

**BEFORE THE HEARINGS COMMISSIONERS FOR THE WAIKATO DISTRICT COUNCIL**

**UNDER**

the Resource Management Act 1991

**AND**

**IN THE MATTER**

of hearing submissions and further submissions on the  
Proposed Waikato District Plan

Hearing 25 – Residential Zone Extents

**PARTIES REPRESENTED**

**CSL TRUST AND TOP END PROPERTIES (89)**

---

**STATEMENT OF ECOLOGICAL EVIDENCE OF  
JENNIFER CAROLYN SHANKS FOR CSL TRUST AND TOP END PROPERTIES LTD  
December 2020**

---

Counsel Instructed:  
Peter Fuller  
LLB, MPlan, DipEnvMgt, BHortSc.  
Barrister  
Quay Chambers  
Level 7, 2 Commerce Street  
PO Box 106215  
Auckland 1143  
021 635 682  
Email: peter.fuller@quaychambers.co.nz

## **1 INTRODUCTION**

- 1.1 My full name is Jennifer Carolyn Shanks, I am a Consultant Ecologist and Director of JS Ecology Ltd, based in Bombay and Associate Botanist with Bioresearches Group Ltd.
- 1.2 I hold the qualifications of Bachelor of Science Degree (1979), Post Graduate Diploma in Science (2005) and Master of Science Degree (with Honours) (2012) in Environmental Science all from the University of Auckland.
- 1.3 I am a full member of the Environmental Institute of Australia and New Zealand (EIANZ)
- 1.4 I have practised as an independent ecological consultant for eight years. I have undertaken ecological surveys, effects assessments and ecological management plans for a range of major public infrastructure projects, and large quarries in the Auckland Region and a range of developments and subdivisions across Auckland, Waikato and Thames-Coromandel.
- 1.5 This evidence is in support of the submission by CSL Trust and Top End Properties for the proposed urbanisation of the 87 hectares of land to the northwest of the Pokeno urban area at 179 and 203 Helenslee Road, Pokeno ('the Site').
- 1.6 I have read the Environment Court's Code of Conduct and agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

## **2 SCOPE OF EVIDENCE**

- 2.1 My evidence will outline why I consider that the proposed Pokeno North development is appropriate and would provide opportunity for sound ecological management and restoration of the site resulting in net biodiversity gains.
- 2.2 My evidence will cover:

- a) Summary of evidence (Section 3);
- b) Brief overview of the proposal (Section 4)
- c) Brief overview of the landscape and wider ecological context of the site (Section 5)
- d) Summary of the ecological values of the site (Section 6);
- e) Evaluation of the Ecological effects of the proposal (Section 7)
- f) Summary of recommended ecological impact management and mitigation (Section 8);
- g) Expected ecological outcomes (Section 9)
- h) Comment on Council's section 42A report (Section 10);
- i) Comment on submissions; (Section 11) and
- j) Conclusions (Section 12).

### **3 SUMMARY OF EVIDENCE**

- 3.1 The 87 hectare site lies in the south eastern corner of the Manukau Ecological District, a lowland district that is depauperate of native ecosystems and where waterways and wetlands have been degraded. The neighbouring Meremere Ecological District to the south is similarly severely depleted of native ecosystems and many remaining ecosystems are dominated by exotic species.
- 3.2 The site is currently used for semi-extensive agriculture with a very low density of buildings and infrastructure.
- 3.3 ..... Much of the property is in exotic pasture where the ecological values are low however there are significant ecological values associated with areas of remnant or regenerating native vegetation and watercourses..
- 3.4 Key terrestrial habitats at the site are mainly associated with the mainstem of the Tanetiwhiora Stream and most of these are mapped as Significant Natural Areas in the Proposed Waikato District Plan.
- 3.5 Vegetation types include broadleaved podocarp forest and kahikatea swamp forest.

These forest types have been assessed as “Endangered” in the Auckland Region under the IUCN<sup>1</sup> threat classification system. They may well carry a similar threat status in the Waikato Region once a similar threat analysis is carried out for ecosystems of the region.

3.6 Nationally uncommon and naturally rare ecosystems<sup>2</sup> exist at the site, principally on the western side. These include naturally rare volcanic boulderfield and uncommon inland tuffaceous cliffs supporting characteristic plant communities. Volcanic boulderfield is an nationally endangered ecosystem and areas of this ecosystem type are typically associated with stream gullies.

