Attachment E1
Ecological Impact Assessment

Moerangi Tourism Accommodation and Track Development

Ecological Impact Assessment

Prepared for: Manaaki Group Holdings Ltd [Manaaki GH Ltd]

Nicholas Singers
Ecological Solutions
innovation in conservation

NSES Ltd report 8:2018/19

Author(s): Nicholas Singers for Nicholas Singers Ecological Solutions Ltd
Date: May 2018

DISCLAIMER

This report has been prepared by Nicholas Singers Ecological Solutions Ltd (NSES Ltd.) exclusively for and under contract to Manaaki Group Holdings Ltd. Unless otherwise agreed in writing by NSES Ltd., NSES Ltd. accepts no responsibility for any use of, or reliance on any contents of this report by any person other than Manaaki Group Holdings Ltd and shall not be liable to any person other than Manaaki Group Holdings Ltd, on any ground, for any loss, damage or expense arising from such use or reliance.

This work is subject to copyright. The copying, adaptation, or issuing of this work to the public on a non-profit basis is welcomed. No other use of this work is permitted without the prior consent of the copyright holder(s).

Contents

Contents 3
1. Introduction 4
1.1 Whirinaki – Te Pua-A-Tāne Conservation Park Management Plan 4
1.2 Assessment of significance of habitat 5
2. The Proposal 7
2.1 The Proposed Track 7
2.2 The Lease site 8
3. The Environment, Ecology and Conservation Values 10
3.1 Forest description 10
3.2 Indigenous fauna 12
3.3 The Social Environment 12
4. Assessment of significance of the habitat 12
5. Determination of effects 15
5.1 Temporary effects 16
5.2 Permanent effects 16
5.3 Cumulative effects 19
5.4 Remediation measures 20
5.5 Mitigation of effects 21
5.6 Recommended monitoring of effects 21
6. Summary of effects and conclusion 21
References 23

1. Introduction

The Department of Conservation requested more information on the effects on vegetation of this Proposal. This assessment of ecological effects has been prepared in-line with the Department of Conservation's guide to preparing an EIA. The report however considers additional impacts associated with the Proposal, in relation to values identified within the Whirinaki – Te Pua-A-Tāne Conservation Park Management Plan. The report:

- Describes the proposed activity (Section 2 'The Proposal')
- Details the physical and social conservation values affected by the Proposal considering Davis *et al.* (2016) (Section 3)
- Assesses the significance of the habitat and conservation values (Section 4)
- Determines potential effects of the Proposal, both positive and adverse and measures taken to avoid, remedy and mitigate adverse effects and monitoring of these (Section 5)
- Summarises the significance of these effects and conclusions (Section 6)

Pertinent information informing this Proposal includes the Whirinaki – Te Pua-A-Tāne Conservation Park Management Plan and the Department of Conservation guidelines for assessing significant ecological values (Davis *et al.* 2016).

1.1 Whirinaki – Te Pua-A-Tāne Conservation Park Management Plan

Whirinaki Te Pua-a-Tāne is classified as a Conservation Park under section 19 of the Conservation Act 1987. Whirinaki Te Pua-a-Tāne Conservation Management Plan was released in October 2017 and is the statutory document that guides development in the Park. The Plan identifies the values of the Park, establishes its strategic direction, and sets out the management objectives, policies and actions to achieve this.

The objectives of interest to the ecological values of this Proposal are the following:

- 19.1.1 The ecosystems and species are managed in a holistic and integrated manner to maintain and restore the Park's biodiversity.
- 19.1.2 Threatened species are conserved to ensure their continued persistence.
- 19.1.3 Species traditionally used by Ngāti Whare and other iwi and/or hapū for cultural purposes are identified and protected.
- 19.1.4 New pest plants and vertebrate animal pests and wild animals are prevented from becoming established in the Park.
- 20.1.1 The natural landscapes of the Park are protected and remain as close as possible to their natural state, free from adverse effects of human-induced activities.
- 20.1.2 The geological features and landforms of the Park are protected to preserve their intrinsic scenic qualities and scientific values.

The policies of interest to the ecological values of this Proposal are the following:

- 17.2.1 Give priority to education, promotion and interpretation programmes that:
  e) encourage people and businesses undertaking activities in the Park to adhere to activity-specific minimum impact codes (care codes) notified on the Department's

website and other voluntary minimum impact codes developed in relation to the Park.

- 19.2.1 Give priority to protecting the following ecosystems and areas from threats
  c) rivers and their margins.
- 19.2.2 Prioritise the protection of, and manage threats to, threatened species including but not limited to those identified:
  a) whio/blue duck;
  b) North Island brown kiwi;
  c) North Island kākā;
  d) short-tailed bat;
  e) pekapeka/long-tailed bat;
  f) New Zealand falcon.
- 19.2.3 Work in partnership with Ngāti Whare, other iwi and/or hapū and the community to protect locally valued natural heritage, including but not limited to those identified:
  b) pirita/scarlet mistletoe;
  c) pirita/yellow mistletoe;
  d) pirirangi/red mistletoe.
- 20.2.1 Avoid undertaking vegetation clearance, earthworks or locating buildings and structures on ridgelines and other prominent landforms and features.
- 20.2.2 Protect the natural and scenic values of the Park's landscapes from potential adverse effects.
- 20.2.3 Avoid or minimise adverse effects arising from buildings and structures through careful consideration of scale, location, orientation, design and material and colour.
- 25.1.4 Should apply the following criteria, in addition to any activity-specific criteria, when assessing the effects of proposed activities:
  b) any measures that can reasonably and practically be undertaken to avoid, remedy or mitigate any adverse effects of the activity including separating that activity from others in terms of time and space.
- 25.1.5 May require monitoring to be undertaken as a condition of use on any authorised activity in order to manage the effects of activities on the Park and other park users.

The Plan specifically states that "...as a Conservation Park, a wide range of uses can occur, provided Park values are also protected ... meaning there is capacity to increase visitation and to provide a wider range of opportunities, provided this is done in a sensitive manner."

The Moerangi Stream is specifically mentioned on page 44 of the Plan in 'Rivers and their margins' for its high water-quality, diverse range of freshwater species including tuna/eel and the whio.

This report has been prepared considering these policies and objectives.

1.2 Assessment of significance of habitat

This development Proposal was assessed using the Department of Conservation's Guidelines for Assessing Ecological Values (Davis *et al.* 2016). These guidelines are aimed at assisting DOC staff to assess ecological values in a consistent and robust way. However, the guidelines are not specific to DOC, as the approach outlined can be used by others involved in ecological assessments (e.g.

councils). The assessment has mainly focused on the values of the vegetation and plant communities.

2. The Proposal

The Proposal involves building a walking track up to 1250 metres long to a small complex of buildings (known here after as the Lease site) in the upper Moerangi Stream (Whirinaki Conservation Park). The lease site includes a small kitchen and dining hall with staff quarters and ten client sleeping huts. This Proposal is shown and fully described in the client's application.

The upper Moerangi Stream area was visited on two occasions, initially in February 2017 and on the 4th May 2018.

2.1 The Proposed Track

Following the initial visit a draft route was plotted using QGIS, considering landforms and attempting to find the safest and shortest route possible. This was uploaded onto a Garmin Rino GPS and was used as guidance for delineating the proposed route, though changes were made onsite after finding better alignments. The route was walked on the 4th May 2018, and a GPS track-log was created. From the hut, the route over the ridge to the Moerangi Stream was periodically marked with pink flagging tape. Observations, descriptions of plants and fauna seen, along with photos, were recorded in order to summarise the composition and structure of the vegetation and communities present. This track log was then displayed onto an aerial photo using QGIS, from which a shapefile was created to produce Figure 2. Using QGIS the length of the track has been calculated as being 1223 metres long. The eventual track may however be slighter longer, up to 1250 metres depending on the number of switchbacks required to reduce the gradient.

