

MITIGATION AND OFFSETTING OPTIONS TO ADDRESS ECOLOGICAL EFFECTS OF URBAN DEVELOPMENT AT SUNSHINE BAY, QUEENSTOWN



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Bracken fernland suitable for planting to restore indigenous forest cover.

Contract Report No. 5152a

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Prepared for:

Sunshine Bay Ltd
Queenstown

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1. INTRODUCTION

Sunshine Bay Ltd own a 6.47 hectare site above the Glenorchy-Queenstown Road, immediately to the west of the low-density Queenstown suburb of Sunshine Bay (Figure 1). A plan change and variation is proposed to enable a master-planned urban development on part of the site, to comprise approximately 200 residential properties. Two master plan development scenarios were initially produced, and a concept plan has more recently been developed. It is recognised that the proposal is for a rezoning, and not for a resource consent for land use. The concept plan (Figure 3) shows a possible development, but the actual urban development of the site, if the rezoning application is successful, may be different, and will be subject to consenting.

As part of the plan change process, Sunshine Bay Ltd previously commissioned an ecology report that describes and maps the ecological features and values of the site, and assessed the ecological significance of these values (Wildland Consultants 2019a). Sunshine Bay Ltd have now required a report that identifies options for remediation, mitigation and/or offsetting of potential adverse effects on these values from urban development. Wildlands have made this assessment on the basis that the roading layout in the concept plan is reasonably certain, and that development will be focussed within the three parts of the site that have flat to gently-sloping land. This report outlines within-site options for remediation, mitigation, and/or offsetting of potential adverse effects of development in these areas. Offsite works are not considered necessary.

2. CURRENT AND FORMER VEGETATION

The land has some relatively gently-sloping areas but is predominantly steep land, sloping down towards Lake Wakatipu.

Current vegetation on the site is dominated by broadleaved forest, bracken fernland with scattered broadleaved trees, exotic coniferous forest, and smaller areas of mixed exotic shrubland, poplar forest, and bluff vegetation (Wildland Consultants 2019a; Figure 2). Indigenous vegetation on the site is recovering from historic burning used to maintain pasture for farming operations (Natural Solutions for Nature 2003). Prior to human settlement of New Zealand, the site would have supported beech forest, with mountain beech occurring on less productive soils and red beech where soils were more productive (Wildland Consultants 2019a). Podocarps such as rimu (*Dacrydium cupressinum*), miro (*Prumnopitys taxifolia*), and Halls totara (*Podocarpus laetus*) may also have been present. Bluffs would have supported shrubs, grasses, and ferns.

3. INDIGENOUS FAUNA

A range of common forest birds currently utilise the site, including kōparapara/bellbird (*Anthornis melanura*), kōkō/tui (*Prosthemadera novaeseelandiae*), piwaiwaka/fantail (*Rhipidura fuliginosa*), pipihi/silvereye (*Zosterops lateralis*), and miromiro/tomtit (*Petroica macrocephala*) (Wildland Consultants 2019a). The site has low habitat value for indigenous lizards, due to its shady aspect and lack of creviced rocks (Wildland Consultants 2019a).

4. ECOLOGICAL SIGNIFICANCE

Bluff habitats have the greatest ecological significance at the site, and many plant species were only observed on these bluffs (Wildland Consultants 2019a). The site provides moderately important habitat for forest birds, with broadleaved forest the most important of these habitats (Wildland Consultants 2019a).

5. OUTSTANDING NATURAL LANDSCAPE

An outstanding natural landscape (ONL) covers the south-western part of the site (Appendix 1). The proposed urban development avoids the ONL (Figure 4).

6. POTENTIAL EFFECTS OF RESIDENTIAL DEVELOPMENT

Clearance and permanent loss of indigenous vegetation and habitat is the main adverse effect of urban development at the site. The concept plan would result in clearance of 0.91 hectares (40%) of broadleaved forest from the site, and 1.01 hectares (52%) of the kōhūhū/bracken shrubland (Figure 3). However, broadleaved forest in the southern part of the site - adjacent to a gully and in the centre of the site - would not be cleared. Bluff habitats would be maintained, with development only extending to near the base of the bluffs. The concept plan would also result in clearance of exotic-dominant vegetation, including 0.4 hectares of Douglas fir-Corsican pine forest, 0.24 hectares of mixed exotic shrubland, and 0.13 hectares of poplar forest (Figure 3).

Two other indirect adverse effects of residential development are also likely:

Firstly, ecological weeds may be dispersed into uncleared habitats as garden escapes from residential gardens. In this respect, most of the residential units at the site do not appear to be associated with gardens, but eight residences in the northern part of the site are low density units with space for curtilages and gardens.

