

# **Queenstown Lakes District Council**

## **Queenstown Lakes District Plan Change - Wanaka**

### **Assessment of Ecological Values**

October 2006

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## **1.0 Introduction**

Queenstown Lakes District Council is proposing a district plan change for an area of Rural General and Rural Residential zoned land in Wanaka, bound by Ballantyne Rd, Wanaka-Luggate Highway and Riverbank Rd. A parcel of the land affected is owned by QLDC. This land contains the council's sewage ponds for Wanaka.

Natural Solutions *for Nature* Ltd have been commissioned to

- Provide advice regarding the appropriate level of assessment required to describe the values present.
- Describe the ecological values of the land containing the sewage ponds, including an assessment of the vegetation and communities present and those that are likely to have been present historically with an assessment of their significance, if any.

Brief recommendations regarding species that may be incorporated into future landscape designs have been provided.

## **2.0 Ecological Assessment**

### *2.1 Background and Methods*

A site inspection was undertaken on the 5<sup>th</sup> October 2006 between 11am to 1.30pm. The sewage ponds and immediate margins were inspected first, followed by the dump site and open pasture to north east. Photographs were taken and referenced using a Global Positioning System (GPS). Plant and bird species were noted. No lizards were observed. Some invertebrates were observed but not recorded.

### *2.2 Site description and values*

#### *Sewage ponds and margins*

The vegetation around the margins of the ponds consists predominantly of brown top (*Agrostis capillaris*) and exotic herbs. There is some variation across the site as a result of rabbit browsing and faecal deposits. Where evidence of grazing and burrowing was observed, dry open patches were noted. Faecal pellets provided localised nutrient enrichment resulting in areas of dense, lush green exotic herbs. Rabbits appear to be the primary agents of variation in vegetation around the margins of the ponds. There are exotic shrubs and rubbish scattered around the ponds.

Along the western margin of the ponds (adjacent to Ballantyne Rd) the vegetation consists of brown top (*Agrostis capillaris*), with yarrow (*Achillea millefolium*), broad leaved dock (*Rumex obtusifolius*), dandelion (*Leontodon taraxacoides*), sheep's sorrel (*Rumex acetosella*), field speedwell (*Veronica arvensis*), turf speedwell (*Veronica serpyllifolia*), storksbill (*Erodium cicutarium*), cat's ear (*Hypochoeris radicata*), shepherd's purse (*Capsella bursa-pastoris*), parsely piert (*Aphanes inexpecta*), mouse ear hawkweed (*Hieracium pilosella*), grass forget me not (*Myosotis discolor*), cocksfoot (*Dactylis glomerata*), sweet vernal grass (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus lanatus*) and in dry open patches mosses and lichens, notably 'popcorn' or unattached lichen (*Chondropsis semiviridis*). Occasional plants include woolly mullein (*Verbascum thapsus*), moth mullein (*Verbascum virgatum*) and scotch thistle (*Cirsium vulgare*). A few broom plants (*Cytisus*

*scoparius*) are present. Figure 1 illustrates the grassland vegetation along the western margin.



**Figure 1** : Vegetation along the sewage pond margin adjacent to Ballantyne Rd. Photograph taken towards the south east (GPS 5604215N 2205165E): source: L Hardy

A structure housing equipment for the sewage ponds is located along this margin and several elder (*Sambucus nigra*) and a weeping willow (*Salix babylonica*) are present here (figure 2).



**Figure 2** : Structure housing equipment with willows and elder. Photograph taken towards the north west (GPS 5603950N 2205262E): source: L Hardy

