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To: Permissions and Planning – J Brennan & L Croft

From: Terrestrial Science – J Marshall, C Mealey

Subject: Karangarua – Sugar Loaf Quarry

Context

An application for an Access Arrangement over a 181ha Mining Permit Area between the Ohinetamatea River and the Karangarua River was received by the Department and a report on the biodiversity values of the area was prepared for the Permissions process (doccm 6389887). The 181ha site on the glacial moraine is ecologically significant and within the World Heritage Area.

The initial application has been superseded by a revised application for 15ha of the initial 181ha application. This report identifies the local terrestrial biodiversity values of the 15ha area and likely impacts of the activity on those values.

A site visit was undertaken on Thursday 1st October 2020, by Jane Marshall and Cassie Mealey (Technical Advisors, Ecology), Lucy Croft (Permissions Advisor) and Michael McMillan (Community Ranger) with Mackley Ferguson, the applicant.

DESCRIPTION OF THE AREA

a. Location and Landform

The proposal is situated in the Karangarua Ecological District at Karangarua, on the true right of the Karangarua river, off State Highway 6 (Fig 1 and 2). The Karangarua district covers the recent low alluvial terraces and extensive wetlands

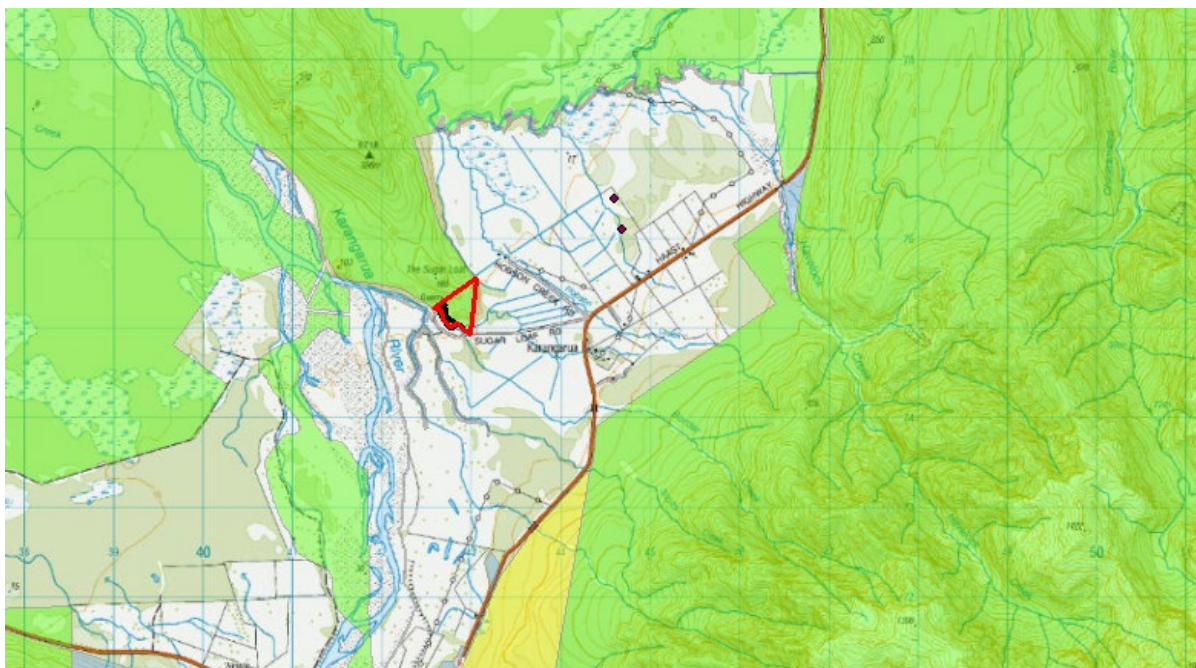


Figure 1: Application area (red outline) public conservation land (green and yellow).