The proposed alignment was purposefully navigated along natural landform features including using existing deer tracks – deer often use the most accessible pathways through forest habitat. The track proposes to use soft design and construction approaches including:

- avoiding straight lines,
- curving around trees and tree root plates/ root zones,
- climbing steep slopes on gradual sidles, along small well defined ridges, and
- using steps in very steep locations and footbridges across small streams
- avoiding areas of saturated ground.

This design has been purposeful to avoid damage to significant trees and reduce ongoing effects such as reducing erosion of pumice soils.

From Moerangi Hut the proposed track will head upstream on the same elevated stream terrace that the Moerangi Hut is located on for 120 metres, until it reaches a small tributary stream (Figure 1). The track then will descend, via stairs, approximately 4-5 metres down into this gully crossing the small stream and ascending up the other side to another terrace at the same elevation. Here the track then follows upstream along the terrace for a further 100 metres. At this point the track starts climbing elevation and then sidles up a steep slope to the next terrace. The upper and steepest part of this climb will include between 10-20 steps. The track then gradually heads uphill within a shallow (dry) gully and then up a hill-face and onto a leading ridge for approximately 150 metres, reaching the summit at approximately 720 metres a.s.l. From this point, the track then sidles downhill, passing around the head of a steep gully and then onto a small ridge, then again sidles upstream to the edge of a defined (pumice) terrace. Below the edge of this terrace is steep and descending this

part will require another 10-20 steps, until the slope levels out. The track then gradually descends to approximately 5 metres above the Moerangi Stream. From this point it follows the true right side of the Moerangi stream — the best location will be between 1 – 5 m on the hillside above the Moerangi Stream terraces, as these are saturated ground throughout this section. This section is 360 m long to the proposed Lease site. It will require the crossing of two very small tributary streams which likely will need a small number of steps (<10 each) on both sides and potentially small footbridges across the streams.

The Proposal involves constructing this track with a small digger, with a 1 m wide blade and on completion the track will have a maximum surface area of 1250 m^2. As the design is intended to avoid trees of greater than 50 cm d.b.h., impacts on vegetation will largely be restricted to sub-canopy vegetation. Where possible, vegetation will be replanted to the side of the track targeting areas of bare ground. While much of this footprint does not contain ground cover vegetation, this Proposal assumes 100% cover and loss of habitat.

2.2 The Lease site

The Lease site includes two components, a terrace where all buildings and infrastructure will be located and a helicopter Drop Zone, shown in detail in the Lease application. The proposed building location is situated on an elevated and free draining stream terrace of the Moerangi Stream which is approximately 4-5 metres above the bed and is facing towards the west. The helicopter Drop Zone is located on the flood terrace of the Moerangi Stream and will initially be used as a site for transporting building materials. Long term it will be kept open so accessible in emergencies (Figure 2). These two areas are approximately 1100 m^2 and 600 m^2 respectively.

The Applicant cites its development at its existing Okahu valley Lease site as an example of what it intends at the Moerangi site. That is only the areas actually required for the footprint of structures, internal pathways, a small cleared recreational area and felling potentially hazardous trees near buildings for the business to comply with the Health and Safety at Work Act 2015. Even where small ferns were removed, they were replanted once the footprints for the structures were identified and cleared. For comparison the area of vegetation cleared around the Moerangi Hut is approximately 2990 m^2 for a single 9 bunk hut, helipad and toilet, more than twice the area proposed. I am advised that the Applicant has committed to adopting this same approach for the Moerangi site, so the clearance will not be 100% after construction has been completed. Regeneration will occur where this does not affect the operation of the business. However, as the vegetation within the Lease site will be human modified thereafter, this Proposal assumes that 100% loss of habitat will occur in these areas.

Figure 1: The Proposed Moerangi Tourism Accommodation and Track site

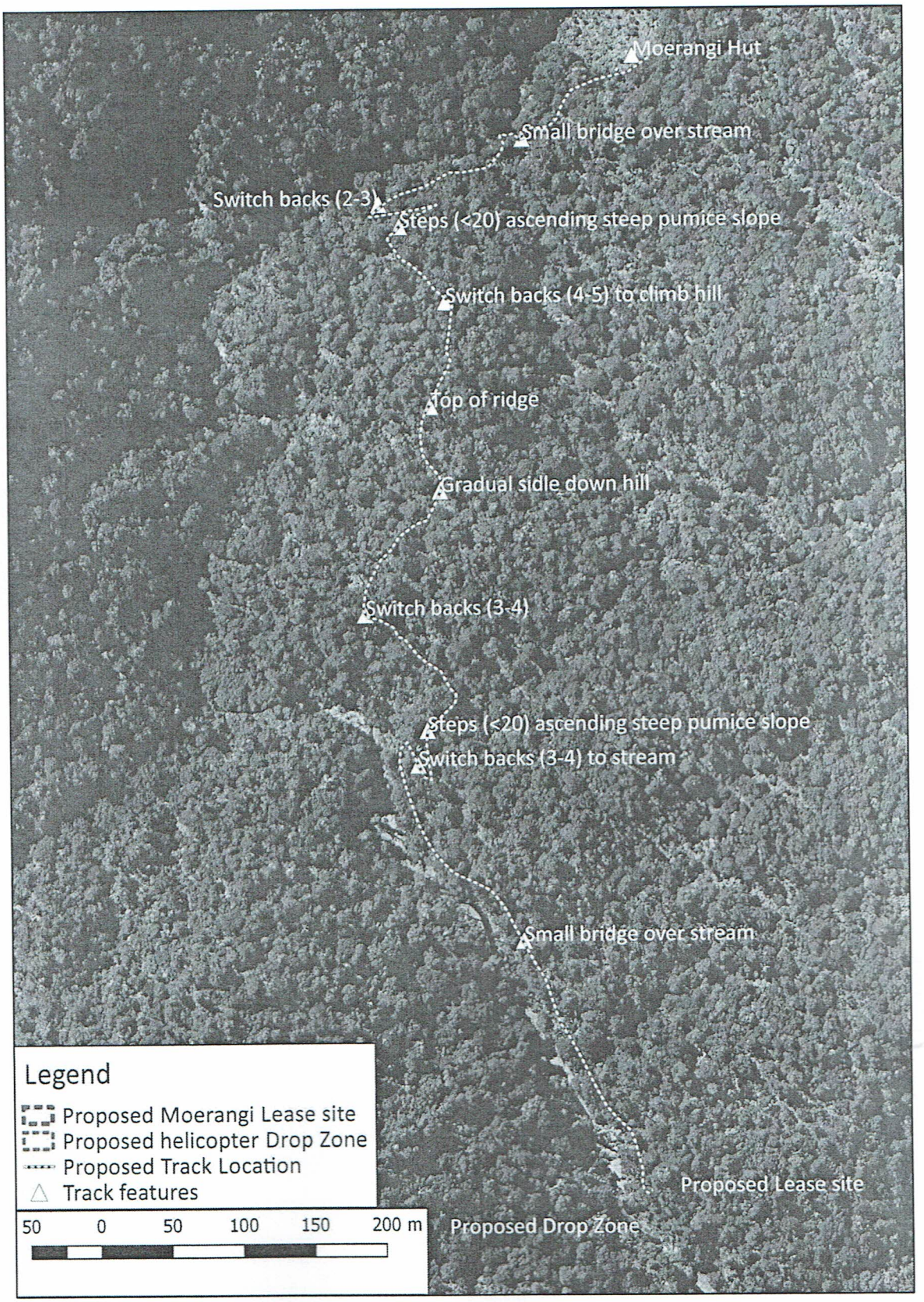
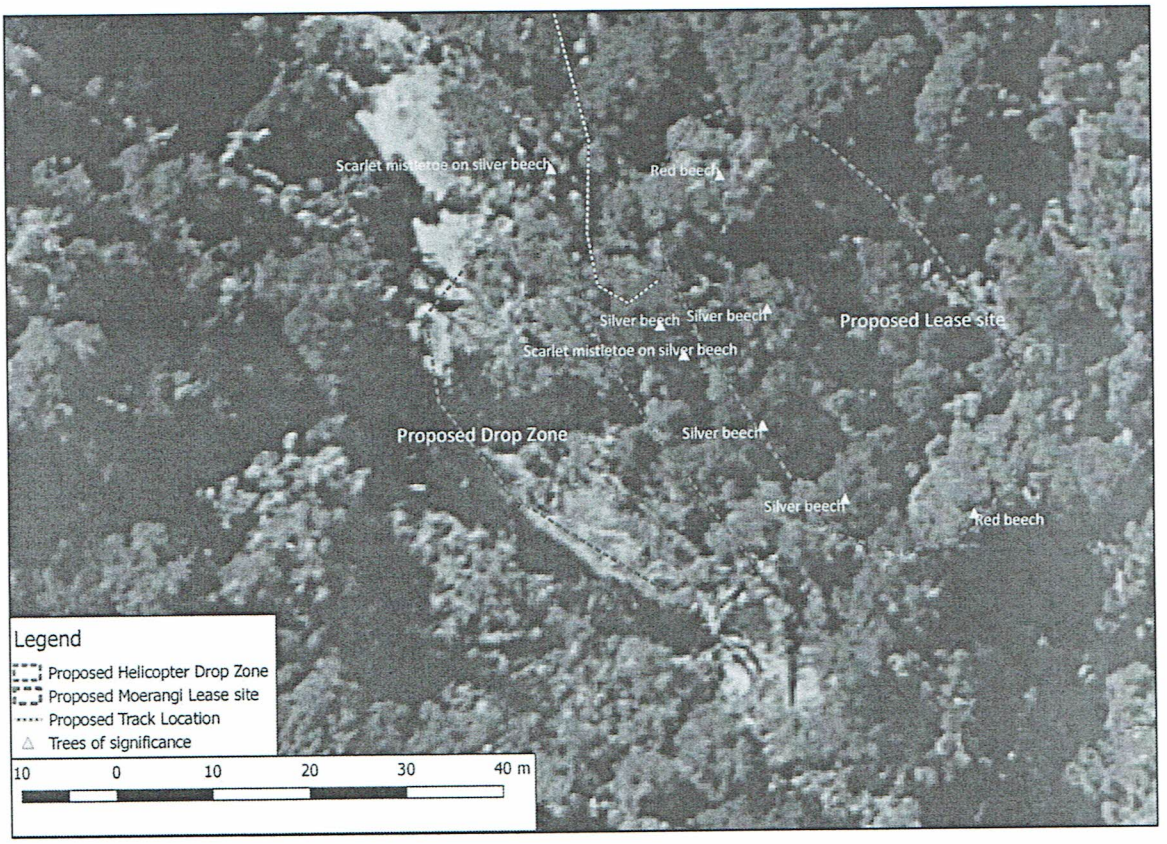