Along the southern margin of the pond, the vegetation is similar. A row of Radiata pine (*Pinus radiata*) trees forms a hedge along the boundary. The bund / bank around the pond forms a dry north facing terrace which rabbits have burrowed extensively into. Introduced herbs are sparse and the rabbit activity has resulted in much exposed bare ground. Along this drier bank species present include moth mullein (*Verbascum virgatum*), woolly mullein (*Verbascum thapsus*), sheeps sorrel (*Rumex acetosella*), viper's bugloss (*Echium vulgare*), sweet vernal grass (*Anthoxanthum odoratum*), brown top (*Agrostis capillaris*), cat's ear (*Hypochoeris radicata*), storksbill (*Erodium cicutarium*), Californian poppy (*Eschscholzia californica*), a small patch of scabweed (*Raoulia australis*), and a few sweet briar bushes (*Rosa rubiginosa*). The remains of feathers from a predated bird (possibly waterfowl) suggest the presence of introduced predators (cats or ferrets). The terrace adjacent to the pine boundary contains similar vegetation as described for the western margin. Figure 3 illustrates the vegetation and pine hedge boundary.



**Figure 3 :** South eastern margin of the sewage ponds with pine boundary. Photograph taken towards north east (GPS 5603950N 2205262E): source: L Hardy

The ponds themselves contain a large number of waterfowl and gulls. Waterfowl present include paradise shelduck (*Tadorna variegata*), mallard (*Anas platyrhynchos*), grey teal (*Anas gracilis*) and Australasian shoveler (*Anas rhynchos*). There was also a large flock of black back gulls (*Larus*

*dominicanus*). A large flock of juvenile and / or non breeding paradise shelduck were present on the water, in addition to several breeding pairs. One pair had eight chicks on the water. Introduced finches were feeding on insects at the margins of the water.

Other birds observed around the margins of the ponds include Spur-winged plover (*Vanellus miles*) breeding in the long grass, redpoll (*Carduelis flammea*), Chaffinches (*Fringilla coelebs*), goldfinch (*Carduelis carduelis*), skylark (*Alauda arvensis*) and starlings (*Sturnus vulgaris*). A South Island Pied Oystercatcher (*Haematopus ostralegus*) was observed flying over.

#### *Pasture to the north-east*

The area to the north east of the sewage ponds consists of pasture and a dump site (figure 4).



**Figure 4** : Panoramic view of the pasture and dump site located north east of the sewage ponds (GPS 5604152N 2205720E) : source: L Hardy

The ground here is uneven from previous excavation and fill, with exposed faces on the sides of dumped material. The vegetation is primarily browntop, with sweet vernal grass, red clover (*Trifolium pratense*), haresfoot trefoil (*Trifolium arvense*), vipers bugloss, woolly mullein, moth mullein, mouse ear hawkweed, storksbill, cocksfoot, dandelion, broad leaved dock, sheep's sorrel, scotch thistle, shepherd's purse, small flowered mallow (*Malva parviflora*), with plantain (*Plantago lanceolata*), Californian poppy (*Eschscholzia californica*) and grape hyacinth (*Muscari* sp) on the newly dumped earth piles. A large area provides a refuse site for vehicles, scrap

metal, green waste, vehicle batteries and concrete. Figures 5 and 6 illustrate the dump and refuse sites.



**Figure 5** : Dump site located to the north east of the sewage ponds (GPS 5604218N 2205520E): source: L Hardy



**Figure 6** : Vehicle dump site located to the north east of the sewage ponds; source: L Hardy

### **3.0 Contextual Environmental Information**

The site is located within the Pisa Ecological District at the western margin of the Central Otago Ecological Region. Ecological districts have been created using topographical, geological, climatic, soil and biological features such as indigenous plant and animal communities (ecosystems) to define characteristic landscapes. Closely related ecological districts are amalgamated to form ecological regions (McEwen, 1987).

The Pisa Ecological District sits higher than the other Central Otago Districts. The glaciated landforms and the fault-block Pisa Range and flats provide its distinctive character. The climate is dry sub-continental with higher altitudes receiving more precipitation. Rainfall in the district varies from 380 to 1200mm per annum. North-west winds prevail (McEwen, 1987).

Wanaka receives a mean annual rainfall of 707mm. The first air frosts of autumn occur during early April and the last spring air frosts are likely to occur by about mid November. Soil evaporation and plant evapo-transpiration rates are greatest during the drier months when drying northerly winds prevail. Mean January maximum and minimum temperatures are 23.9°C and 10.8°C. Mean July maximum and minimum are 8.4°C and -1.2°C (Tait, 2001).

