Muriwai Golf Project

Assessment of Environmental Effects, Appendix 12
ARBORICULTURAL EFFECTS ASSESSMENT

Date: 8 December 2021

Prepared for
The Bears Home Project Management Limited
By: Peers Brown Miller Limited
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1. EXECUTIVE SUMMARY

1.1 A summary of the Project in general terms in provided below.

Summary of existing environment

1.2 The Project will be constructed within the bounds of the existing Muriwai Downs Property ("Property"). The Project area is currently in use as an actively managed farm, with much of the land in use as pastoral farmland. Both exotic and indigenous trees are growing within the pastoral farmland areas, with the trees in these areas subject to heavily stock grazing and compaction. The remaining vegetation is largely growing in existing gully and wetland areas, with some of these areas fenced off from stock.

1.3 Most gully areas comprise of predominately indigenous vegetation and are subject to an SEA overlay. In most cases, the evidence of historic grazing is visible in these gully areas with limited regenerative understorey growth.

1.4 The wetland areas are a mixture of exotic weed species and semi-mature indigenous and exotic tree species, with some subject to an SEA overlay.

Key features assessed

1.5 This report describes the effects on trees and vegetation growing within the Project area, with particular emphasis on areas subject to tree protection under the Auckland Unitary Plan (Operative in part) (AUP). This report includes a description of the Project (with reference to the existing environment) and an assessment of the effects of the Project on trees and vegetation growing within those areas covered by a SEA overlay or are subject to protection under Section E15 and E17 of the AUP. The assessment relates to various areas along the proposed golf course routing and near the location of the proposed buildings and structures.

Summary of assessment of effects

1.6 The proposed tree trimming and works within protected root zones can be managed in such a way that any adverse effect on the health and stability of any protected tree or stand/grouping of vegetation will be less than minor. A draft Tree Management Plan has been proposed to ensure any residual adverse effects are minimised.

1.7 The actual or potential effects from the proposed removal of protected vegetation, after mitigation planting, would be less than minor. This report sets out recommendations that, in conjunction with the proposed planting in the ecological and landscape effects assessments, should be followed to ensure the mitigation is sufficient.

Restoration and replacement planting

1.8 Extensive ecological restoration planting is proposed by the Project's ecological expert[1] that would adequately mitigate any potential effects arising from any proposed tree and vegetation removal, from an arboricultural perspective.

1.9 In addition to the proposed restoration planting, it is recommended that replacement planting be undertaken on Muriwai Road following the proposed works at a ratio 2:1, with a landscape plan to be produced for this particular location.

[1] As set out in the Assessment of Ecological Effects, Appendix 11 to AEE.

2. GLOSSARY OF TERMS AND ABBREVIATIONS

2.1 **Table 1** sets out the technical terms/abbreviations used in this report.

Table 1: Glossary of technical terms/abbreviations

Abbreviation/Terms	Term
AEE	Assessment of Environmental Effects prepared by Mitchell Daysh
AUP	Auckland Unitary Plan (operative in part)
ATCOP	Auckland Transport Code of Practice
CEMP	Construction Environmental Management Plan
ONFs	Outstanding Natural Features
Muriwai Downs Property	Means the sum of all land allotments owned by the Applicant listed at section [X] of the AEE.
Project	As described at paragraph 3.5.
PRZ	Protected Root Zone (AUP Definition)
RMA	Resource Management Act 1991
SEA	Significant Ecological Area - Terrestrial
Site	Means all land within the **Muriwai Downs Property** to be used for the **Project**

3. INTRODUCTION

3.1 The Bears Home Project Management Limited (the "Applicant") is proposing the establishment of a golf resort facility of international standing including a new international standard 19 hole golf course, clubhouse, sports academy and luxury lodge accommodation - all located at the Property ("the Project").

Purpose of this report

3.2 This report forms part of a suite of technical reports prepared for the Project. Its purpose is to inform the AEE and to support the resource consent applications for the Project.

3.3 In doing so the report describes the effects on trees and vegetation growing within the Project area, with particular emphasis on areas subject to tree protection. This report includes a description of the Project (with reference to the existing environment) and assesses the effects of the Project on trees and vegetation growing within those areas covered by a SEA overlay or are subject to protection under Section E15 and E17 of the AUP. The assessment relates to various areas along the proposed golf course routing and near the location of the proposed buildings and structures.

Project description

3.4 This Project description provides the context for this assessment. The Golf Course Operations and Maintenance Report[2] further describes the construction and operational aspects of the Project and should be relied upon as a full description of the Project.

3.5 In summary, the Project will include the following:

(a) A 19-hole golf course with warm-up fairway and short-game practice area;

(b) A clubhouse;

(c) A sports academy including; an academy building, academy driving range, practice green, 9-hole short course, and indoor and outdoor tennis facilities;

(d) A golf and property maintenance complex;

(e) A luxury lodge;

(f) Groundwater and surface water abstraction facilities;

(g) Off-stream water storage reservoir;

(h) Significant ecological restoration and enhancement works; and

(i) Various supporting infrastructure associated with the above items.

[2] Prepared by Steve Marsden Turf Solutions and NZSTI, Appendix 3 to AEE.

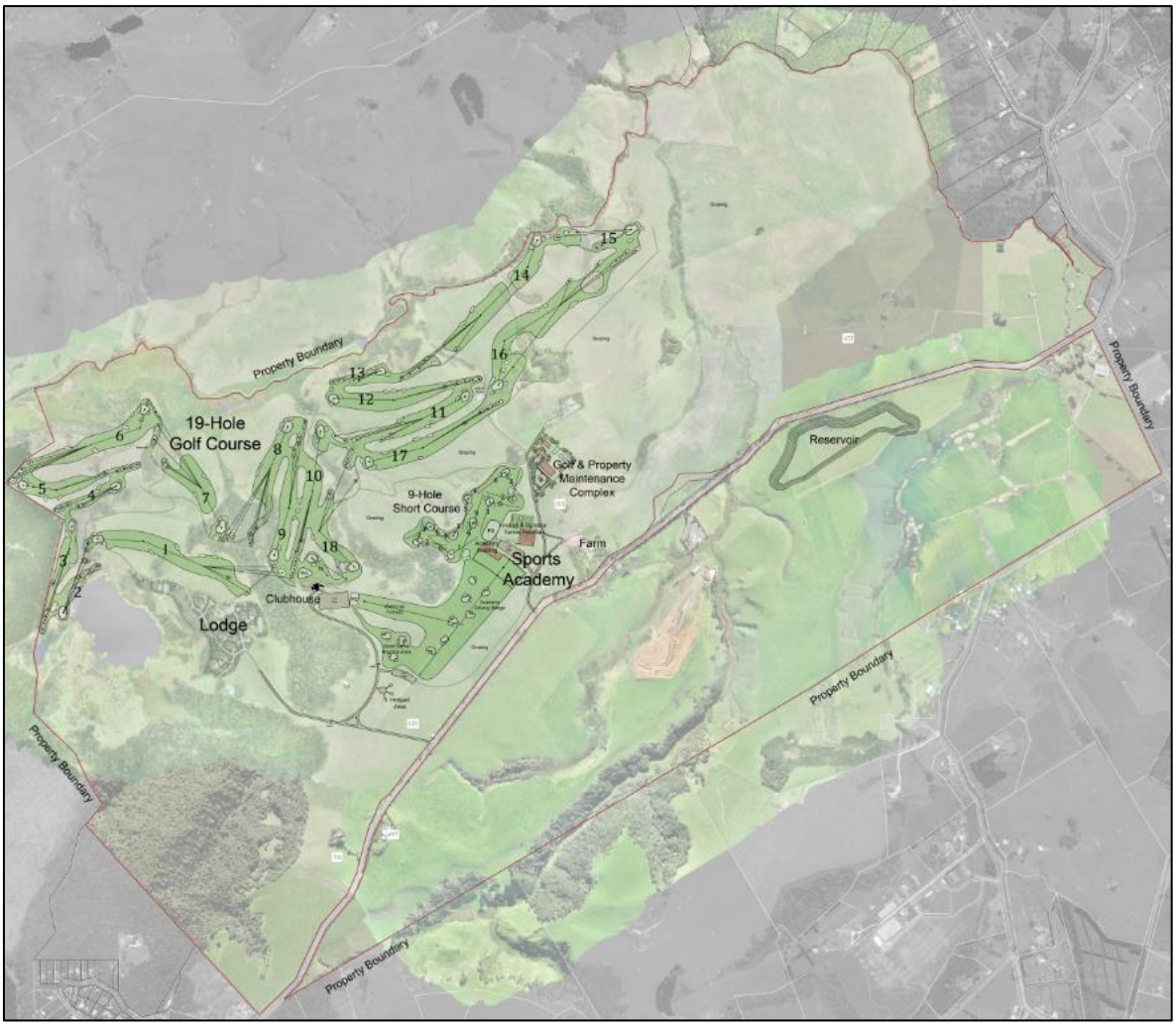


Figure 1: Proposed Site Layout

Project features

3.6 Subject to further refinements at the detailed design stage, key features of the Project relevant to this report are:

(a) The removal of protected and non – protected vegetation required to construct the main playing areas, additional landscape features and general contouring of the existing farmland as part of the formation of approximately 72 Hectares (Ha) of maintained turf which will include: 37.3 Ha of Fairways and Primary Rough, 28.6 Ha of Naturalised Rough, 3.8 Ha of Tees and 3.4 Ha of Greens.

(b) The earthworks specifically affecting areas of protected vegetation, whether as part of general earthworks or those activities required to establish new structures such as bridges, roadways or maintenance access points;

(c) Earthworks near to trees or vegetation proposed for retention as part of the completed project and mechanisms to ensure their long-term protection and retention on an ongoing basis;

(d) The management of Kauri Dieback within the project area. Specifically, the management of soil and vegetative material during and post earthworks.

3.7 Details of the works that are proposed, including the removal, retention, pruning of trees are discussed in Section 8 below.

4. INVOLVEMENT IN PROJECT

4.1 Peers Brown Miller Ltd (PBM) was engaged by the applicant in July 2021 to provide specialist arboricultural input as part of the project. We provided specialist input to inform the project design, including parameters around tree protection. We have also provided detailed advice and recommendations in respect of the design of the golf course itself and other features of the Project. Our advice and recommendations have resulted in amendments to the golf course design, with a number of specific construction methodologies and environment procedures (namely Kauri Dieback) incorporated into the plans and other specialist reports.

Scope

4.2 The scope of PBM's services include the tasks outlined at paragraph 4.1 and attendances at the site as outlined at sections 5, as well as to prepare this Arboricultural Assessment for the purposes of gaining resource consents for the Project. Where required, we will also respond to any arboricultural matters raised by Auckland Council specialists.

5. PREPARATION FOR THIS REPORT

5.1 Since our engagement in July 2021, PBH has undertaken three separate site visits to the site. The initial site visit provided an overview of the Project area. This site visit was undertaken with the Project's principal ecologist. The subsequent site visits were undertaken with other specialists, including the Project's surveyor, lead engineer, golf course operations & maintenance consultant and ecology consultant.

5.2 Following these site visits, a number of project meetings have taken place to discuss any recommended changes from an arboricultural perspective. Where practical, changes have been implemented to minimise actual and/or potential effects on significant vegetation. For example significant design alterations to the original layout of Holes 7 & 8 have been made to limit the potential effects on the adjacent retained vegetation. This will also include the use of an existing farm track for construction and on-going maintenance, further mitigating any potential effects[3]

5.3 PBM has also reviewed the draft assessments and Ecological Management Plan provided by RMA Ecology, the draft earthworks plans provided by McKenzie & Co and the visual landscape assessment provided by Boffa Miskell.

6. ASSESSMENT METHODOLOGY

6.1 In accordance with best arboricultural practice, a Visual Tree Assessment (VTA) was undertaken as part of the field survey works over the three aforementioned site visits.

6.2 VTAs were undertaken on those trees directly and potentially impacted by the Project, whether as part of the completed golf course and amenities or during construction.

[3] As discussed in further detail in Section 9.20 to 9.28

6.3 Further to the onsite tree survey works, an extensive review of the proposed engineering design and relevant plan set has been undertaken, to determine the level of disturbance near to areas of trees and vegetation.

6.4 An ecological baseline survey was also provided by RMA Ecology. This information was also reviewed prior to visiting the site to further inform the tree survey works.

7. EXISTING ENVIRONMENT

7.1 The Project area is and has historically been operated as a typical New Zealand rural farm. Based on information provided by other specialists, it is understood that 428 Hectares is currently in use for the farming of Beef & Sheep, with a further 71 hectares in Dairy.

7.2 The majority of the Project area is grazed farmland, with the significant areas of trees and vegetation largely confined to those areas unsuitable for conventional farming practices. The vast majority of vegetation growing within the Project area consists of the following tree and vegetation types:

(a) Stands and individual exotic species such as *Eucalyptus sp.* and Monterey Cypress (*Cupressus macrocarpa)* growing throughout the existing grassed areas

(b) Common weed species vegetation such as Gorse (*Ulex europaeus)* and Tree Lupin (*Lupinus arboreus)*

(c) Wetland areas consisting of a mixture of native and exotic vegetation. Native vegetation within these areas is dominated by Ti Kouka (*Cordyline australis)*, Karamu (*Coprosma robusta)* with exotic species such as Australian Blackwood (*Acacia melanoxylon*), Willow (*Salix sp.),* Poplar (*Poplus sp.),* Oak (*Quercus palustris and Quercus robur)* also present in several of these wetland areas

(d) Individual specimens and groupings of native species within the main farmland areas. These trees comprise largely of Pohutukawa (*Metrosideros excelsa),* Totara (*Podocarpus totara),* Kauri (*Agathus australis)* and Ti Kouka.

(e) Non-fenced gully areas throughout the farmland areas which contain both native and exotic trees that are typically in poor to moderate condition. This is contributed to by the heavy stock use and current grazing of these areas. These areas also comprise largely of Pohutukawa (*Metrosideros excelsa),* Totara (*Podocarpus totara),* Kauri (*Agathus australis)* and Ti Kouka with the addition of Puriri (*Vitex lucens)*, Karaka *(Corynocarpus laevigatus)* Kahikatea *(Dacrycarpus dacrydioides)* and the occasional Kanuka (*Kunzea ericoides)*. In general terms, these areas are devoid of re-generating native vegetation, due to the propensity of stock to browse on any new seedings or growth within reach.

(f) These areas consist of a mixture of indigenous temperature forest and ridgeline areas in fenced gully and ridgeline areas. Based on onsite observations, the vast majority of the existing vegetated gullies and wetlands within the vicinity of the golf course have been fenced off from stock. However, in some areas, fencing is more recent, as demonstrated by the presence of stock tracks throughout some gully networks and bush areas.

7.3 Most of the fenced gully areas are subject to an SEA overlay and comprise the following vegetation types:

(a) Gully Systems –These areas largely transition from the WF11 to the WF13* vegetation types. Significant trees within these areas include Pohutukawa, Totara, Kauri, Ti Kouka, Puriri, Karaka, Kahikatea, Taraire *(Beilschmiedia taraire)*, Kohekohe *(Dysoxylum [4]spectabile)*, Tawa (*Beilschmiedia tawa),* and Rewarewa (*Knightia excelsa)*. It was noted that healthy native understorey plants and trees species are re-establishing in the majority of these gully areas where fences encapsulate the bush areas.

(b) Ridgeline areas - consisting of mainly Kanuka, Manuka *(Leptospermum scoparium),* Pohutukawa and Rewarewa. Ridgeline areas transition quickly to gully system vegetation types in most cases.

7.4 In the interest of consistency, the vegetation types described above are carried through the remainder of the report.

8. PROPOSED ACTIVITIES IMPACTING TREES - CONSTRUCTION

8.1 The vegetation affected in each area is defined in general terms. Extensive on-ground investigations have been undertaken, with input provided to the design team. Specific design parameters were also provided to inform the formulation of the CEMP.

8.2 For the purposes of this section, the effects assessment is defined by distinct Project areas, be that for earthworks for each individual hole or for the construction of the other areas of the Project such as the Lodge Area, Sports Academy and Clubhouse. Each area is discussed in the order of which the golf course would be played, starting from with the Lodge area and following Holes 1 – 18. The auxiliary areas such as the Sports Academy and Clubhouse are then discussed separately.

Lodge Area

8.3 Visitor accommodation will be provided on the site by a new lodge designed to meet the highest standards of accommodation.

8.4 The Lodge will be located towards the western end of the property on gently sloping land that provides views of the distant Tasman Sea and the property's farm, forests, wetlands, and Lake Ōkaihau.

[4] As per the Auckland Council 'Indigenous terrestrial and wetland ecosystems of Auckland' document (2017)

Figure 2: Proposed Lodge Layout

8.5 The Lodge will be located in an area currently utilised as pastoral farmland, with the occasion mature Pohutukawa, (Trees 1 & 2)[5] growing in the open areas. These particular trees are typical of those trees within the open farmland, possessing heavily compacted root zones, with stock damage evident on most trees. This damage is illustrated by regenerative epicormic growth and the browsing of aerial Pohutukawa roots to a certain height.

8.6 Where possible, the better-quality trees within the Lodge area will be retained and incorporated into the grounds. The individual trees within the open pastoral areas are not subject to protection under section E15 of the AUP.

8.7 The Lodge area will be constructed near to the ridgeline edge (G1) which ultimately falls to the edge of Lake Ōkaihau. The vegetation within these areas will be retained and protected, with a buffer provided between any construction works and the existing fence line. A planting buffer will be provided along the edge of the entire ridgeline, with this planting to greatly improve the ridgeline environment.

8.8 The removal of stock from the non- fenced areas will also aid in the recovery of those trees and vegetation currently subject to casual stock browsing and localised compaction from stock seeking shade during the summer months.

[5] As referenced in Appendix A & B

8.9 Further to the ridgeline area, a natural gully area (G1a[6]) is located immediately south of the Lodge area, adjacent to the existing farm track. No significant works will be undertaken near this area, with the only works to be the demolition of the existing farmhouse, with upgrades to the existing farm track to formalise this as a concrete roadway. Service installations will be limited to the footprint of the accessway, with all works near tree to be supervised in accordance with Section 12.0 of this report.

Figure 3: Existing state of the ridgeline environment to the west of the proposed lodge area

8.10 A significant gully system is located to the east of the Lodge area (G2[7]). The southern portion of this area will be unmodified, with some works proposed further north as part of Hole 1 (discussed below).

Hole 1

8.11 Hole 1 will be played north of the Lodge area and will travel northwest towards Lake Ōkaihau. The fairway area is largely devoid of significant trees, with the exception of a stand of mature Pohutukawa on the western edge, midway down the Fairway, and a section of gully to the northeast consisting of mainly Kanuka and Puriri (G4[8]).

8.12 The stand of Pohutukawa (G3) will be protected with no removal or trimming proposed, with a small portion of the gully section to be removed to enable the earthworks required for the Fairway (G4).

[6] As referenced in Appendix A & B
[7] As referenced in Appendix A & B
[8] As referenced in Appendix A & B

The vegetation removal within the gully will be limited to a cluster of Kanuka, with the more significant vegetation to the north, being mature Puriri, to be retained and protected (Please see Fig 4 & 5 for images defining the extent of clearance).

8.13 A new culvert section and earth wall will be constructed at the edge of the remaining trees. A setback of 5 metres for the construction of the culvert and earth wall is recommended from the retained vegetation.

8.14 Some alterations to the existing contours will be made on the uphill side of G3[9]. However, large cuts will be minimised to ensure the existing overland flow profile immediately adjacent to these trees will remain largely unchanged.