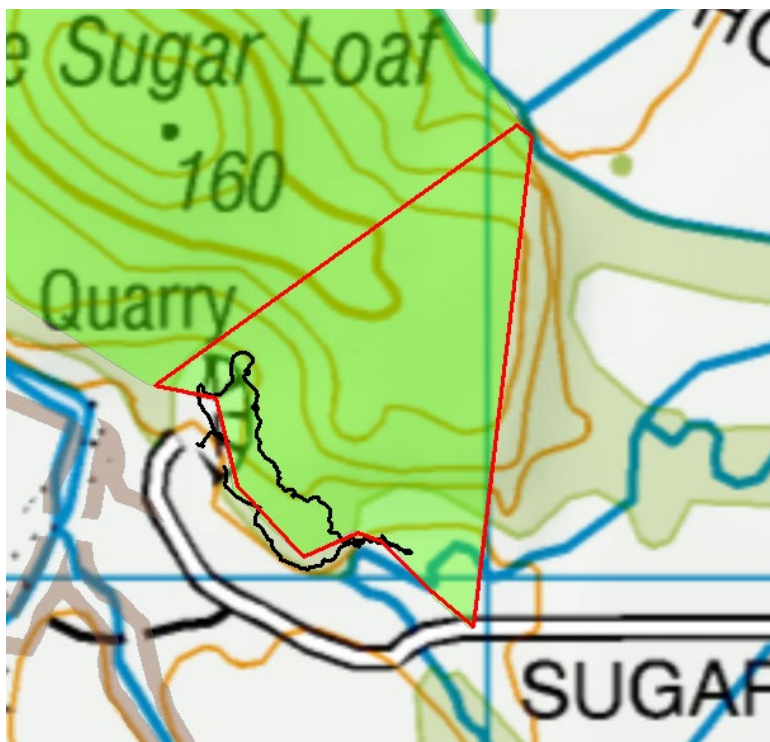


Figure 2 Location of the 15ha Application (red line) on public conservation land (green). Track walked on field trip (black line)

The application area is on the toe slope of a glacial morainic deposit. The Land Environments of New Zealand (LENZ; Leathwick et al 2002) classification identifies three land environments (Fig 3) within the 15ha footprint:

- 75% is a O1.4 land environment
- 22% is a O2.1 land environment
- 3% is an M1.1 land environment

The scale of the LENZ classification can result in finer grain environmental details being lost particularly in the glacial (O) landscapes and at the boundaries of the land environments. However, at the scale predicted by LENZ all of these land environments are well represented in public conservation land in this Ecological District. Similar forest associations to the O land environments will be found at Mt Arthur, behind the Lake Kini wetland on Bannockbrae and on pcd around Jacobs River. The M environments are found more commonly on private land.