The site is located on (recent) Quaternary glacial outwash deposits (Q2a, Institute of Geological and Nuclear Sciences, 1:250 000 Geological Map 18, Turnbull 2000). The soils are mapped as dry-subhygrous Wanaka yellow – grey earths (Cutler, 1964).

#### **4.0 Historical Vegetation**

A description of the theoretical historical vegetation of the site can be used to provide a “benchmark” with which to compare the current vegetation of a site and base recommendations for any ecological restoration that may be considered. Through such comparisons, the degree of naturalness and representativeness of the vegetation present can be assessed and an estimation of the value of the site made. A description of the likely historical vegetation can be used to base recommendations of suitable species for ecological restoration, should any planting be required.

Models based on environmental data (such as geology, soil and climate), fossil and pollen analysis and current patterns of remnant and existing indigenous vegetation can be used to provide an understanding of the likely historical or potential vegetation of the site. Two models applied to the area of the Plan Change - the Land Environment of New Zealand (LENZ – Leathwick 2003) and Pre-Settlement Woody Vegetation Zones (Walker, Lee and Rogers 2003) indicate it is likely the vegetation immediately prior to European settlement consisted of a mosaic of short tussock grassland with Kanuka – Kowhai shrubland and possibly some silver beech and/or totara forest.

The LENZ classification offers a tool for identifying areas sharing similar biological or ecological character. The system classifies sites according to physical attributes such as climate, soils and landform providing an objective analysis of their relationship with vegetation. In doing so, Land Environments are described (Leathwick, 2003). The sewage pond site is located within an area described under the Land Environment of New Zealand (LENZ) system as “N5”.

Vegetation at the time of European settlement in the “N5” environments was almost continuous grassland, with some areas of kanuka. This is similar to the vegetation described as being present within the adjacent Pisa District by McEwen (1987). Swamps found within the “N5” environments contained varying species depending on site drainage but are likely to have included silver tussock (*Poa cita*) on rises, red tussock (*Chionochloa rubra*) on damp

ground, and the sedges *Carex sinclairii* and *C. coriacea* in wet hollows and *C. secta* in deeper water. The “N5” land environment extends across the alluvial plains and gently undulating moraines and outwash terraces extending down the Clutha River, across parts of the Canterbury plains and inter-montane basins of Central Otago.

Predictions of the likely vegetation prior to Polynesian settlement (approximately 800 years ago) suggest the area currently occupied by the sewage ponds was vegetated by kanuka – kowhai woodland and Kanuka – kowhai – Hall’s totara forest (Walker, Lee and Rogers (2003) pre-settlement woody zones 1 and IV respectively).

Canopy species likely to have been present are Kanuka (*Leptospermum ericoides*) with kowhai (*Sophora microphylla*) and manuka (*Leptospermum scoparium*). The kanuka – kowhai woodland may have included the sub-canopy shrubs of shrubby wineberry (*Aristotelia fruticosa*), willow hebe (*Hebe salicifolia*) and *Coprosma crassifolia*. Species which may have occurred in the canopy gaps include *Coprosma propinqua*, porcupine shrub (*Melicytus alpinus*), bush lawyer (*Rubus schmidelioides*), matagouri (*Discaria toumatou*), native broom (*Carmichaelia petriei*), scented tree daisy (*Olearia odorata*), *Muellerbeckia* spp., *Pimelia aridula* and *Hebe pimelioides*. Other species which may have previously been more widespread in the area include *Carmichaelia compacta*, *Coprosma* aff. *pseudocuneata*, *Melicope simplex* and *Olearia aviceniifolia*.

The Kanuka – kowhai – Hall’s Totara forest would have included the species noted above along with Hall’s totara (*Podocarpus hallii*), occasional stands of mountain and silver beech (*Nothofagus solandri* var. *cliffortoides* and *N. menziesii*) and groves of cabbage trees (*Cordyline australis*).