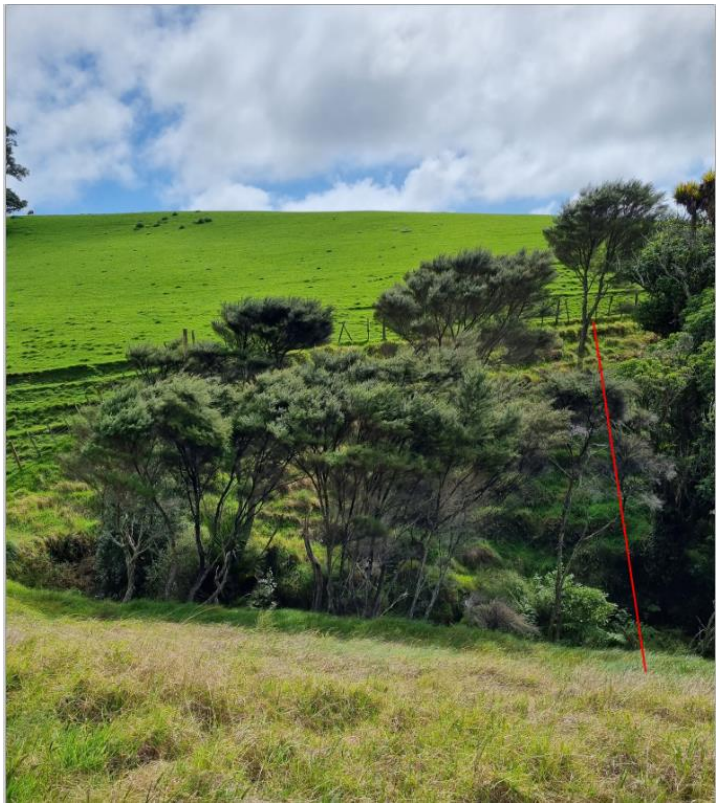


Figure 4: Extent of Kanuka Removal to The Northeast of Hole 1 (G4)

[9] As referenced in Appendix A & B

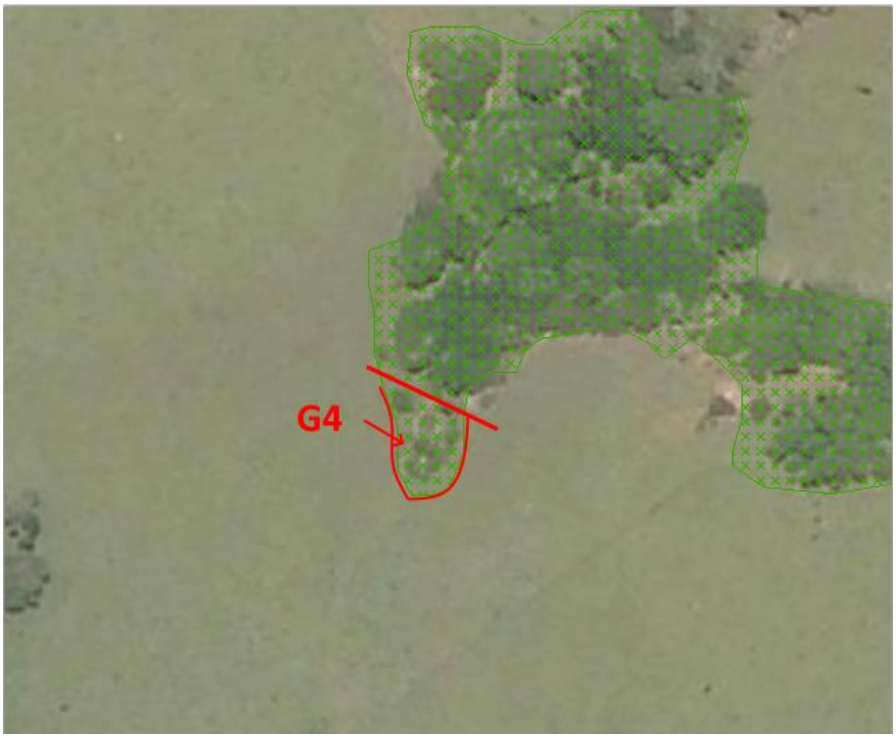


Figure 5: Location of G4 (to be cleared)

8.15 The green area of Hole 1 will be located to the north of an area of large exotic trees and weed species vegetation (G5[10]) which includes a mature Macrocarpa, clusters of Tree Lupin and the occasional Edible Fig tree (*Ficus carica*). This vegetation will be removed and is of relatively low quality, with the macrocarpa possessing a number of structural defects. The mature Pohutukawa (T6) further to the south will be retained. The remaining trees are either weed species vegetation or garden variety exotic trees. This particular grouping is not subject to tree protection under the relevant E15 provision of the AUP. (This vegetation is illustrated in Figure 4 below)

[10] As referenced in Appendix A & B

Figure 6: View from Hole 1 green towards Hole 2. G5 as seen from the North.

Hole 2

8.16 Hole 2 follows the existing ridge from Hole 1 down to the banks of Lake Ōkaihau.

8.17 The vegetation in this area is predominately Tree Lupin, with the exception of the grouping of Gum trees (*Eucalyptus sp.)* (G7 & G8[11]) growing on the southwestern edge of the lake. It is intended to remove the first 10-15 trees within this stand both to maximise playing area, while also removing those trees of poorer health and condition. Those trees in poor condition have significant deadwood visible in their canopies and as such, pose a risk to golf course patrons. G8 is subject to an SEA overlay. The removal of these trees can be adequately mitigated by way of new native lake edge plantings. The remaining trees would benefit from deadwood removal to minimise any potential risks to golf course users. (Group 8 is illustrated in Figure 7 below)

[11] As referenced in Appendix A & B

Figure 7: Existing Gum tree stand (G8)

Holes 3,4,5 & 6

8.18 These Holes are largely constructed in pastoral farmland areas. A grouping of Pohutukawa trees (G9) are currently growing to the south of the Hole 4 fairway. This grouping is to be retained and protected, with any potential adverse effects minimised through the installation of protective fencing and supervision of adjacent works by the works arborist.

8.19 Holes 5 & 6 will be constructed near the Project boundary to the west and in front of the existing Wetland system to the north. There is no additional significant vegetation within the footprint of these two Holes, with vegetation within these areas largely Tree Lupin, with the occasional grouping of Edible Fig. These areas are not subject to tree protection under the AUP, with no indigenous trees or significant vegetation growing within 20 metres of this Wetland area. A 10 metre earthworks buffer will be provided where earthworks are proposed to be undertaken adjacent to the Wetland.

Figure 8: Holes 3,4,5 & 6

Hole 7

8.20 Hole 7 will be played south from Hole 6, with the tee area to be constructed on pastoral farmland. The Green area is proposed for construction within a gully area further south-east. The central portion of the gully is currently Kikuyu, with this area historically grazed.

8.21 This gully has been fenced more recently, with an existing stock/ farm vehicle track located directly to the south of the grassed area (proposed as 7th Green). This track is currently fenced off, but historically it would have been accessed mid-way down the proposed Hole 1 fairway. The evidence of stock use can be seen throughout this area, with well worn tracks and only limited under-storey regeneration.

8.22 A pedestrian bridge connection is also proposed from the Tee area to the Green. This bridge will be constructed with two piled concrete abutments and will span a small gully to the west.[12] Vegetation

[12] Refer to the Drawing 1976 -1-282 of the Bridge Crossing Details plan provided by Mckenzie & Co.

clearance will be limited to small Manuka, less than 1.0m in height. Some minor pruning of the adjacent Puriri tree (less than 10% of the trees canopy) is also proposed.

Figure 9: Proposed 7th Green location. (Approximate bridge location shown in yellow)

8.23 Earthworks will be required within the Kikuyu grassed area as shown above as part of the formation of the new Green and various Sand Traps. The earthworks will require minor fill works within the protected root zones of those trees surrounding the proposed Green. However, fill works will be limited to minor contouring, with no more than 200mm of topsoil to be added within the root zones of any retained trees. The vegetation within these particular areas is covered by an SEA overlay.

8.24 The historic access noted in 8.38 will be formalised as the new maintenance access for 7th Green. This work would involve minor excavations, restricted to the removal of existing grass and the removal of an existing sandstone boulder which currently blocks the upper section of the track. A small timber retaining wall will be constructed on the western side, with a permeable surface added to ensure all year-round access is possible.

8.25 Pruning of an existing Kohekohe (T10[13]) at the edge of the grassed area will be required to re-gain access. The canopy will be crown lifted, with approximately 20% of the lower canopy pruned, in accordance with best arboricultural practice. Only one limb over 100mm in diameter will require removal, with the remaining branches largely 50mm in diameter or less. (Please see Fig 9 & 12 for illustrations)

8.26 Some additional clearance of small Manuka on the western side near to the proposed bridge location is proposed (G11[14]). This vegetation will be cleared to improve the playing line from 7th Tee

[13] As referenced in Appendix A & B
[14] As referenced in Appendix A & B

to 7th Green. It is noted that this particular vegetation is not covered by the SEA overlay that encapsulates the remaining vegetation to the north and south of 7th Green. However, the vegetation stands at the top of the stream bank edge, within 10 metres of the centre of the existing watercourse. As such, this vegetation would be subject to protection under those rules relating to riparian vegetation outlined in Section E15 of the AUP. The specific rule triggers are outlined in Section 10.0 of this report. (Please see Figure 10 & 13 for illustrations)

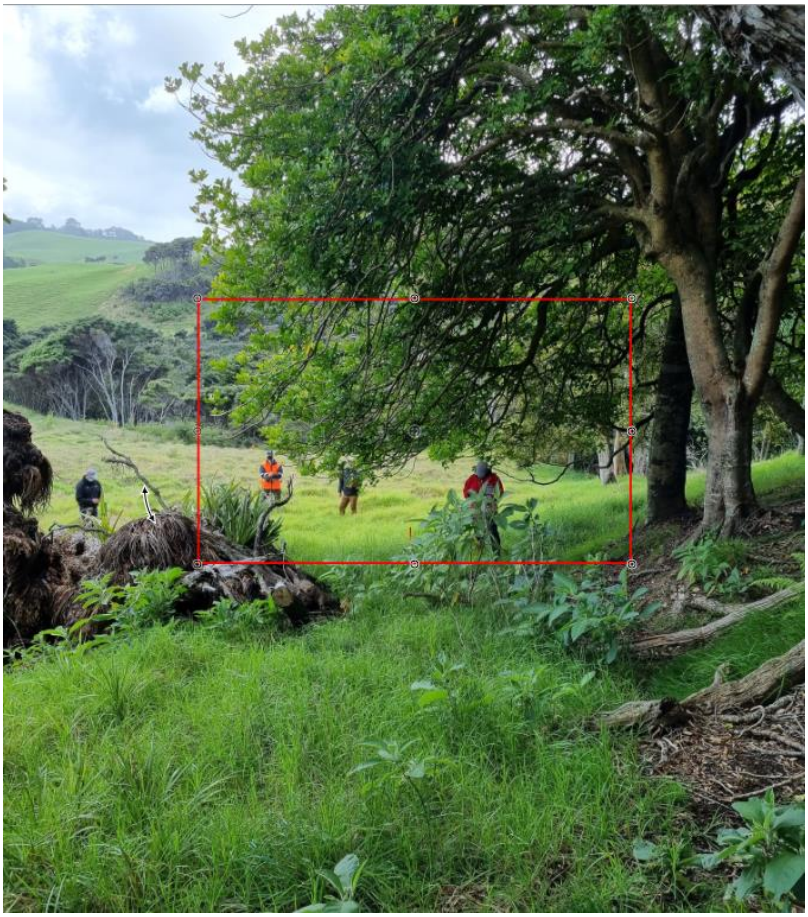


Figure 10: Kohekohe (T10) within SEA area to the south of 7th Green. Proposed crown lifting shown in red square

Figure 11: Manuka (G11) proposed for removal. The removal of this vegetation will improve the playing line from 7th Tee

Figure 12: Layout of Hole 7, faint vegetated areas shown

Figure 13: Unitary Plan Viewer image showing extent of Kikuyu area and locations of T10 & G11

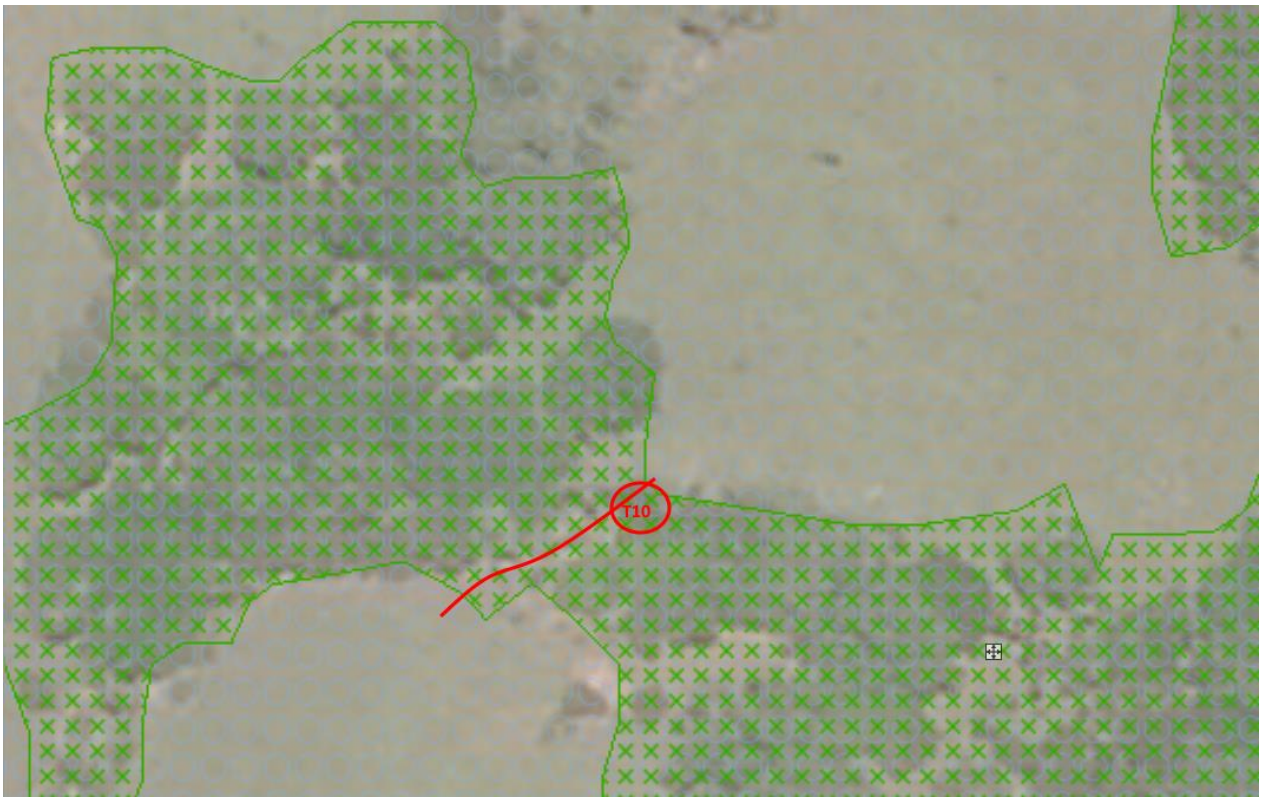


Figure 14: Location of existing stock/farm vehicle track to be utilised for maintenance access (as described in Section 9.19

Hole 8

8.27 Hole 8 is located to the northeast of 7th Green, with 8th Tee to be accessed via a new pedestrian bridge which crosses a small gully system.

8.28 The vegetation within this gully system graduates from large climax species in the upper area (including Mature Puriri, Taraire, Rewarewa & Tawa) to almost exclusively Kanuka/Manuka forest and wetland in the lower portion.

8.29 The proposed pedestrian bridge will require the removal of selected Kanuka, Manuka, a failed Tawa and the two (2) small Mahoe *(Melicytus ramiflorus)* within the 4-metre bridge footprint (G12[15]). The vegetation clearance will be limited to the clearance of vegetation directly adjacent to the bridge entry and exits and construction area required for the abutment construction works. The bulk of the understorey vegetation can be retained, with the bridge to be elevated about each bank section by at least 1.0m.(Approximate bridge location illustrated in Fig 14 below)

8.30 The main earthworks will include the clearance of the bridge abutment footprint, with some pruning and removal of Kanuka required for the actual bridge. This would be determined at the time of construction, so as to minimise the amount of vegetation pruned or removed. All tree pruning and removal is to be undertaken in accordance with the draft Tree Management Plan provided in Appendix C of this report.

[15] As referenced in Appendix A & B

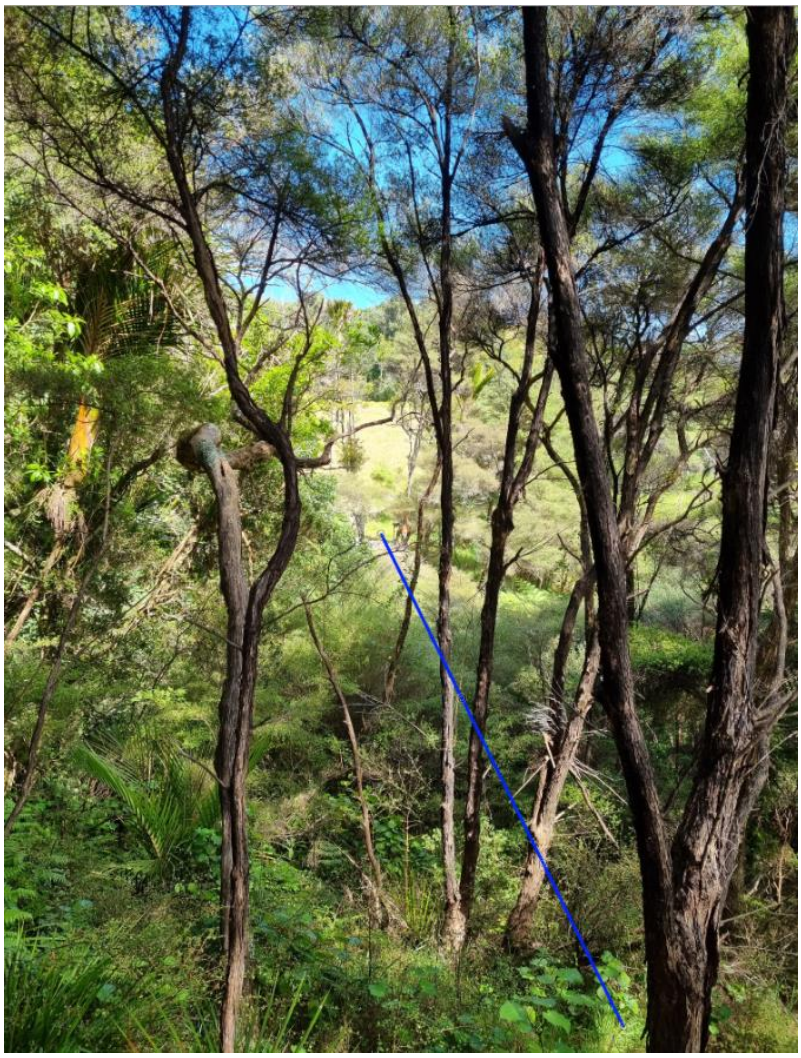


Figure 15: Approximate bridge alignment between Holes 7 & 8

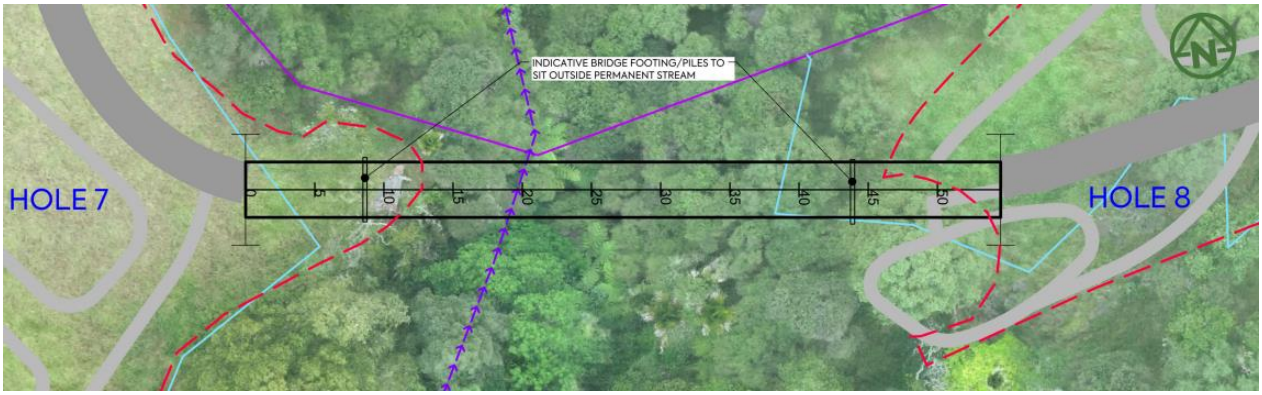


Figure 16: Aerial view of proposed bridge alignment

8th Tee

8.31 The main Tee area will be constructed largely in an area of Kikuyu grassland surrounded by Kanuka/Manuka scrub (G13[16]). The Hole will be played northeast, towards a Pohutukawa ridgeline area.(G14[17])

8.32 Selected Manuka and Kanuka will require removal to enable adequate visibility towards the 8th green, with this vegetation scattered throughout the wider Kikuyu grassed area. Some earthworks will be required within this area, to lift the existing ground level and improve visibility. All significant climax natives will be retained and worked around in this particular area. However, earthworks will be required within the root zones of trees surrounding the Green area.

