APPENDIX 4

Ecological Assessment of the Tirohanga–Hikuwai Dunes Section of the Proposed Motu Cycle Trail

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1. Introduction

Opotiki District Council (ODC) and the Department of Conservation (DOC) have secured funding for construction of a proposed cycleway from Opotiki township along coastal section of dunes between Otara River and Tirohanga to Waiaua River and linking with Old Motu Road and Pakihi Track. This report assesses the ecological values of the coastal section of the trail from Snell Road extending 8.6 km to 800 m west of the Waiaua River. This section is comprised of mostly Opotiki District Council unformed legal road between Snell Road and Waikaraka Road and part of the Department of Conservation administered Tirohanga Dunes Conservation Area east from here to the Tirohanga Stream mouth. From the Tirohanga stream mouth through to the Waiaua River mouth is also DOC administered Tirohanga Dunes Conservation Area.

The proposal is to construct a surfaced track up to a maximum width of 2.2 m using a 100 mm deep layer of compacted aggregate. The proposed route has being designed by Frame Group Ltd and this ecological assessment is based on that proposed route, with changes recommended where appropriate.

This report includes an assessment of the flora and fauna values currently present on the ODC and DOC administered section of the Hikuwai–Tirohanga dunes and describes the permanent and temporary effects of the trail proposal on those values. The report includes recommendations for construction and route alignment in order to avoid, remedy and mitigate any adverse impacts on the values identified. This will be used to support the resource consent application for the earthworks and vegetation disturbance associated with establishment of the trail.

2. Methods

A preliminary fauna assessment of the dunes section was carried out over one day in September 2010 in cool, windy conditions, which was not the most ideal conditions or season for undertaking such surveys.

An assessment of the vegetation types and flora present in the immediate vicinity of the proposed alignment was undertaken over a period of three days in September and October 2010. This assessment traversed the entire proposed alignment through the coastal dune

section noting vegetation types present, weed threats and significant indigenous flora species present.

3. Ecological Context

The Tirohanga Dunes Conservation Area and Hikuwai Beach section has been identified by Wildland Consultants in reports for both Opotiki District Council and Bay of Plenty Regional Council as being of ecological significance. The Opotiki District Natural Heritage Survey (Wildland Consultants 1999) lists the two sites as Significant Natural Areas (SNAs). The Wildland Consultants survey of the Bay of Plenty coastal zone (Wildland Consultants 2006) recognises the sites and adjoining wetland as a Significant Vegetation and Habitat Zone (SVHZ) of 'local' significance based on the extent of sand dune vegetation of moderate to degraded quality and as breeding sites of northern New Zealand dotterel (*Charadrius obscurus aquilonius*) .

Tirohanga Dunes Conservation Area is also the largest area of protected dunes system in the Opotiki Ecological District and one of the largest protected dunes areas in the Eastern Bay of Plenty. Much of the site has been historically grazed but now most of the DOC administered area has been retired and a weed control programme has been implemented. Recovery of indigenous vegetation is advanced and hence improvement in ecological values is ongoing.

The Hikuwai Beach site which runs from Snell Road to SH 35 is also extensive but in a more degraded condition with a mixture of exotic and indigenous vegetation. Some areas of private land and road reserve are still grazed.

Two other ecologically significant areas have been identified in the vicinity by Wildland Consultants (1999 and 2006), being the privately owned Tirohanga Wetland and Tirohanga Pā. The proposed route will skirt Tirohanga Pa along the beach at the base of cliffs so will not impact on the Pa site. The proposed route is on the other side of the Tirohanga Stream from the Tirohanga Wetland, so this site will not be impacted. These sites are therefore not considered further in this assessment.

4. Vegetation/ Flora and Effects

Vegetation along the proposed trail route is described from east to west starting where the proposed route enters Tirohanga Dunes Conservation Area off SH 35 west of Waiaua River. The proposed route does not cross foredune at any stage except at Tirohanga Stream on a formed access so the vegetation assessment focuses on the ecological values of the backdune vegetation in the vicinity of the proposed route and does not consider further the values of the foredune vegetation.

