BAT MANAGEMENT PLAN FOR GLEESON QUARRY, HUNTLY

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BAT MANAGEMENT PLAN FOR GLEESON QUARRY, HUNTLY

Pine trees providing potential bat roosting habitat at the site

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CONTENTS

1. INTRODUCTION 3

2. PROJECT AREA DESCRIPTION 3

3. POTENTIAL ADVERSE EFFECTS ON BAT POPULATIONS 4
   - 3.1 Overview 4
   - 3.2 Loss of roosts, foraging areas and commuting routes 4
   - 3.3 Habitat modified by noise 5
   - 3.4 Habitat modified by light 5
   - 3.5 Mortality through collision with vehicles 5
   - 3.6 Habitat change through creation of edges 5
   - 3.7 Changes in behaviour 5

4. WILDLIFE ACT AUTHORITY PERMIT 5

5. TREE REMOVAL PROTOCOL 6
   - 5.1 Overview 6
   - 5.2 Seasonal restrictions 6
   - 5.3 Roost tree assessment 6
   - 5.4 Acoustic monitoring 7
   - 5.5 Pre-felling surveys and inspections 7
   - 5.6 Communications 8
   - 5.7 Dead or injured bats 8
   - 5.8 Accidental discovery protocol 9

6. REPLACEMENT OF POTENTIAL BAT ROOSTING TREES 9
   - 6.1 Overview 9
   - 6.2 Bat reserve 10
   - 6.3 Chainsaw hollows 12
   - 6.4 Artificial roost boxes 12

7. CONCLUSION 14

ACKNOWLEDGMENTS 14

REFERENCES 14

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1. INTRODUCTION

Gleeson Quarries Huntly Ltd and Gleeson Managed Fill Ltd have identified several new fill areas within the Gleeson Quarries Huntly Ltd landholdings at 300 Riverview Road, Huntly. The Huntly area is known to be a stronghold for 'Threatened - Nationally Critical' (O'Donnell *et al*. 2018) long-tailed bat (*Chalinolobus tuberculatus*), and two of the new fill areas (referred to as Fill Area 4 and Fill Area 5) contain trees that provide potential roosting habitat for long-tailed bat. A survey using Automatic Bat Monitors (ABMs) in October 2019 detected bats in both Fill Areas 4 and 5 (Wildland Consultants 2020) and vegetation clearance has the potential to injure or kill long-tailed bats (an offence under the Wildlife Act 1953), as well as remove potential bat roosting habitat.

Gleeson Quarries Huntly Ltd and Gleeson Managed Fill Ltd, have commissioned Wildland Consultants Ltd to prepare a Bat Management Plan (BMP) that will be implemented to provide mitigation for the potential adverse effects of the consented vegetation clearance on long-tailed bats. This BMP provides protocols for tree removal that aim to eliminate the risk of injuring or killing bats. It also includes management activities to address potential adverse effects upon bat populations to meet the requirements of the Wildlife Act (1953). Specifically, this BMP outlines the following:

- Potential adverse effects of the quarry overburden and managed fill activities on bats and habitat values.
- A Tree Removal Protocol for areas where potential roost trees can be surveyed for bat presence before vegetation clearance.
- Guidelines for the replacement of bat roosts

Disturbance of bat populations in New Zealand is controlled by the Department of Conservation and every development that will disturb bats or destroys their habitat (regardless of area or habitat type, indigenous or exotic) is required to have a Wildlife Act Authority.

2. PROJECT AREA DESCRIPTION

Potential long-tailed bat roosting and foraging habitat is present in several areas within the quarry landholdings. Potential bat roosts are present in both indigenous and exotic trees and foraging habitat is provided by bush edges, wetlands, and watercourses. A stand of planted radiata pine (*Pinus radiata*) in the north-eastern corner of the site will be enhanced and protected in perpetuity as a 'Bat Reserve'.

Vegetation clearance will be undertaken in a staged manner as and when required. This BMP has been written to guide bat management across the site as a whole rather than focussing on discrete areas of bat habitat. The guidelines outlined in this BMP are to be implemented before any trees greater than 15 centimetres in diameter within Fill Areas 4 and 5 are felled.

