandiae</i>	Not Threatened
Fantail*	<i>Rhipidura fuliginosa</i>	Not Threatened
Sacred kingfisher*	<i>Todiramphus sanctus</i>	Not Threatened
Spur-winged plover	<i>Vanellus miles</i>	Not Threatened
Silvereye*	<i>Zosterops lateralis</i>	Not Threatened
Bellbird ³⁵	<i>Anthornis melanura</i>	Not Threatened
Tomtit	<i>Petroica macrocephala</i>	Not Threatened
Whitehead	<i>Mohoua albicilla</i>	Not Threatened
Kereru*	<i>Hemiphaga novaeseelandiae</i>	Not Threatened
Common myna*	<i>Acridotheres tristis</i>	Introduced and Naturalised
Eurasian skylark	<i>Alauda arvensis</i>	Introduced and Naturalised
California quail	<i>Callipepla californica</i>	Introduced and Naturalised
European goldfinch*	<i>Carduelis carduelis</i>	Introduced and Naturalised
European greenfinch	<i>Carduelis chloris</i>	Introduced and Naturalised
Common redpoll	<i>Carduelis flammea</i>	Introduced and Naturalised
Rock pigeon	<i>Columba livia</i>	Introduced and Naturalised
Yellowhammer	<i>Emberiza citrinella</i>	Introduced and Naturalised
Australian magpie*	<i>Gymnorhina tibicen</i>	Introduced and Naturalised
Chaffinch*	<i>Fringilla coelebs</i>	Introduced and Naturalised
Wild turkey	<i>Meleagris gallopavo</i>	Introduced and Naturalised

³⁵ Bellbirds nationally have a Not Threatened threat status. In the Waikato this species is regionally uncommon (Overdyck, 2020).