8.33 Cut and fill works will largely make use of material from this existing area, with no fill to be imported. This will minimise the amount of machinery needed in the 8th Tee area.

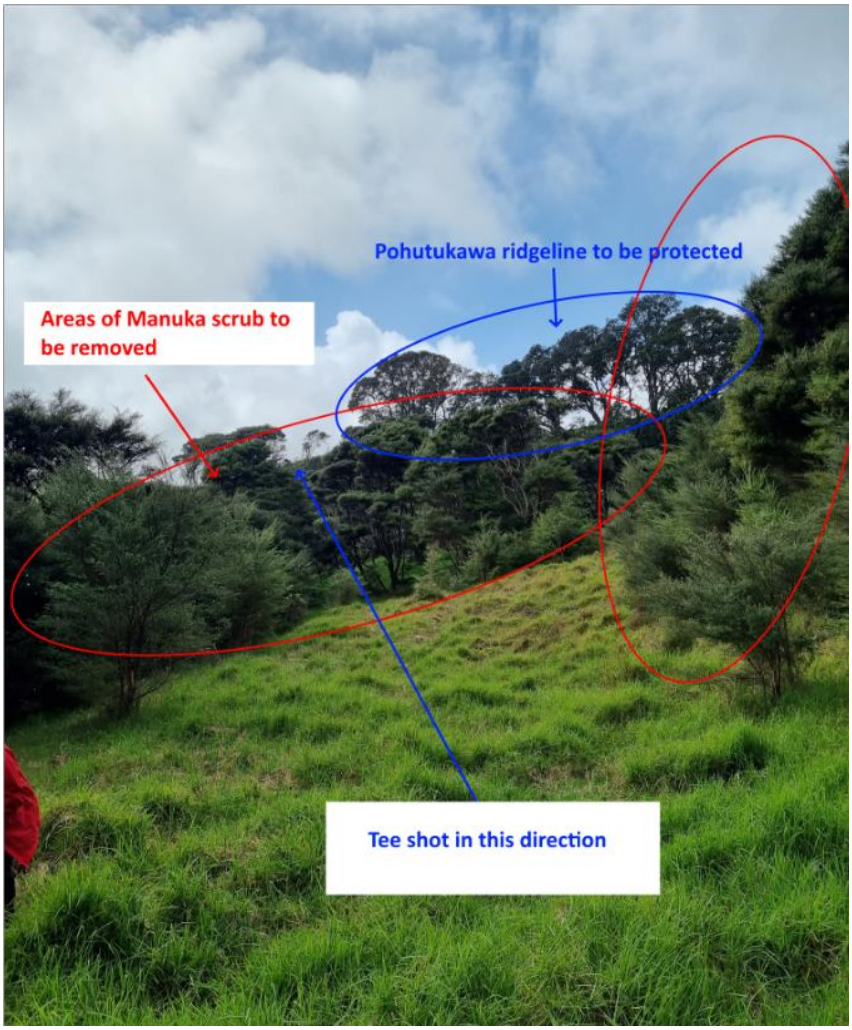


Figure 17 – View of 8th Tee shot direction. Manuka scrub requiring removal (G13) shown by red circles

[16] As referenced in Appendix A & B
[17] As referenced in Appendix A & B

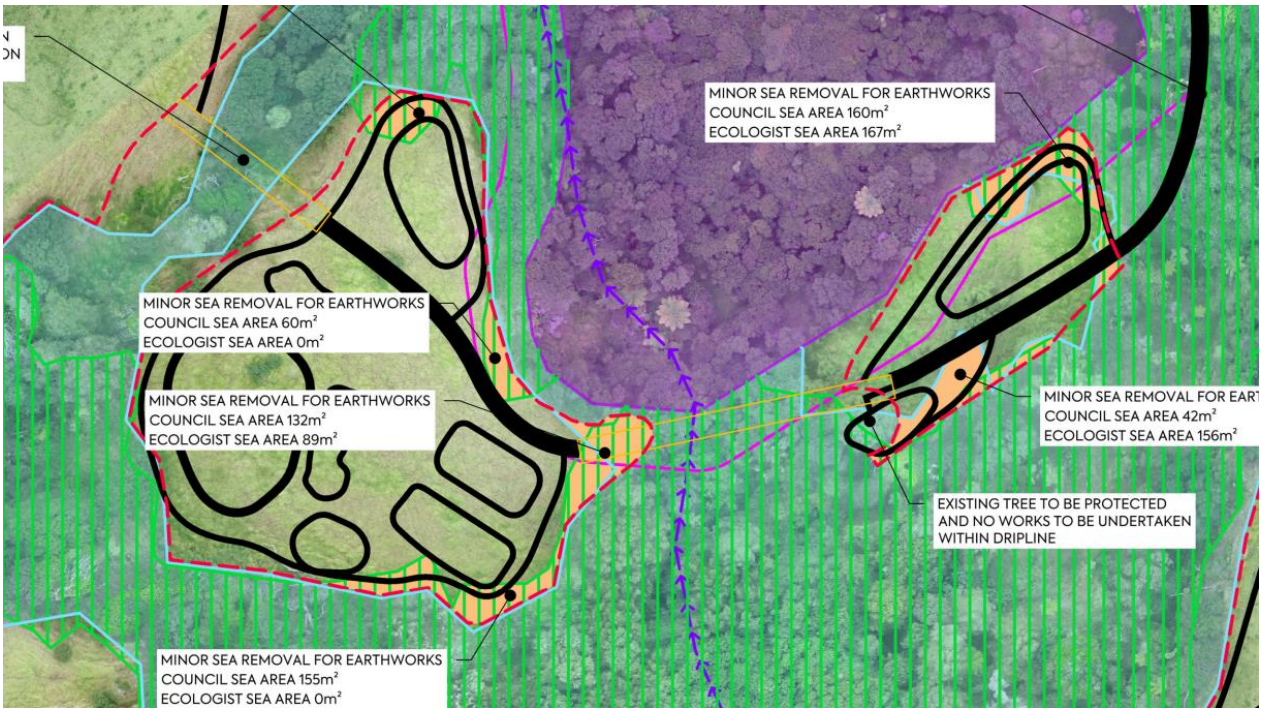


Figure 18 – Proposed Hole 7 and 8th Tee Layout

8th Fairway and Green

8.34 The Fairway section will include a shot over the top of the existing Wetland, with the Green further to the northeast. It is proposed to remove a section of Manuka and Kanuka scrub currently growing on the ridgeline area (G14[18]). Following the removal of this vegetation, earthworks will be undertaken to re-shape and remove the existing steep bank section, improving the existing visibility towards the Green and maintaining the structural integrity of the bank section. (Avoiding any potential risks associated with erosion of the cliff edge further to the southwest).

8.35 The proposed vegetation removal and earthworks would involve works within the root zones of a mature Pohutukawa tree growing at the north-western ridgeline (part of G15[19]). The design in this location is yet to be determined. However, it is recommended that works are limited within the protected root zone of the northern-most Pohutukawa, with disturbance to not exceed 20% of the PRZ. A minimum setback of 5 metres is recommended to minimise the potential for bank instability which may in turn affect the Pohutukawa tree.

[18] As referenced in Appendix A & B
[19] As referenced in Appendix A & B

Figure 19: Anticipated 8th Tee direction and anticipated earthworks extent

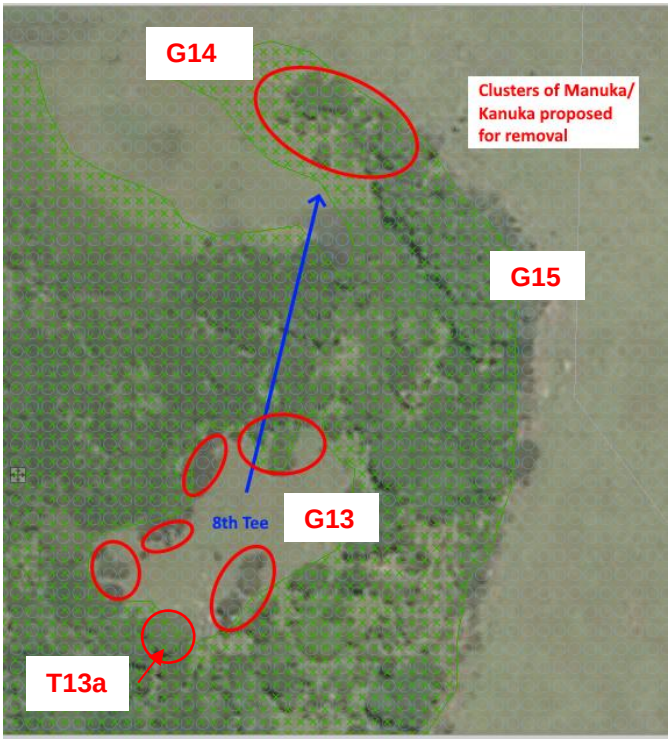


Figure 20: AUP SEA overlay of 8th Tee, red circles show vegetation proposed for removal

8.36 A semi-mature Kahikatea tree (T13a[20]) is noted as growing to the south of the 8th Tee. This tree possesses a significant inclusion at the tree's base, with significant bacterial wetwood visible at the tree's base, suggesting an internal cavity. In considering the change in land use, coupled within the

[20] As referenced in Appendix A & B

proximity of this tree to the pedestrian bridge, it is recommended that this tree be removed in the interest of the long-term safety of golf course users.

Figure 21: Base of T13a showing bacterial wetwood and inclusion.

8.37 Following Tee off from the 8th Tee, access to the Fairway will be gained via a new timber boardwalk accessway. This boardwalk will be constructed along an existing farm track and will be constructed in such a way so as to minimise compaction and the long-term impacts on the more significant adjacent vegetation.

8.38 This accessway will also provide construction and ultimately mower access as part of the golf course operation. Limited vegetation removal will be required along the existing path. Vegetation alteration will be limited to overhead clearance pruning of 3.5 metres (for a small 5 ton truck and 5 ton digger) and the clearance of weed species. Some small Nikau *(Rhopalostylis sapida)* are now growing in the footprint of the accessway. Where practical, these palms will be uplifted and planted off the access track. (G13a[21])

8.39 A temporary surface will be required for construction, with this surface to be a geo-textile base layer, with Gap 40 aggregate carefully placed on top. Following the earthworks, a timber board walk would be constructed to provide permanent access.

[21] As referenced in Appendix A & B

Figure 22: Existing accessway (stock track) to be formalised with a permanent boardwalk for access

Figure 23: Existing access track to be formalised with timber boardwalk

Hole 9

8.40 Hole 9 will be constructed to the east of Hole 8 on the ridgeline adjacent to the Pohutukawa grouping (G15[22]). Hole 9 will run parallel to the existing fence line, with no works to be undertaken beyond the fence.

8.41 Minimal earthworks are to be undertaken to form the existing Fairways within 2.0m of the existing fence adjacent to G15, with this 2.0m setback to ensure any significant structural roots beyond the fence are retained and protected. During construction, a protective fence will be constructed to ensure all works within this area are supervised by the Projects works arborist.

8.42 The vegetation within the gully system to the northwest of Hole 9 is significant WF11 bush, with this vegetation to be retained and protected.

Figure 24 – Proposed Hole 1 Layout and Pedestrian Bridge to Hole 9

[22] As referenced in Appendix A & B

Hole 1-9 Pedestrian Bridge

8.43 A large 70m span pedestrian bridge is proposed, with this bridge to span the gully system between Holes 1 & 9. Due to the pristine nature of the gully system, no support piers are proposed for installation within the gully.

8.44 However, some vegetation clearance will be required to facilitate the construction of the two bridge abutments, which will include the pruning of one (1) Mature Pohutukawa (to exceed Standard E15.6.9 but still acceptable from an arboricultural perspective), the removal of two (2) Kanuka and two Harakeke *(Phormium sp.)* on the Hole 9 side (G16[23]) with four (4) larger Kanuka and a cluster of Manuka to be removed (G17[24]) on the Hole 1 side.

8.45 Some pruning will also be required to clear a path for the new bridge, with a limb of a Kanuka to be pruned to enable clearance (G17). This limb is to be pruned to an appropriate level, leaving the existing Climbing Rata vine (*Metrosideros fulgens)* largely intact. The pruning of this branch will exceed 50mm in diameter. As such, this pruning will exceed the E15.6.9 pruning standard. However, the pruning is deemed acceptable from an arboricultural perspective.

8.46 Care must be undertaken to ensure the vegetation directly adjacent to the bridge is protected, with any additional pruning to be in accordance with Standard E15.6.9 of the AUP.

Figure 25: Proposed Bridge Route between Holes 1 & 9

[23] As referenced in Appendix A & B
[24] As referenced in Appendix A & B

Figure 26: Indicative bridge route (aerial)

Holes 10,11,12 & 13

8.47 Holes 10,11,12 & 13 will be constructed on pastoral farmland. No significant indigenous vegetation is located within the footprint of these four Holes, with all works to be away from any stands of protected vegetation. All works will be outside any areas that are currently protected by existing farm fencing or subject to protection.

8.48 One new bridge crossing will be constructed between Holes 13 & 14. This bridge will cross an existing stream, with the dominant species being Willow and Poplar (*Salix sp. & Populus sp.)* trees in poor-moderate condition. Several of these trees (G18[25]) will require removal to facilitate the construction of the new bridge abutments and associated pathways.

[25] As referenced in Appendix A & B

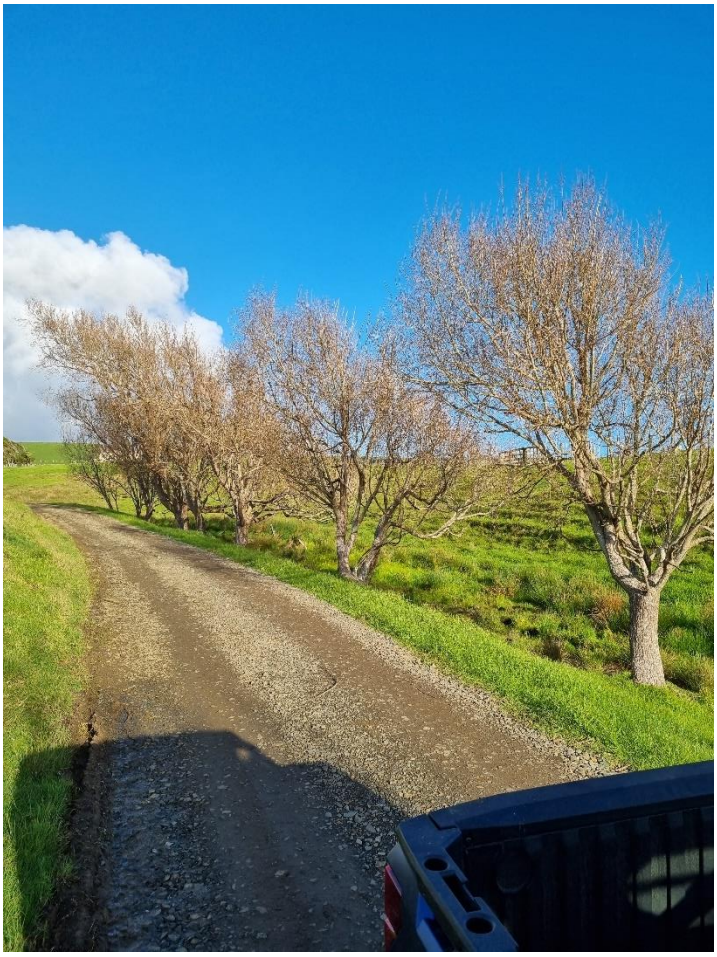


Figure 27: Willows in footprint of new bridge (between Holes 13 & 14)

Holes 14 & 15

8.49 Holes 14 & 15 are located in the northeast corner of the Project area, with the Fairway sections constructed along the edge of the site boundary. The majority of this vegetation is mature native forest including Kauri and Totara (G19[26]). A setback of at least 2.0m from the top of the existing stream bank is recommended, with any works near to or within the PRZ to be limited to minor topsoil augmentation. Protective fencing shall be erected at the edge of the PRZ during construction works to ensure the area is protected.

[26] As referenced in Appendix A & B

Figure 28: Vegetation adjacent to Hole 14 to be protected during construction

Figure 29: Mature Indigenous vegetation adjacent to Hole 14

Hole 16

8.50 Similar to Holes 14 & 15, Hole 16 is largely constructed on existing pastoral farmland. A new pedestrian bridge is proposed to span an existing wetland, located directly to the south of Hole 16.

8.51 A portion of the Fairway will be constructed around this Wetland, with one downstream modified portion to be piped (to the north beyond the fenced Wetland area). It is noted that a culvert and formed farm track are already constructed to the south of the section to be piped.

8.52 The vegetation growing within the footprint of the proposed pipe section is a mixture of Poplar, Willow and Black Wattle (G20[27]) and will require removal to facilitate the proposed Fairway earthworks.