3.7 The Tanitewhiora Stream and the network of tributaries that feed into it with their associated wetlands are key ecological features of the site. Two upper tributaries of the stream flow across the site from north to south and the westernmost of these which has an extensive network of side tributaries feeding into it from the western hill country, appears to be the mainstem.

3.8 Water courses at the site have generally moderate to high aquatic values based on visual assessment of riparian vegetation, bank stability and channel modification, macrophyte presence and water clarity. Virtually all of the watercourses are open to grazing with associated pugging and bank erosion.

Where livestock are excluded by fencing water quality values were visually assessed as being high.

3.9 No nationally threatened or at risk species of plants, terrestrial or aquatic fauna have been recorded for the site although longfin eel (At Risk-Declining) is likely to be present.

3.10 Uncommon and naturally rare ecosystems<sup>3</sup> exist on the western side of the site. These include naturally rare volcanic boulderfield and uncommon inland tuffaceous cliffs supporting characteristic plant communities. Volcanic boulderfield is an endangered ecosystem.

---

<sup>1</sup> International Union for the Conservation of Nature

<sup>3</sup> **Wiser SK, Buxton RP, Clarkson BR, Hoare RJB, Holdaway RJ, Richardson SJ, Smale MC, West C, Williams PA 2013.** New Zealand's naturally uncommon ecosystems. In Dymond JR ed. Ecosystem services in New Zealand – conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand

- 3.11 A network of ecological corridors connecting watercourses and areas of native vegetation is proposed for the site as part of the development.
- 3.12 The proposed change in landuse from rural to urban could result in negative ecological effects from altered stormwater flows, increased erosion and increased sediment inputs to waterways as a result of land disturbance. These effects can be addressed through best practice impact management.
- 3.13 Significant opportunity exists to protect and restore degraded terrestrial and freshwater ecosystems at the site leading to improved ecological connectivity and providing a range of high quality terrestrial and aquatic habitats for native fauna.
- 3.14 There is opportunity to protect and restore naturally uncommon volcanic boulderfield and inland tuffaceous cliff habitats as part of the development.
- 3.15 A detailed site-wide Ecological Management Plan should be developed for the site which sets out a weed and pest management programme and detailed plans for appropriate riparian planting, wetland restoration and enhancement of the small areas of identified significant vegetation. The plan should demonstrate "No Net Loss" of biodiversity and preferably a biodiversity gain.

#### **4 THE PROPOSAL**

- 4.1 The site comprises an area of land some 87 hectares in extent to the north of the Pokeno urban area which is which lies adjacent to an area designated as Residential in the Proposed Waikato District Plan. It includes 179, 203 and 205 Helenslee Road which are currently zoned Rural in the Proposed Waikato District Plan (PWDP). The maps illustrating the proposed zoning are found in Appendix 2 of the Landscape and Visual Evidence of Mr Pryor.
- 4.2 The concept plan for the site by Birch Surveyors has been developed based on initial consultation with Waikato District Council. The proposed development of the Site would provide for the protection of SNA vegetation and riparian restoration planting along the central gully surrounding the the main Tanetiwhiora Stream. On the hill country to the west of the central gully, countryside living lots are proposed and to the

east of the gully staged residential development is proposed on the flatter contoured lowland.

- 4.3 The Concept Plan envisages riparian protection and restoration planting of permanent streams and all identified SNA vegetation at the site. Wetlands along these streams will also be protected as part of the proposed green corridors along the main streams. The proposal will provide protection and linkage of native vegetation along the main riparian corridors.
- 4.4 Protection of remnant cliff vegetation on the western side of the site is proposed. This is an uncommon ecosystem type in the Waikato District.
- 4.5 Areas of volcanic boulderfield habitat will be protected within the proposed green corridors or they otherwise lie mostly on the western side of the site which is proposed for countryside living.

## **5 THE LANDSCAPE AND WIDER ECOLOGICAL CONTEXT**

- 5.1 Like the surrounding rural landscape the site is currently used for semi-extensive agriculture with a low density of buildings and infrastructure. The Ridge Road Quarry lies to the southwest and urban residential areas of Pokeno Village lie to the east and south east. To the north across SH1 lie the Bombay Hills where the southern slopes support substantial areas of regenerating native vegetation.
- 5.2 The site lies within the Manukau Ecological District (ED) in the Auckland Ecological Region (Mc Ewen 1987), a district that includes the lowlands west of the Bombay Hills, between the Manukau Harbour, the Awhitu Peninsula and the Waikato River.. All native ecosystems in this ED are severely depleted and many remaining ecosystems are dominated by exotic species. Only 3% of the original area of native vegetation within the Manukau E.D. remains and only 0.4% of native freshwater wetlands remain of which very little is formally protected.
- 5.3 The situation is very similar in the Meremere ED which adjoins the Manukau E.D just to the south of the site. Both of these E.D.s are predominantly comprised of lowlands and consequently the conversion to agricultural use has been almost absolute.
- 5.4 The site forms part of the upper catchment of the Pokeno (Tanitewhiora) Stream which

drains to the Mangatawhiri Swamp and ultimately to the Lower Waikato River and its wetlands. Both the Mangatawhiri Swamp and the Lower Waikato River are designated as Sites of Special Wildlife Significance (SSWS) and significant wetlands.