Figure 2: The Proposed Moerangi Tourism Accommodation Lease site and helicopter Drop Zone



3. The Environment, Ecology and Conservation Values

The proposed track and Lease site is situated within the upper Moerangi Stream catchment within indigenous forest covered steep hill-county, between 640 and 720 m a.s.l. The underlying geology is greywacke, much of which (at the surface at least) is highly fractured. Overlaying this is a variable layer of Taupo pumice from the 232 AD eruption. In places this still forms distinct terraces and undulating landforms especially on shallow gradient slopes, though has likely been completely eroded from steep landforms.

The vegetation was mapped by Nicholls (1969) as Type I2 and described as Rimu-miro-red beech-silver beech/ kamahi-tawari forest and is accommodated within the ecosystem, CLF10: Red beech, silver beech forest (Singers & Rogers 2014). This is a common forest type within the Whirinaki and Urewera Ranges (McKelvey 1973).

3.1 Forest description

The forest is dominated by two co-dominant species of beech, red beech (*Fuscospora fusca*) and silver beech (*Lophozonia menziesii*) with a canopy height ranging from 12–25 metres. Occasional emergent podocarp trees are present but are relatively uncommon and include, rimu (*Dacrydium cupressinum*) and miro (*Prumnopitys ferruginea*). Toatoa (*Phyllocladus glaucous*) and thin-barked totara (*Podocarpus laetus*) are also present and are largely dominated by small sized trees.

Occasional spars and logs of thin-barked totara are present indicating that this species was likely formerly more common, probably having been killed by possum browse during the post colonisation population eruption period. Downstream of Moerangi hut (outside the area of interest), kahikatea (*Dacrycarpus dacrydioides*) and black beech (*Fuscospora solandri*) occur. Matai is also likely to be present in the catchment though was not recorded along the track route. Understorey trees are relatively scattered with kamahi (*Weinmannia racemosa*) and tawari (*Ixerba brexioides*) most common and in some places form a near closed sub-canopy layer. Also occasionally present are broadleaf (*Griselinia littoralis*) and tawherowhero (*Quitinia serrata*). Understorey vegetation is relatively sparse and has been strongly influenced by red deer for over a century, as described by James and Wallis (1969) in the same forest type at Waikareiti. This vegetation tier is relatively species poor and almost entirely composed of unpalatable species. Small shrubs are most abundant on ridges of which mingimingi (*Leucopogon fasciculatus*) is most common, while other species present include stinkwood (*Coprosma foetidisma*), yellow-wood (*Coprosma colensoi*), and horopito (*Pseudowintera colorata*). Neinei (*Dracophyllum latifolium*) is locally common only on steep ridges and the track avoids areas of these. Treeferns including katote (*Cyathea smithii*) and wheki-ponga (*Dicksonia fibrosa*) occur at favourable sites such as in gullies and on stream terraces. Beech regeneration is dominated by red beech which is unpalatable, while silver beech, which is palatable, is more restricted to refugia. Climbing vines are infrequent, though taramea (*Rubus cissioides*) is the most common. Occasional mountain cabbage trees (*Cordyline indivisa*) occur, typically near shaded areas.

Excluding steep and dry ridgelines, ground cover vegetation (below 1.5 metres height) is almost entirely dominated by two species of ferns which are unpalatable to deer – crown fern (*Lomaria discolour*) and *Dicksonia lanata*. In moist areas not dominated by these two ferns, water fern (*Histiopteris incisa*), prickly shield fern (*Polystichum vestitum*), bush rice grass (*Microlaena avenacea*), hook grass (*Carex spp.*), and locally in heavily shaded locations, heruheru (*Leptopteris hymenophylloides*), kiwikiwi (*Cranfillia fluviatile*). Ongaonga (*Urtica ferox*) is occasional, typically within recent canopy gaps. Palatable understorey and ground cover species are rare and are almost entirely restricted to habitat which is inaccessible to deer such as steep locations near the Moerangi Stream. In these locations palatable species include; makomako (*Aristotelia serrata*), pate (*Schefflera digitata*), large-leaved coprosma shrubs (*Coprosma* spp.) and locally kotukutuku (*Fuchsia excorticata*).

This area is also part of the Whirinaki Ecological Management Zone, an area of a variety of forest types and habitat for numerous threatened species, within which biodiversity conservation is a focus. Possums are currently also managed by TB Free NZ to very low densities to control bovine TB. Possum control here is expected to cease by 2023 for this reason. As a result of possum control undertaken here over the last two decades, palatable species such as kamahi are very healthy. Most indicative of this is the presence of large scarlet mistletoes (*Peraxilla colensoi*), an At-risk declining species (de Lange *et al.* 2013). Five very healthy plants growing on silver beech were seen during field work — none of which were showing any signs of possum browse. Two mistletoes occur at the proposed Lease site.

3.2 Indigenous fauna

Records of common birds were made during field work, though surveys for cryptic fauna such as bats, kiwi and lizards were not undertaken as part of this assessment.