3. POTENTIAL ADVERSE EFFECTS ON BAT POPULATIONS

3.1 Overview

The presence of long-tailed bats has been confirmed in two areas of the site and it is likely that potential bat roosts are present in other areas of the quarry landholdings where surveys have not been undertaken. Jones *et al.* (2019) provides a useful framework to assess the potential adverse impacts of vegetation clearance and habitat loss on bats, based on the likely effects of roads on bats:

- Loss of roosts, foraging areas and commuting routes.
- Habitat modified by noise.
- Habitat modified by light.
- Mortality through collisions with vehicles.
- Habitat change through creation of edges.
- Changes in behaviour.

These effects may result in reductions in population size, increased fragmentation of sub-populations due to loss of connectivity between key features, and isolation of key habitat features. Several of these potential effects do not apply here; however, for the sake of completeness each will be considered.

3.2 Loss of roosts, foraging areas and commuting routes

Loss of roosts, foraging areas and commuting routes as a result of vegetation clearance often have the most significant negative effect on long-tailed bat individuals and populations. Habitat loss can be classified as either "Actual" or "Functional"; using roosts as an example, "Actual" loss occurs when a tree containing a roost is felled. "Functional" loss occurs when a roost tree is still present but a change to the disturbance regime (such as increased noise or lighting) renders the roost unusable for bats.

Loss of roosts

As outlined above, there are numerous potential bat roost trees within the areas proposed for clearance. It is highly unlikely that loss of roost trees within Fill Areas 4 and 5 can be avoided and works at the site may also cause functional loss of roosts through increased disturbance.

Loss of foraging areas

Long-tailed bats are generally considered an edge-adapted species, and foraging rates are highest along linear habitat features such as rivers, cliff edges, and forest edges (Jones *et al*. 2019). Removal of vegetation and filling of gullies will reduce the area of foraging habitat available.

Loss of commuting routes

Construction of roads through bat habitat may alter or remove commuting routes used by long-tailed bats to travel between roosting and foraging areas within their home

ranges. As the vegetation clearance is restricted to small discrete patches of vegetation, vegetation clearance is unlikely to affect commuting routes.

3.3 Habitat modified by noise

Operations at the new fill areas may result in greater noise effects in the surrounding area. Operations at the existing quarry and the new fill sites only take place during daylight hours and any noise impacts are restricted to when bats are roosting; however, this could result in functional loss of roosts.

Increased noise may result in existing roosts being abandoned, but this is very difficult to quantify.

3.4 Habitat modified by light

Current quarry operations only take place during daylight hours and there will be no increase in light levels as a result of operating the new fill areas at the site.

3.5 Mortality through collision with vehicles

Current quarry operations and the fill operations will only take place during daylight hours when bats are roosting and there will therefore be no risk of bat mortality through collision with vehicles.

3.6 Habitat change through creation of edges

Vegetation clearance will comprise sequential removal of discrete patches of vegetation and therefore no new edge will be created.

3.7 Changes in behaviour

The description of this potential effect in Jones *et al.* (2019) is specifically related to the impacts of roads being built through bat habitat. The changes in behaviour outlined by Jones *et al*. (2019) are therefore not relevant to this project.

4. WILDLIFE ACT AUTHORITY PERMIT

All indigenous bats are fully protected under the Wildlife Act (1953) and a permit under the Wildlife Act must be obtained from the Department of Conservation before works can commence, or any indigenous bats are handled.

All bat surveys and felling of potential roost trees must only take place under the supervision of a Department of Conservation-approved bat ecologist holding the correct certifications. Consultation with the Department of Conservation has indicated that a "Catch alive and handle" permit is required before tree felling commences. If the Tree Removal Protocol described below is fully implemented the likelihood of a bat being in a tree when it is felled is very low. However, the small size and cryptic behaviour of bats means that a bat may be missed. The "Catch alive and handle"

permit will allow the approved bat ecologist to legally handle a bat should the worst happen and one be found after a tree is felled. An Accidental discovery protocol detailing how to care for bats that may be found following tree felling is provided below.