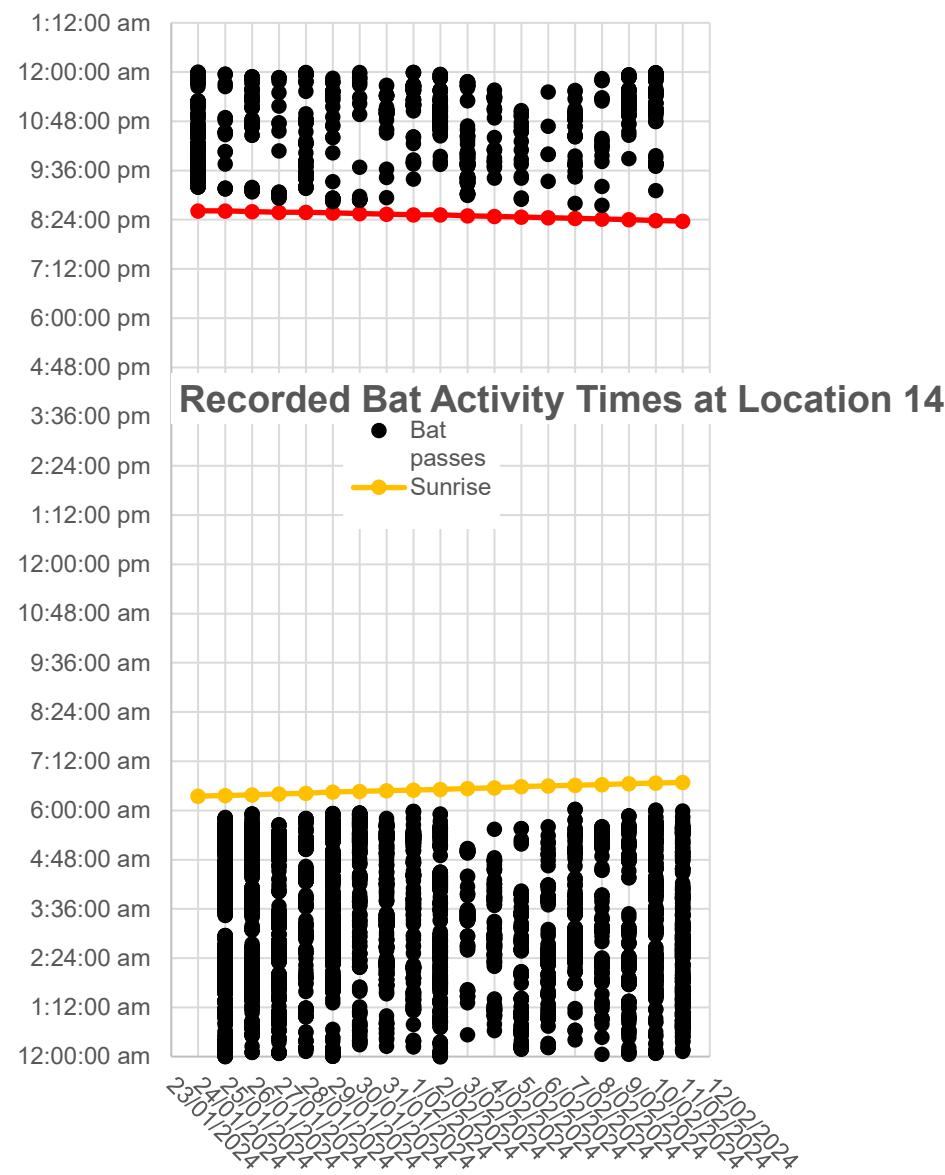
Common name	Species name	Threat status (Robertson et al., 2021)
House sparrow	<i>Passer domesticus</i>	Introduced and Naturalised
Peafowl	<i>Pavo cristatus</i>	Introduced and Naturalised
Common pheasant	<i>Phasianus colchicus</i>	Introduced and Naturalised
Dunnock	<i>Prunella modularis</i>	Introduced and Naturalised
Eastern rosella*	<i>Platycercus eximius</i>	Introduced and Naturalised
Spotted dove	<i>Streptopelia chinensis</i>	Introduced and Naturalised
Barbary dove	<i>Streptopelia risoria</i>	Introduced and Naturalised
Common starling	<i>Sturnus vulgaris</i>	Introduced and Naturalised
Eurasian blackbird*	<i>Turdus merula</i>	Introduced and Naturalised
Song thrush	<i>Turdus philomelos</i>	Introduced and Naturalised
Helmeted guineafowl	<i>Numida meleagris</i>	Introduced and Naturalised
Rook	<i>Corvus frugilegus</i>	Introduced and Naturalised

Appendix 11: Bat activity at Whitehall Quarry

Acoustic survey results

ABM Location	Survey dates	Total number of nights recording data	Fine weather nights during survey period	Total No. of Bat Passes	Total No. of Bat Passes (fine weather nights)	Mean No. of Bat Passes per Night	% of Nights with Bat Passes
1	1/24/2024 to 2/10/2024	18	18	472	472	26.2	94.4
2		7	7	82	82	11.7	100.0
3		18	18	370	370	20.6	100.0
4		16	16	254	254	15.9	100.0
5		18	18	533	533	29.6	100.0
6		18	18	736	736	40.9	100.0
7		18	18	417	417	23.2	100.0
8		18	18	404	404	22.4	100.0
9		Fault					
10		Fault					
11		9	9	232	232	25.8	100.0
12		18	18	369	369	20.5	100.0
13		18	18	212	212	11.8	100.0
14		18	18	7063	7063	392.4	100.0
15		18	18	5680	5680	315.6	100.0
16		18	18	856	856	47.6	100.0