The model used to predict these pre-settlement vegetation types is likely to be biased toward fire tolerant species (predominantly kanuka). Species absent or rare in Central Otago, such as Matai (*Prumnopitys taxifolia*), *Fuchsia* and *Hoheria* sp., and species now confined to refugia on the range toe-slopes,

such as *Coprosma rugosa*, *C. linarifolia*, *Hebe salicifolia* and *Myrsine divaricata*, may have formerly been present in the area.

In much of Central Otago, frost and drought tolerant but fire sensitive tall woody species have been eliminated from valley floors, leaving only fire-resistant compositions. Very few potential canopy species, such as kanuka, kowhai, *Olearia lineata* and occasionally cabbage trees (*Cordyline australis*), presently occupy the most drought and frost prone valley floors of Central Otago.

The vegetation of the Pisa Ecological District at the time of European settlement was dominated by tussockland; hard and silver tussock at low altitudes, fescue, blue and snow tussock at higher altitudes. This is now very much modified by pastoral farming. Very small forest remnants of silver beech forest exist on the south, east and northern slopes of Pisa range (e.g. Luggate Creek and Lower Roaring Meg). Hall's totara forest remnants can be found on the eastern and northern slopes (e.g. Alfern Creek, Skeleton Stream and Lochar Burn). Kanuka – manuka scrub is found on the eastern faces of range, and was formerly more extensive at the northern end. There are very rare remnants of high altitude *Phyllocladus* – *Halocarpus* (Celery pine – bog pine) woodland (e.g. Lochar Burn and Skeleton Stream). In terms of modifications to the landscape, most alluvial fans and terraces are now in exotic pasture; sweet briar and matagouri communities are widespread on the lower slopes (McEwen 1987).

## **5.0 Significance**

### *5.1 Species*

The vegetation observed was predominantly common, exotic pasture grasses and herbs, with the exception of a small patch of indigenous scabweed (*Raoulia australis*) and unattached lichen (*Chondropsis semiviridis*). The indigenous species are not listed as threatened (De Lange et al, 2004).

No threatened bird species were observed. All those present were either introduced or indigenous species commonly found in lowland pasture and wetlands such as ponds, lagoons and sewage ponds.

### *5.2 Habitat*

The lowland pasture to the north east of the ponds currently provides habitat for common indigenous and exotic birds. The environment is far removed from its potential or historical environment as described above. The area is almost entirely vegetated with exotic grasses and herbs typical of lowland agricultural land and can not be considered an area of significant indigenous vegetation or habitat for fauna under Section 6 (c) of the Resource Management Act.

The sewage ponds are providing valuable feeding, resting/roosting and breeding habitat for a variety of indigenous and introduced waterfowl and gulls. The high nutrient status of the ponds will be supporting a larger number of birds than is commonly seen in wetlands of the district. Although the ponds are artificial they still constitute a considerable sized wetland within the wider semi-arid Pisa Ecological District. Nationally wetlands represent some of the most diverse ecosystems in New Zealand, and are estimated to have been lost over 90 percent of their former distribution (Ministry for the Environment, 2000). The scarcity of lowland wetlands through human induced drainage and habitat deterioration places importance on protecting and enhancing the wetlands that do remain. Within the local area wetlands are not well represented within the network of protected areas.

Wetlands provide habitat for mobile and migratory avian fauna that may be dependent upon a series of wetlands distributed over a wider geographic area to provide sufficient quantity and variety of food, breeding habitat, or roosting and flocking areas for juveniles and moulting birds. It is likely that the sewage ponds provide a feeding habitat which is utilised by birds from an area extending beyond the immediate pond environment. It is therefore of potential value when considered within the context of the wider landscape.

Other local and more natural wetlands which provide habitat for waterfowl include the Matakītaki (West Wanaka) wetlands, Scaife's Lagoon, Damper Ponds, Campbell's Ponds, Butterfields Reserve and the Albert Town Lagoon.

Under the proposed plan change the sewage ponds will be decommissioned. This will result in the removal of the artificial wetland habitat and the displacement of the waterfowl. Displaced birds may move to other wetlands present in the area or be lost to the area if they are unable to establish at those sites. It is likely that the sewage ponds sustain higher numbers of birds than naturally occurring wetlands in the area because of the high nutrient status and the presence of invertebrates in the sewage processing ponds.