Figure 30: Area of exotic vegetation to be removed for the 16th Fairway

[27] As referenced in Appendix A & B

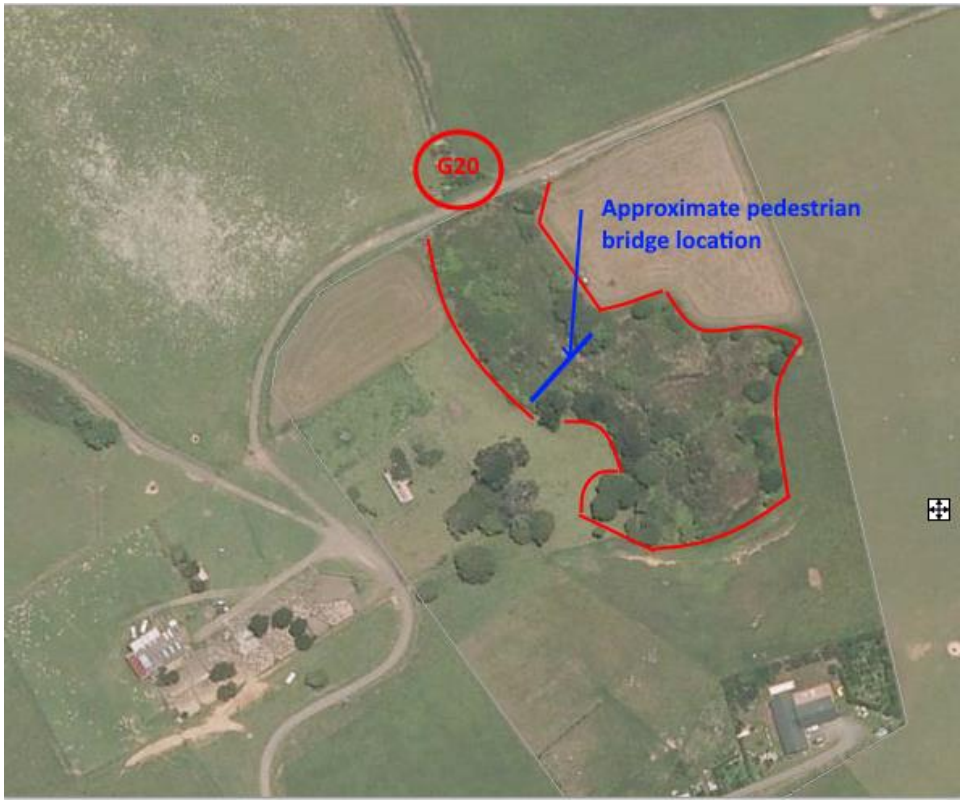


Figure 31: Wetland area to be protected. Approximate pedestrian bridge location shown. G20 proposed for removal with area filled for 16th Fairway

Hole 16 Pedestrian Bridge

8.53 The pedestrian bridge will span the existing Wetland area, with no piers (or other structures) to be constructed within the Wetland area. Care will be taken to avoid significant indigenous vegetation, with those Ti Kouka (*Cordyline australis)* growing within the central area of the Wetland to be retained and protected, with the bridge to be constructed around any such vegetation. The removal of trees in this location will include three (3) Poplar trees growing on the north-eastern side of the wetland, with some small regenerating Ti Kouka and Karamu in this location to also be removed (G21[28]). A semi-mature Pin Oak (*Quercus palustris)* tree is growing further to the east (T22[29]). This tree is intended for retention and will be protected for the duration of the works.

8.54 A small area of low vegetation will require removal on the western side of the pedestrian bridge. This vegetation is of relatively low value, with vegetation alteration limited to the footprint of the new bridge (G23[30])

[28] As referenced in Appendix A & B
[29] As referenced in Appendix A & B
[30] As referenced in Appendix A & B

Figure 32: Location of the proposed 16-17 Hole pedestrian bridge. Affected vegetation as circled.

Figure 32: Approximate route of pedestrian bridge (16-17th Hole)

8.55 An additional grouping of mixed native and exotic vegetation is growing to the south of the new pedestrian bridge. These trees will be fenced and protected for the duration of the works (G24[31]). This area of vegetation is not subject to an SEA overlay.

[31] As referenced in Appendix A & B

Figure 33: G24 to be retained and protected (south of the Wetland adjacent to Hole 16)

Hole 17

8.56 Hole 17 will be constructed largely on pastoral farmland. No significant vegetation is proposed for removal within the footprint of this particular Hole's construction area.

Hole 18

8.57 Hole 18 will Tee off to the southwest of Hole 17, with the Tee shot to be made across a small Wetland gully area. This gully area is largely devoid of large trees, with the most significant vegetation being small Manuka. The vegetation within this area will be retained and protected.

8.58 The Fairway section of Hole 18 will run parallel to Hole 10 and run along side an existing gully section. At the midway point, the Fairway will turn to the southeast, with a shot to be undertaken across the adjacent gully section.

8.59 Groupings of mature indigenous trees are growing within this gully system. This gully section is not subject to an SEA overlay. The quality of the gully vegetation is very mixed, having been heavily grazed and eroded by stock over time. A number of the trees show evidence of extensive browsing, with a number of mature Karaka and Puriri possessing large cavities and significant decay as a result.

8.60 A proposed pedestrian bridge would also be constructed through the gully to connect with the 18th Green. For the most part, the groupings of significant trees and vegetation in this area will be retained, with tree removal restricted to the removal of a dead Kauri tree (T25[32]) affected with Kauri

[32] As referenced in Appendix A & B

Dieback and a mature Karaka tree (T26[33]) to achieve the required sightline from the 18th fairway to the green area.

8.61 Pruning of an additional Karaka to widen this sightline is also proposed (T27[34]), with this pruning to be undertaken in accordance with best arboricultural practice.

8.62 Approximately 20% of the tree's southern canopy would be reduced, with this pruning extent to be maintained for the foreseeable future. It is considered that, with the correct pruning implemented, ongoing pruning would not adversely impact this tree in the long term. However, in the interest of providing flexibility for the ultimate layout, it may be deemed necessary to remove this tree entirely. If removed, 2:1 mitigation, in the form of new Karaka trees at a minimum size of 160L, would be planted as mitigation in this particular case. This planting would be in addition to the proposed re-vegetive planting provided in the gully system.

8.63 The remaining vegetation within the gully system will be retained, with mitigation planting and enhancement undertaken as part of the wider project . This planting is discussed in further detail in Section 11.0.

Figure 34: T26 Proposed for removal to gain required sightline, remaining trees to the north (with the exception to T27) to be retained and area replanted

[33] As referenced in Appendix A & B
[34] As referenced in Appendix A & B

Figure 35: Level of visibility required for Hole 18 from fairway to green. T26 in foreground, with the canopy of T27 to the left of the image

Hole 18 Pedestrian Bridge

8.64 A new pedestrian bridge is proposed to the south of the proposed Fairway crossing. This bridge will provide a link from the Fairway to the Green on the eastern side.

8.65 A grouping of three (3) mature trees which includes a Rewarewa, and two (2) Kahikatea are growing directly to the north of the proposed bridge (G28[35]). The Kauri tree on the northern side of G28 has succumbed to Kauri Dieback and will be removed in accordance with the accepted Kauri Dieback protocols.

8.66 The remaining trees within this group will be retained and protected, with works to be undertaken within their respective PRZ's as part of the bridge construction. Some pruning of the southern-most Kahikatea will be required to gain adequate bridge clearance. This pruning will be undertaken in accordance with best practice, with no more than 20% of the canopy to be pruned/removed.

[35] As referenced in Appendix A & B

Figure 36: G28 as seen from the 18th Fairway. Dead Kauri tree to be removed with the new pedestrian bridge to wrap around this stand (indicative location shown in image)

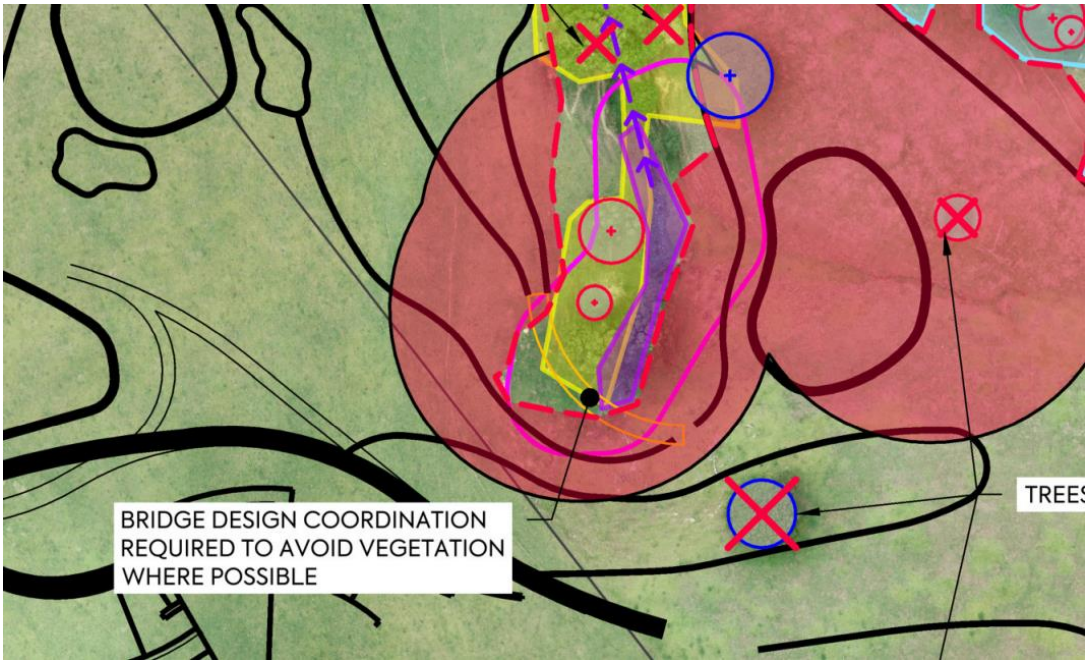


Figure 37 – Proposed Bridge Location Show above adjacent to G28

Clubhouse and Practice Fairway

8.67 To the south of Hole 18, a new Clubhouse and Practice Fairway will be constructed. The removal of two (2) dead Kauri trees, two (2) mature Kauri trees, one (1) mature Totara tree, and four (4) mature Ti Kouka are required to undertake the proposed construction works in this location. (G28a & G28B[36])

8.68 These particular trees are in an open pastoral area and as such are not subject to protection under Chapter E15. The removal of the Kauri trees is to be undertaken in accordance with the Kauri Dieback protocols, with contaminated soil removal, or retention on-site, to be undertaken in accordance with the Clearing Layout plan provided by Mckenzie & Co (referenced as plan 1976-1-186).

Figures 38 & 39 – G28a & G28b as seen from the south looking north

[36] As referenced in Appendix A & B

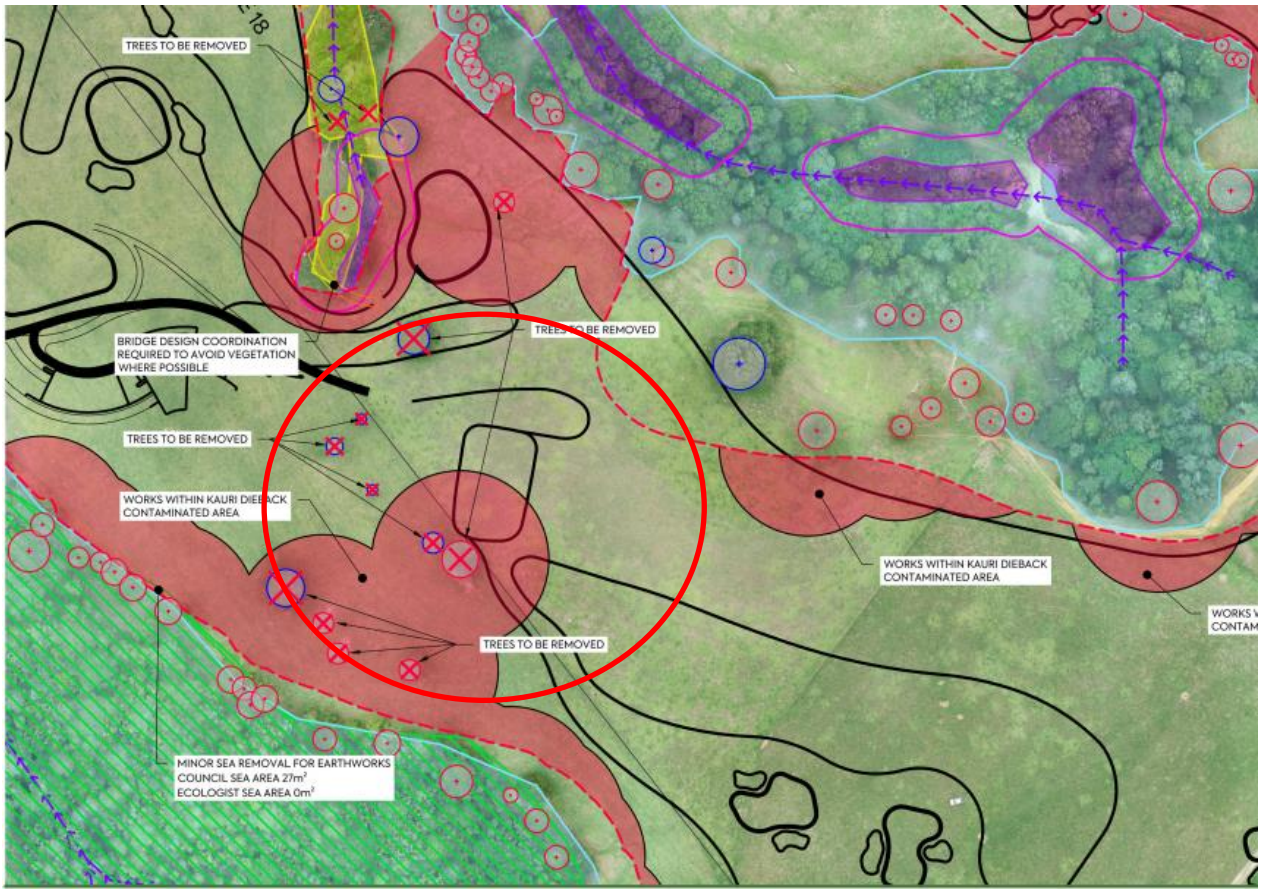


Figure 40 – Referenced Mckenzie & Co clearance plan showing tree removals for Clubhouse

Upgrades to the existing accessway to the new Lodge

8.69 As part of the existing accessway upgrades, works will be required within the root zone of one mature tree (Pohutukawa) with a second mature tree (Totara) requiring removal. (G29[37]). These two trees are currently growing adjacent to the metalled accessway. This accessway will be upgraded, with a new concrete surface to be prepared and constructed. It its recommended that the existing base course be re-used where practical, with excavations to be minimised to ensure no significant disturbance occurs within the root zone of the Pohutukawa. These trees are not covered by the adjacent SEA overlay.

8.70 However, it is noted that some trees growing within the adjacent SEA overlay area also overhang the existing accessway to be upgraded (G30[38]). The same methodology noted above will be employed in this location. All works in this location are to be undertaken in accordance with the draft Tree Management Plan provided in this report.

[37] As referenced in Appendix A & B
[38] As referenced in Appendix A & B

Figure 41: Totara tree overhanging existing accessway to be upgraded (requiring removal) (part of G29)

Figure 42: Pohutukawa tree overhanging existing accessway to be upgraded (part of G29)

Figure 43: Locations of G29 & G30 overhanging existed metalled accessway

Sports Academy and 9 Hole Course

8.71 An area of mixed indigenous vegetation (G26[39]) is located to the north of the new Sports Academy and west of the proposed 9 Hole Course. This area will be retained and protected, with all works to be undertaken in accordance with the measures outlined in Section 11.0.

8.72 This area is not subject to an SEA overlay. The vegetation in this is already fenced on the southern side adjacent to the pastoral farmland, with this fence to remain.

Golf & Property Maintenance Complex

8.73 9.68 A small gully of largely exotic species is located directly to the northwest of this complex (G24a[40]).

8.74 This area of vegetation is not protected but will be retained and protected in any case, with any pruning or works to upgrade the existing adjacent tracks to be undertaken in accordance with the recommendations outlined in Section 12.0.

Retention of non-protected Indigenous trees within open grassed Fairway and Green areas.

8.75 All significant trees within Fairway and Green areas have been retained where they do not clash with proposed earthworks or new structures. Any works within the PRZ are to be minor and involve the augmenting of the existing ground for the preparation of new Turf or Rough grass areas. It is

[39] As referenced in Appendix A & B
[40] As referenced in Appendix A & B

noted that these trees stand in areas that are heavily grazed, with evidence of stock compaction and browsing.

8.76 The removal of stock from the proposed golf course footprint (in areas not currently fenced off) will greatly improve the long-term prospects for these trees from a longevity perspective.

8.77 The main areas where the exclusion of stock will greatly improve the existing environment is within the Fairways of the 1st, 9th and 18th Fairways, where individual Pohutukawa, Totara and the occasional Kauri tree (when in good health) will be retained and worked around. It is noted that these particular trees are not subject to protection, as they do not stand within areas of SEA or within 20 metres of a watercourse.

8.78 All works around those trees to be retained in these locations are to be undertaken in accordance with the draft Tree Management Plan provided in Appendix C of this report.

Installation of new services for buildings and structures

8.79 The locations of any new services have not been determined at this early stage. However, it is recommended that all final service locations and construction methodologies are approved by the works arborist prior to final design and implementation. All works are to be undertaken in accordance with the draft Tree Management Plan provided in Appendix C.

Proposed Vegetation Alteration and Removal – Muriwai Road

8.80 As part of the wider infrastructure improvements, alterations to the existing road layout will be required to cater for the increase in turning traffic volumes in the high speed environment.

8.81 A new shoulder, drainage and right turn will be required to service the new golf course, with two new entrances required. Tree and vegetation removal will be required within Road Reserve in these two locations.

Eastern Entrance

8.82 A new entrance is proposed directly to the west of the existing eastern farm entrance. This will serve as the new farm and maintenance depot entry. A new right turn is proposed, with the existing lanes to be widened to incorporate the new layout. Two clusters of vegetation will require removal for the required earthworks. These two clusters are identified as:

(a) Cluster 1 (G31a) – This cluster of vegetation comprises of two (2) semi-mature Kanuka trees and four (4) small Kanuka trees growing on the northern side of Muriwai Roard

(b) Cluster 2 (G31b) – This cluster of vegetation comprises of two distinct groups, with the western grouping comprising of one (1) semi-mature Kanuka, and a single Karamu (*Coprosma robusta)* and the eastern grouping comprising of a semi-mature Ti Kouka and Karamu.

8.83 Mitigation planting will be undertaken following the completion of the new road upgrades in this location. A minimum of 2:1 replacement planting is proposed, with at least 16 new specimen trees to be planted on Road Reserve post completion.

8.84 It is noted that the three (3) Kanuka and one (1) Ti Kouka exceed 4 metres in height or 400mm in girth and are therefore subject to protection under Chapter E17 of the AUP.

Figure 44 – G31a & b proposed for removal on Road Reserve

Western Entrance

8.85 A second entrance is proposed further to the west. This entrance is to serve as the main public entry for the lodge and golf course.

8.86 This is the most significant vehicle entrance, with extensive vegetation removal required along the northern side of Muriwai Road. The new road layout will be designed in such a way so as to limit the impacts on the largely continuous vegetation on the southern side. The vegetation growing on the northern side of Muriwai Road consists of a mixture of low indigenous vegetation and semi-mature tree species including Ti Kouka, Karamu, Kanuka. Ground cover species includes Pōhuehue (*Muehlenbeckia complexa*) and Bracken Fern (*Pteridium aquilinum var. esculentum*). A small Pohutukawa tree is also growing approximately halfway along this eastern section. (G32).

8.87 A large Pohutukawa tree is growing to the west of the existing farm entry (T33). This tree stands within the boundary of 670 Muriwai Road, as such, this tree is not protected. This tree will require removal to form the new widened entranceway.

