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1.0 Site Description

The Bryant Ecological District is mostly comprised of steep hill country along the western flank of the Mt Richmond Forest Park. It has a complex geology and soils vary greatly in structure and fertility. The climate is generally sheltered with mild winters and moderate rainfall. Almost the entire ecological district would have been covered in forest, the only exceptions being waterways the ultramafic areas and the immediate coastal fringe. While extensive areas of inland beech forest remain, most lowland and coastal broadleaf forests have been destroyed. Most remaining forests have diminished integrity due to exotic plants and animals

This site is approximately 25 hectares and is centred on the Reservoir Creek gully system. The study area stretches from the Reservoir up a broadly north facing hillside towards the ridgeline. The study area spans 120 – 513 m and the vegetation displays typical altitudinal stratification.

1.1 Geology

The management area of Reservoir Creek sits on variably bedded grey or green sandstone, with minor mudstone, red and green sandstone, lenses of conglomerate and fossiliferous limestone blocks. It is the Stephens Subgroup of the Maitai Group, which was formed between the early Permian and middle Triassic.

1.2 Vegetation

a. Titoki- mahoe- tawa forest

From the Reservoir titoki (*Alectryon excelsus*) is abundant with many mature specimens particularly from lower to mid sections of the study area. It is present as a pure canopy or co-dominant with mahoe (*Meliclytus ramiflorus*). Elsewhere mahoe dominates with some marvellous examples. Tawa (*Beilschmiedia tawa*) is scattered throughout lower sections of the gully system, again with multiple mature specimens. Other prominent canopy/subcanopy tree species include matai (*Prumnopitys taxifolia*), miro (*Prumnopitys ferruginea*) totara (*Podocarpus totara*) and pigeonwood (*Hedycarya arborea*). Supplejack (*Ripogonum scandens*) and rata vine (*Metrosideros spp*) are common within all tiers throughout the forest area.

b. Mahoe-Pigeonwood Forest

Pigeonwood and Mahoe dominate the canopy of the mid section. Totara, Matai, and Kahikatea (*Dacrycarpus dacridioides*) are also present. In this section there are a few emergent specimens with a couple of particularly impressive examples. The mid-section appears to be regenerating reasonable well. Pate (*Schefflera digitata*) and Kawakawa (*Macropiper excelsum*) are common in the understorey. Kiekie (*Freycinetia banksii*) and Nikau Palm (*Rhopalostylis sapida*) can be seen occasionally. Kotukutuku (*Fuchsia excorticata*) is occasionally present in lower and mid sections, although the obvious presence of possums may account for the low numbers. Rata and supplejack vines are again a feature of this section. A single juvenile Karaka (*Corynocarpus laevigatus*) was noted in this section, probably having been brought in by Kereru.

c. Beech-Broadleaf Forest

The upper section is defined by a significant change in the vegetation along altitudinal lines. Tawa and Titoki give way to Red Beech (*Northofagus fusca*) and Hard Beech (*N. truncata*). There are some impressive mature broadleaf (*Grislinea littoralis*) in the canopy.

The sub canopy consists of broadleaf, pigeonwood, and greater representations of marbleleaf (*Carpodetus serratus*), mapou (*Myrsine australis*), lancewood (*Pseudopanax crassifolius*), koromiko (*Hebe salicifolia*), Kahakaha (*Collospermum hastatum*), *Coprosma* spp, and tree ferns than lower sections. There are areas in the upper section with a denuded understory, possibly due to browsing pressure.

1.3 Fauna

The site visit was done in early November. Titoki are in fruit at this time of the year. Titoki, tawa, pigeonwood and kawakawa are all important food sources for Kereru (*Hemiphaga novaeseelandiae*) in particular. Three Kereru were noted during the visit. Since the extinction of the moa, the kereru is now the only seed disperser large enough to swallow the large fruit of karaka, matai and tawa. Kereru are also important in the distribution of miro seed. The presence of an isolated juvenile karaka indicates that kereru are using the forest as a food resource.

Occasional bellbird (*Anthornis melanura melanura*) and tui (*Prosthemadera novaeseelandiae novaeseelandiae*) were also noted during our site visit. Fantail (*Rhipidura fuliginosa fuliginosa*) and silvereye (*Zosterops lateralis lateralis*) were more common. One grey warbler (*Gerygone igata*) was observed. Other species, not observed, but likely to inhabit the area include forest geckos, hoverflies and native bees. Skinks are likely to inhabit areas of secondary growth such as the forest edge. Other likely species include South Island Tomtit (*Petroica macrocephala macrocephala*), brown creeper (*Mohoua novaeseelandiae*), and weta.