Permits are issued for a fixed term and therefore multiple permit applications may be required over the life of this project. The permits are held by the landowner and handling can only be undertaken by the ecologists named on the permit, or by people under their direct supervision. Should project personnel change, a variation request naming the new ecologist(s) must be submitted to the Department of Conservation before any further work can be undertaken under the permit.

5. TREE REMOVAL PROTOCOL

5.1 Overview

The confirmed presence of long-tailed bats at the site requires that all potential roost trees are inspected by an arborist under the supervision of an ecologist before they are felled. The following protocols are based on 2019 Department of Conservation tree removal protocols (DOC-5952435) and they should be implemented during the tree felling process.

5.2 Seasonal restrictions

Table 1 summarises when each of the actions outlined below can be undertaken.

Table 1: Summary of timing restrictions for bat monitoring and tree felling

Activity	Season when it can be undertaken
Roost tree assessment	All year
Acoustic monitoring	1 October-30 April, inclusive
Pre-felling inspections and felling of roost trees	1 October-31 October and 1 March-30 April, inclusive

5.3 Roost tree assessment

Prior to vegetation clearance, potential roosts will be identified during a bat roost survey carried out by the Supervising Bat Ecologist (SBE). This survey is not dependent on bat activity and can be undertaken at any time of the year. Trees greater than 15 centimetres in diameter within the vegetation clearance area must be systematically surveyed to identify trees that contain one of more of the following features:

- Cracks, crevices, fractured limbs, or other deformities, large enough to support roosting bat(s).
- Sections of loose flaking bark large enough to support roosting bats.
- A hollow trunk, stem or branches.

- Deadwood in canopy or stem of sufficient size to support roost cavities of hollows.
- Dense epiphyte clumps.

Each potential roost tree must be marked, photographed, described, and its location recorded using a GPS unit.

5.4 Acoustic monitoring

(a) Acoustic monitoring aims to minimise the likelihood of carrying out pre-felling inspections on an active bat roost tree (i.e. a tree in which bats are roosting on the day of inspection). This can help to minimise unnecessary disturbance to roosting bats.

(b) At least one ABM will be deployed within areas of appropriate habitat (as determined by a pre-construction bat roost survey), at least two days prior to the first day of proposed inspections and felling. ABMs will be set to start recording half an hour prior to sunset and stop half an hour after sunrise. ABMs have a detection radius of around 30 metres and ABMs will be placed at 40 metre spacing through the clearance to ensure full coverage.

(c) ABM recordings will be analysed by the SBE at the beginning of each day of proposed inspections and felling. Particular attention will be given to bat activity levels over the last hour before sunrise.

(d) If the SBE identifies relatively high levels of bat activity on any ABM across the area designated for clearance during the last hour before sunrise (i.e. there is a high likelihood that bats are roosting within trees in the area), no tree inspections or felling will occur this day within the vicinity of that ABM.

(e) Otherwise, the SBE will advise on the areas with no, or very low, bat activity in the hour before sunrise, and these areas will be prioritised for inspections for this day only, where this is practical.

5.5 Pre-felling surveys and inspections

(a) Felling of canopy trees and potential or identified bat roost trees shall not be carried out during the period when bats are likely to be either heavily pregnant or non-volant[1] young may be present (November to February inclusive) or during the colder months (temperatures <10°C in first four hours after sunset) when bats are less likely to be active (Smith *et al*. 2017).

(b) All trees that contain potential bat roosts will need to be climbed and visually inspected by an arborist on the day of proposed felling. The arborist will photograph/video/communicate any potential evidence of bats (e.g. staining, cavities, guano) to the SBE, and use a bat detector to detect social and echolocation calls from any roosting bats. All evidence provided by the arborist will be reviewed by the SBE.

[1] Unable to fly.

(c) The arborist will take care while climbing trees to avoid disturbing, removing, or destroying bat roost features such as large sections of loose bark or cavities in dead wood.

(d) If no evidence of bats or their sign is found following inspection, the tree can be felled on the same day only. The SBE will need to be on-site for the duration of all tree felling operations to advise staff should bats be detected and to inspect each felled tree for signs of bat roosts.