4.1 Waiaua River West to Tirohanga Stream (Section E1–E2)

Section 1

This section of the proposed route leaves SH 35 and follows an existing vehicle track. Vegetation is

- bare sand and exotic grassland. Surrounding vegetation is pohuehue (*Muehlenbeckia complexa*) vineland interspersed with pohuehue–bracken (*Pteridium esculentum*)–tall fescue (*Schedonorus arundinacea*) fern–vineland.

Section 1: Existing vehicle track off SH 35

The proposed route largely follows the existing vehicle track but does have one major deviation from it to maintain gradient. As the gradient change is minor and the immediate vicinity is surrounded by pohuehue vineland it is recommended to follow the existing track as much as practicable to avoid unnecessary vegetation disturbance.

Section 2

The proposed route leaves the existing vehicle track and traverses relatively flat ground near SH 35. Vegetation is predominantly exotic species comprised of

- tall fescue–Yorkshire fog (*Holcus lanatus*)–cocksfoot (*Dactylis glomeratus*)–clover (*Trifolium repens*)–blackberry (*Rubus fruticosus* agg.) grass–vineland with local pohuehue
- tall fescue–cocksfoot–bracken–blackberry grass–fern–vineland

As the proposed route is on flatter ground in predominantly exotic grassland vegetation impacts are negligible. The final 100m of the proposed route before the Kelly's Beach carpark climbs onto the backdune ridge face. Vegetation in this area is dominated by dense pohuehue vineland on steeper slopes and it is therefore recommended the route should avoid having to cut a wide bench through this and instead follow the toe of the backdune through predominantly exotic grassland with less impact on indigenous vegetation.

Section 3

The proposed route crosses an existing vehicle track in from Kelly's Beach carpark and follows along or near the dune ridge through predominantly

- pohuehue vineland.

Again as in Section 2 wider benching required through this section would remove larger areas of pohuehue vineland habitat than is necessary and it is therefore recommended to make better use of the existing vehicle track which is predominantly bare sand. The alternative route therefore climbs onto a flat dune ridge following an old vehicle track of exotic grassland comprised of

- Yorkshire fog–cocksfoot–veldt grass (*Ehrharta erecta*) grassland.

Section 3: Existing old vehicle track comprised of mostly exotic grassland.

This traverses through pohuehue–veldt grass–(bracken) vine–grassland on either side and rejoins the proposed route and follows it closely making only minor deviations to avoid denser areas of pohuehue vineland on ridges in preference for following the old vehicle track which is predominantly rank exotic grassland.

Both the proposed and alternative routes pass within 15 metres of a large population of shore spurge (*Euphorbia glauca*) classified as At Risk –Declining (de Lange *et. al.* 2009) at GPS ref NZMG 2893871 6348145. It is unclear of the origins of this population as it is in a remote location but most likely to have been planted. Regardless of the origin it is essential that this population is avoided during track construction.

Section 4

Proposed route traverses a small section of predominantly indigenous vegetation of

- pohuehue–tall fescue–bracken vine–grass–fernland

on relatively flat to rolling terrain where minimum cutting or benching will be required.

Section 5

The proposed route weaves through backdunes on steeper to rolling hills for the next 300 metres approximately. The vegetation is predominantly

- pohuehue vineland
- pohuehue–tall fescue–bracken vine–grass–fernland

Upon assessment it was felt that this section would require extensive cutting and filling of the dune structure and hence removal of a larger footprint of pohuehue than was absolutely necessary.

Section 5: Alternative route on flatter areas with predominantly exotic rank grassland.

An alternative route has been proposed along the flat area between SH35 and backdune which traverses mostly exotic vegetation comprised of

- cocksfoot–bracken–blackberry grass–fern–vineland with local Chinese privet (*Ligustrum sinense*)

Section 6

The alternative route rejoins the proposed route and follows it closely. The vegetation is predominantly mixed indigenous and exotic vegetation comprised of

- pohuehue–tall fescue–bracken vine–grass–fernland on flatter to rolling terrain

with minimal impacts on vegetation.

Section 7

- The proposed route goes amongst dunes and along a dune crest with extensive views.