1.4 Plant and Animal Pests

There is plenty of possum (*Trichosurus vulpecula*) sign in the area and their abundance is indicated by the limited distribution of certain species of plants, notably the kotukutuku or tree fuchsia. The upper section has areas that are clear of understory species indicating the probable presence of goats (*Capra aegagrus*). There were no obvious signs of pig rooting (*Sus scrofa*), although members of the public spoke of pig hunters in the area during a public forum on the 12th of November 2007. The occasional fallow deer (*Dama dama*) has been noted in the upper section by long time local resident, Alan Hart. There are likely to be populations of both species of rat, ship rats (*Ratus ratus*) and Norway rat (*Rattus norvegicus*). Rats have been known to predate native fauna and compromise native ecosystem function by consuming large quantities of seed. Members of the public also spoke of mustelids in the area and it would seem likely that stoats (*Mustela erminea*) would be present. Typically forest fragments near urban areas such as Reservoir Creek are havens for feral cats (*Felis catus*). A member of the public had some cat traps in the area around the reservoir. Stock have been recently excluded from the area, however there was discussion of the fence still being breached occasionally at the public forum.

Plant pests are an issue at the site. Exotic climbing plants, herbaceous plants and small tree and shrub species are present. Some species are an issue while others are not. This is usually due to their varying ability to handle shade or their ability to smother native vegetation. The most serious species present are the invasive climbing plants, Old mans beard (*Clematis vitalba*) and Banana passionfruit (*Passiflora mollissima*). These species are widely distributed through the area although in higher concentrations in the forest margins. These two species in particular threaten the integrity and therefore the long-term sustainability of this forest. There are examples of indigenous forest fragments in the district where mature forest trees such as tawa and matai are collapsing under the weight of these

two species. It is likely that the same result will occur in Reservoir Creek unless the pest plants are managed.

Other problem species present at the site include woolly nightshade (*Solanum mauritianum*), wilding pines (*Pinus radiata*), barberry (*Berberis glaucocarpa*), hawthorn (*Crataegus monogyna*), Himalayan honeysuckle (*Leycesteria formosa*), tutsan (*Hypericum androsaemum*), gorse (*Ulex europaeus*) and blackberry (*Rubus fruticosus*). Of these, the tree species pose the greatest threat to regenerating areas. Woolly nightshade has a relatively limited distribution in the region, however there is a significant infestation on the private land that borders the area. Woolly nightshade is dispersed by birds and stock. Tutsan grows to a height of 1.5m has the capacity to form a dense mat that can smother native regeneration, particularly in forest margins.



View of the Reservoir Creek Forest gully from Richmond Suburbs

2.0 Ecological Values

2.1 Significance of Ecological Values

Representativeness: *Does the site represent a good example of one of the characteristic types of native vegetation in the district?*

The gully forest is a prime example of lowland hill country forest dominated by titoki-mahoe-tawa-matai assemblages in the Bryant ecological district.

Rarity: *Are there rare species or communities?*

Forests with a significant tawa component is rare in the Bryant ecological district

Diversity and pattern: *Is there a notable range of species and habitats?*

The altitudinal range of the site and subsequent stratification of the vegetation means that plant species diversity is moderate and plant community patterning and diversity is high.

Naturalness: *How modified is the site by anthropogenic effects? (Direct disturbance, animal and plant pest impacts)*

The site contains pockets of primary forest in the main gully, but is largely regenerating secondary growth. Plant pest impacts are moderate with obvious signs of herbivore impacts.

Distinctiveness/ Special features: *Are there any features that make the site stand out locally, regionally, or nationally?*

The size of some of the emergent podocarps is remarkable. There is one particularly large Totara, but also Matai and Kahikatea specimen trees. Some of the mature Tawa are also impressive.

Size/ Shape: *How large and compact is the site?*

The site is of moderate size at approximately 25 hectares. However the shape is long with a large edge/interior ratio. At certain points the forest is no more than 100m wide. The forest is surrounded by a Pinus radiata plantation.