The area contains a variety of common birds and including; tomtit, grey warbler, fantail, NI robin, rifleman, whitehead, bellbird, tui, long-tailed cuckoo, shining cuckoo and kereru — all of which were observed during the site visits. Threatened species seen include whio, kaka and karearea (Robertson *et al.* 2017). During the February 2017 visit two whio pairs were seen including one pair with four class 4 subadult sized ducklings. NI kiwi is also known in the valley. While not seen or heard during field visits the area is also likely habitat for yellow crowned kakariki and long-tailed and short-tailed bats, both of which are threatened species O'Donnell et al. 2013.

The Whirinaki Plan identifies that several lizards are present within the Park including the; Auckland green gecko (*Naultinus elegans*) and the ornate skink (*Oligosoma ornatum*) both – At risk declining species. A taxonomically unnamed species, the Whirinaki skink (*Oligosoma* "Whirinaki") is also known, which is data deficient.

No fish records for the Moerangi Stream are in the New Zealand freshwater fish database. However records do exist for the Wairoa Stream which the Moerangi Stream joins — only tuna/ long-finned eel (*Anguilla dieffenbachii*) was recorded as being present. It is likely that the Moerangi Stream also has tuna and likely also koaro (*Galaxias brevipinnis*) and koura.

3.3 The Social Environment

Moerangi Hut is the centre of human activity in the upper Moerangi Stream area and is accessible by foot, mountain bike or helicopter. The hut is used by a small number of users, including backcountry trampers, mountain bikers and hunters. Based on records within the hut book, it is likely that less than 100 people per year currently stay in the hut.

Upstream of the hut, hunters and conservation workers are likely the main visitors. From the hut there is a flagged route to the leading ridge. The was no sign of human activity beyond this point, such as campsites, old fires, cut wood or plants, rubbish etc. Given this, the area currently likely receives fewer than 50 people per year that visit or travel through this area. This project may conflict with hunters' current use of the area as deer may become less abundant due to a combination of deer avoiding people and localised deer culling to promote vegetation regeneration.

4. Assessment of significance of the habitat

This development Proposal was assessed using the Department of Conservation's Guidelines for Assessing Ecological Values (Davis *et al.* 2016). These guidelines are aimed at assisting DOC staff to assess ecological values in a consistent and robust way. However, the guidelines are not specific to DOC, as the approach outlined can be used by others involved in ecological assessments (e.g. councils). The assessment has mostly focused on the values of the vegetation and plant communities.

This process identified that the area within the development footprint is ecologically significant. This is unsurprising given that the development is within a Conservation Park with active management to conserve these values.

The five criteria used for this assessment process were:

i. representativeness,
ii. diversity and pattern,
iii. rarity and special features,
iv. naturalness, and
v. ecological context.

The three management criteria — Long term viability, Fragility and Threat and Management Input were not assessed. The criteria and justifications for their significance score is presented below.

Representativeness — High

Justification = the plant communities/ habitat present are entirely typical and expected of red beech silver beech forest present within the mountain ranges north of the central volcanic plateau.

Diversity and Pattern — Medium

Justification = the plant communities/ habitat along the track alignment and Lease site are native dominant with compositional differences are most pronounced between ridge and gully habitats.

Rarity and Special Features – Low

Justification = the communities/habitat are relatively species poor and are dominated by common and widespread species that occur in beech forests that have had a long history of deer. One threatened plant; scarlet mistletoe (*Peraxilla colensoi*) an At risk – declining species (de Lange *et al.* 2013) was observed growing parasitically on five silver beech trees (Figure 3). Threatened fauna present include NI kaka, Yellow crowned kakariki, long tailed cuckoo, rifleman and whio (Robertson *et al.* 2017). Short-tailed and long tailed bats are also known broadly within the park, and NI kiwi are present at low numbers. Tuna (long finned eel) occur in the Moerangi Stream, though at relatively low abundance.

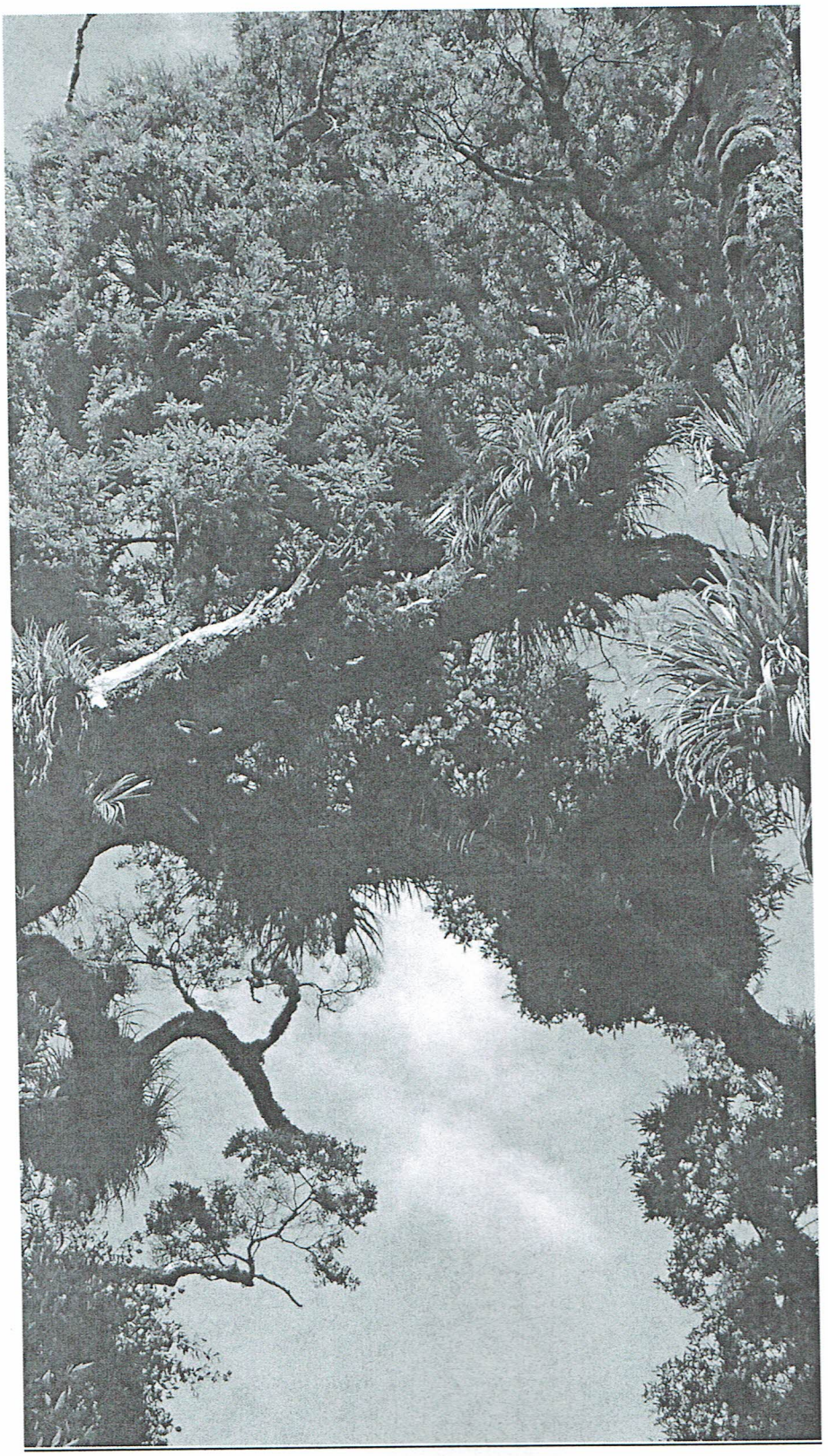
Naturalness – Moderate

Justification = the plant communities/habitat present are almost entirely native dominant and are largely ecologically functional. Understorey and ground cover vegetation has however been greatly modified by the presence of red deer for a century or more and for this reason is less intact and natural. Modification of regeneration patterns is occurring due to the present of red deer and there is a lack of regeneration of palatable species in the browse tier such as kamahi, and tawari.