Secondly, residential development is likely to increase the density of rodents and cats given that residential housing provides shelter and food for rodents while cats will be kept as pets. This could result in additional pest animal pressure on indigenous forest birds using the site and adjacent areas.

In addition, a permanent walking track will be created across the site. This track is likely to be located in areas dominated by bracken fernland, and its construction should be able to avoid adverse effects on indigenous trees. As such, the adverse effects of construction of the track are considered to be minimal.

8. MITIGATION AND OFFSETTING OF ADVERSE EFFECTS

8.1 Planting

Planting of ecologically-appropriate indigenous tree species within the site is an important action that would help to mitigate clearance of indigenous vegetation. Planting could be undertaken in remaining areas (totalling 0.82 hectares) of kōhūhū/bracken fernland or areas where exotic woody species have been controlled (if the remaining Douglas fir-Corsican pine forest was cleared, this would result in almost one additional hectare of land becoming available for planting of indigenous trees. Many of the areas mapped as ‘broadleaved forest’ within the site contain bracken-filled gaps and these could also be planted. Examples of where this planting could occur are shown in Figure 4. Planting of kowhai and ecologically-appropriate shrubs and tussock grasses could also be undertaken at the top of the bluff habitat, which likely supported similar natural vegetation historically. Table 1 identifies ecologically-appropriate trees and shrubs that could be planted in different habitats within the site, and approximate planting densities. The selection of tree species includes a range of fast-growing fleshy-fruited species broadleaf (*Griselinia littoralis*), three finger (*Pseudopanax colensoi*), lancewood (*P. crassifolius*), fuchsia (*Fuchsia excorticata*), and species such as kowhai (*Sophora microphylla*) that produce copious nectar and provide an important winter food source for kereru (*Hemiphaga novaeseelandiae*). In addition, eventual canopy-dominant species such as mountain beech, red beech, and Hall’s totara are also included. A selection of riparian species is included for planting beside any permanent or ephemeral streams that pass through the planting sites. The fleshy-fruited broadleaved trees described above would ultimately form a subcanopy below emergent beech trees. The planting densities described in Table 1 would result in planting at approximately one metre spacing in most places, more rapidly achieving canopy closure and reducing the need for ongoing maintenance of planted trees.

Table 1: Indigenous trees, shrubs, and grasses that could be planted in different habitats within uncleared parts of the site.

Species	Common Name	Plant Type	Habitat	Density per Hectare
<i>Discaria toumatou</i>	Matagouri	Shrub	Above bluffs	200
<i>Carpodetus serratus</i>	Putaputaweta	Tree	Most places	500
<i>Chionochloa rigida</i>	Narrow-leaved snow tussock	Tussock grass	Above bluffs	200
<i>Coprosma propinqua</i>	Mingimingi	Shrub	Above bluffs Riparian	200 500
<i>Cordylina australis</i>	Cabbage tree	Tree	Most places	500
<i>Cortaderia richardii</i>	Toetoe	Tussock grass	Riparian	200
<i>Hebe salicifolia</i>	Koromiko	Shrub	Riparian	200
<i>Griselinia littoralis</i>	Broadleaf	Tree	Most places	2,500
<i>Leptospermum scoparium</i>	Manuka	Tree	Most places	1,000
<i>Fuchsia excorticata</i>	Fuchsia	Tree	Most places	500
<i>Fuscospora fusca</i>	Red beech	Tree	Deep soils, sunny aspects	500
<i>Fuscospora cliffortioides</i>	Mountain beech	Tree	Most places	2500
<i>Olearia arborescens</i>		Shrub	Above bluffs	200
<i>Phormium cookianum</i>	Mountain flax	Monocot herb	Above bluffs	400
<i>Pittosporum tenuifolium</i>	Kohuhu	Tree	Most places	1,000

<i>Podocarpus hallii</i>	Hall's totara	Tree	Most places	100
<i>Pseudopanax colensoi</i>	Three finger	Tree	Most places	1,000
<i>Pseudopanax crassifolius</i>	Lancewood	Tree	Most places	500
<i>Sophora microphylla</i>	Kowhai	Tree	Above bluffs	100

It should be noted that while planting would ultimately mitigate the loss of indigenous forest habitat at the site, it would not do so in the short term, due to the time it would require for indigenous trees to mature and replace the ecological functions of the cleared indigenous forest. Thus other actions, such as wilding tree and pest animal control, should also be considered.