5.6 Communications

Once the results of the visual inspections have been assessed by the approved SBE the following communication procedures shall be implemented:

(a) If no bats are sighted or detected, the SBE will give permission to the arborist for the affected tree(s) to be felled. At the completion of all tree felling an email report will be sent to a representative of the Department of Conservation that summarises the results of the survey.

(b) If the SBE considers that bats are roosting within the trees that are scheduled to be felled, they will inform the arborist and designated representative of Gleeson Quarries Huntly Ltd and Gleeson Managed Fill Ltd that the affected tree(s) cannot be felled. In addition, an email will be sent to a representative of the Department of Conservation detailing the results of the survey.

(c) A record of any trees containing bat roosts will be kept, detailing the size, location, and type of tree.

5.7 Dead or injured bats

(a) Any bats that are found during felling either trapped within a roost or on the ground will require handling and/or short-term retention (e.g. dead or possibly injured bats) and should be inspected by the SBE. There must be bags and/or other equipment at the felling site, ready to hold any captured bats. If bats are confirmed to be using the site prior to construction, wildlife veterinarians may be contacted to let them know that there is some risk of bats being injured and requiring veterinary care over the coming weeks. All bats that are found post-felling must be taken to a vet for triage or further care. Wildlife vets at Hamilton Zoo or Global Veterinary Services at 308 Gordonton Road, Gordonton are considered to be the most suitable options within close proximity to the project area. Any bats found on the ground must be kept for observation for three days, and they should not be allowed to enter torpor during this time so that any injuries/severe bruising are able to be observed and treated. Mealworms should be available in case bats need to be held for observation. The vet must be prepared to give the bat sub-cutaneous fluids due to the likelihood of bats becoming dehydrated.

Vets should be provided with 'Initial veterinary care for New Zealand Bats' (Wildland Consultants 2019[1]), which was prepared for the Department of

[1] https://cdn.ymaws.com/www.nzva.org.nz/resource/resmgr/docs/other_resources/Initial_Vet_Care_NZ_Bats.pdf

Conservation, Wildlife Society of the New Zealand Veterinary Association, and the New Zealand Transport Agency.

(b) Injured bats should be immediately taken to a vet for assessment. Bats which have obvious injuries that are assessed as being serious, or likely to reduce their ability to function independently long-term, should be assessed promptly using criteria for euthanasia. Bats should be placed within a cotton or similar material bag in a cool, quiet, dry location during transport. If the vet has no experience with bat care then it is recommended that they contact a bat specialist for advice. The bat specialist should be contacted prior to felling/vegetation removal taking place so that they are aware of the timing of operations.

(c) The Department of Conservation (nearest District Office, or office that has been involved in/is aware of the process, or Department of Conservation Hotline if after hours[1]) should be contacted no longer than two hours after a potentially injured or dead bat is found.

(d) Any bat that is found dead or must be euthanised will be returned to the local Department of Conservation Office.

(e) Department of Conservation advice should be sought with regards to the rehabilitation requirements of any injured bats. For example, legislative requirements will need to be considered.

(f) Any rehabilitated bat should be released in the same general location in which it was found. Such releases should occur after works at the release site have been completed.

5.8 Accidental discovery protocol

If bats are not detected during survey work, but subsequently found during construction activities, then works must stop immediately. The site supervisor will immediately contact Wildland Consultants and the appointed SBE should undertake a site visit to assess the situation. In the event that a bat is discovered on the ground or injured, the SBE will follow the protocols outlined above (Section 4.2.5).

6. REPLACEMENT OF POTENTIAL BAT ROOSTING TREES

6.1 Overview

Checking trees for bats before felling is the first step in the mitigation process for the loss of potential roost tree loss. Additional mitigation for the loss of potential roosts should be provided in the form of artificial roosts to replace the loss of potential roosts and by planting of appropriate indigenous cavity-bearing trees. Installation of artificial roosts will take place within a 'Bat Reserve' to the east of FA5 (Figure 1).

[1] After Hours - Phone: 0800 DOCHOTline (0800 362 468).

Two forms of artificial roosts are proposed - chainsaw hollows and artificial roost boxes. Chainsaw hollows are a relatively new method of providing artificial roosting habitat. As they are currently unproven in New Zealand, artificial roost boxes will also be installed.