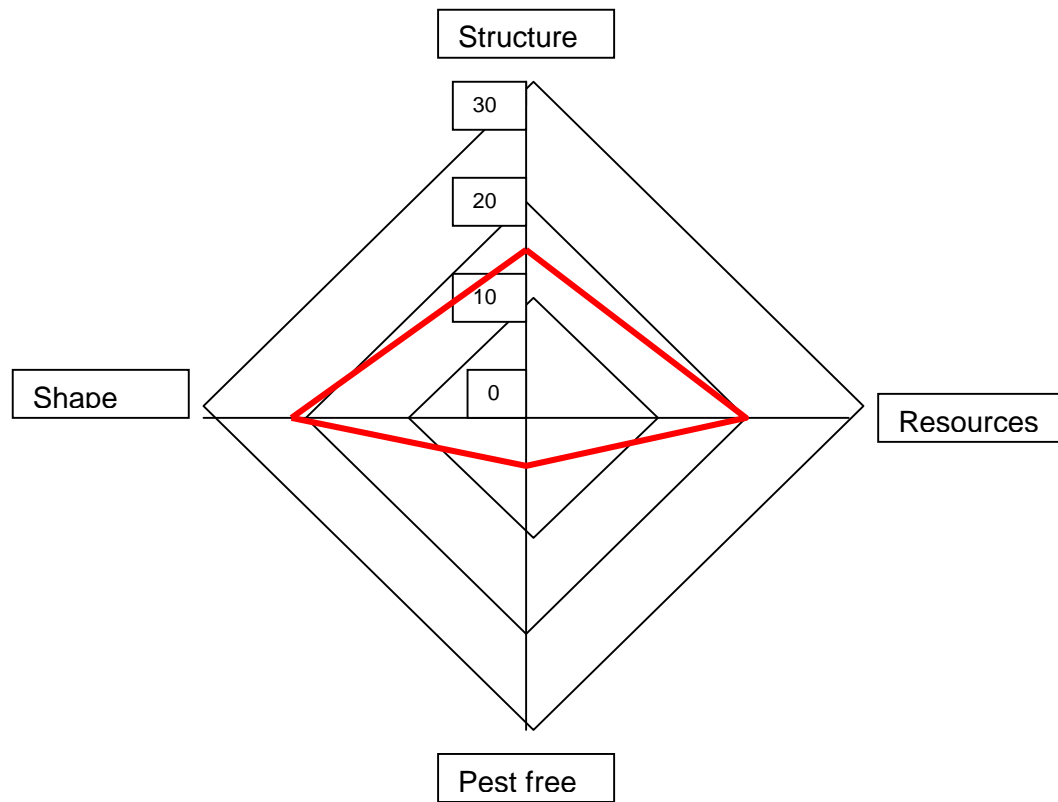
Connectivity

This gully system links into a corridor restoration project attempting to link the top of the watershed with the sea. The site is reasonably well connected with a few small sites (<25ha) with 2km and a few large sites (>25ha) between 2-10km.

Summary Table

Criterion	Ecological District Ranking
Representativeness	Medium – High
Rarity	Medium
Diversity and Pattern	Medium – High
Naturalness	Low - Medium
Distinctiveness/ Special features	Medium
Size/ Shape	Low - Medium
Connectivity	Medium - High

2.2 Forest Vitality Summary Chart



This forest is under heavy pest pressure that is also reducing the food available for native fauna and degrading the structure. Shape and Structure scores also suffer from having the exotic forestry surrounding the native forest.

2.3 Forest Diagnosis Summary Chart

Element	Strengths	Weaknesses	Opportunities	Threats
Spatial Integrity	Size and connectivity good	Long shape with high edge/interior ratio	Harvest of forestry may represent an opportunity to increase the size of the forest to improve its viability. Contributes to a wider project	Harvest of the forestry may destroy existing margin habitat
Forest Structure	Fairly good canopy cover with some emergent tree species	Degraded buffer zones. Surrounded by pines	Control of animal and plant pests will have a positive impact on forest structure. Restore and manage buffer zones	Plant and animal pests. Harvest of the forestry may destroy existing margin habitat
Food Resources	Autumn migration food resources are very good. Winter and Spring – OK	Limited distribution of some species due to browse pressure	Restoration and Management of this area will provide opportunities for resource species	Animal pests
Pests	No obvious sign of pigs however they have been reported. Trapping for cats. Stock have been excluded	Serious climbing species widely distributed. Possum sign abundant. Some areas of under story browsed out – possibly by goats	Control Pests. Identify priority habitats.	Forestry harvest and road construction may introduce more pests