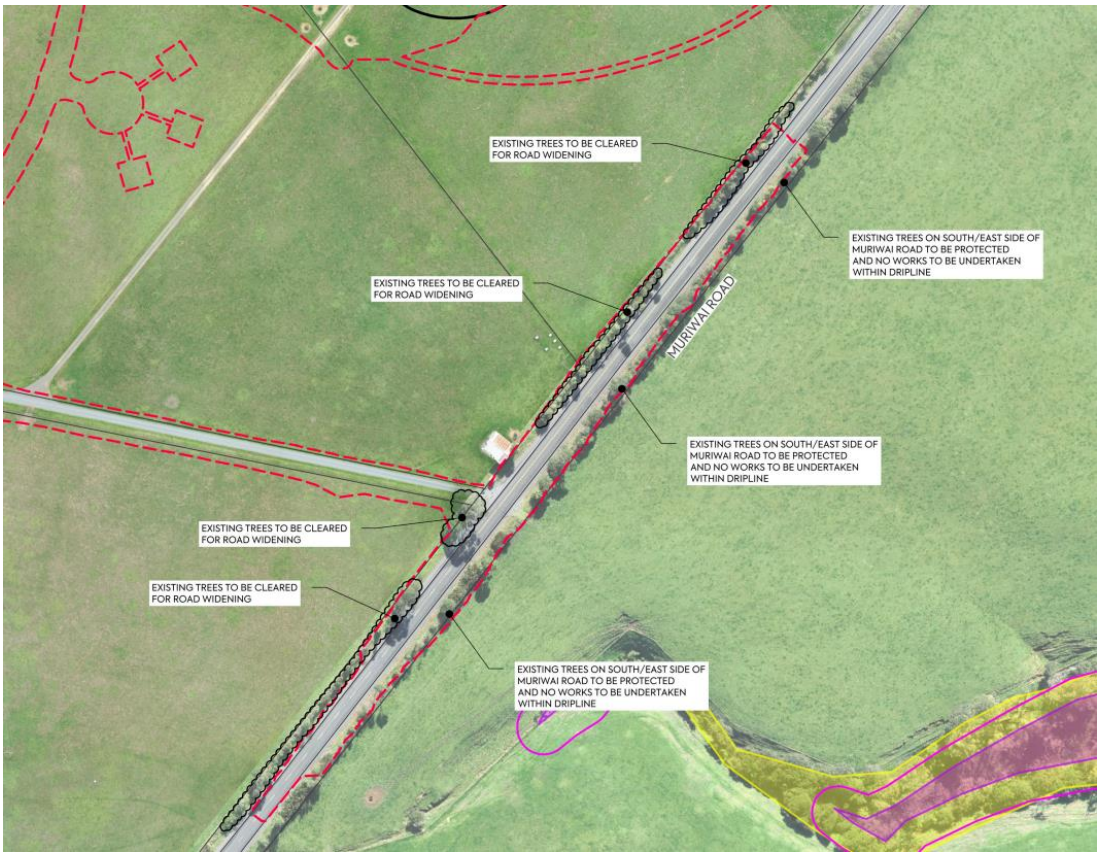


Figure 45 – Extent of Tree Removal Proposed to form new entrance (northern side)

Figure 46 – Tree 33 proposed for removal

9. ANTICIPATED EFFECTS ASSESSMENT

Overview

9.1 As outlined in the previous sections, the Project area is currently operating as a pastoral dairy and sheep farm. The farm use has been detrimental to those trees both growing in open pastoral land in recent times and some gully systems that were grazed prior to fencing in more recent times.

9.2 The proposed change from pastoral farming to a managed golf course and associated facilities will be a great improvement in the medium term from an arboricultural perspective. The elimination of stock, augmentation of existing pastoral areas and general indigenous restorative planting and management (as outlined in the Ecological Planting Plans provided by Boffa Miskell[41] and the Ecological Assessment provided by RMA Ecology[42]) will provide significant benefits for all trees and groupings of vegetation to be retained.

9.3 Where stock is removed from gully and Wetland areas, natural regeneration will occur. This is demonstrated by the more recently fenced bush areas adjacent to Holes 7 & 8, where pioneer species such as Nikau, Manuka and Karamu are proliferating throughout the historically grazed areas.

Applicable AUP Rules

9.4 This application will be assessed against those rules pertaining to vegetation within Chapters E15 and E17 of the AUP. The specific rules deemed relevant to this proposal are outlined in the table below:

Chapter E15

Table E15.4.1 Activity Table (All zones outside the RUB and all riparian and coastal areas (as described below)

Rule	Description	Activity Status
(A1)	Biosecurity tree works	**P**
(A6)	Pest Plant Removal	**P**
(A7)	Conservation Planting	**P**
(A10)	Vegetation alteration or removal, including cumulative removal on a site over a 10-year period, of greater than 250m2 of indigenous vegetation that: (a) is contiguous vegetation on a site or sites existing on 30 September 2013; and (b) is outside the Rural Urban Boundary	**RD**

[41] Referenced as Plan 2042
[42] Appendix 11 to AEE

Rule	Description	Activity Status
(A13)	Vegetation alteration or removal within 50m of the shore of a lake within a Natural Lake Management Area	**RD**
(A17)	Vegetation alteration or removal within 10m of rural streams in the Rural – Rural Production Zone and Rural – Mixed Rural Zone	**RD**
(A18)	Vegetation alteration or removal within 20m of a natural Wetland, in the bed of a river or stream (permanent or intermittent), or lake	**RD**
(A23)	Permitted activities in Table E15.4.1 that do not comply with one or more of the standards in E15.6	**RD**

Table E15.4.2 Activity Table (Vegetation and biodiversity management in overlays)

Those works affecting vegetation within the SEA overlay areas would be assessed against the following rules.

Rule	Description	Activity Status
(A36)	Pest Plant Removal	**P**
(A37)	Conservation Planting	**P**
(A41)	Tree Trimming (in accordance with Standard 15.6.9)	**P**
(A43)	Any vegetation alteration or removal not otherwise provided for	**D**

Table E17.4.1Activity Table

Those works affecting vegetation within Road Reserve would be assessed against the following rules.

Rule	Description	Activity Status
(A9)	Tree removal of any tree less than 4m in height and/or less than 400mm in girth	**P**
(A10)	Tree removal of any tree greater than 4m in height and/or greater than 400mm in girth	**RD**

9.5 A summary is provided below in terms of tree removal or for the undertaking of works within the PRZ of trees to be retained under the Restricted Discretionary or Discretionary Rules noted above as per the tree numbers referenced in Section 9.0 and Appendix A of this report.

Activity & Rule	Tree Number as referenced in this report	Total number of Trees/Groups of Trees requiring resource consent under this rule
Rule E15.4.1 (A10) – Restricted Discretionary Activity	G3, G9, G14,G15	Four (4)
Rule E15.4.1 (A17) – Restricted Discretionary Activity	G11, G12, G19, G20, G21, G22, G25, T26, T27	Nine (9)
Rule E15.4.1 (A18) – Restricted Discretionary Activity	G7, G8	Two (2)
Rule E15.4.2 (A43) – Restricted Discretionary Activity	G4, T10, G12, G13, G13a, G14, G15, G16, G17, G19, G30	Eleven (11)
Rule E17.4.1 (A10) – Restricted Discretionary Activity	G31a, G31b, G2	Three (3)

Assessment Against Relevant AUP Criteria

9.6 As aforementioned, vegetation growing within the Project area (610 & 670 Muriwai Road) is subject to those rules outlined in Activity Tables E15.4.1 & E15.4.2 of the AUP.

9.7 An assessment is provided below against the relevant RD criteria outlined in Section E15.8.1 of the AUP for the removal or pruning of trees or works within the PRZ of trees subject to protection under Rules E15.4.1 (A10, A17 & A18). (Table 10.11)

9.8 In the case of the tree removal or alteration within SEA overlay areas, it is noted that there are no standards, matters for discretion or assessment criteria available to invoke or have regard to for a Discretionary Activity in Chapter 15, with regard to the removal of vegetation with an SEA.

9.9 For the purposes of this assessment, the Objectives and Policies outlined in Sections D 9.2 & D9.3 are considered, as recommended in Section E15.1.

9.10 Both Objectives outlined in D9.2 and selected Policies deemed appropriate for this proposal as detailed in D9.3 are assessed against the proposal in Table 10.12.

9.11 Noting that the overall activity status for these works are bundled as a discretionary activity and the boarder project is being assessed as a non-complying activity, the assessment criteria are not determinative. An assessment against the assessment criteria has been included for completeness.

Table 10.11 – Removal of trees and works within the PRZ of trees

E15.4.2 Assessment criteria The following is my assessment against the criteria for the proposed removal of protected trees contained in E15.4.2 of the AUP (OP). The criteria are given in the left hand column (red text), with the response in the right hand column (black text)		
The Council will consider the relevant assessment criteria for restricted discretionary activities from the list below:		
1(a)	the extent to which the vegetation alteration or removal is minimised and adverse effects on the ecological and indigenous biodiversity values of the vegetation are able to be avoided, remedied or mitigated	The proposed vegetation alteration and removal has been limited as much as practical, while still achieving a good level of functionality for the proposed golf course. A number of alterations have been made to the course layout and certain elements of the Project (including the locations of bridges and structures for the golf course and the location of the lodge) have been undertaken to ensure disturbance is kept to a minimum. Significant benefits will be achieved through the removal of stock from the course areas and the significant landscape planting proposed.
1a (ii)	whether vegetation removal will have an adverse effect on threatened species or ecosystems	For the most part, vegetation removal will be limited to lower value tree species such as Kanuka and Manuka. The majority of trees will be retained and worked around, with appropriate protocols. All works involving Kauri trees (both dead or healthy) are to be undertaken in accordance with the best practice guidelines (as attached to this report as Attachment 1 & 2) A number of natural areas have already been degraded through stock browsing, with natural regeneration already happening in areas that have been fenced more recently. This is likely to occur in those areas to be retired from active farming, specifically on the fringes of natural areas where regeneration will be allowed to re-grow, to be enhanced with new plantings.
1a (ii)	the extent to which the proposal for vegetation alteration or removal has taken into account relevant Pbjectives and Policies in Chapter B7.2 Indigenous Biodiversity, B4 Natural heritage, Chapter E18 Natural Character of the Coastal Environment and E19 Natural Features and Natural Landscapes in the Coastal Environment	B7.2 – Indigenous fauna or biodiversity would not be significantly compromised by the proposed works B4 – Natural heritage values inherent in the relevant natural landscape – in this case the existing natural areas will be ultimately enhanced. E18 – The subject property is a not a coastal environment. No vegetation or tree removal will be undertaken within a 'top of cliff' zone, and the proposed works would not compromise the root zones of

		any vegetation to a degree whereby the health or stability of retained vegetation would be compromised. E19 – see E18 discussion above.
1b (i)	the extent to which the vegetation serves to avoid or mitigate natural hazards and the amount of vegetation to be retained or enhanced	The retirement of pasture and the change in stock use will greatly improve the wider Project environment. The vegetation proposed for removal is largely in areas away from natural hazards. Setbacks are provided where required to mitigate any potential effects.

Table 10.12 – Tree removal, pruning or alteration within SEA overlay areas

Objectives and Policies – Sections D9.2 & D 9.3 The following is my assessment against selected Objectives and Policies for the proposed removal of protected vegetation within the footprint of the works. The Objective or Policy criteria are given in the left hand column (red text), with the response in the right hand column (black text)		
The Council will consider the relevant assessment criteria for restricted discretionary activities from the list below:		
D9.2 (1)	Areas of Significant Indigenous Biodiversity value in Terrestrial, Freshwater, and Coastal Marine Areas are protected from the adverse effects of subdivision, use and development.	The most pristine terrestrial environments will be retained and protected. The most significant level of disturbance (within SEA areas) will be undertaken in an area with evidence of extensive stock use and browsing. (Holes 7 & 8). The vast majority of the works in these areas will be within existing Kikuyu grassed areas with works within natural areas to be of low impact and largely for construction only with additional planting proposed post earthworks. Boardwalks and low impact solutions will be employed long term to minimise any long term effects.(As outlined in the ecological planting plan areas plan provided by RMA Ecology)
(2)	Indigenous Biodiversity Values of Significant Ecological Areas are enhanced.	Weed eradication and enhancement planting will be undertaken in degraded areas adjacent to the main playing areas, the lodge surrounds, SEAs and general areas. This will enhance the existing environment. Furthermore, the removal of intensive farming will greatly improve the long term health and regeneration of natural areas.
(3)	The relationship of Mana Whenua and their customs and traditions with indigenous vegetation and fauna is recognised and provided for.	It is considered any impacts would be temporary, with the existing environment to be improved by the replacement and enhancement planting proposed. We note the findings of the Cultural Impact Assessment prepared by Te Kauwerau ā

		Maki[43] that vegetation and tree clearance may cause minor adverse effects on Ngahere (Native Forest/Bush) and its recommendation that vegetation removal from SEAs and other areas of higher density habitat be minimised. We have adopted this same approach. Further improvements will be made through pest plant control and management, ultimately improving the existing environment
D9.3 (1)	Manage the effects of activities on the indigenous biodiversity values of areas identified as Significant Ecological Areas by:	
(a)	avoiding adverse effects on indigenous biodiversity in the Coastal Environment to the extent stated in Policies D9.3(9) and (10);	Not applicable as the site is not within the Coastal Environment
(b)	avoiding other adverse effects as far as practicable, and where avoidance is not practicable, minimising adverse effects on the identified values;	The extent of earthworks is to be managed carefully, so no over-cut or vegetation removal beyond that within the footprint of the works is undertaken. The golf course has been designed with a view to avoiding and protecting significant ecological features including significant vegetation and a number of changes have been made to the design throughout the process to respond to potential effects of the design on SEAs. Works within the PRZ of all trees to be retained will be supervised, with all areas fenced during the earthworks phase.
(c)	remedying adverse effects on the identified values where they cannot be avoided	Replacement and enhancement planting will be undertaken in order to remedy and/or mitigate any potential long term adverse effect throughout the project area
(d)	mitigating adverse effects on the identified values where they cannot be avoided or remediated; and	As above
(2)(a)	fragmentation of, or a reduction in the size and extent of, indigenous ecosystems and the habitats of indigenous species;	It is not considered that any additional fragmentation of indigenous ecosystems will occur. Significant tree removal (largely G4 & G14) are on the edge of large areas to be retained and protected. Vegetation removal at bridge construction locations will be limited and the vegetation will largely remain continuous in these locations. There will be no significant negative edge effects and as such the remaining vegetation adjacent to the clearance areas will remain healthy. Additional planting and pest

[43] Appendix 21 to the AEE.

		plant removal will further enhance the existing areas.
(b)	fragmentation or disruption of connections between ecosystems or habitats;	The disruptions of continuous stands of vegetation will be minimal as most vegetation removal proposed is of lower quality vegetation on the extreme edge of any significant remnant areas.
(c)	changes which result in increased threats from pests on indigenous biodiversity and ecosystems;	Currently there is very little pest control within the Project area. It is anticipated that a proactive pest control program will be implemented as part of the long term management of the Project as the existing natural areas are intended to be a major feature. The Project will reduce rather than increase the risk of pests on indigenous biodiversity and ecosystems.
(d)	loss of buffering of indigenous ecosystems;	The natural areas are already largely limited to gully systems not suitable for pastoral farming.
(e)	loss of a rare or threatened individual, species population or habitat;	No rare or threatened plants were identified within clearance or earthworks areas, from an arboricultural perspective.
(f)	loss or degradation of originally rare ecosystems including Wetlands, Dune Systems, Lava Forests, Coastal Forests;	Most wetlands within the Project area are heavily degraded. The Project intends to improve the current state of all Wetland areas by reducing run off and nutrient loads.(As outlined in the ecology report provided by RMA Ecology, Appendix 11 to AEE).
(g)	a reduction in the abundance of individuals within a population, or natural diversity of indigenous vegetation and habitats of indigenous fauna;	The proposed plant and tree removals are not considered to adversely impact the localised population. The vegetation type to be removed is the same as that which is dominant across the entire site.
(h)	loss of ecosystem services;	The likely impact on ecosystem services would be less than minor when considering the retained vegetation over the entire site. The proposed planting over the wider site will ultimately enhance the existing environment.

(l)	effects which contribute to a cumulative loss or degradation of habitats, species populations and ecosystems	It is not considered the proposed vegetation removal is significant in terms of the wider Project area. The removal is localised and in areas of generic vegetation. The site is already heavily modified and grazed by stock.
(3)(a)	Enhance indigenous biodiversity values in significant ecological areas through any of the following: (a) restoration, protection and enhancement of threatened ecosystems and habitats for rare or threatened indigenous species;	It is considered that the replacement planting and weed management plan will ultimately have a more positive impact, by controlling plant pests established throughout the existing bush and gulley areas as well as planting new native areas which will increase indigenous biodiversity and actual natural areas for the wider ecosystem
(b)	control, and where possible, eradication of plant and animal pests;	As above, a weed and animal management plan is proposed to manage plant and animal pests
(e)	Development and implementation of management plans to address adverse effects	As above, a weed management plan is recommended to address management of plant pests during and post the driveway construction works. A draft Tree Management Plan has been prepared by PBM. Measures and recommendations for the management of Kauri Dieback are also provided in this assessment.
(f)	Re-vegetating areas using, where possible, indigenous species sourced from naturally growing plants in the vicinity with the same climactic and environmental conditions; or	Due to limits in supply, it may not be considered practical to eco-source from the immediate vicinity. However, it is recommended that plant source be selected from seed banks possessing similar forest typologies in the Auckland Area

In summary, it is concluded that the Project will have less than minor adverse arboricultural effects overall, with any potential and actual adverse effect adequately mitigated by the proposed replacement and enhancement planting proposed in the wider Project.

Table 10.13 – Removal of Trees and Vegetation on Road Reserve

E17.8.2Assessment criteria – trees in roads and Open Space zones The following is my assessment against the criteria for the proposed removal of trees and vegetation within road reserve as part of the proposed entrance works. (black text) contained in E17.8.2 of the AUP (OP).		
The Council will consider the relevant assessment criteria for restricted discretionary activities from the list below:		
(1) trees in roads and Open Space zones:		
(a)	The specific values of the trees including any ecological values with respect to water and soil conservation, ecosystem services, stability, ecology, habitat for birds and amelioration of natural hazards;	The trees and vegetation proposed for removal is growing within Road Reserve in an area largely un-maintained by Council. Considering the continuity of the vegetation, it is likely that the vegetation will provide habitat for lizards and birds.

E17.8.2Assessment criteria – trees in roads and Open Space zones The following is my assessment against the criteria for the proposed removal of trees and vegetation within road reserve as part of the proposed entrance works. (black text) contained in E17.8.2 of the AUP (OP).		
		However, the vegetation is directly adjacent to a high speed road which would interrupt bird nesting and long term use. Management of the relocation of any lizards is set out in the Ecological Effects Assessment report.[44]
(b)	The loss of amenity values that tree or trees provided;	Some visual amenity loss will occur in the short term as a result of the vegetation removal. However, it is considered that amenity will still be provided by the vegetation to be retained on the southern side if Muriwai Road, with replacement planting post works to adequately mitigate any potential adverse visual effect in the medium term per the Landscape and Visual Effects Assessment report.[45]
(c)	*The risk of actual damage to people and property from the tree or trees including the extent to which adverse effects on the health and safety of people have been addressed as required under health and safety legislation*	There are no current risks to people or property. The proposed works will enable the construction of the new entrances in accordance with the required ATCOP standards (so as to ensure the new intersections are safe for road users and pedestrians)
(d)	*Any alternative methods that could result in retaining the tree or trees;*	The only alternative layout would require the removal of the trees growing on the southern side of Muriwai Road. The trees and vegetation on the southern side are much denser and larger than those growing on the north
(e)	*The degree to which any proposed mitigation adequately compensates for the values that trees provide*	2:1 replacement planting is proposed for G31a & b with new specimen trees on Road Reserve. In the case of G32, it is recommended that a comprehensive replacement planting scheme be prepared by the Project's landscape architect for this particular location, to be planted on road reserve.
(f)	*The degree to which the proposal is consistent with best practice guidelines for tree management*	The proposed layout has been designed in such a way so as to retain the trees and vegetation on the southern side. This is the most significant publicly owned vegetation adjacent to the western intersection and as it is considered to be in accordance with best practice.
(g)	*Methods to contain and control plant pathogens and diseases including measures for preventing the spread of soil and the safe disposal of plant material;*	No Kauri trees are growing within Road Reserve in this location. All material is to be chipped and disposed of in accordance with best arboricultural practice.