Section 7: Dense pohuehue–sea couch vine–grassland on gentle seaward face of dune.

Vegetation is predominantly

- pohuehue–sea couch (*Elytrigia pycnantha*) vine–grassland on gentle seaward face of dune.

Local patches of dense pohuehue are present. Mimimal vegetation impacts as dense pohuehue is localised and exotic sea couch predominates throughout. Care needs to be taken not to expose dune ridge to windblown sand movement inundating vegetation once track is constructed. Sea couch will likely rapidly recolonise bare sand.

Section 8

Proposed route largely follows flatter terrain along top of broad dunes. Vegetation is comprised of

- pohuehue–tall fescue vine–grassland with local boxthorn (*Lycium ferocissimum*), some of which was dead following control work.

As terrain is gentler denser areas of pohuehue can generally be avoided where necessary

Section 9

Proposed route follows in front of houses largely following undulating terrain in dune swales. Vegetation is comprised of

- pohuehue–bracken–cocksfoot vine–fern–grassland
- sea couch grassland (local patches)

Minimal vegetation issues as terrain is gentler and denser areas of pohuehue can generally be avoided where necessary

Section 10

Proposed route follows in front of houses largely following undulating terrain in dune swales. Vegetation is comprised of

- sea couch –bracken–pohuehue grassland

No vegetation issues as terrain is gentler and sea couch predominates through much of this area.

Section 10: Exotic sea couch grassland dominates in places

Section 11

Proposed route crosses small section of road reserve. Vegetation is comprised of:

- pohuehue–cocksfoot vine–grassland

There are minimal vegetation issues.

Section 12

Proposed route follows west of houses through flat to rolling terrain towards stream.

Vegetation is largely exotic comprised of

- cocksfoot–blackberry grass–vineland

A small section of proposed route traverses a deep depression covered in part by dense blackberry vineland with areas of *Carex geminata* present indicating a small area of wetland. It is recommended to deviate around this area through the adjoining marram (*Ammophila arenaria*)–cocksfoot–sea couch grassland on the higher ground.

Section 13

Proposed route crosses stream on a footbridge and follows between houses and true left of stream.

Vegetation is largely exotic comprised of

- sea couch–(sweet briar (*Rosa rubiginosa*)–bracken) grassland

Various plantings of both native and exotic species are present in the area including coastal banksia (*Banksia integrifolia*), taupata (*Coprosma repens*), flax (*Phormium tenax*) along with gorse (*Ulex europaeus*) and pampas (*Cortaderia selloana*) (sprayed).

Further towards the gravel road giving beach access pohuehue becomes more common amongst the predominant sea couch grassland. Here the proposed route follows existing resident's tracks onto the formed road access before following a vehicle track west towards campground. Some minor realignment is needed here to avoid building the track on mobile raw sand with shore bindweed (*Calystegia soldanella*) present and to avoid cutting a bigger section out of the existing dune face which could lead to sand movement on exposed face and would be more difficult to revegetate given steep and exposed nature of face.

Section 13: Sea couch dominated grassland and plantings in front of houses.

Section 14

Proposed route follows an existing mown vehicle access along boundary of campground through

- Mown exotic grassland dominated by prairie grass (*Bromus willdenowii*)–white clover–sheeps sorrel (*Rumex acetosella*).

There are no vegetation issues present

Section 15

In vicinity of area where pine trees were removed in front of campground the proposed route deviates from mown track to stay within the DOC administered land. Vegetation is predominantly exotic grassland comprised of:

- tall fescue–veldt grass–kikuyu (*Pennisetum clandestinum*)–scrambling fumitory (*Fumaria muralis*) grassland interspersed with bare areas of barkchip.

One year old plantings of cabbage tree (*Cordyline australis*) and akeake (*Dodonaea viscose*) undertaken by DOC as restoration, are present within this area. Some of these may have to be removed for construction of the proposed route but remaining vegetation is mostly exotic.