Timing of bat passes



Appendix 12: Biodiversity model

	This section captures which elements of biodiversity, and over what area, will be impacted by the proposal					This section is where the change in measure of each Biodiversity Attribute due to the proposed Impact is quantified, and Attribute Biodiversity Value calculated. Inputs are derived from direct measures, existing data or models where available, or expert estimated predictions			
	Biodiversity Component	Biodiversity Attribute		Measurement Unit	Area of Impact (ha)	Benchmark	Measure <u>prior</u> <u>to</u> Impact	Measure <u>after</u> Impact	Biodiversity Value
0.1	Northern tawa forest	0.1a	Native:Exotic	% native	2.6	100	98	0	-2.55
		0.1b	Native species diversity	No.species	2.6	46	17	0	-0.96
		0.1c	Canopy cover	%	2.6	80	95	0	-2.60
		0.1d	Height to maturity (tawa)	metres	2.6	10	10	0	-2.60
		0.1e	Understorey	% native	2.6	70	10	0	-0.37

This section captures which elements of biodiversity, and over what area, will be impacted by the proposal						This section is where the change in measure of each Biodiversity Attribute due to the proposed Impact is quantified, and Attribute Biodiversity Value calculated. Inputs are derived from direct measures, existing data or models where available, or expert estimated predictions			
Biodiversity Component	Biodiversity Attribute		Measurement Unit	Area of Impact (ha)	Benchmark	Measure <u>prior</u> to Impact	Measure <u>after</u> Impact	Biodiversity Value	
0.1	Western tawa forest	0.1a	Native:Exotic	% native	2.86	100	98	0	-2.80
		0.1b	Native species diversity	No.species	2.86	46	17	0	-1.06
		0.1c	Canopy cover	%	2.86	80	95	0	-2.86
		0.1d	Height to maturity (tawa)	metres	2.86	10	10	0	-2.86
		0.1e	Understorey	% native	2.86	70	10	0	-0.41

	This section captures which elements of biodiversity, and over what area, will be impacted by the proposal					This section is where the change in measure of each Biodiversity Attribute due to the proposed Impact is quantified, and Attribute Biodiversity Value calculated. Inputs are derived from direct measures, existing data or models where available, or expert estimated predictions			
	Biodiversity Component	Biodiversity Attribute		Measurement Unit	Area of Impact (ha)	Benchmark	Measure <u>prior</u> <u>to</u> Impact	Measure <u>after</u> Impact	Biodiversity Value
0.2	Kanuka scrub (with tawa)	0.2a	Native:Exotic	% native	0.22	100	75	0	-0.17
		0.2b	Native species diversity	No.species	0.22	46	6	0	-0.03
		0.2c	Canopy cover	%	0.22	80	75	0	-0.21
		0.2d	Height to maturity (tawa)	metres	0.22	10	0	0	0.00
		0.2e	Understorey	% native	0.22	70	5	0	-0.02

This section captures which elements of biodiversity are to be accounted for, and the benchmark value for the Attribute. The information matches that in the Impact Model						These cells provide information about the proposed Offset Actions			Calculations can be made for a finite end point, or at five yearly time-steps over 35 years. Indicate preference in Column K and Follow the instructions in Column L		This section is where the marginal change in the measure of Biodiversity Attribute due to the Offset Action is quantified. Inputs are derived from direct measure, existing data or models where available, or expert estimated predictions. Attribute Biodiversity Value at the Offset Site is compared to the Attribute Biodiversity Value at the Impact Site to calculate the Net Present Biodiversity Value for each Attribute						This is the average Net Present Biodiversity Value for the Biodiversity Component
Biodiversity Component	Biodiversity Attribute		Measurement Unit	Benchmark	Proposed Offset Actions	Offset area (ha)	Confidence in Offset Actions	Measure <u>prior</u> to Offset			Measure <u>after</u> Offset	Time till endpoint (years)	Biodiversity Value at Offset Site	Biodiversity Value at Impact Site	Attribute Net Present Biodiversity Value	Component Net Present Biodiversity Value	
0.1	Northern tawa forest	0.1a	Natve:Exotic	% native	100	Weeding, planting, pest animal control	7	Confident 75-90%	Finite end point	Continue to Column M	15	100	5	4.23	-2.55	1.69	1.94
		0.1b	Native species diversity	No.species	46	Weeding, planting, pest animal control	7	Very confident >90%	Finite end point	Continue to Column M	5	25	5	2.51	-0.96	1.55	
		0.1c	Canopy cover	%	80	Weeding, planting, pest animal control	7	Very confident >90%	Finite end point	Continue to Column M	2	80	5	5.62	-2.60	3.02	
		0.1d	Height to maturity (tawa)	metres	10	Weeding, planting, pest animal control	7	Confident 75-90%	Finite end point	Continue to Column M	0	10	20	3.20	-2.60	0.60	
		0.1e	Understorey	% native	70	Weeding, planting, pest animal control	7	Confident 75-90%	Finite end point	Continue to Column M	0	70	20	3.20	-0.37	2.83	