Ecological Context – Medium

Justification = the plant communities/habitat present are part of a much larger area of identical or similar habitat present in Whirinaki and Urewera. These do grade into other forest communities, though well outside of the area of interest.

Figure 3: One of five scarlet mistletoes (centre) seen flowering in February 2017. This plant is with 100 metres from the Moerangi hut on the first stream terrace and track will avoid this host tree. This observation was added to NatureWatchNZ as a permanent record



5. Determination of effects

In line with the Department of Conservations guide to preparing an EIA, this report has considered temporary effects, permanent effects and cumulative effects focused primarily on impacts to vegetation, and on common fauna present — associated with construction, use of the track and operation of the Lease site. Measures have been proposed to avoid effects on some cryptic fauna such as bats, however specific risk assessment for bats and lizards has not occurred. The Proposal includes a number of methods and approaches to avoid, remedy and mitigate effects.

The approach taken to avoid effects during design and construction include:

- As identified in the Whirinaki Te Pua-A-Tāne Conservation Management Plan the Moerangi Stream has been acknowledged as being ecologically significant. Track delineation has been (as best as possible) sited away from the stream and tributaries to avoid impact on it.
- The track has been specifically delineated to utilise natural landform features suitable for an easy grade foot track, and will require minimal hard construction methods such as earthworks for cuttings etc. Steep land and small tributary streams will be traversed using formed steps and switch backs to reduce the potential for erosion and sedimentation of the Moerangi Stream.
- The track alignment will be initially physically delineated prior to construction to ensure that it will curve around the root ball zone of large trees, or, within the rooting zone. Where necessary soil will be built up rather than cut down through roots, and will not remove large deer palatable trees suffering recruitment failure including tawari and broadleaf.
- Threatened species and their habitat will be avoided including;
    - The track will as best as possible curve around trees of greater than 30cm diameter at breast height. Trees of greater size than 30cm d.b.h (with cavities) can be habitat for roosting bats, which could be killed if present during felling. Minimising the size of trees removed should also help to prevent potential mortality on arboreal lizards, if present.
    - During construction within all areas, any hazardous larger trees (with cavities) or dead standing spars that will require felling for safety reasons, will be monitored first for the presence of bats before felling. Methods for assessing the presence of bats include (and are not limited to) physical examination by a bat specialist, placement of a bat recorder physically on the tree overnight before any felling and analysis of activity. Any bat roosts discovered will be avoided.
    - Beech trees were surveyed for the presence of mistletoe and at least three scarlet mistletoes were discovered within proximity to the track and proposed Lease site and helicopter Drop Zone. Two silver beech trees have been tagged near the proposed Lease site to ensure they are not impacted. Other beech mistletoes, such as the yellow mistletoe (*Alepis flavida*) are more difficult to detect (especially at the top of the canopy). Fallen mistletoe leaves were not found of species other than the scarlet mistletoe beneath beech trees at the proposed Lease site. For this reason, I have high confidence that these do not contain any other threatened mistletoe species.

  - The track construction along the Moerangi stream section will ensure nesting whio are avoided. Measures taken may include; construction this section outside of the nesting period or surveying this section prior to construction (using an expert) to ensure that whio are not nesting on the true right side of the river before construction starts.
- The helicopter Drop Zone has been sited next to the Moerangi Stream and some of this is gravel river bed which is devoid of vegetation, reducing the amount of vegetation clearance required form safe helicopter use.
- The five large beech trees in the Lease site were inspected for cavities (from the ground and vantage points using binoculars) which could potentially be nesting or roost sites for kaka, kakariki or bats. All trees appeared sound with minimal loss of branches and rot and no obvious cavities were seen. For the two red beech trees, this assessment is not definitive given their large size.
- The boundaries of the Lease site and Drop Zone will be physically delineated before any vegetation clearance.
- Tree felling of any large trees will occur outside of the bird breeding season from September to March to avoid incidental impacts on nesting birds. Small trees (<30 cm d.b.h) will be inspected for bird nests before felling.
- The upper Moerangi Stream is essentially free of invasive weeds and other organisms capable of impacting on biodiversity values. All equipment used for construction purposes will be thoroughly cleaned prior to entering to remove weeds seeds and eliminate the risk of micro-organism spread such as didymo and pathogenic fungi.
- Plants able to be dug up and relocated, such as tree-ferns, and small seedlings will be moved to bare ground and healed in.
- During construction soil will not be deposited within or near a water course. Where required cut vegetation will be used for sediment control, placing vegetation down-hill of cut slopes where soil erosion could potentially occur.
- Post construction any invasive weeds that have arrived adjoining the track, Lease site or helicopter Drop Zone will be promptly removed.

5.1 Temporary effects

Potential temporary effects of the Proposal are largely associated with soil disturbance during track and building construction, especially of pumice-based soils and disturbance of native wild-life such as nesting whio. Measure will be taken to avoid these effects (see above).

5.2 Permanent effects

While it is acknowledged that not all vegetation will be cleared within the Lease site and helicopter Drop Zone and natural regeneration will occur, loss of vegetation, especially of tall forest trees is regarded as being a permanent loss. This is because habitat within the areas identified will be permanently modified due to alteration of the baseline state, as the areas directly impacted, including the foot print of the track and Lease site are no longer natural (unmodified) forest habitat.

Permanent effects primarily include;

- the loss of natural unmodified forest habitat within the Lease site (approximately 1100 m^2),
- helicopter Drop Zone (approximately 600 m^2) and

- the footprint of the track (1250 m^2).

Combined, this amounts to a reduction of habitat of 2950 m^2 or 0.295 ha.

Vegetation clearance at the Lease site involves the removal of:

- Two large mature red beech trees (>1.8 m d.b.h and approximately 20-25 m high)
- 3 large silver beech trees (85 cm, 50 cm & 70 cm d.b.h) and between 20 and 28 m high.
- Approximately 23 small to moderate sized kamahi stems (between 15 cm and 50 cm d.b.h).
- Approximately 15 pole sized red beech of approximately 8–12 m height.
- Loss of understorey vegetation of associated with the footprint of buildings and (94 m^2) and pathways and clearance around the buildings of approximately 200 m^2.
- Within this area is a tagged silver beech tree (D933) hosting a scarlet mistletoe at approximately 11 m height. This will be specifically avoided when felling any trees nearby.

While the loss of long-lived trees is permanent, the felling of these trees will create a light gap which will promote the regeneration of vegetation. Typically, this may include fast growing shrubs and sub-canopy trees, especially in areas where red deer avoid people. Any species including makomako, kotukutuku, pate, large leaved coprosma, broadleaf and tawari will be encouraged where they do not shade or interfere with tracks, buildings and other infrastructure. These species appear to be suffering recruitment failure in the upper Moerangi Stream in the presence of deer.

Figure 4: The Proposed Lease site area. The orange figure (centre) is standing to the southernmost large red beech tree which will be required to be felled for the kitchen and dining hall. Larger trees in the foreground of this photograph will also be required to be felled

Vegetation clearance at the helicopter Drop Zone (Figure 5) involves the removal of:

- One standing dead silver beech tree

- Two small-stemmed (c. 25-30 cm d.b.h) kamahi and one small multi-stemmed (10-20 cm) tawari.
- Three small-stemmed (15-25 cm d.b.h) red beech trees
- Approximately 45 sapling beech , mostly red beech but also some silver beech
- Several small sized kamahi branches leaning out from the terrace edge
- Downstream of the area marked in Figure 1 is a tagged silver beech tree (D932) hosting a large scarlet mistletoe at approximately 4 m height. This will be specifically avoided when felling any other trees on the Lease site.

Figure 5: Vegetation on the proposed helicopter Drop Zone

Vegetation clearance along the 1250 m^2 walking track (Figure 6) involves;

- Removal of the dominant cover of two species of ferns (crown fern & and *Dicksonia lanata*). These species occupy between 70-90% of the ground cover.
- Occasional seedling and sapling red beech trees
- Localised areas of unpalatable shrubs particularly on ridges of which mingimingi is most abundant. Also in this tier, are neinei, stinkwood and yellow-wood, though these species are less common.