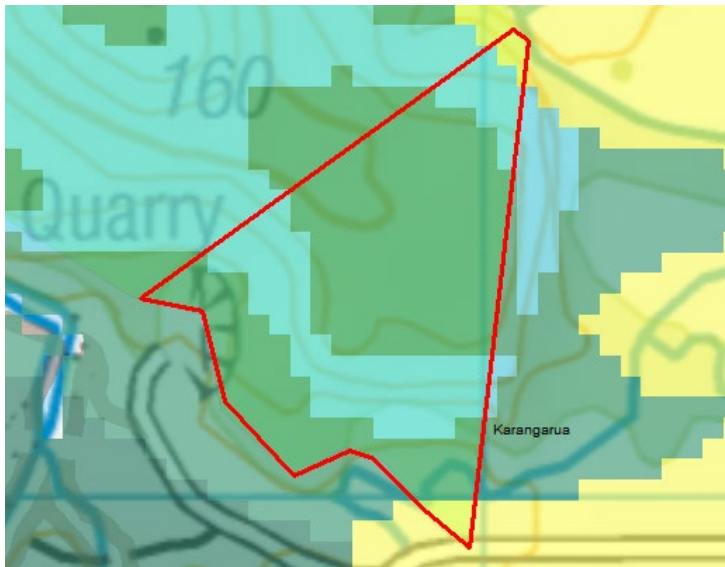


Figure 3: Land environments of New Zealand classification

b) Vegetation and Flora Values

Within the 15ha the vegetation is a good quality representative example of a forest type typical of moraine and hillside vegetation in South Westland. The structure of the forest is relatively intact with good ground cover, shrub, subcanopy and canopy layers, and emergent individuals, primarily rimu, but including kahikatea, totara, southern rata and miro. The most common species of forest trees on the hillslopes are rimu, kahikatea, kamahi, miro and pigeon wood. The M1.1 area (south east area below 20m contour line) supported kahikatea, totara and matai on the more fertile surfaces with numerous small trees and shrubs including Raukawa anomalous, *Coprosma rotundifolia*, *C propinqua*, *C robusta* and *Penantia croymbosa*. The footprint supports a mix of young, seral vegetation which reflects the disturbance history of the site, amongst areas of intact forest with functioning tiers and emergent podocarps; the canopy is not continuous over the site and reflects a pattern of past natural disturbance. The emergent trees are likely over 500yrs old, and there are many of these very old individuals on site (Fig 4).



Figure 4. Image of canopy cover and many emergent crowns of individuals greater than 500yrs old.

Fauna Values

Fauna values that were observed onsite included habitat for a variety of native bird, gecko and skink species and potential bat roost trees (trees greater than 15cm diameter at breast height (DBH) with hollows, flaking bark, epiphytes).

Lizards

Lizards may be present within the area, however, are likely to be in low densities based on the habitat type. Forest geckos (*Mokopirirakau granulatus*; Threatened - Nationally endangered) may reside within the forest. The speckled skink (*Oligosoma infrapunctatum*; At Risk - Declining) may potentially be found amongst shrubs on the outer edges of the forest. There would be limited advantage to undertaking a lizard survey at the site given that a no detection result could be a false negative based on the low density of lizards. There isn't currently a better method of detecting lizards in this forest type available. Actions within the construction and operation may be modified to assist with the preservation of lizards during vegetation removal. Actions may include, felling during warmer months (October to April) when lizards are active and able to move out the way and leaving felled vegetation onsite for 2- 3 weeks to allow any lizards caught in the vegetation to escape.

Bats

The Department's database shows that long-tailed bats (*Chalinolobus tuberculatus*; Threatened – National Critical) have been recorded (during the early 1980's) between the Karangarua and the

Ohinetamatea Rivers and surrounding areas. Long-tailed bats are extremely rare and have been assigned to the category that is most at risk of extinction, Threatened - Nationally Critical. The site visit identified several large trees (greater than 15cm diameter at breast height (DBH)) with bat roost features (hollows, flaking bark, epiphytes) at the site which could be used as bat roosts.

Given bats have been recorded in the area habitat and the presence of bat roost habitat, it is recommended that a suitably qualified ecologist undertake a bat survey of the area to be cleared. The survey will assess whether bats are utilising the area and potentially roosting in the trees to be felled. Automatic acoustic recorders can be used in the area to detect bats. A bat survey using acoustic recorders typically involves placing recorders out for 10 fine weather nights in the season bats are active (October to April, with night temperatures of at least 7 degrees). Protocols on detecting bats are available here: <https://www.doc.govt.nz/our-work/biodiversity-inventory-and-monitoring/bats/>.

If bats are not identified through the acoustic recorder survey, the works may operate as planned. Should bats be identified as using the site, a bat management plan is to be developed prior to any works. The management plan should follow a avoid, remedy and mitigate line of thinking whereby bat roost trees are first avoided, secondarily moved and if unavoidable, felled (once vacated by bats). If potential bat roost trees are to be felled, a tree removal protocol is to be developed to ensure bats are not directly harmed. An ecological consultant is to be engaged to write and implement the tree removal protocols. The Department of Conservation may be involved in assessing these protocols through the RMA process or an application for a Wildlife Act permit. Tree removal protocols for bats are currently in draft and the Department can provide them on request.