- 5.5 The site itself is drained by the Tanitewhiora Stream and its tributaries and is likely to have originally supported kahikatea floodplain forest on low-lying land close to the main streams grading up to podocarp broadleaved forest, rock and cliff vegetation on more elevated parts of the site.
- 5.6 The contour is variable across the site with more gently undulating land on the eastern side sloping up to steep land on the western side at an altitude of between 40 -180m a.s.l.<sup>4</sup>approximately. A series of steep east facing gullies and ridges fall away from Ridge Road on the western boundary.
- 5.7 Soils are well-drained Typic Orthic Granular Soils on the eastern side of the site with imperfectly drained Mottled Mafic Brown Soils on the western side.
- 5.8 The volcanic origins of the locality are displayed in the numerous basalt boulders and stones that are found across the site, particularly in the stream channels. On the western side of the site are steep cliffs of tephra.
- 5.9 Today, remaining native vegetation is concentrated around the main Tanetiwhiora stream tributary in the central gully. Much of this vegetation is identified as SNA in the Proposed Waikato District Plan. The total area shown as SNA at the site is c. 7.3ha. SNA vegetation continues to the north towards SH1.

## **6 ECOLOGICAL VALUES OF THE SITE**

### **Vegetation**

- 6.1 The majority of the site is grazed, improved pasture. Although grazing pressure is clearly intense at times, significant areas of indigenous habitat still remain.
- 6.2 Fenced regenerating forest on the northern side on the western tributary contains a significant component of tawa (*Beilschmiedia tawa*) with tall kanuka, rimu (*Dacrydium cupressinum*), rewarewa (*Knightia excelsa*), taraire (*Beilschmiedia tarairi*), kahikatea, hinau (*Elaeocarpus dentatus*), pukatea (*Laurelia novaezelandiae*) and puriri (*Vitex*

---

<sup>4</sup> Above sea level

*lucens*). Tall mamaku (*Cyathea medullaris*), nikau (*Rhopalostylis sapida*) and a range of forest understorey shrubs, vines and epiphytes form a diverse forest community. This area is mapped as SNA and its ecological values are high due to the species diversity and completeness of the plant community.

- 6.3 Where grazing occurs the native canopy along the western watercourse tends to be discontinuous with stands of totara, kanuka and the occasional kahikatea occurring in the gullies and on steeper faces.. Substantial open grassy areas occur along the watercourse and there is little in the way of an understorey due to livestock grazing. The ecological values are moderate; and the vegetation provides important aquatic habitat values through shading of the watercourse and its tributary streams.
- 6.4 Tall kahikatea swamp forest occurs on the southern boundary of the property on a broad floodplain at the confluence of several major side tributaries with the western tributary. Much of the area is fenced and the understorey is recovering following historic grazing. The canopy is predominantly tall kahikatea with scattered large totara (Plate 8). Mahoe, kawakawa (*Piper excelsum*), mapou (*Myrsine australis*), pigeonwood (*Hedycarya arborea*) and thin-leaved coprosma (*Coprosma areolata*) are all found in the understorey.
- 6.5 An unfenced stand of kahikatea upstream of the fenced area are affected by grazing and pugging of the soil. These trees have no understorey apart from exotic species characteristic of wet pasture. They appear to be in significantly poorer health than the fenced trees with a much thinner canopy and a yellowish hue to the foliage.
- 6.6 Small stands (>0.1ha) of remnant native trees typically consisting of totara, kahikatea, mahoe (*Melicactus ramiflorus*) and nikau are found scattered across the western half of the site, usually associated with minor watercourses.
- 6.7 Much of the native vegetation along the main western watercourse is captured within identified SNAs in the Proposed Waikato District Plan.
- 6.8 Remnant forest on steep south-facing tephra cliffs in the north western corner of the site near Ridge Road runs from the western edge of the site eastward for some 200m in a narrow band. A key canopy species is mangeao (*Litsea calicaris*), a tree known for its association with volcanic ash soils and “boulder forest”. Other typical cliff forest species recorded here were kohekohe (*Dysoxylum spectabile*), large old mahoe trees,



rangiora (*Brachyglottis repanda*), koromiko (*Hebe stricta*), kawakawa and taurepo (*Rhabdothamnus solandri*). Climbers such as kiekie (*Freycinetia banksii*), white rata (*Metrosideros perforata*) and bush lawyer (*Rubus cissoides*) cling to the cliffs. Cliff forest on tephra is an uncommon ecosystem throughout the ecological district and the ecological values of this forest area are high.