[44] Appendix 11 to the AEE.
[45] Appendix 13 to the AEE.

E17.8.2Assessment criteria – trees in roads and Open Space zones The following is my assessment against the criteria for the proposed removal of trees and vegetation within road reserve as part of the proposed entrance works. (black text) contained in E17.8.2 of the AUP (OP).		
(h)	*the provision of a tree works plan to address the effects of the works on the tree or trees and outlining the proposed methods to be used;*	A draft Tree Management Plan is outlined in Appendix A of this report. It is recommended that all works are undertaken in accordance with this plan.
(i)	*the need for the direction and supervision of an on-site monitoring arborist while the works are being carried out;*	The vegetation on the southern side must be fenced and protected for the duration of the works. All works near to this vegetation is to be undertaken under the supervision of a works arborist, in accordance with the draft Tree Management Plan outlined in Appendix C of this report. The works arborist shall accurately identify the trees proposed for removal.
(j & k)	*the functional and operational needs of infrastructure; and* *the benefits derived from infrastructure*	The works are necessary to undertake the proposed construction of the two new entrances and associated intersections. In order to construct the entranceways in accordance with accepted industry best practice, the road must be widened, triggering the need for vegetation removal.

10. REPLACEMENT AND ENHANCEMENT PLANTING

10.1 A high level Ecological Restoration plan has been prepared for the main Project area (with the exception of Muriwai Road) by RMA Ecology, (This Plan is referenced as Appendix D in this report).

10.2 This plan outlines a proposal for extensive restoration and enhancement planting in Forest, Riparian and Wetland areas within the Project area.

10.3 From an arboricultural perspective, this planting strategy would adequately mitigate the loss of any protected vegetation proposed for removal as part of the Project, with new plantings in areas not currently vegetated deemed enhancement for an effects perspective.

11. DRAFT TREE MANAGEMENT PLAN (TMP)

11.1 A draft detailed Tree Management Plan has been prepared for all stages of the Project's delivery including Pre-Works, Construction and Post Works.

11.2 The draft Tree Management Plan is attached as Appendix C to this report.

11.3 Provided the proposed draft Tree Management Plan is implemented, and all works near to or associated with protected trees and vegetation are supervised by a works arborist, the anticipated effects would be less than minor and acceptable from an arboricultural perspective.

12. KAURI DIEBACK MANAGEMENT

12.1 The presence of Kauri Dieback has been identified within the wider Project area as part of the various site visits undertaken by PBM. A number of large Kauri trees in pastoral areas have died and are standing dead, with dead trees and visual canopy dieback is evident in a number of gulley and ridgeline stands.

12.2 As such, all Kauri within the Project area will be treated as affected and managed in accordance with the current Biosecurity Guidelines provided by MPI and Auckland Council. Where dead trees are located in bush areas which will not be modified by the Project, no tree removal will occur, so as to minimise the future spread of the disease within the Project area. Where removal of Kauri is proposed or works will be undertaken in the vicinity of Kauri trees, the removal and/or works will be undertaken in accordance with best practice.[46]

12.3 The 'Kauri Contamination Zone' in defined as three times the dripline spread radii. Bio-security protocols are required when working within the above-referenced parameter, and for the disposal of cut material and soil. The protocols are intended to control the removal of soil and Kauri tree material so as to minimise and limit the spread of the Kauri Dieback Disease.

12.4 As such, all works are to be undertaken in accordance with Chapter E11.6.2 – Note 1 (6) of the Unitary Plan, which states the following;

(6) To prevent the spread of contaminated soil and organic material with kauri dieback disease, vehicle and equipment hygiene procedures must be adopted when working within 3 times the radius of the canopy drip line of a New Zealand kauri tree. Soil and organic material from land disturbance within 3 times the radius of the canopy drip line must not be transported beyond that area unless being transported to landfill for disposal.

12.5 Two documents containing the detailed guidelines pertaining to the above-referenced rule have been issued by the Kauri Dieback Programme team[47], and are attached to this report as Attachments 1 & 2. They are titled;

(a) Best Practice Guideline – Tree Removal and Pruning of Kauri - Version 2.1 – October 2017

(b) Best Practice Guideline – Vehicle and Heavy Machinery Hygiene – Version 1.1 – October 2017

12.6 Further information pertaining to Kauri Dieback protocols, and on any activity proposed to be undertaken in the vicinity of any Kauri tree, can be obtained from PBM or by visiting this website – www.kauridieback.co.nz.

12.7 Provided that all Kauri tree removal and works within the driplines of those Kauri trees to be retained are managed in accordance with the Kauri Dieback Protocols outlined in this report it is considered that any effects on those Kauri tree remaining within the project area as part of the initial earthworks and ongoing golf course use would be less than minor. This would especially be the

[46] Please refer to the 'Contaminated Kauri Dieback Disturbance Area' plan set provided by Mckenzie & Co (Drawing 1976-1 -190 to 1976 -1 -192 for kauri soil management areas
[47] As prepared by Travis Ashcroft for the Kauri Dieback Programme

case in those areas where stock is removed (with the transport of Kauri Dieback disease by way of soil stuck on the hooves of sheep and cattle a known cause of spore spread)

13. CONCLUSION

13.1 An arboricultural assessment has been undertaken in relation to the trees and tree/vegetation groups affected by the proposed works for the Project.

13.2 In summary, consent is being sought to carry out the activities outlined in Section 10.0 of this report, with an assessment provided against the relevant Criteria outlined in Chapters E15.4.2, E26.4.3.1 and the Objective and Policies outlined in D9.2 & 9.3.

13.3 The trees and tree/vegetation groups affected have been described in general terms - with all tree removal, pruning and works within the PRZ of retained vegetation to be undertaken within the Project area associated with the formation of the new golf course and associated buildings, structures and common areas.

13.4 All works are to be overseen by the appointed works supervisory arborist in accordance with the draft Tree Management Plan outlined in Section 12.0 of this report.

13.5 This report has been prepared to accompany the resource consent application for the overall proposal. It provides the information that will assist Council to assess activities that affect protected trees under Chapters E15 & E17 of the Auckland Unitary Plan.

13.6 The variety of activities that are proposed to take place within the root zones of the trees to be retained can be managed in such a way that any adverse effect on the health and stability of the protected trees or stand/grouping of vegetation will be less than minor, provided the tree protection methodologies supplied in Appendix C of this report are adopted..

13.7 From an arboricultural perspective, the removal of protected vegetation would be adequately mitigated, so that any actual or potential effects would be less than minor, provided that replacement planting was to occur in accordance with the recommendations outlined in both this report and that which is also recommended in the Ecological and Landscape Assessment (prepared by RMA Ecology and Boffa Miskell dated 8/12/2021 respectively).

LIST OF APPENDICES

Below is a list of the appendices annexed to this report:

(a) Tree and Vegetation inventory

(b) Location map

(c) Tree Management Plan

(d) Ecological Restoration and Enhancement Planting Plan (prepared by RMA Ecology)

Attachment (1 & 2) Kauri Dieback Protocols

(e) CV of the author

APPENDIX A – TREE AND VEGETATION INVENTORY

1.0 Categories

The following categories have been used within the tree survey tables and, where appropriate, the criterion used to define each category is defined.

- **Tree No.**: refers to the number or letter assigned to a tree or group of trees, also identified as such on the accompanying tree location plan located in Appendix B of this assessment
- **Botanical Name**: The genus and species, and cultivar or variety where known, is given. Where the species is unknown the tree is identified as: (Genus) sp.
- **Tree Name**: The generally accepted common, or Maori, name of the tree is given.
- **Location**: Location within the project area
- **Protected Status**: refers to protected status of each tree and whether the tree is either Protected (P) (within near proximity to a wetland, lake or stream), Protected within an SEA overlay Area (SEA) or Not Protected (NP)
- **Height** : refers to the height of the tree in metres (approximate).
- **Girth**: approximate in metres
- **Crown Spread (Radius)**: refers to the radius of crown spread of the tree in metres (approximate).
- **Condition**: Refers to the overall physical appearance of the tree compared to that typical for the species.

  The condition is described as:

  Good – Good branch structure, full healthy canopy but possibly including some suppressed or damaged branches.

  Fair – Average branch structure, slightly reduced leaf cover, minor dead wood or isolated major dead wood.

  Poor – Poor structure, overall sparse leafing and/or extensive dieback. In decline.
- **Comments:** Any comments relating to each specific tree.
- **Trees for removal** – red text

- **Trees for retention** – black text

Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
T1	*Metrosideros excelsa*	Pohutukawa	Lodge	NP	12	2000+	8+	F	Mature specimens, subject to stock damage and compaction to be retained in lodge area
T2	*Metrosideros excelsa*	Pohutukawa	Lodge	NP	10	2000+	8+	F	Mature specimens, subject to stock damage and compaction to be retained in lodge area
G1	*Mixed indigenous vegetation dominated by Metrosideros excelsa Kunzea ericoides*	Mixed Natives	West of Lodge	SEA					Mature trees and vegetation. Currently fenced. To be protected as part of project. Works in accordance with Section 12.0
G2	*Mixed indigenous WF11 vegetation*	Mixed Natives	West of Lodge	SEA					Mature trees and vegetation. Currently fenced. To be protected as part of project. Works in accordance with Section 12.0 on both sides of gulley area.
G3	*Metrosideros excelsa x 7 (larger than 250m2)*	Pohutukawa	1st Fairway	P	10-18	2000+	8+	F	Mature specimens, subject to stock damage and compaction. To be retained and worked around.
G4	Kunzea ericoides (group)	Kanuka	1st Fairway	P SEA	6-8	400-800	2-4	F	Young to semi-mature specimens. Remove to fill gulley head for fairway
G5	*Cupressus macrocarpa*	Macrocarpa Tree Lupin	Between 1st & 2nd Fairways	NP	3-18	200-2000+	2-14	F	Predominately exotic vegetation. To be removed

Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
	Lupinus arboreus *Ficus carica (group*	Edible Fig							and replanted with native restoration plantings.
T6	*Metrosideros excelsa*	Pohutukawa	Between 1st & 2nd Fairways	NP	15	2000+	10	F	To be retained and worked around. Removal of deadwood and broken branches proposed.
G7	*Eucalyptus sp.* *Lupinus arboreus*	Blue Gum x 10-15 Tree Lupin (Pest plant)	South of 2nd Green	P (NP)	2-18	450-2000+		F	Gum trees subject to protection as they stand on the edge of the wetland. Remove for green construction. Replacement planting proposed
G8	*Eucalyptus sp.*	Blue Gum (remainder of row)	South of 2nd Green	P	10-18	1-2m+		F	Gum trees subject to protection as they stand on the edge of the wetland. This portion of the stand is to be retained.
G9	*Metrosideros excelsa (group)* *(larger than 250m2)*	Pohutukawa	South of 4th Fairway	P	8-12	1-2m+	8+	F	Semi mature specimens, subject to stock damage and compaction to be retained and worked around
T10	*Dysoxylum spectabile*	Kohekohe	South of 7th green adjacent to access track	SEA	8	1200	8	G	Pruning required to clear access track
G11	*Leptospermum scoparium (group)*	Manuka	Western side of 7th Green (for sight line)	P	2-6	350-600	1-2	F	Removal required for sight lines
G12	*Kunzea ericoides* *Leptospermum scoparium* *Beilschmiedia tawa* *Melicytus ramiflorus (group)*	Kanuka Manuka Tawa Mahoe	Northeast of 7th Green. Pedestrian bridge link to 8th Tee	P SEA	3-8	250-800	-	F	Cluster of small pioneer vegetation to be removed for pedestrian bridge and associated earthworks. Pruning of remaining vegetation.

Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
G13	*Kunzea ericoides* *Leptospermum scoparium* *(shrubs and small trees)*	Kanuka Manuka	8th Tee area adjacent to pedestrian bridge line and footprint of Tee area.	NP SEA	2-8	100-800	1-4	F	Clusters of Manuka/Kanuka scrub to be removed for Tee construction. Works to be undertaken within the protected root zones of vegetation surrounding the Tee area
T13a	*Dacrycarpus dacrydioides*	kahikatea	South of 8th Tee	SEA				G	
G13a	*Regenerating indigenous vegetation including:* *Corynocarpus laevigatus* *Rhopalostylis sapida* *Beilschmiedia tarairi*	Karaka Nikau Taraire	Existing farm track from 8th Tee to 8th Fairway	SEA				G	Mixture of mature native overhanging trees and vegetation. Larger trees to be pruned for access and Nikau to be transplanted off the footprint.
G14	*Kunzea ericoides* *Leptospermum scoparium* *(shrubs and small trees)*	Kanuka Manuka	Footprint of 8th Fairway.	SEA	2-8	100-800	1-4	F	Clusters of Manuka/Kanuka scrub to be removed for Fairway construction. Works to be undertaken within the protected root zones of vegetation surrounding the Fairway
G15	*Metrosideros excelsa x5*	Pohutukawa	Ridgeline above 8th Fairway	SEA	8-15	1000+	-	G	Mature Pohutukawa on ridgeline area. Setback to be provided for earthworks. Supervision of works within PRZ.
G16	*Kunzea ericoides x2* *Leptospermum scoparium* *Phormium tenax x2* *(shrubs and small trees)*	Kanuka Manuka Harakeke	Hole 9 side of new pedestrian bridge (between Hole 1 & 9)	SEA	2-8	100-800	1-4	F	Clusters of Manuka/Kanuka scrub to be removed for bridge pier construction. Works to be undertaken within the protected root zones of vegetation

Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
									surrounding the bridge and Pier.
G16	*Metrosideros excelsa*	Pohutukawa	Limbs within the footprint of the proposed pedestrian bridge	SEA	12	1000+	-	G	Mature Pohutukawa on ridgeline area. Limb to be pruned for bridge clearance. Supervision of works within PRZ.
G17	*Kunzea ericoides x4 Leptospermum scoparium Phormium tenax x2 (shrubs and small trees)*	Kanuka Manuka Harakeke	Hole 1 side of new pedestrian bridge (between Hole 1 & 9)	SEA	2-8	100-800	1-4	F	Clusters of Manuka/Kanuka scrub to be removed for bridge pier construction.Works to be undertaken within the protected root zones of vegetation surrounding the bridge and Pier.
G17	*Kunzea ericoides*	Kanuka	Limb within the footprint of the proposed pedestrian bridge	SEA	12	1000+	-	G	Mature Kanuka on lower ridgeline area. Limb to be pruned for bridge clearance. Rata vine on trunk. Supervision of works within PRZ.
G17a	*Mixed indigenous vegetation (recently planted) largely Leptospermum scoparium*	Mainly Kanuka	North of Hole 8, to west of Hole 12 & 13	SEA					Already fenced. To be retained and protected. No works within this area.
G18	*Salix sp. Populus sp.*	Willow Poplar	Standing in footprint of new 13-14 pedestrian bridge	NP	5-8	400-1000	2-6	F	Remove selected trees for bridge crossing. Remaining trees removed for new indigenous plantings.

Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
G19	*Mixed Native species*	Totara Kauri Rimu Kauri	Northern side of Hole 14	SEA ONF	6-20	1000+	-	G	Group of native trees on the northern boundary. Some minor shaping in PRZ. Works to be supervised and trees fenced.
G20	*Acacia mearsii* *Populus sp.(Group)*	Wattle Poplar	Northern side of the existing causeway/wetland within Hole 16	P	4-10	400-1200	1-2	F	Group of semi-mature specimen trees to be removed for Hole 16 construction
G21	*Cordyline australis* *Coprosma robusta* *Populus sp.*	Ti Kouka Karamu Poplar	Eastern side of Wetland area adjacent to Hole 16. Pedestrian bridge abutment location	P	2-12	200-1400	2-6	F	Group of mixed indigenous and exotic vegetation. Proposed removal to enable bridge abutment construction.
T22	*Quercus palustris*	Pin Oak	Eastern side of proposed pedestrian bridge (Hole 16)	P	10	1500	6	G	To be retained and protected during bridge construction. Works within PRZ.
G23	*Cordyline australis* *Coprosma robusta* *(other weed species vegetation)*	Ti Kouka Karamu	western side of Wetland area adjacent to Hole 16. Pedestrian bridge abutment location	P	1-3	>500	1-3	F	Group of mixed indigenous and exotic vegetation. Proposed removal to enable bridge abutment construction.
G24	*Mixed native and exotic vegetation*	Black Wattle Totara English Oak	South of the proposed Hole 16 bridge	NP P	4-15	400-2000+	2-10	G	Group of mixed mature trees and vegetation. To be retained and fenced during earthworks.
G24a	*Mixed exotic vegetation including:* *Pinus radiata* *Quercus robur*	Monterey Pine English Oak (other mixed species)	Northwest of Maintenance complex						Group of mixed mature trees and vegetation. To be retained and fenced during earthworks.

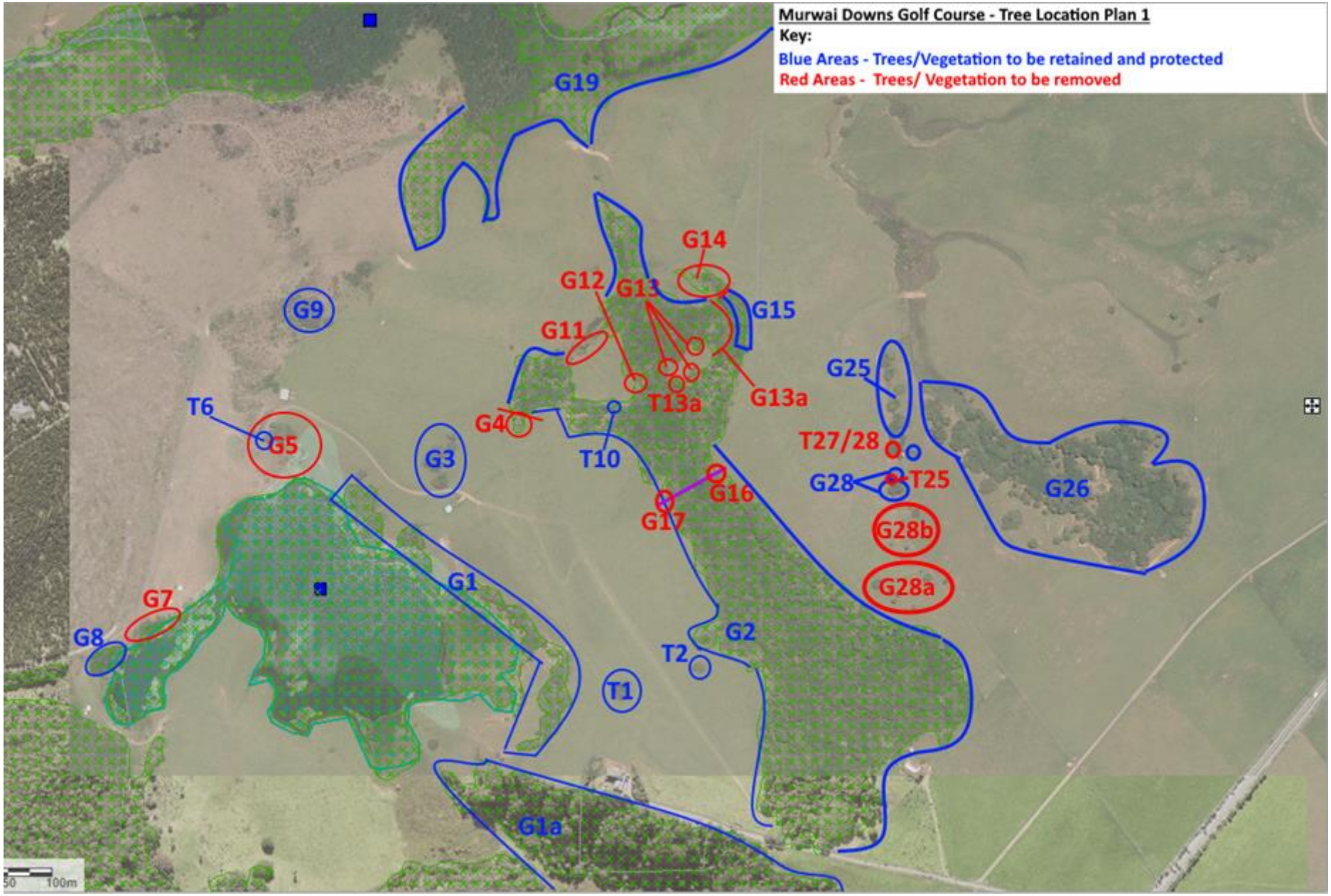
Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
G25	*Mixed natives* *Corynocarpus laevitgus* *Knightia excelsa* *Dacrycarpus dacrydioides* *Vitex lucens* *Podocarpus totara*	Karaka Rewarewa Kahikatea Puriri Totara	Area of degraded stream system adjacent to Hole 18	P	4-15	400-1200+		P-G	Heavily grazed stream gulley with mixture of tree species in poor -good condition. To be retained and enhanced with new trees
G26	*Mixed natives* *Corynocarpus laevitgus* *Knightia excelsa* *Dacrycarpus dacrydioides* *Vitex lucens* *Podocarpus totara* *Agathis australis*	Karaka Rewarewa Kahikatea Puriri Totara Kauri	Area of mixed native vegetation adjacent to sports academy and 9 hole course.	P NP	4-15	400-1200+		P-G	Vegetated area with stream in centre. Not subject to overlay but some protection adjacent to stream in centre. To be retained and protected.
T25	*Agathis australis*	Kauri	South of Hole 18 through shot and north of proposed pedestrian bridge	NP					Tree is dead and to be removed in accordance with Kauri dieback protocols.
T26	*Corynocarpus laevitgus*	Karaka	North of the proposed Hole 18 through shot to green	P	8.0	1760	6.0	G	Remove tree to enable sight lines through to 18th Green. Mitigation proposed.
T27	*Corynocarpus laevitgus*	Karaka	North of the proposed Hole 18 through shot to green	P	8.0	1.74	6.0	G	Intended to prune tree in first instance and confirm if level of view is adequate. Otherwise, this tree will be