Section 16

In vicinity of main part of campground and houses to west still in the area where pines were removed the proposed route traverses relatively flat dune landscape. Vegetation is:

- Indian doab (*Cynodon dactylon*)– tall fescue–veldt grass–kikuyu–scrambliing fumitory grassland with scattered taupata

Apart from the preference for the proposed route to avoid taupata shrubs where possible the remaining vegetation is mostly exotic and vegetation impacts are minimal. A range of exotic weed species are present.

Section 17

This section comprises the dune area in front of the westernmost three houses through to the access road near Tirohanga Stream. Vegetation is:

- sea couch–(pohuehue) vine grassland with scattered taupata and karo (*Pittosporum crassifolium*) throughout.

Section 17: Area previously logged of pines where exotic sea couch predominates in grassland with pohuehue, karo and taupata.

Apart from the preference for the proposed route to avoid taupata and karo shrubs where possible the remaining vegetation is mostly exotic. A range of exotic weed species are present.

This section of the proposed route is one of the closest sections of track to residential properties in the dune section of the trail. The option of moving the track further seaward was investigated on site but this is not be desirable from a vegetation perspective as the track would need to be benched into the foredune face with the risk of sand movement and would need to traverse through mobile foredunes which are dominated here by native spinifex (*Spinifex sericeus*) grassland.

4.2 Tirohanga Stream to Waikaraka Road (E3–E4)

Section 18

The proposed route restarts at the western end of Tirohanga stream mouth climbing the gentle ridge. Vegetation is:

- cocksfoot–wild carrot (*Daucus carota*)–pohuehue–sheeps sorrel herb–vine–grassland

As vegetation is predominantly exotic there are no vegetation issues here.

Section 19

The section follows an existing narrow eroding dune ridge between river and beach. Vegetation is

- cocksfoot–(pohuehue–blackberry) grassland with local lupin (*Lupinus arboreus*)

Being highly modified there are no vegetation issues. Note: this section is very vulnerable to dune erosion from the adjoining river with potential to break through altering the vegetation currently present.

Section 19: Exotic cocksfoot dominated grassland amongst broad dune swales.

From here the proposed route follows through broad dune swales and sidles around a second river loop. Vegetation is similar to above but with occasional boxthorn instead of lupin further inland. DOC have recommended a deviation from proposed route to follow an old track along edge of river loop to link up with existing farmland further east.
This avoids further earthworks and vegetation disturbance on the steeper dune sections further west (and also provides an attractive view of a significant wetland and the river).

Section 19: Alternative route following old track along stream edge.

Section 20

The alternative route reaches the grazed pasture further east than the proposed route. Both routes follow the grazed pasture from here to Waikaraka Road on flatter land at toe of backdunes still within the DOC administered land. A section of pasture will need to be fenced out to accommodate the proposed route. The alternative route follows the existing fenceline while the proposed route tends to follow the middle of the paddock which is less practical to fence but either way no vegetation issues are present. A small planting of shore spurge was noted on ungrazed dunes side of fence beside beach access way at end of

Waikaraka road so provided route stays on pasture side of fence there should be no issues here.

Section 20: The alternative route joins the eastern end of grazed DOC area and follows along the flatter toe of dunes through exotic pasture.

.3 Waikaraka Road to Hikuwai Beach roadside reserve (E4–E5)

Section 21

From the end of Waikaraka Rd the proposed route follows west on flatter land in backdunes within Tirohanga Dunes Conservation Area. Vegetation is predominantly exotic comprised of:

- prairie grass–cocksfoot–tall fescue narrow–leaved plantation (*Plantago lanceolata*) grassland with various indigenous plantings present, mainly ngaio (*Myoporum laetum*)

This area has only been recently retired from grazing. No vegetation issues. Note: the proposed route marked on ground does not appear to follow the original GPS route proposed hence route discrepancy on map between the proposed and alternative route in this section.

Section 22

The proposed route enters ODC road reserve as it sidles gently onto the backdunes. Vegetation is predominantly native species

- pohuehue–bracken–meadow rice grass *(Microlaena stipoides)s*–tall fescue vine – fern – grassland.

Minimal vegetation issues present.

Section 23

The proposed route traverses rolling back dune lands within ODC road reserve. Vegetation is mainly

- pohuehue–(blackberry–bracken) vineland.