- 6.9 The main area of native vegetation (c. 0.6ha) associated with the eastern watercourse is a stand of totara trees (*Podocarpus totara*). Although the stand appears to be partially fenced the understorey is very sparse and the canopy consists mostly of medium sized totara trees and tall kanuka (*Kunzea robusta*). Downstream of this area is a small grazed wetland (0.5ha).
- 6.10 Other areas of note along the eastern tributary include a patch consisting mostly of old barberry (*Berberis glaucocarpa*) and hawthorn (*Crataegus monogyna*) 2 -3m in height growing on a bouldery substrate with ground ferns such as rasp fern (*Doodia australis*) and rough grass beneath. The volcanic boulder substrate is an endangered habitat type.
- 6.11 The diverse topography and hydrology of the site supports a number of different plant habitats, two of which, kahikatea floodplain forest and cliff/rock forest have high botanical values. Uncommon and endangered habitats include volcanic boulderfield and inland tephra cliffs.

#### **Fresh water aquatic values**

- 6.12 The Tanitewhiora Stream and the network of tributaries that feed into it with their associated wetlands are key ecological features of the site. The stream definitions given in the Auckland Unitary Plan were used for stream classification as they give specific criteria for the determinations of intermittent streams. Overland flow paths that only contain water during and shortly after rain and which do not meet the criteria for an intermittent stream are classed as ephemeral and were not considered in the ecological report. Permanent streams generally provide better aquatic habitat than intermittent streams however natural pools and aquatic vegetation in intermittent streams can still provide habitat and refugia for aquatic fauna even at times when the stream is not continuously flowing.
- 6.13 Most streams at the site were assessed as being permanent with intermittent reaches generally occurring on the western side of the site in the upper reaches of the tributary streams.

6.14 Water courses at the site are generally gravel-bottomed with cobbles and boulders. They have moderate to high aquatic values based on visual assessment of riparian vegetation, bank stability and channel modification, macrophyte presence and water clarity. The cobble and boulder substrate found in many parts of the streams helps to maintain good habitat values by reducing sediment mobilisation and providing a variety of aquatic habitats for native aquatic fauna.

Virtually all of the watercourses and wetlands are open to grazing with associated pugging and bank erosion.

6.15 Stream shading along the main Tanetiwhiora Stream varies from poor to excellent. Tributary streams have generally poor riparian shading. Good stream shading is associated with cooler water temperatures and higher oxygen saturation providing better quality habitat for native aquatic fauna and invertebrates.

6.16 Visual assessment of aquatic habitat values showed generally high values amongst fenced patches of bush along the mainstem of the Tanetiwhiora Stream and moderate values in most other watercourses. Habitat diversity, including pools, runs and riffles is generally good. Stream Ecological Valuation (SEV) assessments have not been done for these watercourses as yet.

6.17 Native fish species previously recorded for the Tanitewhiora Stream<sup>5</sup> at the Munro Road Bridge include long finned eel (*Anguilla dieffenbachii*) adults and juveniles, common bully (*Gobiomorphus cotidianus*) and freshwater crayfish (*Paranephrops planifrons*). Long finned eel have a National Threat Status of “At Risk – Declining”. In addition to these species shortfin eel (*Anguilla australis*) are likely to be present in the Tanitewhiora Stream or in headwater streams. Except for banded kokopu (*Galaxias fasciatus*) which are competent climbers galaxiid fish species are unlikely to be present due to a significant waterfall on the Tanitewhiora Stream downstream of the site (Coffey and Associates 2008). Shortfin eel, koura, common bullies and banded kokopu have a conservation status of “Not Threatened”.