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Figure 1: Location of the Sunshine Bay site



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Scale: 1:1,500
 Date: 14/08/2019
 Cartographer: TP
 Format: A3



Legend

Vegetation and habitat type

- 1. Bluff vegetation
- 2. Broadleaved forest
- 3. Douglas fir-Corsican pine forest
- 4. Kohuhu/bracken fernland
- 5. Mixed exotic shrubland and grassland
- 6. Poplar forest

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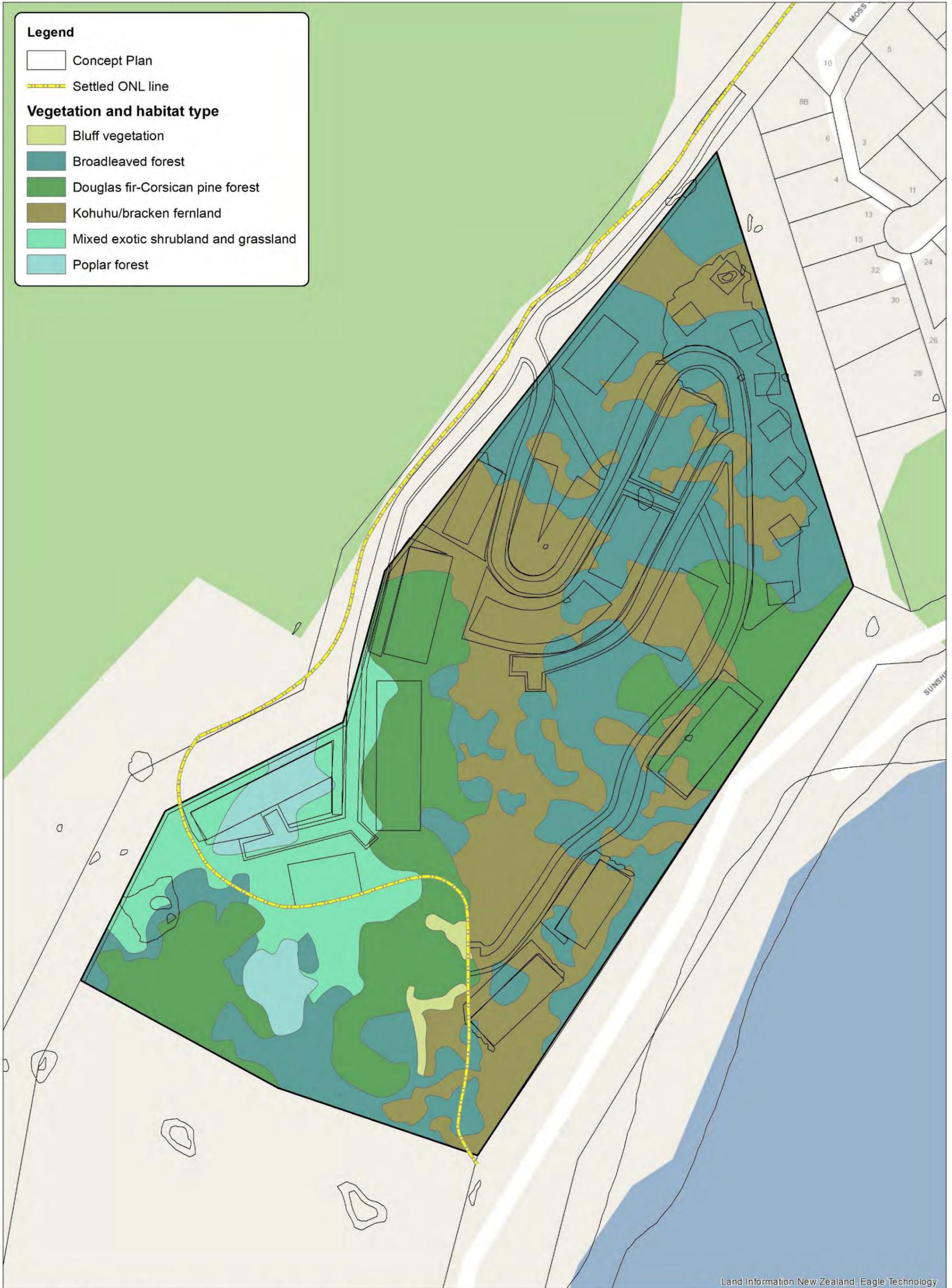
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 File: Fig2_vegetation.mxd

Figure 2: Vegetation and habitats at the Sunshine Bay site



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 Date: 21/08/2019
 Cartographer: TP
 Format: A3



Legend

- Concept Plan
- Settled ONL line

Vegetation and habitat type

- Bluff vegetation
- Broadleaved forest
- Douglas fir-Corsican pine forest
- Kohuhu/bracken fernland
- Mixed exotic shrubland and grassland
- Poplar forest