3. Likely Effects on existing Native Vegetation of the Removal of Exotic Pine Forest

Likely Effects	Likely Impacts
<i>Exposure of margins</i>	It is likely that some vegetation in the forest margins that has grown in a sheltered environment will not tolerate sudden exposure. Increased windthrow and tree mortality in the forest margin provides opportunities for pest plant establishment and further fragmentation.
<i>Damage to vegetation</i>	The physical process of logging the <i>Pinus radiata</i> is likely to result in damage to vegetation in the indigenous forest margin. Again, loss or damage to vegetation in the forest margin provides opportunities for pest plant establishment and further fragmentation.
<i>Weed Invasion</i>	The presence of Woolly nightshade in the area is likely to become a problem in the indigenous forest margins, once the forestry has been removed. Loss of vegetation in the margin will provide increased opportunities for wilding <i>Pinus radiata</i> , Old mans beard and banana passionfruit.
<i>Spray drift</i>	The forestry area is likely to be sprayed after the trees have been harvested, in preparation for replanting. This is usually done with a helicopter using non-selective herbicides. This is usually done accurately, however, spray drift is a threat to the indigenous forest.
<i>Sedimentation</i>	The sedimentation effects of clear felling forestry are well documented. The relevant literature promotes the use of indigenous forest buffers to reduce the impacts on water quality, however the impact on the indigenous forests themselves is less understood. <i>Pinus Radiata</i> depletes vital topsoil nutrient reserves. Pine litter accumulates acidic humus of which derivatives leach into the soil reducing a soil's nutrient and water storage capacity. (Janssen 2007)
<i>Road Construction through indigenous forest</i>	The planned construction of the access road through the indigenous forest will increase opportunities for pest plant establishment and further fragmentation.

4. Key Issues

The Forest Vitality Summary Chart highlights the key issues for the Reservoir Creek Forest:

1. This forest is under heavy pest pressure that is also reducing the food available for native fauna and degrading the structure.
2. The shape and structure of the native forest suffers from having the exotic forestry surrounding it.
3. Recognition of the Ecological significance of the area should introduce the requirement to avoid, remedy or mitigate the adverse environmental effects caused by the harvest of the surrounding pine forest. Likely effects include increased windthrow and tree mortality at edges, increased susceptibility to weed invasion and reduced habitat quality for some canopy tree species at edges

5. Recommendations

This area should be recognised on the Tasman District Resource Management Plan as being of Ecological Significance. The implication of this recognition is that any adverse environmental effects should be avoided, remedied or mitigated under the Resource Management Act 1991.

The harvest of the forestry and the construction of the access road are likely to compromise the forest margin and result in adverse environmental effects.

The effects can be mitigated by the development and implementation of an integrated pest management strategy. Under the RMA the responsibility of the mitigation lies with the party that causes the adverse environmental effect, however, there are roles that the community may be interested in providing.

In other semi urban areas there are community animal pest control programmes that are supported by territorial local authorities or consultants. These programmes can be very popular with local residents and are extremely cost effective. Volunteers take turns to check traps and bait lines for mustelids, possums and rats. A programme like this would make a significant difference.

Mammalian pests should be hunted with the goal of eradication, either by recreational or professional hunters. Mammalian pests in this area should not be treated as a resource.

An integrated pest management strategy should address the issue of pest plant management. The need for management will be ongoing although the resources required typically decrease to negligible levels within a few years. The community's ability to deliver the required outcomes is compromised by the skill, knowledge and qualifications needed to implement effective pest plant control. Persistence, consistency and timing are all critical. Specialist contract service providers should be engaged to provide the required services.

Planting of the forest margin areas could be done to improve the spatial integrity of the forest. This should be undertaken in conjunction with the plant pest control. A limited range of hardy ecosourced early successional colonising species should be used. Certain species such as harakeke (*Phormium tenax*), karamu (*Coprosma robusta*) and koromiko (*Hebe salicifolia*) are ideal for buffering a forest edge and will provide additional food resources. Community groups are often keen to plant areas with native species. Plantings should be maintained by the pest plant control team.

Systematic monitoring of the forest area should be commenced prior to implementation of works. Measures and analysis of the effects and performance can provide information that can be used to manage a forest area more effectively.

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