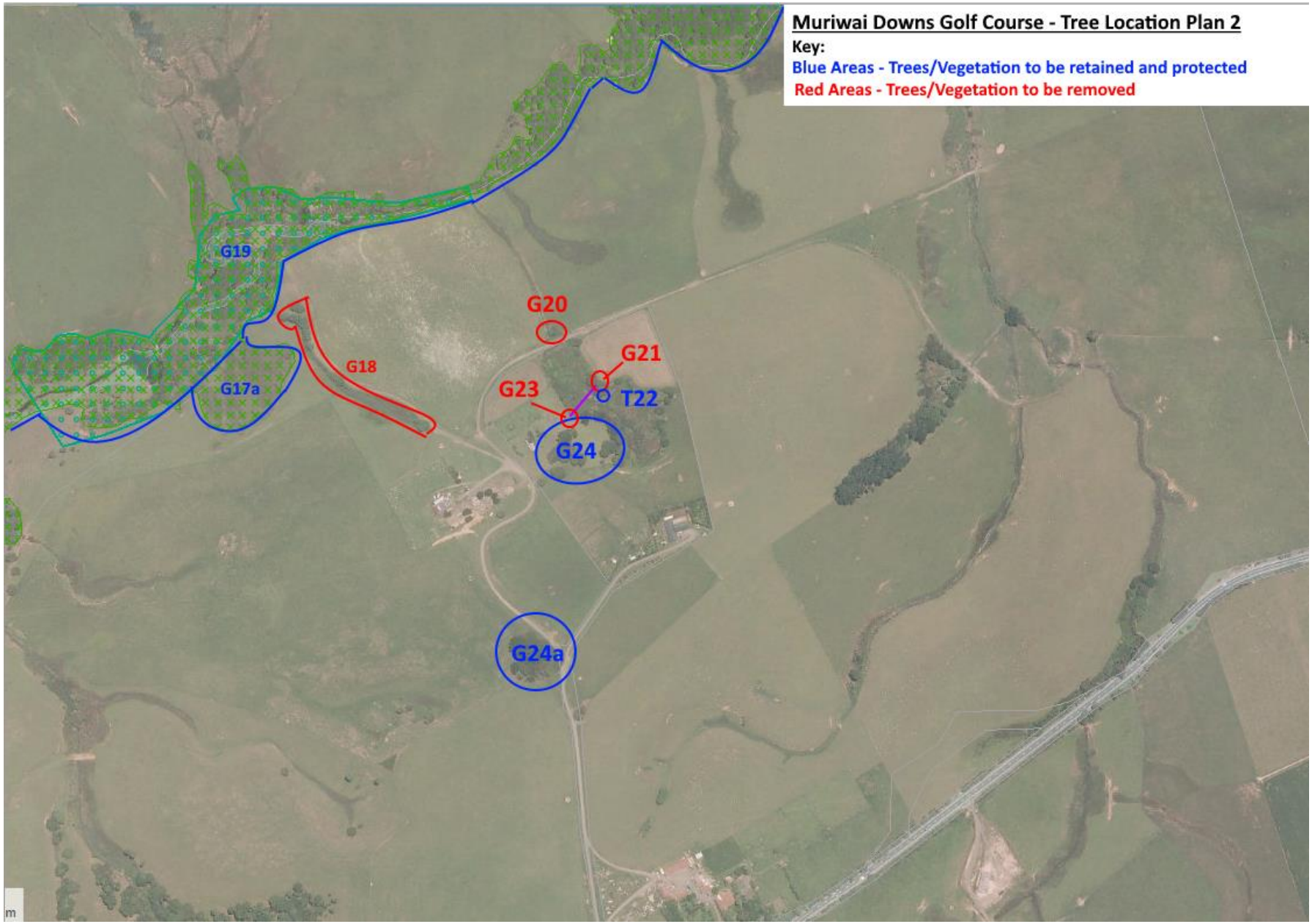
Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
									removed. Mitigation proposed. through to 18th Green.
G28	*Knightia excelsa* *Dacrycarpus dacrydioides x2* *Agathis australis*	Rewarewa Kahikatea Kauri	Grouping of trees north of the proposed pedestrian bridge.	P	14.0-18.0	1000+	4.0-14.0	G	Proposed pedestrian bridge to be constructed to the south of the stand. Some pruning required on low hanging branches.
G28a	*Agathis australis x4 (2 dead)* *Podocarpus totara*,	Two (2) mature Kauri trees, two (2) dead kauri trees, one (1) mature totara tree,	Adjacent to the SEA boundary (Clubhouse location)	NP	10-18	1000+	2.5-5.0	P-G	Proposed removal to enable construction of Clubhouse facility.
G28b	*Cordyline australis x4*	four (4) mature Ti kouka	Directly south of Hole 18 bridge	NP	6.0-8.0	1000+	1.5-3.0	P-G	Proposed removal for new Clubhouse and associated earthworks
G29	*Podocarpus totara* *Metrosideros excelsa*	Totara Pohutukawa	Pair of trees growing adjacent to the existing accessway to the lodge area	NP	15-17	2000+	8.0-12.0	G	Proposed upgrade of current accessway to concrete to be used as lodge access. Works within PRZ.
G30	*Podocarpus totara* *Metrosideros excelsa*	Totara Pohutukawa	Pair of trees growing adjacent to the existing accessway to the lodge area	SEA	15-17	2000+	8.0-12.0	G	Proposed upgrade of current accessway to concrete to be used as lodge access. Works within PRZ.
G31a	*Kunzea ericorides x6*	Two (2) semi-mature Kanuka trees and four (4) small Kanuka trees	Grouping of Kanuka trees growing on the northern side of Muriwai Road adjacent to an existing farm entry (to be relocated and upgraded)	P	3.8 - 6.0	250 - 1200	2.0 – 4.0	G	Proposed for removal to enable the construction of a new entry and intersection upgrade.

Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
G31b	*Kunzea ericorides x1* *Coprosma robusta x2* *Cordyline australis x1*	(Western side) One (1) semi-mature Kanuka, One (1) Karamu and the eastern grouping comprising of a (Eastern side)semi-mature Ti Kouka and Karamu.	Grouping of vegetation on the southern side of Muriwai Road adjacent to an existing farm entry (to be relocated and upgraded)	P	1.0 – 8.0	200 – 1000	1.0 – 4.0	P-G	Proposed for removal to enable the construction of a new entry and intersection upgrade
G32	*Kunzea ericorides (clusters)* *Coprosma robusta (various)* *Cordyline australis (various)* *Metrosideros excelsa x1* *Muehlenbeckia complexa*	Kanuka, Karamu,Ti Kouka,Pōhuehue, Pohutukawa x1 (various groups in clearance area)	Northern side of Muriwai Road adjacent to the new western entranceway and intersection	P	0.5 – 10.0	>100 - 1000	0.5-4.0	P-G	Proposed for removal to enable the construction of a new entry and intersection upgrade

Tree No.	Botanical Name	Common Name	Location	Protection status	Height (m)	Girth (mm)	Crown Spread Radius (m)	Condition	Comments
G33	*Metrosideros excelsa*	Pohutukawa	Northern side of Muriwai Road adjacent to existing driveway	NP	15.0	2000+	10.0	G	Private tree – to be removed to construct access.

APPENDIX B – TREE AND VEGETATION LOCATION PLANS


Murwai Downs Golf Course - Tree Location Plan 1
Key:
Blue Areas - Trees/Vegetation to be retained and protected
Red Areas - Trees/ Vegetation to be removed
G19
G14
G12
G13
G15
G9
G11
G25
T6
G5
T13a
G13a
G4
G3
T10
T27/28
G28
T25
G26
G16
G17
G28b
G28a
G1
G7
G8
G2
T2
T1
G1a
50
100m


Muriwai Downs Golf Course - Tree Location Plan 2
Key:
Blue Areas - Trees/Vegetation to be retained and protected
Red Areas - Trees/Vegetation to be removed
G19
G20
G21
G18
G17a
G23
T22
G24
G24a


Muriwai Downs Golf Course - Tree Location Plan 3
Key:
Blue Areas - Trees/Vegetation to be retained and protected
Red Ares - Trees/Vegetation to be removed
G31a
G31b
G32
G33
670
60m

APPENDIX C – DRAFT TREE MANAGEMENT PLAN (TMP)

Pre-works Tree Management Plan

1. Prior to any works commencing on the site in the vicinity of any of the subject trees, a designated Pre-commencement Meeting should be held to discuss all issues pertaining to the protection of the trees to be retained and to gain a common understanding of the protection measures and construction methods in that regard. This meeting would take the form of a site induction to present the standards and expectations of the tree protection within the site. Present at the meeting should be;

    - The Project Manager
    - All site managers & foremen
    - All the site workers
    - The site works arborist
    - Auckland Council Compliance Monitoring Officer(s)

2. All tree removal and pruning works are to be undertaken by a qualified arborist prior to or during the earthworks phase. The pruning shall be undertaken in accordance with best arboricultural practice, with the extent of pruning to be limited to the removal of no more than 20% of the trees canopy or branches no larger than 100mm in diameter unless specified otherwise in Section 9.0 of this report.

3. All removal of existing structures (power poles, buildings, pipes, culverts.) is to be supervised and managed according to this TMP when within 2 metres of the PRZ extent of any retained tree.

4. Temporary protective fencing should be erected around every tree/group of trees to be retained, and any stands of trees where there is no existing solid fence to serve as a protective fence. The fence should be located to completely enclose the open ground area of berm out to the protected **root zone (dripline extent)** of the tree, while leaving existing accessways clear.

5. The fence shall not be moved by any contractor or site worker at any stage of the construction activities. Any exception would be where the Site Arborist determines that the fence may be moved to execute consented construction activities.

6. The fencing is to be constructed of, as a minimum, orange mesh tightly supported by a steel wire and waratah standards . Where the Site arborist determines, 1.8m diamond mesh fencing panels shall be used to afford greater protection for vulnerable trees.

7. The protective fence shall remain in place until the completion of the project in the vicinity of the tree (some sections of the project may finish well before the overall completion date).

8. The exact bridge abutment locations as noted in Section 9.0 in this report (and within the indicative bridge plans prepared by Mckenzie & Co) are indicative at this point of the proposal. As such, some flexibility is recommended to ensure adequate space is afforded for these structures. Some additional tree removal may be required in these areas. However, all tree removal will be documented and recorded, with appropriate mitigation provided. If this occurs, updated clearance plans will be provided the Auckland Council Arborist specialist with a confirmation that any tree removal will be limited and that proposed mitigation will be appropriate and adequate on a case by case basis. The replacement planting will be undertaken in accordance with the planting species and size agreed in consultation with the project's ecologist. This new plantings would then be maintained by the client for a period of 24 months, in accordance with best practice.

9. In addition to those trees noted above, it is possible that the same scenario may apply in cases not specifically identified. In some cases, tree removal may be required where works will exceed acceptable thresholds. In that case, the same protocols would apply. The largest replacement tree (like for like or a similar species), available as a nursery specimen, will be sourced and planted in replacement, subject to the suitability of ground conditions. This tree would then be maintained by the client for a period of 24 months, in accordance with best landscape practice.

Construction Activities Tree Management Plan

10. All equipment/vehicles shall be manoeuvred to/ within the site in a manner that avoids any damage to the root zone and canopy of any retained/protected trees.

11. No machinery or equipment or materials shall be stored or deposited within the protected root zone of any tree within the site (i.e. no products, fluids, machinery, or tools, etc). Special attention shall be paid to any petrol/diesel operated machinery to avoid contaminating the soil in the root zone of the trees.

12. No tracking or movement of equipment, trucks or machinery is to be undertaken within the rootzone of protected trees. A mulch accessway or track-mats are to be utilised for the directional drilling machine in order to avoid damage to tree roots if movement is required within any protected rootzone or on the berm.

13. The areas to be excavated adjacent to trees to be retained shall be clearly indicated with spray paint by the Site Manager.

14. The Site Arborist shall indicate, with a different colour spray paint, those areas where direct supervision of the excavation is required by the site arborist.

15. Prior to approaching the zones which require supervision, the site manager shall engage the site works arborist to assist and direct activities.

16. Once the upper vegetated layer has been removed, the initial cut to define the outside edge of the excavation closest to the street tree should be made by hand (spade) by the Site Arborist prior to full excavation by machine. Utmost care must be taken to minimise root strike.

17. If significant roots are encountered within the first 100mm, the level must be altered to accommodate that root and any subsequent roots discovered.

18. If any significant roots are encountered during excavation in the dripline of any retained/ protected trees, that root should be accommodated; unless the arborist is satisfied that severance of such a root would not cause a deterioration of the health of the tree. No roots beyond the approved thresholds are to be removed. (Roots up to 80mm for protected trees under the supervision of a suitably qualified arborist).

19. Any retained roots shall be wrapped in hessian and immediately re-covered if possible. Any roots to be exposed for more than 4 hours must be kept wet until recovering occurs.

20. Any roots less than permitted diameter may be severed cleanly to the excavated face. All root severance shall be undertaken by the Site Arborist.

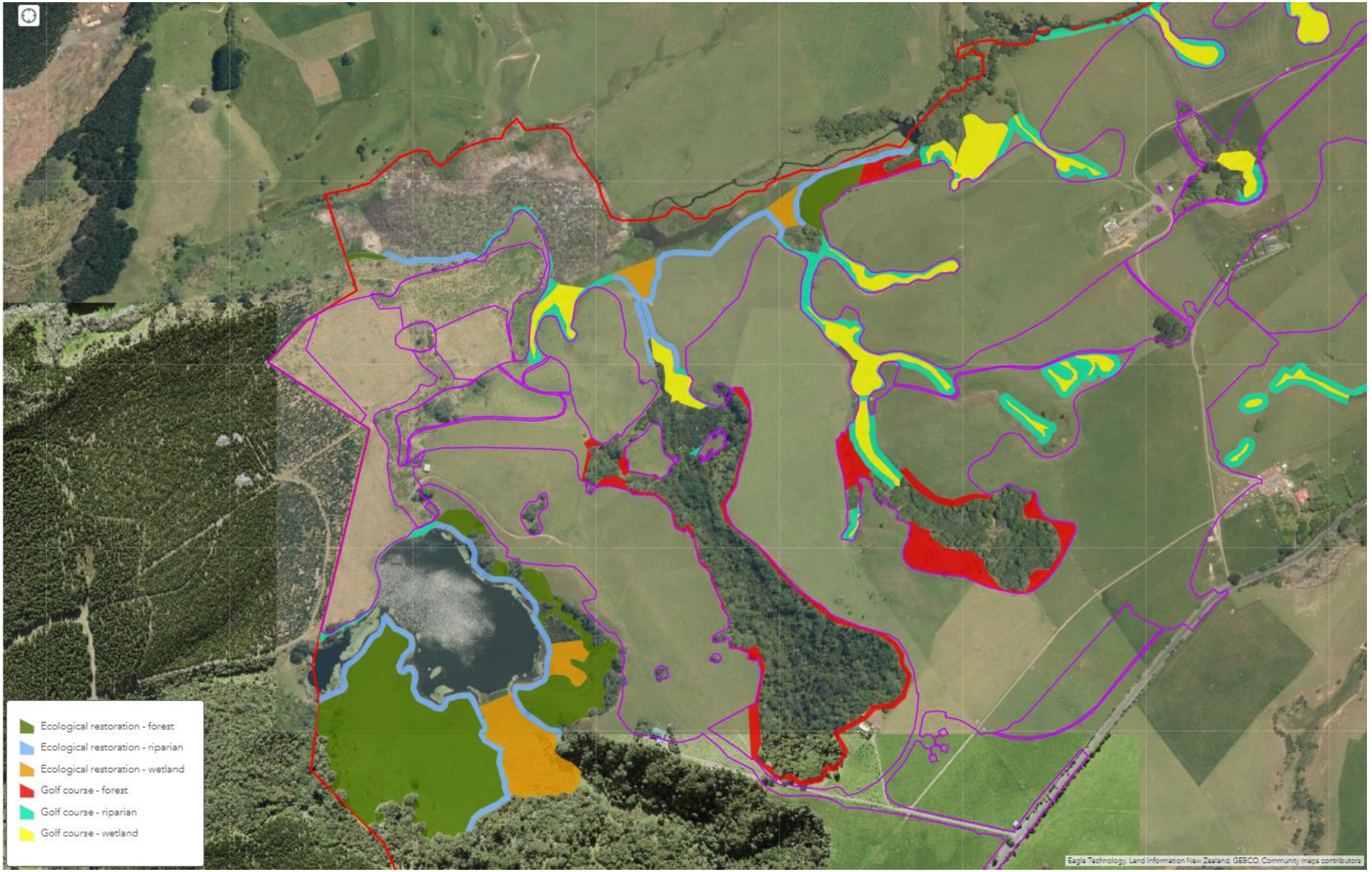
21. A layer of hessian shall be securely pinned to the excavated face against retained trees to shade the root ends and minimise desiccation.

22. Any service installations should be made via directional drilling or outside the PRZ of any retained trees. If this is not practical, the works arborist must be consulted and an acceptable method agreed upon.

Post -works Tree Management Plan

23. Compliance with all conditions of consent relating to tree protection shall be monitored by the appointed Site Arborist - with the detail of communication and works activities being logged. The completed log will be provided to the consent holder at the completion of the project to serve as a compliance report.