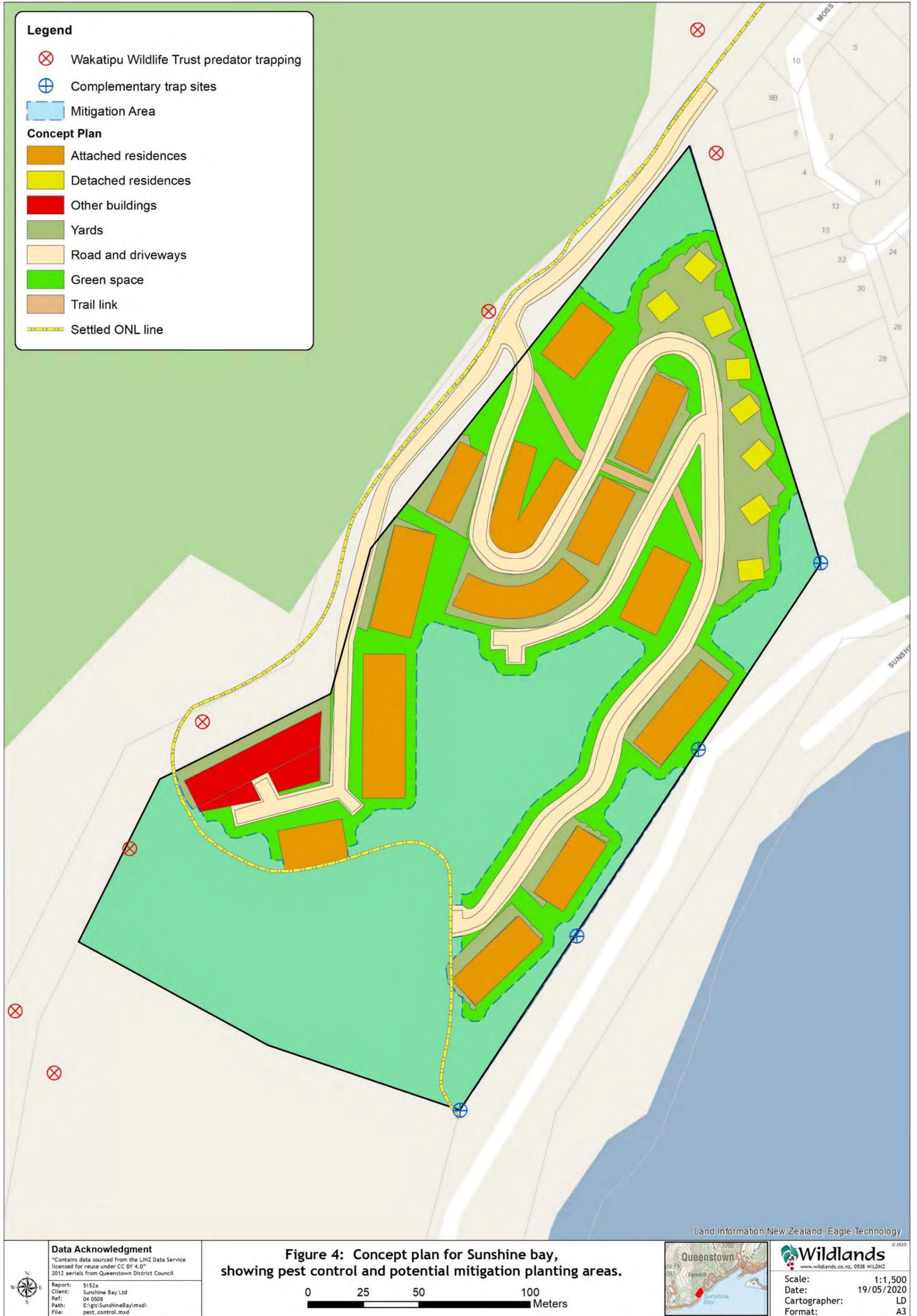
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Figure 3: Sunshine Bay vegetation/habitat types with Concept Plan overlaid.

0 25 50 100 Meters



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 Cartographer: LD
 Format: A3



8.2 Control of exotic trees

The clearance of exotic trees, especially Douglas fir (*Pseudotsuga menziesii*) and Corsican pine (*Pinus nigra*), should also be addressed, and would be a positive effect of the proposal. Control of these trees would need to be undertaken in any case to allow the proposed urban development in parts of the site, but in other parts (particularly in the southern part of the site), urban development would not coincide with stands of exotic conifers. Control of wilding conifers and other exotic trees in these areas would therefore form an additional conservation action consistent with biodiversity offsetting principles.