There are some dense areas of pohuehue vineland along the backdune faces in this area, probably the most significant areas of indigenous vegetation that the proposed route traverses in the ODC road reserve section. As this entire section of dunes is relatively narrow between main dune crest and farm boundary there are limited available options for a route through here. Hence with most of the proposed route on sloping backdune faces earthworks with benching will be required for much of this section.

Therefore two recommendations are made here to minimise the amount of pohuehue vineland needed to be removed. It is recommended that the proposed track width is reduced below 2.2m in these areas, particularly on steeper slopes to minimise ecological and potential erosive impacts. Secondly, it is also noted that there are sections of the existing fenceline in vicinity of the 0.6 ha block of DOC administered land currently grazed under license where the existing fenceline with neighbouring farm is inside the road reserve boundary. Therefore the second recommendation is to re-fence this section on the boundary which would allow the proposed route to traverse some areas of flatter land which are currently grazed exotic grassland. This is reflected in the alternative route mapped.

Section 23: Dense areas of pohuehue vineland.

Section 24

The proposed route continues along high but relatively flat and broad dune ridges and also backdune faces within ODC road reserve. Vegetation is a mainly a mixture of native and exotic comprised of

- pohuehue–cocksfoot– meadow rice grass–bracken vine–grass–fern land with occasional karo. A few small infestations of lantana (*Lantana camara* var. *aculeata*) were also noted here.

There are no significant vegetation issues in this section.

Section 24: Broad dune crests with mixed exotic and indigenous vegetation.

The final part of the proposed route in this section climbs steeply onto a dune ridge before dropping steeply again to the Hikuwai Beach parking area immediately to the west. The vegetation is similar to above but more dominated by bracken rather than pohuehue on steeper faces. Since the vegetation here is mixed exotic and indigenous species the proposed route could traverse this area but it is relatively steep on both sides and extensive benching and earthworks would be required with a larger footprint and hence impact on vegetation and dune structure. An alternative consideration would be to reroute the proposed track around the toe of the dune on much flatter land which is currently grazed exotic grassland. This may not have been considered in the design as this land, part of Tirohanga Dunes Conservation Area is currently under a DOC grazing license. This would require a small section of re-fencing and an amendment to the grazing license area. An alternative route is mapped in this regard (refer Appendix 1 map).

.4 Hikuwai Beach roadside reserve to Snell Road (E5–E6)

Section 25

The proposed route runs along the front of the existing carpark at Hikuwai Beach. Most of this section is dominated by exotic grass species comprised of

- sea couch–kikuyu grassland amongst native plantings including ngaio, pohutukawa (*Metrosideros excelsa*) and flax. Local areas of pohuehue are present and shore bindweed (*Calystegia soldanella*) is present near main beach access.

As this area is dominated by exotic grasses and is heavily impacted by public use there are minimal issues with vegetation clearance here. Existing native plantings are generally well advanced and avoidance of these areas is desirable where possible. The remainder of the proposed route through here is along the edge of the existing carpark and roadway.

Section 26

Section 26: Sea couch dominated grassland and scattered boxthorn.

To the west of Hikuwai Beach carpark the proposed route follows an existing informal walking track through dunes in part. Vegetation is comprised of

- (boxthorn)/pohuehue–cocksfoot vine–grassland
- sea couch–kikuyu grassland

As the vegetation is heavily modified in most places and the terrain is relatively gentle there should be minimal vegetation issues in this section.

Section 27

This section runs along behind a radiata pine shelterbelt on neighbouring property. Most of this section is dominated by exotic grass species comprised of

- (boxthorn)/pohuehue–bracken–cocksfoot vine–fern–grassland at the western end with
- (boxthorn)/kikuyu grassland towards the eastern end

As vegetation is heavily modified in this section and the terrain is relatively gentle there should be minimal vegetation issues in this section.

Section 28

Section 28: Grazed dunes dominated by boxthorn–lupin with mixed exotic pasture grasses.