6.2 Bat reserve

An area of planted radiata pine (*Pinus radiata*) to the east of FA5 will be enhanced to provide additional bat roosts to replace those removed during works at the site. At the time of writing (4 March 2019) the exact area of the Bat Reserve has not been fully determined; however, it will be in the general area shown in Figure 1 and it will be no less than 1.5 hectares in area. The trees are in >20 metres tall and >30 centimetres in diameter making them a suitable size to attach artificial roost boxes to and to create chainsaw hollows. The eastern edge of the existing vegetation is around 100 metres from the Waikato River and previous research has shown that female bats select roosts within 150 metres of waterways (Borkin and Parsons 2011). With the exception of relatively low-stature willows (*Salix* sp.) on the water's edge, there is little vegetation within 150 metres of the river and therefore provision of artificial roosts in close proximity to the river could provide significant benefits to the local bat population. The Bat Reserve will be fenced to protect natural indigenous plant regeneration underneath the pine canopy and it will be protected in perpetuity.

Figure 1. Proposed bat reserve area at Gleeson Quarry, Huntly. Plan provided by Paua Planning Ltd 28 February 2020.

6.3 Chainsaw hollows

A recent study in Australia concluded that artificial roosts created by making a hollow in a live tree using a chainsaw had better thermal insulation properties than artificial roost boxes, and therefore provide better roosting conditions (Griffith *et al*. 2018). As stated above, this technique does not appear to have been trialled in New Zealand; however, advice received from the Department of Conservation is that chainsaw hollows show promise and should be used in this project (A. Styche, Department of Conservation, pers. comm.).

Chainsaw hollows will be created according to the methods outlined below:

- Suitable trees for chainsaw hollows will be identified by the SBE and the lead arborist. Hollows will only be created on trees with a minimum diameter at the point of installation of 30 centimetres. Hollows will be created 5-7 metres off the ground and there must be enough clear space in front of the hollow to allow bats to swoop down and away when emerging. Hollows should be placed at different heights and different orientation to replicate the variation found in natural roosts (Griffiths *et al*. 2018).

- Hollows will be created using an upwards plunge cut at an angle of approximately 60 degrees. The chainsaw blade will be held vertically in order to create a vertical slit entrance measuring 2 x 15 centimetres with a depth of 25-30 centimetres.

- One chainsaw hollow will be created or each potential bat roost felled. The total number of potential bat roosts felled will be determined by the bat specialist present on site during vegetation clearance, noting that one tree may contain multiple potential roosts.

- Predator-exclusion metal bands, or bands of other suitable material, must be placed above and below the chainsaw hollow and must entirely circle the tree/branch. An arborist with experience in installing predator-excluding bands should be engaged for installation. If predator-exclusion bands cannot be installed another tree must be chosen.

- Monitoring of chainsaw hollows and predator-exclusion bands should occur annually for 15 years after creation. Hollows should be carefully inspected for signs of bat activity such as faeces, staining, odour, and the absence of spider webs over the hollow entrance. If bark has started to grow across the entrance this should be removed to keep the hollow accessible to bats. Monitoring should occur between 1 September and 1 November each year to avoid disturbing heavily pregnant bats.

6.4 Artificial roost boxes

In order to provide alternative bat roosts in the short-term, five artificial roost boxes per Fill Area (i.e. 10 total) will be installed prior to vegetation clearance. The roost boxes will be installed according to the methods outlined below:

- These boxes should be Schwegler-type boxes constructed from Woodcrete (a cement-bonded wood fibre mix). Bat roost boxes made from Woodcrete have

been shown to provide better thermal insulation properties than boxes made from timber (Griffith *et al*. 2018). It is understood that trials are being undertaken by the Department of Conservation investigating the effectiveness of different models of bat roost boxes. It is therefore suggested that advice is sought from Department of Conservation bat specialists before roost boxes are installed to ensure the most effective model(s) are chosen. An image of a Schwegler bat box is provided below:

[1]

- Predator-exclusion metal bands, or bands of other suitable material, must be placed above and below the bat box and must entirely circle the tree/branch. An arborist with experience in installing predator-excluding bands should be engaged for installation. If predator-exclusion bands cannot be installed another tree must be chosen.