Figure 6: Typical understorey vegetation composition along the track route

5.3 Cumulative effects

Potential cumulative effects are due to the ongoing impacts on the ecology and environment from people. This could include avoidance of some wildlife near the Lease site, such as whio, especially if disturbed by people. Recreation users could also have an impact on some species such harvesting tuna (long-finned eel) from the Moerangi Stream. People are also vectors for the spread of weeds and other invasive species, such as didymo.

Impacts of people on the ecology are however not all negative. Providing access for hunters from Moerangi hut is likely to result in greater harvest of deer. Deer are also likely to avoid the track and local area with greater use by people. As a real local example, downstream of the Moerangi track, deer palatable species including makomako, kotukutuku and pate have regenerated in profusion adjoining the track (Figure 7).

Pest animals will also use the track and will make it easier for these species to move long distances. This potentially could result in higher predation levels in some places and for some sensitive species, such as whio, for example if they chose to nest between the track and the river.

Figure 7: Profuse regeneration of the highly deer preferred understorey tree makomako (right) along the margin of the Moerangi dual use track

5.4 Remediation measures

To minimise the impact of people on the environment and wildlife, education of clients will be paramount and has been part of the 'story' since the tourism business was launched at Whirinaki in 1993. This will include briefing all clients of the need to adhere to the New Zealand environmental code. Specific actions will involve ensuring that clients clean equipment such as boots, and gaiters to avoid the spread of invasive weeds and unwanted microorganisms such as didymo.

Tuna (long-finned eel) are an At risk – declining threatened species (Goodman *et al.* 2013) and indigenous, pristine habitats such as the Moerangi Stream are of high importance for the continued persistence of this vulnerable species. While the recreational harvesting of tuna (long-finned eel) is a permitted activity in the Park, the Applicant Company does not offer this as an activity for its clients and does not intend to in the future. Further the Applicant recognises that increased harvesting could result in the local decline of this species in the Moerangi Stream. The Applicant does however recognise that local residents harvest eels from time to time, though rarely from the Moerangi Stream. The Applicant will add to its Staff Training Manual a statement that staff who are Tangata Whenua must follow Kaitiakitanga protocols if they harvest tuna adjacent to the Lease site and do not harvest any large female tuna.

Predator control (to control mustelids especially stoats) will be established along the margin of the proposed track to control stoats to reduce impact on whio in the immediate area. Initially this will involve placement of a predator trapline from Moerangi Hut to the proposed Lease site with approximately 12-15 traps, checked at least every fortnight. There is intent however to use the

business and donations from clients to increase predator trapping more widely and combine this work as part of the stewardship and advocacy to clients.

5.5 Mitigation of effects

Mitigation for the loss of vegetation such as tall red beech and silver beech trees many hundred years old is not possible given their age and size.

The Applicant however proposes to undertake conservation management around the Lease site and along the track. To mitigate for loss of vegetation this will include;

- Culling red deer in the upper Moerangi Stream area, specifically targeting hinds in order enhance the regeneration of palatable plant species along the track and stream margin. As the caretaker will live onsite during the winter off-season, it is expected that numerous deer will be harvested annually. Records of deer controlled, including the number and sex, will be kept.
- As TB Free vector possum control is planned until 2023, and possums are currently at a very low abundance, it is recognised that this work may not currently be required. Possum control will be undertaken, if detected around the Lease site and along the track, especially if damage to palatable vegetation, such as mistletoe is seen.
- Invasive weed surveillance and immediate control will be undertaken along the track and stream margin and around the Lease site and Drop Zone.

5.6 Recommended monitoring of effects

Recommended monitoring of effects includes;

- Monitoring vegetation recovery along the track and around the Lease site will be undertaken using a standardised permanent photo point monitoring method, including permanent marking the locations and directions of photos. Up to 10 sites will be chosen including terraces, gullies, ridges etc. to record change. These will be photographed annually for a minimum of 5 years. The purpose of this monitoring will be to show recovery of track side vegetation and potentially in the abundance of palatable species such as makomako, as seen below the Moerangi Hut.
- Records of wildlife will be kept, specifically the number of whio present, and if any breeding from the Lease site downstream adjoining the proposed track occurs. Records of pairs fledging ducklings will be added to NatureWatchNZ as a permanent record.
- Records of deer, including the number of hinds and stags shot, will be kept along with predators killed in traps if single set traps are the chosen method.

6. Summary of effects and conclusion

The assessment of significance has identified that the habitat is of high conservation value. The magnitude of effect of the Proposal on these values is however relatively small with respect to vegetation loss of a maximum area of extent of 0.295 ha. This is a smaller footprint than the current clearing around Moerangi Hut. In the Lease site there is intention that vegetation will be retained where it can be. The most significant component is the loss of several large red and silver beech trees and sub-canopy trees including kamahi at the Lease site. These trees are however extremely

common in the area and throughout the mountain regions of New Zealand area. Even just considering the upper Moerangi Catchment, the loss of these trees is insignificant, unless in the very small chance they were found to be bat roosts. The track will result in the loss of understorey vegetation which is highly deer modified and relatively uniform and dominated by unpalatable ferns. No plants of significance other mistletoe were seen.

Forest regeneration upstream of the Moerangi Hut is strongly influenced by the browsing pressure of red deer. This pest is not being controlled to sufficiently low levels (by either aerial 1080 or recreational harvest) to allow regeneration of palatable trees. Mitigation proposed focusing on deer (and possum control if and when required) is therefore highly appropriate, to improve vegetation regeneration. Culling in association with the avoidance of this area by red deer (caused by an increased human presence) should allow localised recovery of species, such as makomako especially in close proximity to the Lease site. While this would not mitigate the loss of tall beech trees many hundreds of years old, it will be beneficial for the wider forest ecosystem, as these trees typically are important dietary components for many native birds and other fauna. Ongoing predator control targeting stoats should also remedy any potential impact of enhanced predation on sensitive species such as whio, by predators dispersing along the track.

In summary, if measures proposed are undertaken to avoid, remedy and mitigate effects and monitoring measures are implemented at sufficient regularity, I consider that this application will have a very minimal impact to the ecology of the upper Moerangi Stream area and species of importance. Potentially with effective control of pest species especially red deer and predators, long term (10–20 years) the Proposal may have a positive ecological benefit.

References

Davis, M., Head, N. J., Myers, S. C., & Moore, S. H. (2016). Department of Conservation guidelines for assessing significant ecological values. *Science for Conservation 327. Department Conservation, 71p.*

Department of Conservation. docdm-367160 - Guide to preparing EIA for Concession Applications.doc. https://www.doc.govt.nz/documents/about-doc/concessions-and-permits/concessions/guide-to-environmental-impact-assessments.pdf

de Lange, P. J.; Rolfe, J. R.; Champion, P. D.; Courtney, S. P.; Heenan, P. B.; Barkla, J. W. & Hitchmough, R. A. (2013). Conservation status of New Zealand indigenous vascular plants, 2012. *New Zealand threat classification series, 3.*

Goodman, J., Dunn, N. R., Ravenscroft, P. J., Allibone, R. M., Boubee, J. A., David, B. O., ... & Rolfe, J. R. (2014). *Conservation status of New Zealand freshwater fish, 2013* (p. 16). Publishing Team, Department of Conversation.

James, I. L., & Wallis, F. P. (1969). A comparative study of the effects of introduced mammals on Nothofagus forest at Lake Waikareiti. In *Proceedings of the New Zealand Ecological Society* (Vol. 16, pp. 1-6).

McKelvey, P. J. (1973). The Pattern of the Urewera Forests. New Zealand Forest Service, Wellington.

Nicholls, J. L. (1969). Forest type map of New Zealand Series 2. 1:63, 360. Map Sheet N104: Maungataniwha. Forest Research Institute, New Zealand Forest Service.