From here the proposed route enters a grazed section on what is currently a mix of private and ODC road reserve. Vegetation is heavily grazed and dominated by exotic species. comprising of:

- (lupin–boxthorn)/cocksfoot–white clover – catsear (*Hypochoeris radicata*) grass–herbfield. A range of other grazed exotic pasture grasses and flatweeds are present.

Vegetation cover is thin in places and bare sand is present where stock have impacted on the slopes. No vegetation issues present.

Section 29

West of grazed dune area the proposed route crosses a beach access road off end of Snell Road. Vegetation is comprised of a mosaic of

- (boxthorn)/pohuehue – cocksfoot vine–grassland with occasional kikuyu
- pohuehue–sea couch vine–grassland
- pohuehue vineland

On the east side of the access road the proposed route partly follows an existing 4WD vehicle track through the dune swale. In a few places the proposed route runs parallel but off the existing 4WD track through (boxthorn)/ pohuehue–cocksfoot vine–grassland and pohuehue vineland. Given the terrain is largely undulating to flat on an existing track it would be preferable to follow this more closely than to impact on additional indigenous vegetation in the vicinity. This also prevents the additional need to restore the old vehicle track through re-vegetation if it is becomes part of the cycleway route (see Section 29 photo).

The proposed route deviates off the existing 4WD vehicle track and turns south–west and crosses a dune ridge with relatively dense pohuehue vineland present on faces in order to maintain gradient. Again it would preferable to avoid a major deviation off the existing vehicle track through this vegetation type if possible. The proposed route rejoins the existing 4WD track on flatter ground and follows it for a distance.

Section 29: Existing 4WD vehicle track east of Snell Road.

Section 30

The final section of dune leaves the existing 4WD track and follows through flat wide backdune hollows through vegetation comprised of

- pohuehue–periwinkle vineland with occasional cocksfoot.

As this part is highly modified with an extensive periwinkle infestation and gentle terrain there are no vegetation issues here.

From here the proposed route meets an existing vehicle track off Snell Road and leaves the coastal dune system.

.5 Threatened Flora

Throughout the entire dune section of the proposed route no other threatened flora species (as per de Lange *et. al.* 2009) were located other than shore spurge seen in Sections 3 and 20

which were recorded on or near the proposed cycleway route. Wildland Consultants (1999, 2006) did not record the presence of any threatened flora species either.

5. Fauna and Effects

5.1 Birds

The following bird species were recorded at the dunes during the assessment:

Native species were red-billed gull (*Larus novaehollandiae scopulinus*), variable oystercatcher (*Haematopus unicolor*), southern black-backed gull (*Larus dominicanus dominicanus*), silvereye (*Zosterops lateralis*) and the North Island weka (*Gallirallus australis greyi*) (reported).

Introduced species observed were common pheasant (*Phasianus colchicus*), mallard (*Anas platyrhynchos platyrhynchos*), Eurasian skylark (*Alauda arvensis*), song thrush (*Turdus philomelos*), yellowhammer (*Emberiza citrinella*), dunnock (*Prunella modularis*), European goldfinch (*Carduelis carduelis*) and welcome swallow (*Hirundo neoxena neoxena*).

Wildland Consultants (2006) list both northern NZ dotterel and pied stilt (*Himantopus himantopus leucocephalus*) as present at Hikuwai Beach and Tirohanga dunes. Northern NZ dotterel (classed as Nationally vulnerable) and pied stilt (classed as At Risk, Declining) are both listed as threatened species (Townsend *et.al*, 2008). Wildland Consultants also reports a reduction of northern NZ dotterel breeding pairs along the coast. Observations show that most northern NZ dotterel in the area breed at either the mouths of the Waioeka or Waiaua Rivers and not along the dunes. A total of 6 breeding pairs were observed at the river mouths in August 2010 (Keith Owen, pers. obs.).

From our assessment and past experience it's clear that should any breeding northern NZ dotterel be nesting on the dunes they would normally do so on the fore dunes and would not be impacted directly from the cycleway route which lies further inland, essentially on the back dunes. Pied stilts usually nest in damp paddocks or around the inland margins of estuaries and not directly on the dunes, so they will not be impacted by the route.