### *5.3 Weed and Pest burden*

The property is relatively free of noxious weeds and plant pests.

A small amount of broom was noted. Broom is declared a pest plant in the Otago Regional Council Pest Management Strategy (RPMS) and occupiers of land are required to control broom on their land.

## **6.0 Summary and recommendations**

It is the view of the author that the ecological values of the site do not warrant further investigation or assessment.

The Council owned land currently in use as a sewage pond and dumping area and vegetated by lowland pasture to the north east of the ponds provides habitat (both breeding and feeding) for common indigenous and exotic birds.

The Council owned land within the proposed Plan Change area is almost entirely vegetated with exotic grasses and herbs typical of lowland agricultural land and is not considered to be an area of significant indigenous vegetation or habitat for fauna under Section 6 (c) of the Resource Management Act.

The sewage ponds and margins provide breeding and feeding habitat for a large number of indigenous and introduced waterfowl and gulls. The artificial wetland habitat is considered to be providing valuable habitat given the rarity of wetlands, both nationally and within the district's legally protected network of reserves.

The potential decommissioning of the ponds and conversion of the land to industrial use would displace the birds present.

Recommended management options are:

- Establish a wetland feature within the current site as part of the proposed Plan Change which provides waterfowl breeding and feeding habitat. It is likely that this feature would support a reduced number of birds and a lower diversity of species compared to those currently present in the sewage ponds.

## References

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**Attachment A : QLDC Wanaka Sewage Ponds - Species list**  
**appropriate for use in landscape designs incorporating elements of**  
**ecological enhancement<sup>1</sup>.**

<b>Botanical Name</b>	<b>Common Name</b>	<b>Species Likely to Benefit</b>	<b>Beneficial Attribute</b>	<b>Seasonal Benefit</b>
<i>Aristotelia fruticosa</i>	Mountain wineberry	Tui, bellbirds, kereru, silver eye	Flowers, fruit	Early and late summer
<i>Blechnum minus</i>	Small kiokio, hard fern		Wetland plant, Low cover	
<i>Carex coriacea</i>	Sedge		Wetland plant, Low cover	
<i>Carex secta</i>	Purei sedge	Invertebrates	Wetland plant, cover, seeds shelter, nesting habitat for fernbirds, crakes and bitterns	Year round
<i>Carex sinclairii</i>	Sedge		Wetland plant, Low cover, seeds	
<i>Carex virgata</i>	Sedge		Wetland plant, Cover	
<i>Carmichaelia petriei</i>	Native broom	Weevils and moths	Seed pods, flowers, foliage	Summer
<i>Chionochloa rubra</i>	Red tussock		Wetland plant, Cover	Year round
<i>Coprosma crassifolia</i>	Hairy Coprosma	Tui, bellbirds, lizards	Fruit	Autumn
<i>Coprosma propinqua</i>	Mingimingi	Bellbirds, tui, lizards, invertebrates	Fruit	Autumn
<i>Cordyline australis</i>	Cabbage Trees	Bellbirds, kereru, tui	Flowers, fruit	Flowers spring to summer, fruit summer to winter
<i>Corokia cotoneaster</i>	Korokia	Invertebrates, birds	Cover, food, habitat, flowers, fruit	Flowers summer, fruits late autumn to winter
<i>Cortaderia richardii</i>	Toe Toe		Shelter, nesting cover	Year round
<i>Dacrycarpus dacrydioides</i>	Kahikatea	Tui, bellbirds, silver eyes, kereru	Red fruit	

<sup>1</sup> Simpson (unpublished), Wilson (1994), Wilson (1996), Wilson and Galloway (1993), Whitaker, Tocher and Blair (in process of publication), Patrick and Peat (1999), Williams and Karl (2002) and Baker (1999), and personal observations.