O'Donnell, C. F., Christie, J. E., Lloyd, B., Parsons, S., & Hitchmough, R. (2013). *Conservation status of New Zealand bats, 2012*. Publishing Team, Department of Conservation.

Robertson, H. A; Baird, K.; Dowding, J. E.; Elliott, G. P.; Hitchmough, R. A.; Miskelly, C. M.; McArthur, N.; O'Donnell, C. F. J.; Sagar, P. M.; Scofield, R. P.; Taylor, G. A. (2017). Conservation status of New Zealand birds, 2016. *New Zealand Threat Classification Series 19. Wellington, Department of Conservation. 27*p.

Singers, N. J., & Rogers, G. M. (2014). *A classification of New Zealand's terrestrial ecosystems.* Science for Conservation 325, Department of Conservation, Wellington.

TB Free (2016). Area Disease Management Plan. North Island (2016–2055) National Bovine Tuberculosis Pest Management Plan Version 1.0. https://ospri.co.nz/assets/Uploads/Documents/2017-03-06-North-Island-Area-Disease-Management-Plan-v1.0.pdf

Attachment E2
Water/wastewater engineering report

KeySolutions (2005) Ltd
Ph: 07 378 4415 • Mob: 027 494 0125 • info@keysolutions.co.nz • 66 Wharewaka Road • TAUPO

KeySolutions 121212

Proposed Accommodation
Moerangi Valley
Whirinaki Te Pua-a-Tane Conservation Park

PROPOSAL FOR THE PROVISION OF WATER SUPPLY AND WASTEWATER SERVICE

APPLICANT:
MANAAKI GROUP HOLDINGS LTD

14 May 2018

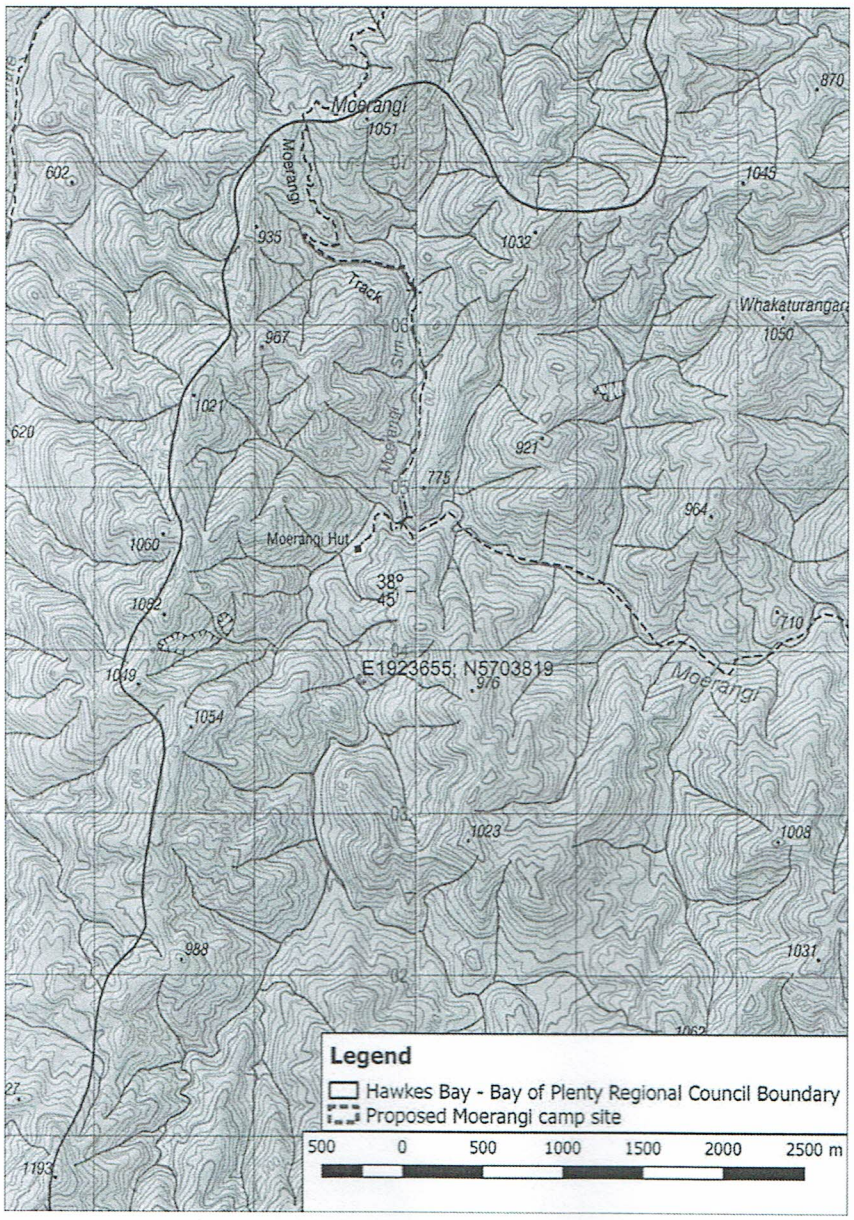
"unlocking the answers"

1 INTRODUCTION

KeySolutions is a small engineering consultancy operating out of Taupo, New Zealand. The Director is Mike Keys who has spent 40 years designing and approving infrastructural engineering in and around the Taupo District. From 1993 to 2006 Mike was the Chief Engineer at Taupo District Council. He is familiar with both small and large water supplies and wastewater systems, and innovative solutions for the tertiary treatment of wastewater.

2 OVERVIEW

The Principal of the Applicant Company has been operating single day and two day walks in the Whirinaki Conservation Park for 24 years and it has been a successful operation. The company wishes to expand the range of tours it operates to incorporate a 3 day, 2 night experience following the recent opening of a 35 kilometre dual purpose (walking and mountain biking) track in that locality by the Department of Conservation. This 3 day option will involve the construction of new overnight accommodation in the Moerangi Valley, which will be home for the second night of the 3 day walk. The location is shown at left.



The proposed accommodation will be on a plateau on the true right bank of the Moerangi Stream at NZTM co-ordinates E1923655 N5703819.

This report covers the provision of water and wastewater services for this development proposal.

The proposed lease provides for 10 Sleeping Huts/wharemoe each with its own ensuite, the number 10 being consistent with the consent/lease recently granted for the company's other site in the Okahu Valley. In addition there will be accommodation for 2 on-site staff, a total of 22 persons for a maximum of 8 months per annum. A Kitchen/dining hall/wharekai will also be built where 2 staff will live and guests will dine.

There will be no electricity supply at the facility so neither water supply or wastewater infrastructure will incorporate an ability to pump or aerate.

3 WATER SUPPLY

The potable water for the accommodation will be sourced from an adjacent stream and from the roof of the kitchen/dining hall.

The proposed extraction system will be located in a stream south east of the proposed accommodation which feeds into the Moerangi Stream. This side stream can be seen on the location map above. The intake would be a screened gravity inlet structure with a pipe approximately 20 or 25mm in diameter feeding storage tanks. The tanks will have enough capacity to cater for the daily peaks of usage and refill through the feed pipe in a "trickle feed" 24/7 type operation. This un-named side stream has widely varying flows, but even at low flow the "trickle" extraction will mean that less than 10% of the flow is consumed [this is a condition of the Hawkes Bay Regional Council (HBRC) and explained further later in this report]. It can be seen on the map above that it is fed by a sizeable catchment area, at least 500m x 500m, 25ha. The tanks will provide at least 2 days storage (5000 litres) and be kept full from the trickle feed. "Overflow" water will be fed back into the stream downstream of the tanks.

Water will be filtered at the outlet of the tank before being reticulated to the wharekai and the 10 wharemoe. It will be monitored for compliance with the drinking water standards and additional treatment added into the system in series if necessary. This proposed system and catchment is similar to the one in use at the companys existing site in the Okahu Valley and there have been no water quality or quantity problems at that site.