Where these trees are concentrated along the top of the bluffs in the south-western part of the site, control of these trees needs to take into account the important bluff habitats on and at the base of these bluffs. Conifer trees would likely be felled and dragged above the bluffs for further processing. Conifers in other parts of the site can be felled and left lying, but care should be taken not to restrict access for planting of indigenous trees.

Other woody weeds that warrant control within the site include buddleia (*Buddleja davidii*), shrubs of cotoneaster, rowan (*Sorbus aucuparia*), poplars (*Populus* spp.), and willows (*Salix* spp.). The latter three species/groups of species can re-sprout from cut stumps so if controlled by felling, stumps need to be pasted with a suitable herbicide.

8.3 Pest animal control

There is likely to be an increase in cat and rodent density within the site due to the proposed residential development. Undertaking rodent control could therefore constitute an action that would help offset the loss of forest bird habitat and mitigate the adverse effects of predation by rodents and cats. Pest control should not be undertaken as a one-off activity, but undertaken on a permanent, ongoing basis. This can be most efficiently achieved by maintaining grids of bait stations and/or traps.

For a small site like this, it is important that pest animal control is coordinated with external control efforts so as to obtain a protected core area that is not constantly reinvaded by pest animals. In this respect, the development site is located within an area where pest control is undertaken across the wider landscape by the Whakatipu Wildlife Trust who coordinate a trapping programme in the Queenstown area. The site is also within a suggested 'Predator Free Queenstown' area (Wildland Consultants 2019b).

The Whakatipu Wildlife Trust have developed a trap line on the Arawhata Track directly above the Sunshine Bay site (Figure 4), as part of the Alpine Bird Song project (Wildland Consultants 2019b). This line comprises a mix of traps that primarily target mustelids (*Mustela* spp.) and possums (*Trichosurus vulpecula*), but which would also capture rats (*Rattus* spp). While mustelid trap lines are generally spaced up to 600 metres apart, a parallel trapline could be established along the lower margin of the site approximately 200 metres below the Arawhata Track, to better control mustelids and possums in this area. Consolidation of trapping effort has been recommended to the Whakatipu Wildlife Trust as a medium priority action within the Queenstown Lakes area (Wildland Consultants 2019b) and establishment of a parallel trap line on the site

would complement the existing trapping network on the Arawhata Track. Figure 4 illustrates a line of four traps as an indicative complementary trapping line.

In addition, while the density of rodents at the site is not known, rat densities are likely to be relatively low in this area (Wildland Consultants 2019b). If rat densities are low, this means that maintaining rodent bait stations on a 50 metre grid within the site would be capable of suppressing rats within the site, thus providing an additional benefit to indigenous forest birds. Pest animal control could be managed by the Whakatipu Wildlife Trust, Queenstown Lakes District Council, and/or any body corporate or the developer.

Due to proximity to existing and newly-developed residential areas, control of cats would need to be by live trapping using cage traps, with any captured domestic cats being returned to their owners. Microchipping of domestic cats would facilitate this, but this practice is not currently a requirement for cat owners.

8.4 Legal protection

Areas not affected by urban development, including areas of bracken fernland that are planted with indigenous trees, could be legally protected by mechanisms such as Open Space zoning, a QEII covenant, or a reserve under the Reserves Act 1977 administered by, for example, Queenstown Lakes District Council. Legal protection is important in the context of the ongoing development of urban areas in Queenstown Lakes District, which could otherwise threaten the areas not proposed for urban development. The applicant is willing to explore the vesting of local purpose and recreation reserves with Queenstown Lakes District Council at the subdivision stage.

9. CONCLUSIONS

Urban development at the Sunshine Bay site will result in the permanent loss of a sizeable area of indigenous broadleaved forest. Indirect adverse effects include the spread of weeds, increased densities of rodents, and predation of birds by cats. As such, it will require significant mitigation or offsetting to address these adverse effects within the undeveloped part of the site. To mitigate or offset within the Sunshine Bay property, an approach is suggested that combines the control of exotic trees with extensive high-density planting over undeveloped areas, a permanent trap line for mustelids and possums along the lower margin of the site, and a permanent 50 metre rodent bait station grid. In addition, a suitable part of the undeveloped area could be given legal protection through a QEII covenant, Open Space zoning, or as a reserve. These actions would be sufficient to fully mitigate the adverse ecological effects generated by the proposed urban development.

ACKNOWLEDGMENTS

Blair Devlin of Vivian+Espie Ltd is thanked for providing project liaison.

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SETTLED ONL LINE FROM CONSENT ORDER





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