This section captures which elements of biodiversity are to be accounted for, and the benchmark value for the Attribute. The information matches that in the Impact Model						These cells provide information about the proposed Offset Actions			Calculations can be made for a finite end point, or at five yearly time-steps over 35 years. Indicate preference in Column K and Follow the instructions in Column L		This section is where the marginal change in the measure of Biodiversity Attribute due to the Offset Action is quantified. Inputs are derived from direct measure, existing data or models where available, or expert estimated predictions. Attribute Biodiversity Value at the Offset Site is compared to the Attribute Biodiversity Value at the Impact Site to calculate the Net Present Biodiversity Value for each Attribute						This is the average Net Present Biodiversity Value for the Biodiversity Component
Biodiversity Component	Biodiversity Attribute		Measurement Unit	Benchmark	Proposed Offset Actions	Offset area (ha)	Confidence in Offset Actions	Measure <u>prior</u> to Offset			Measure <u>after</u> Offset	Time till endpoint (years)	Biodiversity Value at Offset Site	Biodiversity Value at Impact Site	Attribute Net Present Biodiversity Value	Component Net Present Biodiversity Value	
0.1	Western tawa forest	0.1a	Natve:Exotic	% native	100	Weeding, planting, pest animal control	5	Confident 75-90%	Finite end point	Continue to Column M	15	100	0	3.51	-2.80	0.70	1.62
		0.1b	Native species diversity	No.species	46	Weeding, planting, pest animal control	5	Very confident >90%	Finite end point	Continue to Column M	5	25	0	2.08	-1.06	1.02	
		0.1c	Canopy cover	%	80	Weeding, planting, pest animal control	5	Very confident >90%	Finite end point	Continue to Column M	2	80	0	4.66	-2.86	1.80	
		0.1d	Height to maturity (tawa)	metres	10	Weeding, planting, pest animal control	5	Confident 75-90%	Finite end point	Continue to Column M	0	10	5	3.92	-2.86	1.06	
		0.1e	Understorey	% native	70	Weeding, planting, pest animal control	5	Confident 75-90%	Finite end point	Continue to Column M	0	70	5	3.92	-0.41	3.52	