APPENDIX D – INDICATIVE ECOLOGICAL RESTORATION AND ENHANCEMENT PLANTING PLAN (PREPARED BY RMA ECOLOGY)


Ecological restoration - forest
Ecological restoration - riparian
Ecological restoration - wetland
Golf course - forest
Golf course - riparian
Golf course - wetland
Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Attachments 1&2: Kauri Dieback Protocols and Recommendations

Vehicle and Heavy Machinery Hygiene

Prepared By: Travis Ashcroft
Planning & Intelligence Workstream
Kauri Dieback Programme

Prepared For: Lynn McILveen
Programme Manager
Kauri Dieback Programme

Version: 1.1

Status: FINAL

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Document Information

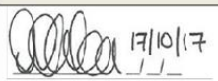
Version History

Date	Version	Author	Description of changes
September 2017	1.0	T. Ashcroft	Original version
October 2017	**1.1**	T. Ashcroft	Changes to Figure 1. Definition of 3x the radius of the canopy dripline.

Consultation and peer review

Role	Name	Date submitted
Planning & Intelligence Workstream	C. Green / T. Beauchamp	August 2017
Operations Workstream	L. Hill / J. Allport	May 2017
	K. Parker	April 2017

Approval

Name	Role	Signature/ Date	Endorsement
Lynn McILveen Programme Manager	**Approve / Note** the contents of this document	 17/10/17	Yes / No

Associated documents

Document name	Link
Hygiene Procedures for Kauri Dieback	https://www.kauridieback.co.nz/more/documents-and-resources/
Land disturbance activities (incl. earthworks) around kauri	
Tree Removal and Pruning of Kauri	
Landfill disposal of contaminated material	

Glossary

Terminology	Meaning
Dripline	The outer extent of the branch spread from the trunk.
Kauri area	The ground area around kauri, defined as 3 times the radius of the canopy dripline. Considered contaminated with PA, until proven otherwise.
Kauri dieback	Name of the disease that causes dieback on kauri caused by the pathogen *Phytophthora agathidicida*
KDP	Kauri Dieback Programme
Outermost dripline	The furthest (maximum) extend of the branch spread from the trunk.
PA	*Phytophthora agathidicida*
Propagule	Microscopic life stage (like seeds) whose role is to progress the propagation of an organism to the next stage in their life cycle.
Root Zone	The ground area around kauri, defined as 3 times the radius of the outermost canopy dripline.
SOP	Standard Operating Procedures
Sterigene	2% solution of detergent Sterigene®
Wash-down	Removal of soil and organic material using pressurised water and brushes.
Wastewater	Water generated from washing down vehicles and heavy equipment.

Disclaimer

The information in this guideline is intended to be general information. It is not intended to take the place of, or to represent, the written law of New Zealand or other official guidelines or requirements. While every effort has been made to ensure the information in this document is accurate, the Kauri Dieback Programme (and any of their representatives involved in the drafting of these guidelines) does not accept any responsibility or liability for error of fact, omission, interpretation or opinion that may be present nor for the consequences of any decisions based on this information.

1.0 Purpose

To provide hygiene guidelines to mitigate the spread of kauri dieback on vehicles and heavy machinery when operating near kauri (*Agathis australis*).

A precautionary approach is taken to manage the level of scientific uncertainty around ascertaining whether kauri and the surrounding soil is infected or not.

2.0 Background

Kauri dieback is a soil-borne disease that spreads primarily through the movement of contaminated soil. Just a pinhead of soil is all that is needed to spread the pathogen (that cause's kauri dieback), *Phytophthora agathidicida* (PA), to other areas.

Humans and their activities are the primary cause of spread through soil contaminated conveyances. Vehicles (e.g. cars, trucks, four-wheel drives, tractors) and heavy machinery (e.g. dozers, excavators, graders) are often used in and around kauri forests where earthworks, maintenance and construction operations are involved. It is therefore important that vehicle and heavy equipment hygiene practices are followed before, during and after an operation to reduce soil contamination and hence reduce the likelihood of spread of the disease on these pathways.

These guidelines outline best practice hygiene measures when using vehicles and heavy machinery and the use of such vehicles when transporting potentially contaminated soil or other loads from an infected or potentially infected area.

3.0 Assumptions & Constraints

Due to a number of uncertainties ascertaining whether an area is infected with kauri dieback or not, a number of assumptions have been made which has informed these guidelines:

3.1 Since we do not know the time from infection to when disease symptoms first occur on the tree, healthy trees may be infected. As a result all kauri and their root zone (i.e. 3 x the radius of the outermost tree canopy dripline) are potentially infected with the disease.

3.2 Movement of contaminated root, trunk, bark materials and associated by-products such as sawdust, could spread PA.

3.3 Vehicles and other similar conveyances such as heavy equipment are vectors for disease dispersal.

Soil samples were taken from soil-contaminated vehicles during an Auckland Council study (unpublished) to link the movement of vehicles to the spread of PA. Even though a small sample size was taken, *Phytophthora* species were detected in 4 out of 6 samples which indicates that vehicle movements can facilitate the spread of pathogens (Lee Hill, pers. comm.).

3.4 Disease spread outside the kauri root zone can occur by movement of infected material via human and animal vectoring. Although yet to be proven (Bellgard et.al, unpub), there is anecdotal evidence that spread via wastewater run-off and water catchment discharge is possible.

3.5 Long-lived spores (oospores) of kauri dieback can survive and remain viable in the soil, long after a tree dies (at least 6 years and potentially a lot longer)(Horner, 2015).

4.0 Before you begin

4.1 These guidelines has been developed to provide written advice on the management of kauri dieback during vehicle and heavy machinery use in a kauri forest and within the root zone of kauri.

4.2 The guidelines are not policy but should be considered by planners, land managers and contractors when planning any operations.

4.3 Please contact your local council or land management agency if there are local policy or regulatory constraints.

4.4 The guide provides what is considered best practice based on the current information and uses risk management principles to reduce the likelihood of spread of PA during operations.

5.0 Planning Considerations

5.1 Prior to using a vehicle or heavy machinery near kauri, proper planning is required to ensure that you have considered the following factors in reducing the likelihood of contamination onto vehicles and heavy machinery.

- Consider using vehicles or heavy machinery that will do the job but are also easy to clean, such as machines with rubber tyres rather than tracks.
- Undertake operations in dry weather wherever possible to reduce contamination of vehicles and equipment and to make decontamination operations easier. If necessary postpone operations and reschedule when there are drier conditions. Wet soil tends to cling to vehicles and heavy equipment making it easier for PA to be transported.
- Where possible, consider leaving heavy machinery and vehicles onsite for the duration of the job to minimise the risk of introducing kauri dieback each time the vehicles or heavy machinery is brought to the site.

5.2 The following Best Practice Guidelines should be read in conjunction with these guidelines, prior to undertaking any on-site operations.

Best Practice Guideline	Link
Hygiene Procedures for Kauri Dieback	https://www.kauridieback.co.nz/more/documents-and-resources/
Land disturbance activities (incl. earthworks) around kauri	
Tree Removal and Pruning of Kauri	
Landfill disposal of contaminated material	

6.0 General Considerations

6.1 All heavy machinery and vehicles should be **free of soil or organic material** when (1) entering and exiting a kauri forest; and (2) entering, moving between and existing a kauri root zone (Figure 1).

6.2 Upon exiting a root zone, a full wash-down of soil and debris should occur on site prior to movement, thereby containing any problems at the source.

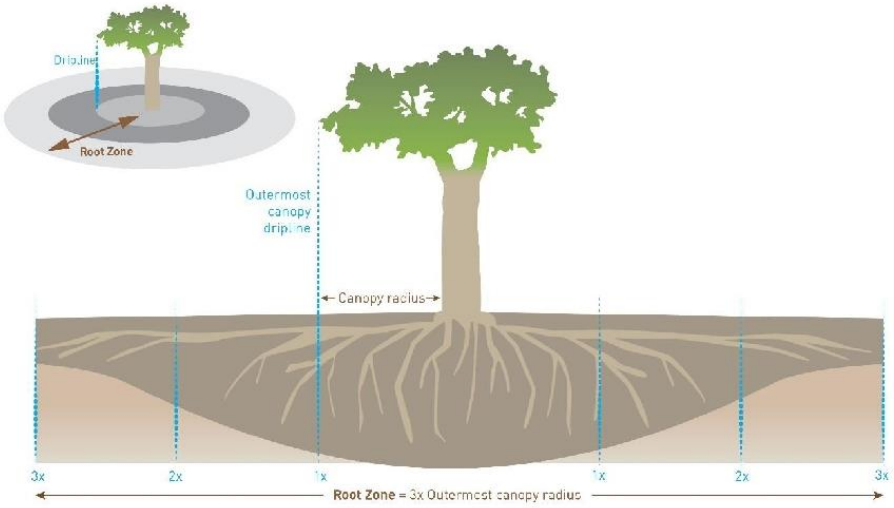
6.3 Alternatively, if this cannot occur then vehicles and heavy machinery may be taken off site and cleaned in a wash-down facility, but all loose soil and debris must be

removed at the kauri site prior to moving and care should be taken to ensure that risk of spread during transport to that facility is minimised.

6.4 Soil and organic material cleaned from vehicles and heavy equipment should, where possible, be collected and disposed of appropriately at an approved landfill (see Best Practice Guidelines - Landfill disposal of contaminated material). Alternatively the material can be left in situ at the source.

6.5 **Extreme care** should be taken as to not damage the kauri roots when using vehicle or heavy machinery near kauri.

Figure 1: Root zone of kauri (3 times the radius of the outermost canopy dripline).



7.0 Wash-Down Sites

7.1 Site Selection in a kauri forest

- Wash down of vehicles and/or heavy machinery that was used within a kauri root zone should occur within that area where possible.
- If vehicles and/or heavy machinery have been operating outside a root zone, then wash-down should occur prior to exiting a kauri forest.
- The following considerations should be taken into account when selecting a suitable wash-down site:

- Hard-stand area and well-drained surface e.g. a road near the edge, firm grass or gravel.
- At least 30m away from a water course or water body.
- An area within the root zone, if use of equipment and vehicles has occurred in this area.
- Is of gentle slope to drain wastewater away from (1) the wash-down area and into a kauri root zone; (2) water catchment; (3) areas outside the kauri root zone and; (4) vehicles and heavy machinery being washed to prevent potential re-contamination.
- Enable cleaned objects to exit without being re-contaminated.
- Undertaking a risk assessment of the site to inform a health & safety risk management plan e.g. working around powerlines.

- Where run-off cannot be managed to an acceptable standard (e.g. large quantity of wastewater and/or an extensive run-off) construction of a bund and sump may be required to safely dispose of the wastewater.

- Commercially available bunds or containment berms are available as temporary wash-down solutions. This will allow the decontamination of heavy equipment and vehicles on site where the wastewater is contained, collected and removed for safe disposal. An example of a portable containment berm in use is in the below link.

  https://www.nzta.govt.nz/innovations-and-ideas/innovations/decontamination-wash-down-bay-for-geotechnical-investigation-equipment/

- If wash down cannot occur in the forest then the vehicles and/or heavy machinery should be taken to a suitable facility off site for decontamination.

7.2 Off-site facilities

- **Commercial Operators - Vehicle wash facilities (e.g. Petrol stations).**

  - Different commercial operators have different wastewater discharge consents which is dependent on the council by-laws of that area. The commercial operator environmental policy may also place voluntary conditions on the discharge of wastewater from the site. Regardless, a large percentage of the wastewater generated from urban vehicle wash facilities is likely to end up in the reticulated storm water system and then onto waterways.
  - If the wastewater is infected with PA, the discharge consents (ranging from the use of on-site detergents to sediment separators) is unlikely to reduce PA oospore viability. As a result, commercial operators of wash-down facilities can be used, as long as the wastewater from the facility does not drain into catchments running into or near a kauri forest or an area with kauri.
  - A purpose built vehicle wash-down facility instead of an automated washing facility (as seen in petrol stations) is preferred due to the availability of the

facilities equipment to remove contaminants in difficult to reach places such as the undercarriage of vehicles and heavy machinery. An automated wash facility (such as a car wash at a petrol station) may be suitable if soil contamination is in areas of the vehicle where the automated system can effectively remove the soil during the washing process.

- **Truck wash facilities**

  - There are a number of truck wash facilities operated by private trucking companies that are used to wash-down cattle or livestock trucks. Some of these companies may be accessible to the public.
  - These facilities are **not recommended** where the effluent generated from the wash-down is used to irrigate farmland, hence if the effluent is contaminated with PA, then spread of PA directly onto rural farmland is likely to occur. This applies only to irrigation of farmland close to kauri forests or in catchment areas leading into kauri forests or surrounding areas.

- **Landfills disposal**

  - Disposal of soil and organic material at a landfill, requires the truck/trailer unit to be washed down after unloading.
  - The majority of landfills recommended in the 'Best Practice Guideline: Landfill disposal of contaminated material', have dedicated on-site wash down facilities that can be used for this purpose.

- **Council Depots**

  Council depots have wash down facilities however you will need to contact the relevant local government authority to seek permission to use them. As long as the wastewater discharge is away from catchments leading too or near kauri forests, these facilities can be used.

8.0 Wash-Down Procedural Guidelines

8.1 Field - On site

- If the vehicle or heavy machinery cannot be washed down effectively on site, all loose soil and vegetation should be removed where possible, before it is transported off-site to a wash down facility.
- Attempt to remove as much soil and mud (preferably when it is dry) by first physically removing it using a hard brush or broom or by using compressed air.

- Pay attention to the underside, between dual wheels, sump guards, mud flaps, hollow sections, foot wells, bumper bars. Minimise the amount of water to be used.
- Remove any soil/debris inside the vehicle, particularly on the vehicle floor and workers footwear as well as any tools used to remove the soil/debris at completion of the job.
- If possible, minimise the use of pressurised water in situations where the wastewater is not sufficiently contained and/or the runoff is not controlled.
- If possible, it is advised that vehicles and heavy machinery are washed using a pressurised spray unit (to reduce run-off) and then sprayed with a solution containing 2% Sterigene solution **before** the vehicle or heavy machinery leaves the area.
- Do not drive through wash-down wastewater as this may re-contaminate the vehicle and/or machinery.
- No dirt or loose soil should be present after wash-down.

8.2 Public & Commercial Facilities - Off site

- A purpose built vehicle wash-down facility is preferred due to the availability of the facilities hand-held equipment to remove contaminants in difficult to access places such as the undercarriage of vehicles.
- Decontaminating off site mainly involves washing down the vehicle and heavy machinery with high pressure water at a wash-down facility and then spraying with a solution containing 2% Sterigene solution.
- Pay attention to the body underside, crevices and ledges, sump guards, mud flaps, hollow sections, foot wells, bumper bars, chassis. Between dual wheels, inside and out, spare wheel.
- Clean interior (floors, mats, under seats).
- Wash wastewater away from vehicle, do not drive through wastewater.
- An automated wash facility at a petrol station won't be effective if undersides and concealed areas are likely to be contaminated with soil but may be suitable if soil contamination is restricted to areas where the automated system can effectively remove the soil.

9.0 Loading and transport of material out of an area

9.1 The movement of potentially contaminated loads via vehicle transportation out of an area containing kauri, may result in the spread of the disease if part of the load falls off during transit. A load can be (1) soil resulting from earthworks, (2) wood debris from road maintenance or (3) soil contaminated heavy machinery that are transported on a trailer (that cannot be washed down on site).

9.2 Certain practices should therefore be taken into consideration during the loading and transportation of such loads to reduce the risk of accidental exposure of the disease during transit.

9.3 Transport vehicle trailers should have sealed sides (or liners installed) to ensure all loads being transported is appropriately contained and leakage from soil or debris is reduced during transit. There may be situations where this is not practical, however every care should be taken to reduce the risk of soil or debris from falling off the transport vehicle.

9.4 Liners should be of a suitable thickness and durability to prevent rupture during transport and contain the material sufficiently to prevent any leakage.

9.5 Water can be mist sprayed onto soil loads to reduce dust and spillage during transportation.

9.6 The liners can be folded over to encompass the entire load and then appropriately secured.

9.7 Loads carrying potential contaminated material i.e. soil and/or wood debris shall be transported to one of the recommended landfills listed in the Best Practice Guideline 'Landfill disposal of contaminated material'.

The vehicle (including trailer) should be cleaned after unloading, using the wash-down facilities at the landfill (if available) and the liners subsequently disposed of.

The trailer unit should be sprayed with a solution containing 2% Sterigene solution either at the landfill (if available) or back at the depot prior to re-use.

References

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Kauri Dieback Disease - Tree Removal and Earthworks Procedures

Overview

Kauri Dieback is a fungus-like disease called *Phytophthora agathidicida.* The disease is specific to Kauri and kills trees of all ages and sizes. It can spread through both water and soil, with soil movement on equipment such as footwear and machinery.

Controls have been implemented at a regional level to attempt to restrict the spread and infection of this disease, including a tree removal and earthworks procedure for both the removal of trees and works in the vicinity of both healthy and infected trees.

Tree Removal

The removal of both healthy and diseased Kauri should be undertaken in the accordance with the following procedure:

- Any foliage removed as part of the felling process should remain intact on the site or removed to a Council-approved landfill (Council's biosecurity division has a list of these sites). Where possible, logs should be left whole on site. However, if it is impractical to leave the logs on site, they must be disposed of at an approved landfill.
- Tree stumps should be left in place where possible, or extracted intact and removed to an approved landfill.

- All associated machinery including chainsaws and/or climbing equipment should be inspected for any evidence of soil, and sprayed with Sterigene (Biosecurity approved disinfectant) on arrival at the site, and again before it is removed from site. If it can remain at the site for the duration of the works, that would reduce the number of times such action would be required.

Earthworks and Soil Removal

- There are strict rules, detailed in the Unitary Plan, pertaining to the prevention of the spread of the Kauri Dieback Disease (*Phytophthora agathidicida*).

- The rule states that the removal of soils within 3 x the particular dripline radius of a New Zealand Kauri tree is restricted. No soil within this zone can be removed from a site, unless it is taken to an approved landfill.

- The Unitary Plan rule: PART 3 - REGIONAL AND DISTRICT RULES» Chapter H: Auckland-wide rules»4 Natural resources»4.2 Earthworks»2. Controls»2.1 Permitted activities»2: states: *To prevent the spread of Kauri Dieback disease, vehicle and equipment hygiene techniques must be adopted so that no soil from earthworks within 3 x the particular dripline radius of a New Zealand kauri tree is transported offsite.*

- When transporting this material from site, the soil should be covered. Once the load has been dumped at the approved site, Sterigene should be applied to the deck surface to prevent any further contamination of future loads or new sites.

- All associated equipment including trucks, diggers and associated equipment in direct contact with soil material should be washed or brushed before leaving site.

If you require any further information relating to Kauri Dieback please contact a Peers Brown Miller Ltd staff member on 09 631 7610 or phone the Kauri Dieback Hotline on 0800 NZ Kauri 0800 6952874

APPENDIX E: CV OF MATTHEW TREVOR PAUL

Matthew Paul

I am a Consultant Arborist with Peers Brown Miller Ltd ("**PBM**") and a Company Director of PBM. I am responsible for providing arboricultural consultancy services.

I have a Diploma in Arboriculture (Level 6) from the Waikato Institute of Technology. I have 18 years' experience working in the arboricultural industry, having been a director of a successful arboricultural service company which provided both physical tree works and consultancy services prior to joining PBM. I have been a Director of Peers Brown Miller Ltd for 5 years. I am also a member of the New Zealand Arboricultural Association and am actively involved in the industry.

I have provided arboricultural consultancy services for a number of significant projects, which include:

- Large and small-scale residential and commercial subdivisions including private plan changes
- Specialist services for state owned enterprises such as Waka Kotahi (NZTA)
- Special services for local government owned enterprises including Auckland Transport, Auckland Council and Healthy Waters

I have also provided specialist advice and reporting for a number of operation golf courses throughout the wider Auckland area including Titirangi Golf Course and Wattle Downs Golf Course.