Memorandum

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To:	**Lewis Consultancy**	**Date:**	4 December 2019
Attention:	Joanne Lewis	**Ref:**	63097
Subject:	**Whareroa Village Subdivision Vegetation Report**		

Whareroa Village Site Description

The proposed subdivision is located in an area where pasture borders scrub. This regenerating vegetation cover continues down a steep slope to the south-western shores of Lake Taupo. Singers & Rogers (2014) classified the climate of this area as mild, sub-humid and the vegetation most accurately reflects VS5-Regenerating Broadleaved Species.

Bioresearches (2005) described the vegetation from five zones (Figure 1) in the North Side Development Area. This memo updates the information from Zones 1-4 in that assessment. Zone 5 (low-stature scrub on steep scarp / Esplanade Reserve above lake) was not re-assessed as it is outside the area of proposed works. Full plant species are provided in Appendix I.

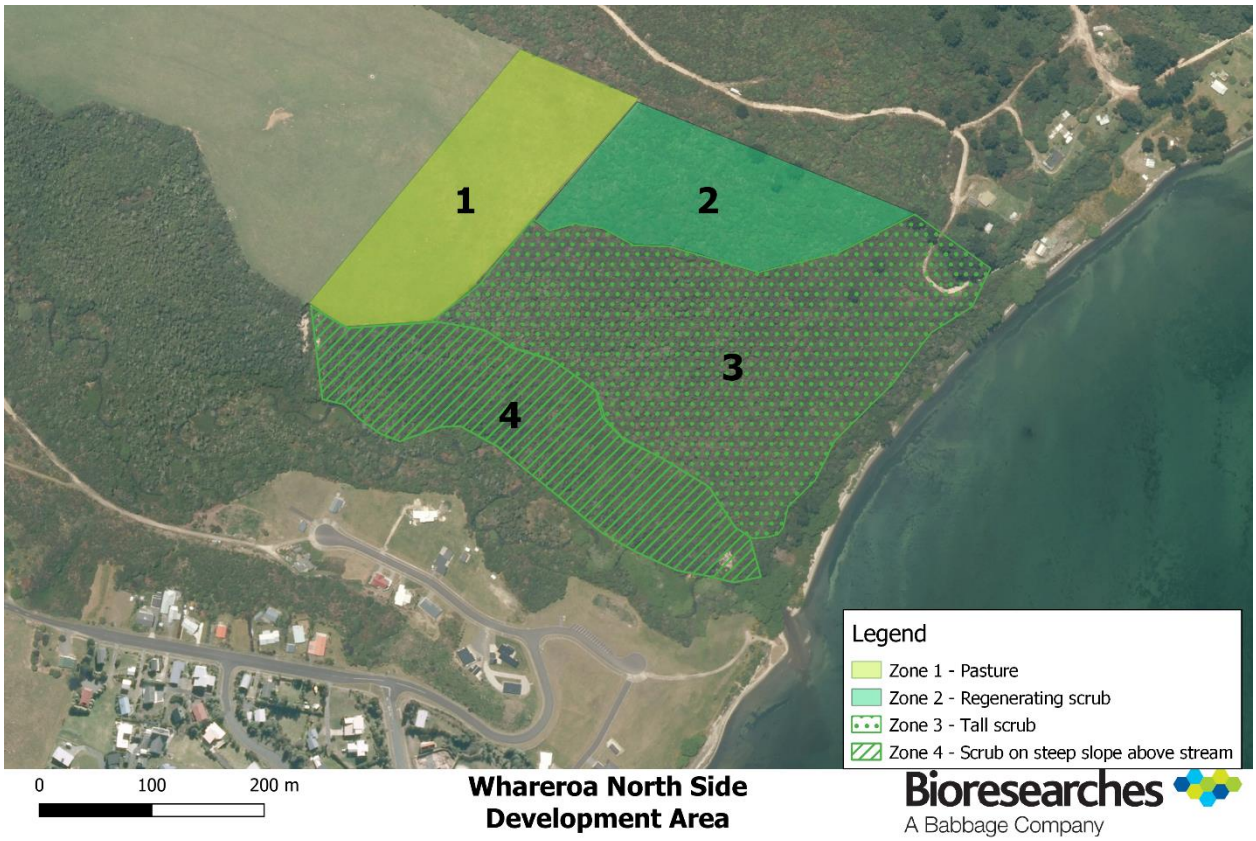

Figure 1. North Side Vegetation Zones.

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Zone 1: Pasture

This area is best described as pasture dominated by exotic grasses. An approximate 5 m wide swath of exotic broom (*Cytisus scoparius*) separates the pasture and the fence line which encloses the regenerating scrub of Zone 2.

Bioresearches (2005) do not record broom within Zone 1 but describes 2-3 m tall individuals near the paddock edge in Zone 2. In 2019, broom is abundant in Zone 1 pasture at the eastern edge of the paddock which suggests it has expanded.

Zone 2: Regenerating scrub

Emergent kānuka (*Kunzea robusta*, approximately 8-9 m high), were visible above a canopy comprised primarily of fivefinger (*Pseudopanax arboreus*, approximately 5-8 m high). Kōhūhū (*Pittosporum tenuifolium*) was a conspicuous edge canopy species, however, exotics such as broom, blackberry (*Rubus fruticosus*), and Himalayan honeysuckle (*Leycesteria formosa*) dominated the initial 3-5 m of edge understorey vegetation and were also recorded occasionally in the forest interior. Bracken *(Pteridium esculentum*) was common at both the forest edge and areas in the interior where canopy gaps created light wells. Koromiko (*Veronica stricta*), kiokio (*Parablechnum novae-zealandiae*) five-finger, karamū (*Coprosma robusta*) and tutu (*Coriaria arborea var. arborea*) had the highest proportion of abundance for native species in the understorey and the ground cover vegetation, although patchy, was dominated by native ferns and mosses; particularly hounds tongue (*Zealandia pustulata subsp. pustulata*), lace fern (*Paesia scaberula*), and climbing clubmoss *(Lycopodium volubile*). It should be noted that climbing clubmoss was not recorded in Zone 2 in the 2005 survey (only in Zone 3), indicating that its distribution may have expanded. Other ferns such as hairy fern (*Lastreopsis hispida*), sickle spleenwort *(Asplenium polyodon*) and fragrant fern (*Dendroconche scandens*) were also present in low abundance as were snowberry (*Gaultheria depressa var. novae-zealandiae*) and hook grass (*Carex uncinata*).