This section captures which elements of biodiversity are to be accounted for, and the benchmark value for the Attribute. The information matches that in the Impact Model		These cells provide information about the proposed Offset Actions				Calculations can be made for a finite end point, or at five yearly time-steps over 35 years. Indicate preference in Column K and Follow the instructions in Column L		This section is where the marginal change in the measure of Biodiversity Attribute due to the Offset Action is quantified. Inputs are derived from direct measure, existing data or models where available, or expert estimated predictions. Attribute Biodiversity Value at the Offset Site is compared to the Attribute Biodiversity Value at the Impact Site to calculate the Net Present Biodiversity Value for each Attribute							This is the average Net Present Biodiversity Value for the Biodiversity Component		
								Measure prior to Offset	Measure after Offset	Time till endpoint (years)	Biodiversity Value at Offset Site	Biodiversity Value at Impact Site	Attribute Net Present Biodiversity Value				
Biodiversity Component	Biodiversity Attribute	Measurement Unit	Benchmark	Proposed Offset Actions	Offset area (ha)	Confidence in Offset Actions										Component Net Present Biodiversity Value	
0.2	Kanuka scrub (with tawa)	0.2a	Natve:Exotic	% native	100	Weeding, planting, pest animal control	0.5	Confident 75-90%	Finite end point	Continue to Column M	15	100	5	0.30	-0.17	0.14	0.18
		0.2b	Native species diversity	No.species	46	Weeding, planting, pest animal control	0.5	Very confident >90%	Finite end point	Continue to Column M	5	25	5	0.18	-0.03	0.15	
		0.2c	Canopy cover	%	80	Weeding, planting, pest animal control	0.5	Very confident >90%	Finite end point	Continue to Column M	2	80	5	0.40	-0.21	0.20	
		0.2d	Height to maturity (tawa)	metres	10	Weeding, planting, pest animal control	0.5	Confident 75-90%	Finite end point	Continue to Column M	0	10	20	0.23	0.00	0.23	
		0.2e	Understorey	% native	70	Weeding, planting, pest animal control	0.5	Confident 75-90%	Finite end point	Continue to Column M	0	70	20	0.23	-0.02	0.21	

Appendix 13: Revegetation Plan

Revegetation

Background

The proposed revegetation planting area of at least 0.62 ha is shown in section 8 in the report above. The planting site occurs alongside an SNA.

Eco-sourcing

Plants are to be eco-sourced, using seed collected from the Maungatautari Ecological District. The plants are to be grown locally as much as practicable.

Site preparation

Weed control

All weeds found within the planting site and listed in the Consolidated List of Environmental Weeds in New Zealand (Howell, 2008) must be appropriately controlled.

Spraying operations will be carried out by a suitably qualified and experienced contractor with GrowSafe certification (or similar approved). All herbicide spraying application and rates shall be in strict accordance with the manufacturer's recommendations. For any use of sprays with a residual effect the sprayed area should be left for 4 weeks minimum prior to planting.

Fencing

The planting must be secured from stock and fenced with 8-wire post and batten fencing. This fencing is to be maintained in perpetuity to protect the riparian planting.

Planting and densities

All plants, plant grades and plant densities will be selected and planted accordingly.

All plants are to be supplied from the nursery in the specified grade and true to type. Foliage should be in good health and free from pests and disease. The roots must not be root-bound (roots wound around the inside of the pot) and enough to hold the soil around the roots.

Fertilizer

All plants are to be planted with a slow-release fertilizer tablet such as Plantodur Special™ or Osmocote™. Fertilizer provides the plant long lasting nutrients which is important for optimizing plant growth while the plants are small. Fertilizer tablets will be placed in the backfill of the plant hole prior to the placement of the plant within the hole.

Pest control

The revegetation planting is directly next to existing mature bush which has previously been covenanted. It is best practice to undertake pest control within covenanted areas, and this pest control should be expanded to include the revegetation planting specified in this planting plan.

Pests targeted are:

- Ferrets and stoats (mustelids),

- Possums,
- Rats,

For the control of ferrets, stoats and possums and rats a DOC 200 trap is recommended and should be placed along linear landscape features (fence lines, forest edges, and tracks). These should be checked bi-weekly between January and May and monthly between June and December.

Possum control using toxins can also be effective but must be implemented by a pest control contractor. Best practice guidelines developed by Landcare Research (Landcare Research Ltd, 2019) must be followed for toxic pest control measures.

Maintenance

Any new plantings need to be maintained. We recommend that any maintenance for the new plantings follow the same provisions for the neighbouring covenant. This includes the following maintenance measures:

- The planting area to be fenced off and maintained to be stockproof;
- Stock to be excluded from the planting area;
- The felling or removal of any native plants or native trees within the planting area to be prevented, except where necessary to maintain access through the area;
- Any noxious weeds to be removed from the area and maintained as such in an ongoing manner; and
- Possum control measures.