<i>Discaria toumatou</i>	Matagouri	Invertebrates, birds	Cover, food, nectar	Year round, flowers late spring, fruit summer
<i>Dracophyllum longifolium</i>	Inaka		Cover, flowers	
<i>Eleocharis acuta</i>	Sharp spike sedge		Wetland plant, Cover	
<i>Festuca novae-zelandiae</i>	Hard tussock		Cover	Year round
<i>Fuchsia excorticata</i>	Fuchsia	Tui, bellbirds, kereru, silver eyes	Fast growth, Cover, flowers	
<i>Griselinia littoralis</i>	Broadleaf		Cover, fruit	
<i>Halocarpus bidwillii</i>	Bog Pine		Cover	Year round
<i>Hebe salicifolia</i>	Koromiko	Insect	Cover, attracts insects as prey	Year round
<i>Hoheria angustifolia</i>	Narrow leaved lacebark / houhere / ribbonwood	Bellbirds, tui	Cover, flowers, fruit	
<i>Juncus gregiflorus</i>	Native rush		Wetland plant, low cover, seeds	
<i>Kunzea ericoides</i>	Kanuka	Lizards, insects, quail, grey warbler, fantail	Cover, insect pollinated, insects as prey, nesting, seeds, leaves, buds, flowers (nectar)	Flowers spring to summer, fruits main seed fall autumn.
<i>Melicope simplex</i>	Poataniwha		Flowers, fruit	Flowers Sep – Nov, fruit Dec – Apr
<i>Melicytus alpinus</i>	Porcupine shrub	Bellbirds, lizards	Fruit, cover	Year round
<i>Metrosideros umbellata</i>	Rata		Cover, flowers	Flowers Nov – Jan
<i>Myrsine divaricata</i>	Weeping Matipo		Cover, flowers and berries	Year round
<i>Nothofagus menziesii</i>	Silver beech	Leaf binding and mining moths, invertebrates, birds feeding on larvae	Habitat, invertebrates as prey for birds, shelter, nesting	Year round
<i>Olearia avicenniifolia</i>	Mt akeakea	Important host for invertebrates	Habitat, invertebrates	
<i>Olearia fragrantissima</i>	Fragrant tree daisy	Important host for invertebrates	Cover in spring, summer and autumn,	Flowers late spring

			deciduous	
<i>Olearia hectorii</i>	Hector's tree daisy	Important host for invertebrates	Cover in spring, summer and autumn, deciduous	Flowers late spring
<i>Olearia lineata</i>	Tree daisy	Important host for invertebrates	Cover in spring, summer and autumn, deciduous	
<i>Olearia odorata</i>	Scented tree daisy	Important host for invertebrates, in particular moths.	Attract and provide food and habitat for moths, which fall prey to birds. Cover in spring, summer, autumn, deciduous	Flowers in summer
<i>Phormium tenax</i>	Flax	Tui, bellbird	Nectar, flowers, cover	
<i>Phyllocladus alpinus</i>	Mountain toatoa		Cover, black seeds	Flowers early summer, seeds late summer to autumn
<i>Pittosporum tenuifolium</i>	Kohuhu	Grey warblers, fantails, silvereyes and bellbirds	Cover, attracts insects which fall prey, seeds, flowers	Flowers late spring to early summer, fruits through year from summer on.
<i>Plagianthus regius</i>	Manatu / lowland lacebark		Flowers, fruit	
<i>Poa cita</i>	Silver tussock	Lizards, finches	Cover	Year round
<i>Podocarpus hallii</i>	Totara	Tui, bellbirds, silvereyes	Red fruit	Late summer to autumn
<i>Prumnopitys taxifolia</i>	Matai	Kereru, Tui, bellbirds, silver eyes	Black fruit	
<i>Pseudopanax ferox</i>	Fierce Lancewood		Flowers, fruit	
<i>Rubus schmidelioides</i>	Bush Lawyer		Flowers, fruit	
<i>Sophora microphylla</i>	Kowhai	Bellbirds, tui, kereru, insects	Nectar, leaves, buds, flowers, insect larvae eat seeds, insects fall prey to birds	Flowers late spring, seeds autumn.