4 WASTEWATER SERVICE

i. Wastewater from the wharekai and the 10 wharemoe will be reticulated to a treatment and design system, the design of which is a work in progress.

ii. The preliminary design of the wastewater infrastructure incorporates 2 standard septic tanks in series but with the ability to add a third and fourth should it prove environmentally and economically sensible to do so. Given that desludging tanks will require the use of a helicopter, the operation would be monitored closely to reduce the cost of maintenance and make it as efficient as possible. Technology exists in the form of a portable electronic sensor to determine the depth of the solids mat on the surface of tanks and to determine the depth of sludge on the bottom. We intend to use a similar monitoring system at this facility as it is important that solids removal is done in a timely manner. Both tanks would be designed with 24 hours retention of effluent and accommodate the ability to monitor sludge depths and thickness and also adjust the height that the outlet of each tank draws from so that it is producing the best effluent possible. It is likely that the first tank in the series will trap much of the grease and fats, so the outlet would be set at around 70% of liquid depth, the second tank around 50%. As mentioned, these will be adjustable by the Operator to get the best performance out of the system.

iii. One option for the treated effluent disposal system is a surface irrigation (dripper/dribbler) system. There is an undulating plateau, approximately 20m above the Moerangi Stream, and to the north of, and lower than, the proposed accommodation. This could be used as a dispersal field. Surface mounted "dribbler" pipes would connect to a larger diameter falling main and, like the septic tanks, will be monitored to ensure that the dispersal of effluent is as uniform as possible and no problematic concentration of effluent (ponding etc) is occurring. Provision will be made for a "balancing tank" should this prove necessary. This would accommodate the highs and lows of the daily effluent cycle by having a 90mm diameter inlet and a 20mm (may vary with final design of effluent dispersal system) outlet so that the disposal field is operating uniformly 24 hours a day. The surface irrigation pipes would need to be stapled in place as required by HBRC and covered by the leaf fall/ mulch which exists in abundance on the site.

iv. As detailed in the following section, discussion is ongoing with the consenting authority and it is likely that the final design will vary from that described above.

5 HAWKES BAY REGIONAL COUNCIL (HBRC) RULES

i. The site is within the Hawkes Bay Region. We have had extensive discussions with the Council's Regulatory staff regarding the Regional Plan rules that need to be complied with (both for the water supply extraction and for the wastewater treatment and disposal) and the best way of achieving this compliance. Both consents staff and council's hydrologists have been involved in those discussions.

ii. The position we have got to at time of writing this report is summarised in an email from the Consents Planner dated 10th May 2018:-

"I have spoken with one of our senior planners and Council's hydrologists in relation to your proposal.
I have a question regarding alternative methods of water supply. Have you considered rain water tanks in addition to or in the place of the proposed surface water take? I would suggest looking into this if you hadn't already.
If you wish to proceed with the surface water take as you have proposed, the following permitted activity rule (Rule 54) still applies.

a. Except for takes occurring for a period of less than 4 weeks, the total volume taken shall not exceed 20 m^3/d[134] per property; (or per work site where the activity relates to the take and use of water for the maintenance of road reserves) nor shall the total volume exceed the reasonable needs of the user, whichever is the lesser.

b. For takes occurring for a period of less than 4 weeks within any 90 day period, the total volume taken by any person shall not exceed 200 m^3 per 7 day period.

c. The rate of take shall not exceed 10% of the instantaneous flow[135] at the point of take.

d. The intake velocity shall not exceed 0.3 m/s.

e. The activity shall not adversely affect any wetland.

f. The take shall not adversely affect any lawfully established efficient groundwater take, or any lawfully established surface water take, which existed prior to commencement of the take unless written approval is obtained from the affected person.

I must stress that in order for the surface water take to remain permitted you will need to ensure you meet all of these conditions, particularly condition (c): the rate of take shall not exceed 10% of the instantaneous flow at the point of take. Council's hydrologists have estimated that the Mean Annual Low Flow (MALF) of the stream from which you are proposing to take is approximately 1.2 L/s. You will need to consider what your options are for water supply during summer dry when your rate of take will likely exceed 10% of 1.2 L/s and you will have to cease abstracting water. Based on the information you have supplied, and provided the above points can be addresses, then this take will be permitted and consent will not be required.
It will be your responsibility to ensure that any water abstracted is of suitable quality for its intended use. Where water is to be used for human consumption, you should have the water tested prior to use and should discuss these requirements with a representative of the Ministry of Health and should consider the following Drinking Water Standards (see link below):
https://www.health.govt.nz/system/files/documents/publications/drinking-water-standards-2008-jun14.pdf
The proposal to discharge wastewater at the site is slightly more difficult. Given there is a kitchen facility and the accommodation facilities proposed each have an en-suite with a shower/toilet, it is more appropriate to design the system with a flow allowance for a fully serviced camping ground. Having also taken into account the potential insecurities of water supply in periods of summer dry, it is considered more appropriate to base the flow allowance on the recommended flow allowance for a fully serviced camp ground with on-site roof water supply (100 L/person/day). Based on your calculations of maximum occupancy = 22 people, this equates to a maximum daily discharge volume of 2.2 m^3. This exceeds the permitted activity rule 37 (b). You will need to look at what type of system has the required capacity and is appropriate for the site.
The other issue is that in order to install surface irrigation, wastewater must be secondary treated (see 6.2.2 of Figure 6 in the RRMP), or consent is required. If you were to use a trench or bed system then gravity drainage is not permitted, unless a specifically designed siphon system is used to provide dose loading and even distribution. So either way, you will need to apply for resource consent to discharge wastewater to land.
I recognise there are some limitations at the site and would recommend speaking to one of our accredited wastewater designers/installers about your proposal. I have attached the accreditation register with the names of designers and the types of systems they are accredited for. They are used to filling out our forms but I have attached these as well in case you wish to fill them out yourself.
As always, let me know if you have further questions. We give an hour of free advice and then charge for our time on an actual and reasonable basis, just to let you know.

Kind regards

Amberley Gibson
Consents Planner

14/05/2018

6 OUR RESPONSE

i. With respect to water supply, the system proposed is to "trickle feed" storage tanks on a 24/7 basis through a small diameter screened intake. This methodology will prevent the peaks and lows of normal domestic demand impacting on the stream source.

ii. HBRC hydrologists have confirmed that the Mean Annual Low Flow of the stream at the extraction point is approximately 1.2 litres/second or 103680 litres/day. Noting that Rule 54c (see 5ii) requires that less than 10% of this flow is extracted, a maximum take of 10,000 litres/day is permitted. Our calculations suggest that the demand will be less than a quarter of this. HBRC's calculation for daily water demand (see 5ii) is $2.2m^3$ or 2200 litres.

iii. As discussed in Section 4, the design of the wastewater infrastructure is ongoing. Certainly the requirements of HBRC will be met, and every effort will be made to exceed that benchmark. This tourist operation has a strong environmental message associated with all the activities involved and it is paramount that the Applicant "walks the talk". It would be appropriate to be able to say that environmental requirements are being met and bettered.

iv. With this in mind, we will continue to search for an appropriate "state of the art" treatment and disposal system for wastewater for this unique accommodation, and work closely with HBRC staff regarding the necessary consenting, implementation and monitoring processes required.

7 SUMMARY

The proposed accommodation in the Moerangi Valley for Manaaki Group Holdings Ltd will provide a serviced overnight facility for trampers on a 3 day trek in a very special part of New Zealand's wilderness.

Providing water supply and wastewater infrastructure to service this facility also needs to be done in a special way.

Water can be sourced from an adjacent stream, stored and treated to serve the wharekai and staff quarters and the ensuite bathrooms in the 10 wharemoe. No consent from HBRC is required for this operation and the water quality will meet drinking water standards.

All wastewater (black and grey) will be collected from the facility and treated and disposed of in a way which meets HBRC requirements. This will be done in a transparent way so as to showcase protection of the pristine environment

Mike Keys
KeySolutions (2005) Ltd
May 2018