Timeline, Completion and Protection

Timeline

The stages of the revegetation planting plan, season and activities to be undertaken is shown in the table below. The summer season is between November 1 and March 30 of any year. The winter season is between June 1 and September 30 of any year.

Timeline outlining the stages, seasons and activities for the revegetation planting plan at 510 Whitford Road, Whitford.

STAGE	SEASON	ACTIVITY
Year 1	Summer	Undertake initial weed control.
	Winter	Plant revegetation site.
Year 2	Summer	Undertake maintenance weed control (two visits per summer).

	Winter	Replace all dead plants from Year 1.
Year 3-5	Summer	Undertake maintenance weed control (one visit summer) .
	Winter	Replace all dead plants from previous plantings.

Completion targets after 5 years

1. Planted vegetation will achieve a minimum 90% survival of all specimens,
2. The planting has achieved a minimum of 80% canopy cover,
3. The revegetation site is free of weeds.

Protection

The revegetation planting area is to be protected with the same protection measures as the adjoining SNA.

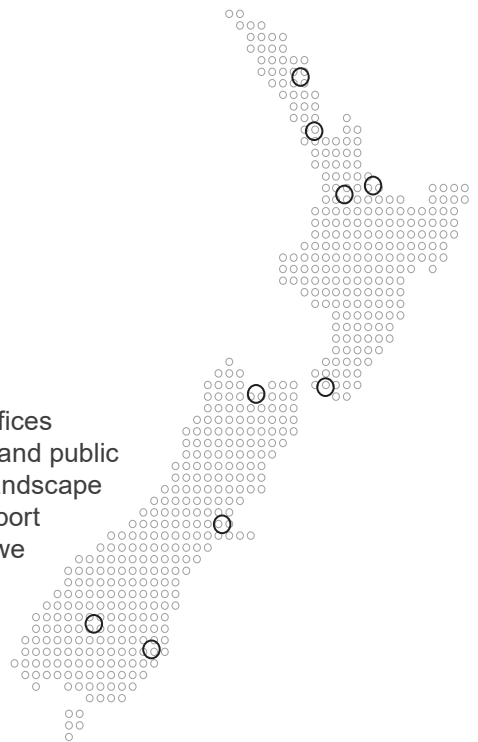
Appendix 14: Response to key statutory provisions

Reference	Provision	Outcome
NPS-IB		
Objective	(1) The objective of this National Policy Statement is: (a) to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date; and (i) (b)	There will be no overall loss of indigenous biodiversity associated with the Project and indigenous biodiversity is maintained (see s. 12 in report and response to maintaining indigenous biodiversity below).
Maintaining indigenous biodiversity (s. 1.7)	(1) Maintaining indigenous biodiversity requires: (a) the maintenance and at least no overall reduction of all the following: (i) the size of populations of indigenous species: (ii) indigenous species occupancy across their natural range: (iii) the properties and function of ecosystems and habitats used or occupied by indigenous biodiversity: (iv) the full range and extent of ecosystems and habitats used or occupied by indigenous biodiversity: (v) connectivity between, and buffering around, ecosystems used or occupied by indigenous biodiversity: (vi) the resilience and adaptability of ecosystems; and (b) where necessary, the restoration and enhancement of ecosystems and habitats.	After application of the effects management hierarchy, the proposed quarry activities will not result in any loss of indigenous biodiversity and the high ecological values are retained through management practices and offsets: • The size of indigenous populations – no fatalities or loss of recruitment to populations of indigenous biota through management practice and/or offsets. • Properties and functions of ecosystems and habitats remain and offset as required. • Full range and extent of ecosystems and habitats used or occupied by indigenous biodiversity is mostly avoided (retained) and offset. • Connectivity between, and buffering around, ecosystems is retained and enhanced. • The resilience and adaptability of ecosystems is retained. • Ecosystems and habitats are enhanced through pest and weed management.
Waipa District Plan		
Objective 24.3.1	Managing effects on district wide indigenous biodiversity. To maintain and enhance the existing level of biodiversity within the District. Policy 24.3.1.1 To achieve the maintenance and enhancement of indigenous biodiversity values in the District by ensuring that removal of indigenous vegetation or disturbance of wetland areas only occurs where: (a) Connectivity to link core habitats along biodiversity corridors is supported; and (b) Sensitive sites remain buffered from intensive land use, development and subdivision; and (c) Habitat is retained for at risk and threatened indigenous species; and (d) Customary activities do not adversely affect at risk or threatened indigenous species; and	After applying the effects management hierarchy, the effects on indigenous biodiversity are managed through: • Improvements in connectivity of core SNA habitats. • Enhancement of existing habitat values. • No change in landuse. • Retention of sensitive SNA sites and habitats for at risk and threatened indigenous species. • Long-term gain in indigenous biodiversity values.