The North Island weka (classed as Threatened-Nationally Vulnerable) (Townsend *et. al*, 2008), has been observed in low numbers at the Tirohanga dunes in recent years (Anastacia

Kirk, DOC, pers. comm.). Weka has made a return (comeback) around the Opotiki District after the population had contracted severely about 2 decades ago. Birds are now observed regularly around the District.

Red-billed gulls (classed as Threatened-Nationally Vulnerable) (Townsend et.al, 2008), were observed flying over the dunes and was seen on a number of the beaches and in groups of about 5-10 birds.

During our visit mallard, common pheasant and Eurasian skylark were all disturbed from the dunes and it appears that all 3 species could be breeding on the dunes?

It's unlikely that many of these bird species will be greatly impacted by the route alignment, apart from human disturbances caused by cyclists or walkers operating on the cycleway during the breeding season. As most of the bird species recorded are introduced species this potential impact is considered acceptable.

.2 Invertebrates

Apart from common native invertebrates, such as cockroaches, earwigs and spiders that were recorded during our assessment, there is likely to be a population of the threatened native katipo spider (*Latrodectus katipo*) (classed as Chronically Threatened - Serious Decline; Townsend *et. al*, 2008) found there (B. Christensen pers. comm.).

Patrick (2002) undertook a national survey of the distribution of katipo and although he did not visit or have records from the Opotiki District, the national distributional range of katipo indicates that they should be present. Katipo build untidy cobwebs found in vegetation or debris on beaches and dunes. They are largely threatened by competition from *Steatoda capensis* (an introduced spider). Katipo spiders usually inhabit the foredune and associated swale where drift wood, spinifex and marram prevail, although they are also known to inhabit *Coprosma acerosa* shrublands and pohuehue vinelands. It is unlikely that there will be many katipo spiders in the back dunes as this habitat is generally thought to be less attractive to the species.

.3 Native butterflies and moths

Native copper and migrant blue butterflies are likely to be occupying the dunes. Although these species were observed at the dunes and appear similar to the common copper (*Lycaene salustius*) and common blue (*Zizina otis labradus*) butterflies, its unclear what species they actually are without undertaking some survey work. Both species are very dependant on the retention of pohuehue vinelands on dunes in coastal areas, as this native plant is their prime habitat (Patrick, 2006). At least 100 species of native butterflies and moths feed as larvae on various species of native *Muehlenbeckia*, with over 75 exclusively dependent on *Muehlenbeckia* for their survival (Patrick, 2006).

.4 Native lizards

There is limited information regarding the presence of native lizards on the dunes but species such as the copper skink (*Cyclodina aenea*), moko skink (*Oligosoma moco*) and shore skink (*Oligosoma smithi*) are possibly present, as these species are known from the wider Bay of Plenty especially in the Tauranga Ecological District (Whitaker, 2001). A survey is needed to ascertain what species might be present. With beach properties at Tirohanga nearby, the opening up of a cycleway close to houses could make access into the dunes easier for domestic cats to prey upon native lizards. The creation of the cycle way may also increase the risk of fire from cycleway users thus removing important habitat for lizards (and other fauna species) for several years until the vegetation fully recovers.

5. Summary/ Conclusions

Given the large size of the Hikuwai–Tirohanga dunes section the overall effects of this proposal on the flora and fauna are relatively minor. This is based on the fact that although the Tirohanga Dunes Conservation Area and Hikuwai Beach site have been identified as being ecologically significant (Wildland Consultants 1999, 2006) vegetation has already been substantially modified with existing tracks present and is also still recovering from past heavy modification by grazing, burning and weed encroachment. Some more significant areas have been identified – mostly denser pohuehue vinelands which are also considered to be notable sites for a number of species of native fauna which inhabit or are hosted by this plant.

Potential Negative Ecological Effects

- The main impact identified to vegetation from the proposed cycleway surrounds the removal of pohuehue vineland, with the greatest impacts on steeper dune areas where this habitat often predominates and where the track footprint may be wider (up to 8m in places) where earthworks for benching are required.

- Increasing the effects of cat predation on lizard and bird populations, where the track offers easy access into the entire interior of the dune system for both feral and domestic cats.