- Bat boxes must be installed with oversight from a suitably qualified bat ecologist who will advise on the placement (i.e. location, orientation, and height) of each box. All boxes will be placed in trees, ideally at least five metres above the ground. There must be enough clear space in front of the bat box to allow bats to swoop down and away when emerging. Boxes should be placed at different heights and different orientation to replicate the variation found in natural roosts (Griffiths *et al*. 2018).

- Monitoring and maintenance of all bat boxes and predator-exclusion bands must be carried out annually for 15 years following installation to determine if bats are using them. The condition of each bat box should also be monitored at the same time, and replacement and maintenance must occur as required. Replacement and maintenance of boxes and predator-exclusion bands should occur as required between 1 September and 1 November each year to avoid impacts on heavily

[1] Image sourced from https://www.hornbeamwood.org.uk/product-page/schwegler-2f-bat-box

pregnant females and non-volant young. Boxes should be designed with a slight 'lip' to catch bat faeces, which will serve as an indicator of use.

7. CONCLUSION

Vegetation clearance for the creation of new fill areas at Gleeson Quarry, Huntly will require the removal of vegetation that provides potential roosting habitat for long-tailed bats.

A Tree Removal Protocol has been provided. Following this protocol will minimise the risk that long-tailed bats are injured or killed during tree felling.

Additional mitigation will be provided in the formation of a Bat Reserve in radiata pine forest to the east of FA5. This forest is approximately 100 metres from the Waikato River and it is known that female long-tailed bats prefer to roost within 150 metres of waterways. The absence of suitable roost trees within 150 metres of the river suggests that the provision of artificial roosts in the Bat Reserve will be beneficial to the local bat population. The Bat Reserve will be fenced and protected in perpetuity.

Artificial roosts will be provided in the short term through the creation of chainsaw hollows in suitable trees and installation of roost boxes.

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REFERENCES

Borkin, K.M. and Parsons, S., 2011. Sex-specific roost selection by bats in clearfell harvested plantation forest: improved knowledge advises management. *Acta Chiropterologica*, *13*(2), pp.373-383.

Griffiths, S.R., Lentini, P.E., Semmens, K., Watson, S.J., Lumsden, L.F. and Robert, K.A., 2018. Chainsaw-carved cavities better mimic the thermal properties of natural tree hollows than nest boxes and log hollows. *Forests*, *9*(5), p.235.

Jones C., Borkin K., Smith D. 2019: Roads and wildlife: the need for evidence-based decisions; New Zealand bats as a case study. *New Zealand Journal of Ecology DOI*: https://dx.doi.org/10.20417/nzjecol.43.26.

O'Donnell C.F.J., Pryde M.A., van Dam-Bates P., and Elliott G.P. 2017: Controlling invasive predators enhances the long-term survival of endangered New Zealand long-tailed bats

(*Chalinolobus tuberculatus*): implications for conservation of bats on oceanic islands. *Biological Conservation 214*: 156-167.

Scrimgeour J., Beath A. and Swanney M. 2012: Cat predation of short-tailed bats (*Mystacina tuberculata rhyocobia*) in Rangataua Forest, Mount Ruapehu, Central North Island, New Zealand. *New Zealand Journal of Zoology 39*(3): 257-260. DOI:10.1080/ 03014223.2011.649770

Smith D., Borkin K., Jones C., Lindberg S., Davies F., and Eccles G. 2017: Effects of land transport activities on New Zealand's endemic bat populations: reviews of ecological and regulatory literature. Appendix C: The relationship between traffic intensity and long-tailed bat activity along New Zealand highways. *NZ Transport Agency Research Report 623*. p 146-159.

Wildland Consultants 2019: Initial veterinary care for New Zealand Bats. *Wildland Consultants Ltd Contract Report No. 4984*. Prepared for Department of Conservation, Wildlife Society of the New Zealand Veterinary Association, and New Zealand Transport Agency. 66 pp.

Wildland Consultants 2020a: Long-tailed bat surveys at Gleeson Quarry, Huntly. *Wildland Consultants Lt Contract Report no. 5208b.* Prepared for Gleeson Quarries Huntly Ltd and Gleeson Managed Fill Ltd. 10 pp.

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