Reference	Provision	Outcome
	(e) Consideration has been given to opportunities that contribute to no net loss at a regional scale.	Biodiversity corridors are maintained and enhanced.
Policy 24.3.2	Maintain and enhance indigenous biodiversity within the biodiversity corridors To maintain and enhance indigenous biodiversity, ecological processes and connectivity within the biodiversity corridors as identified on Planning Map 49. Policy 24.3.2.1 - Loss of indigenous biodiversity The removal indigenous vegetation and habitat of indigenous species or the disturbance of wetland areas within the biodiversity corridors is discouraged. Policy 24.3.2.2 - Promote enhancement of indigenous biodiversity To recognise and promote the importance of maintaining and enhancing connectivity along biodiversity corridors, and indigenous vegetation and habitat of indigenous fauna within the biodiversity corridors. Policy 24.3.2.3 - Encouragement of permanent protection in the biodiversity corridors To encourage incentives that achieve permanent protection for the retention of features within the biodiversity corridors such as wetlands and kahikatea stands.	
Objective 24.3.3	Significant natural areas and bush stands To protect the indigenous biodiversity values and the existing level of indigenous biodiversity within the significant natural areas listed in Appendix N5 and bush stands listed in Appendix N8. Policy 24.3.3.1 - Limiting indigenous vegetation removal and other activities within identified significant natural areas and bush stands. To protect the ecological sustainability, indigenous biodiversity values and characteristics of significant natural areas including wetlands, and bush stands by ensuring that: c. The removal of indigenous vegetation or habitat of indigenous species is discouraged and: ii. Only occurs in sustainable quantities in significant natural areas of local significance; and ii. Only occurs in limited circumstances within internationally, nationally or regionally significant natural areas and bush stands. d. The health and functioning of significant natural areas including wetlands, and bush stands is maintained through appropriate land use practices. Policy 24.3.3.2 - Identification of additional significant natural areas Complete the identification and mapping of additional areas that meet the significant natural area criteria identified in the Waikato Regional Policy Statement, including wetlands that are identified by the Waikato Regional Council as significant.	After applying the effects management hierarchy, existing level of indigenous biodiversity within the significant natural areas is maintained and protected: - Removal of SNA is limited. - Offset for the loss of SNA vegetation. - Improvements in connectivity of core SNA habitats. - Enhancement of existing habitat values. - Retention of sensitive SNA sites and habitats for at risk and threatened indigenous species. - Health and function of SNAs is improved through enhanced pest management.

Together. Shaping Better Places.

Boffa Miskell is a leading New Zealand environmental consultancy with nine offices throughout Aotearoa. We work with a wide range of local, international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, Te Hīhira (cultural advisory), engagement, transport advisory, climate change, graphics, and mapping. Over the past five decades we have built a reputation for creativity, professionalism, innovation, and excellence by understanding each project's interconnections with the wider environmental, social, cultural, and economic context.



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