- Increased the risk of fire with greater recreational use of this high risk (fine fuels) site from the cycleway impacting on both flora and fauna.

- Possible increased weed colonisation of open sites along track edges or weed species such as pampas or gorse being introduced with track surfacing aggregate.

- Impact of dogs on flightless weka populations. Weka have been naturally re-establishing in this area for approximately the past 5 years, and depend on dense vegetation cover for nesting and roost sites. An increased use of dogs along this cycleway, by recreational users could expose them to increased risk of predation.

- It is likely that the informal development of tracks off the approved cycleway route will occur, which may increase local or site-specific erosion through removal and suppression of vegetation cover.

Potential Positive Ecological Effects

- Greater public use will hopefully provide opportunities for interpretation and greater public awareness about the importance of the Hikuwai–Tirohanga dunes system and its flora and fauna. This may lead to a greater community effort to protect dunes and manage threats to the system e.g. vehicle access, encroachments, plant and animal pest control.

- Better access and awareness may lead to additional surveys carried out for flora and fauna in native vegetated habitats which will generally only increase the conservation value of a site by adding additional species to known information about a site. For example, with further

survey work at the dunes, confirmation of the presence of native lizards, butterflies and invertebrates including the katipo spiders could be determined.

Recommendations

Avoid pohuehue vinelands where possible. This will ensure recovering indigenous vegetation is retained where practicable and impacts on associated fauna are minimised. In this regard recommendations have been made by DOC staff for possible alternative route adjustments (see Appendix 1 map and relevant text).

If the proposed route must go through pohuehue vineland areas then track width should be narrowed to less than 2.2m to minimise the extent of vegetation clearance needed, especially given vegetation disturbance could be up to 8m in width including cut and fill areas on steeper slopes. By minimising earthworks on steeper slopes it will also preserve the existing dune structure as much as possible.

Several sections of track follow existing or old vehicle tracks through the dunes which are predominantly either bare sand or rank exotic grassland. It is important that the proposed route maximises the use of these and avoids deviating where at all possible, both to avoid vegetation disturbance but also to avoid creating multiple sets of tracks through vegetation which will require restoration work.

Where earthworks are carried out leaving cut and fill areas with exposed sand it will be important to revegetate these areas as quickly as possible following track construction to ensure sand is stabilised and weed encroachment is managed. Therefore as mitigation large scale planting of both nursery raised pohuehue (*Muehlenbeckia complexa* and *Muehlenbeckia complexa–M. australis*) hybrids sourced from the site is recommended in early winter following completion of track construction. Planting will focus on all areas of exposed, bare sand created as a result of track development as well as any existing bare areas of sand or areas where exotic species predominate and pohuehue is absent.

In addition where existing pohuehue is removed for track development, plants will be replanted along track edges. This technique has had some success in the past (M. Houghton *pers. comm.*).

Both ODC and DOC already have an ongoing plant pest management programme operating in parts of their respective reserves for a number of years. As a result most of the key plant pest species are now at low density, particularly in Tirohanga Dunes Conservation Area. Therefore there is no need for a plant pest monitoring and management plan as recommended by Wildland Consultants (2010) but both ODC and DOC need to continue with ongoing plant pest control of priority species in their respective reserves as part of mitigation for this project. Particular emphasis needs to be on the section from Snell Road to Hikuwai Beach roadside reserve which has extensive infestations of boxthorn which require control, although some of this is currently on private land adjoining the ODC road reserve. The periwinkle infestation off Snell Road which the proposed route traverses should also be a priority.

To avoid spreading further plant pest infestations into the reserve it is important that aggregate used for track surfacing is free of plant pest seeds. Pampas, gorse and buddleia are some of the main risks from aggregate so it is very important that a preferably local weed-free source of aggregate is used. Machinery should also be cleaned before it enters or leaves the site.

In regard to the threatened weka population at this site, the implications and feasibility of banning domestic dogs along this cycleway should be explored.

Management of any increase in off track usage and associated impacts on vegetation that arise from cycle trail within the dune system is required.

8. References

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