Birds

During the site visit, several birds were observed or heard including, piwakawaka, bell birds, brown creeper, grey warbler, tui, kea (flying overhead), paradise shelduck (flying overhead), common chatfinch. At Risk birds that may be utilising the habitat may include pipit (Declining), and fernbird (Declining) and threatened species include the falcon (Nationally Vulnerable), kea (Nationally Endangered), and kākā (Nationally Vulnerable). Birds are mobile and are able to avoid disturbance with the exception of the breeding season.

Summary

Given that the habitat to be affected is modified and the proportion of habitat proposed to be cleared is on the edge of a larger continuous forested area, it is unlikely the works will have a substantial effect the population viability of any fauna species. It is acknowledged that it will take a large amount of time to replace the habitat lost and in the case for bat roosts, potentially centuries. The greatest risk to fauna from this proposal is through direct harm associated with individuals or groups of species being entangled in the vegetation clearance. This can be mitigated through construction management plans and bat tree removal protocols.

Biodiversity Values of the application Area

Representativeness; The area immediately around the old quarry site is not representative of the original forest values, as it has been modified by past use. Most of the 15ha is a good example of a representative forest type.

Naturalness: Most of the 15ha is a relatively natural site with few exotic plant species but with a range of pest animal species present including deer. The area immediately around the old quarry site is likely to be of lesser value as the vegetation likely contains a greater abundance of exotic plant species and younger, seral native vegetation.

Diversity and Pattern

The vegetation of the moraine, and the vegetation of the lower, flat topography to the west of Sugarloaf are different, with the vegetation association on the flat terrane likely supporting large

podocarps including matai, whilst vegetation on the slopes of Sugarloaf are a more mixed podocarp broadleaf association, found commonly on hillsides in the Ecological Region

Rarity and Special features

No Threatened or At-Risk species of plants were identified on the field trip or recorded in Bioweb although the Karangarua riverbed is habitat for the Nationally Vulnerable species *Carmichaelia juncea*. The area provides habitat for Threatened fauna species.

Ecological Context: The value of the connection with other conservation land is highest in north west of the old quarry site, and of least value immediately around the old quarry itself. This south eastern tip of the morainic feature is surrounded by developed land and human infrastructure.

Impacts of the activity and opportunities to avoid, remedy or mitigate the activity

The activity of rock quarrying removes the natural landform and the vegetation of the site. From my understanding there is no recovering of the natural landform post mining, although with good planning and excellence in operational activity revegetation can be given a “leg up” through a work plan which allows sequential mining and restoration, good restoration planning which focuses on separation of any topsoil and organic material for restoration, appropriate numbers and species for restoration of the site post mining and pest plant and animal control. Any opportunity to use transfer of vegetation and soils to the resultant landform would provide further opportunity to remedy and mitigate the effects of removing approx. 14ha of natural, native forest cover.

Conclusion

The values found on the application area are found elsewhere in the Ecological District and in the Ecological Region, but the area is part of a nationally significant ecological system and the landform cannot be restored once the activity has occurred. The application will result in the loss of approx. 14ha of natural native forest and many dozens of individual trees of great age (>500yrs). This 14ha represents a small proportion of similar forest in the Ecological District. Mining in this reduced, modified area is unlikely to significantly reduce the value of the wider area for nature conservation. This loss of biodiversity value over the site can be mitigated, though not replaced, with best practice and planned mining operation, fauna mitigation techniques and restoration techniques.

The greatest risk to fauna from this proposal is through direct harm associated with individuals or groups of species being entangled in the vegetation clearance. This can be mitigated for through the development and implementation of management controls. For lizards, this includes felling during warmer months (October to April) when lizards are active and able to move out the way and leaving felled vegetation onsite for 2- 3 weeks to allow any lizards caught in the vegetation to escape. A bat survey should be under-taken prior to work beginning, to assess the presence of bats onsite, given the availability of roost trees, sightings in the area and the Nationally Critical status of the long-tailed bat. If bats are not detected, works may operate as intended. If bats are identified to be using the site, a suitably qualified ecologist should be engaged to develop a bat management plan including a roost tree removal protocol that reduces the risk of direct harm to bats. A Wildlife Act permit will be required from the Department to undertaken the tree removal protocol if bats are present.