Overall, the species composition and abundance has not changed substantially in the 14 years since the 2005 assessment. However, early seral species, such as broom and bracken, are now being succeeded by an establishing native canopy, consistent with Zone 3: Tall scrub of fivefinger and kanuka.

Zone 3: Tall scrub of fivefinger and kānuka

The current composition of Zone 3 is consistent with Bioresearches (2005) whereby fivefinger, kānuka and kōhūhū are the dominant canopy species. Additional species not previously recorded include a single juvenile lancewood (*Pseudopanax crassifolius*) and native vines such as jasmine *(Jasminum polyanthum*) and passionfruit (*Passiflora tetrandra).* Unlike Zone 2, ferns in Zone 3 are now more widespread rather than patchy (Bioresearches 2005). This is likely due to decreased light levels resulting from taller / more mature vegetation.

Photo 1. View from Zone 1 to Zone 2: Emergent kānuka with a five-finger canopy in Zone 2. Wild broom dominates the edge of Zone 1.

Photo 2. Zone 2 - Forest interior.

Photo 3. Zone 2 - Patchy understorey vegetation dominated by hounds tongue.

Photo 4. Zone 2 - Patchy understorey vegetation dominated by climbing clubmoss.

Zone 4: Scrub on steep slope above stream

The vegetation above the Whareroa Stream appeared to have a similar vegetation composition as the 2005 assessment with, perhaps, an increase in proportional abundance of kānuka. Predominantly five-finger, emergent pines were, at present, infrequent in the canopy. Closer to the stream, crack willow (*Salix fragilis*) and grey willow *(Salix cinerea*) were recorded and willow seedlings formed a dense ground cover in areas. Reserve plantings on the southern side of the stream included 8 – 10+ m stems of kahikatea (*Dacrycarpus dacrydioides*), kowhai (*Sophora* sp.), māhoe (*Melicytus ramiflorus*) and tōtara (*Podocarpus totara*). Flax lined the watercourse and kiokio, bindweed (*Calystegia sp*.), water fern and bracken were abundant.

As with Area 3, species composition and abundance has not changed substantially in the 14 years since the 2005 assessment.

Photo 4. Area 4 looking up toward Area 3.

Summary

Feral pig sign, in the form of rooting and faeces, is widespread in Zones 2 and 3, and as noted in Bioresearches (2005). Similarly, Bioresearches (2005) also suggested possum damage was visible and this is also evident in Zones 2 and 3 where many fivefinger had sustained moderate damage (with some die-off observed).

The Bioresearches (2005) Report, which assessed the same area, details a similar habitat and species composition and it can be concluded that growth and succession has been slow.

Trees, which in 2005 were noted to be approximately 5 m tall, are now approximately 7-8 m tall. The regeneration of climax species in Zones 2 and 3 is still negligible. Only one rewarewa (*Knightia excelsa*) seedling was recorded and no podocarps were observed in Zones 2 or 3. Tree ferns are lacking however exotic species such as broom, Himalayan honeysuckle, and blackberry are abundant at the paddock's edge. Only gorse (*Ulex europaeus*) appears to have decreased as it was not recorded in the recent survey.

A machine track was documented in the previous report however natural regeneration has now covered this.

Yours sincerely,

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Appendix I - Native Species List

Botanical Name	Common Name
Asplenium flaccidum	**drooping spleenwort**
Asplenium hookerianum var. hookerianum	**Hookers spleenwort**
Asplenium polyodon	**sickle spleenwort**
Astelia banksii	**astelia**
Carex uncinata	**hook grass**
Clematis fosteri	**native clematis**
Coprosma lucida	**shining karamū**
Coprosma robusta	**karamū**
Cordyline australis	**cabbage tree**
Coriaria arborea var. arborea	**tutu**
Dendroconche scandens	**fragrant fern**
Gaultheria antipoda	**bush snowberry**
Gaultheria depressa var. novai-zealandiae	**snowberry**
Jasminum polyanthus	**native jasmine**
Knightia excelsa	**rewarewa**
Kunzea robusta	**kānuka**
Kunzea serotina	**kānuka**
Lastreopsis hispida	**hairy fern**
Leptocoophylla juniperina	**prickly mingimingi**
Leucopogon fasciculatus	**mingimingi**
Lycopodium volubile	**climbing clubmoss**
Myrsine australis	**māpou**
Paesia scaberula	**lace fern**
Parablechnum novaezealandiae	**kiokio**
Pittosporum tenuifolium	**kōhūhū**
Pseudopanax arboreus	**five-finger**
Pteridium esculentum	**bracken**
Veronica stricta	**koromiko**
Zealandia pustulata subsp. pustulata	**hounds tongue**

Appendix II - Exotic Species List

Botanical Name	Common Name
Rubus fruticosus	**blackberry**
Leycesteria formosa	**Himalayan honeysuckle**
Erica lusitanica	**Spanish heath**
Cytisus scoparius	**wild broom**
Jacoraea vulgaris	**ragwort**
Lupinus arboreus	**tree lupin**
Crataegus monogyna	**hawthorn**