6.18 Fish passage for native fish moving up and down watercourses can be disrupted by natural barriers such as waterfalls or by artificial barriers such as culverts, weirs and dams. Potential artificial barriers at the site include a farm track and culvert on the mainstem Tanetiwhiora Stream and another crossing with culvert on the main eastern tributary. Culverts along the mainstem Tanetiwhiora Stream do not present a barrier to fish passage, however a two perched culverts on the main eastern tributary are

---

<sup>5</sup> Coffey and Associates Ltd (2008) Pokeno Catchment Management Plan Ecological Considerations

potentially restricting fish passage. All of these will be removed and new fish passage friendly crossings created as a consequence of the proposed development. Four other small culverts on the western tributaries of the Tanetiwhiora Stream would restrict fish passage at times of low flow and could be removed as part of the development.

- 6.19 Natural barriers to fish passage include a waterfall on the mainstem of the Tanetiwhiora Stream 75m above the culvert and slumping of the stream channel on a side tributary.

#### Wetlands

- 6.20 Small areas of grazed wetland are commonly associated with small tributary streams on the western side of the site in the area proposed for countryside living. These are generally <500m<sup>2</sup> in area and support rushes, pasture grasses and moisture tolerant species such as buttercup (*Ranunculus repens*). These wetland areas generally have low ecological value.
- 6.21 Two larger areas of grazed wetland (0.35 – 0.5ha) lie along the larger eastern tributary to the Tanetiwhiora Stream in the part of the site proposed for residential development. Their ecological values are currently low, however they lie within the stream corridor proposed for riparian protection and could be restored to native wetland as part of the development proposal.
- 6.22 Wetlands were not assessed under the recent (August 2020) National Environmental Standards for Freshwater (NES-FW), however this would be a requirement for any resource consent application.

#### Terrestrial Fauna

- 6.23 No threatened species of terrestrial fauna were recorded for the site.
- 6.24 Common species of native birds were observed.
- 6.25 Small areas of habitat exist for the common copper skink (*Oligosoma aenum*) and other lizards such as arboreal geckos. Habitats for lizard species such as boulderfields and native bush are frequently impacted by grazing. As there is no pest control currently occurring at the site mammalian predators would be significantly impacting on the survival of any lizards present.
- 6.26 Large native trees at the site, particularly in the SNA areas could provide bat roosts however no surveys for native bats have been undertaken as yet. Long tailed bats

have a National Threat status of “Nationally Critical”. Terrestrial fauna values at the site are currently low.

## **7 EVALUATION OF THE ECOLOGICAL EFFECTS OF THE PROPOSAL**

- 7.1 The site has been significantly modified with loss indigenous vegetation and, impacts of livestock contributing to the currently degraded state of most terrestrial and freshwater habitats. No threatened or at risk species of plants, terrestrial or aquatic fauna have been recorded for the site other than the probable presence of longfin eel (At Risk-Declining).
- 7.2 Development of the site as countryside living and urban use could have significant effects on the hydrology and landscape values of the site, however the current concept plan envisages the protection, restoration and enhancement of key ecological features including watercourses and remnant indigenous vegetation.
- 7.3 Valuations were undertaken as per the EIANZ<sup>6</sup> Ecological Impact Assessment guidelines for use in New Zealand (Roper-Lyndsay *et al.* 2018). Ecological values are assigned for species and other attributes of importance for freshwater and terrestrial habitats and communities. An overall value is then assigned based on the outcome of the value of the attributes, as set out in **Appendix 2**.
- 7.4 The freshwater habitats, terrestrial vegetation, flora and fauna values for the site were assessed based on desktop reviews and site surveys. The conservation status of individual species of plants, terrestrial and freshwater fauna has been determined using the New Zealand Threat Classification System Manual (Townsend *et al.* 2008) and relevant Department of Conservation status publications for the various taxonomic groups. Naturally uncommon and rare habitats were assessed as per Holdaway *et al* (2012)<sup>7</sup> and Wiser *et al* (2013).
- 7.5 Terrestrial habitats were assessed as having low values across most of the site with higher value vegetation and habitat being associated mainly with the mainstem of the

---

<sup>6</sup> Roper-Lindsay, J.; Fuller, S.A.; Hooson, S.; Sanders, M.D.; Ussher, G.T. 2018. Ecological Impact Assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

<sup>7</sup> Holdaway RJ, Wiser SK, Williams PA 2012. Status assessment of New Zealand's naturally uncommon ecosystems. *Conserv Biol.* 2012;26(4):619-629. doi:10.1111/j.1523-1739.2012.01868.x

Tanetiwhiora Stream and its riparian vegetation. No threatened species were recorded.

7.6 Endangered volcanic boulderfield was recorded for the site, mainly associated with the stream corridors and uncommon tuffaceous cliff vegetation was recorded for the steep western side of the site.

7.7 Wetlands are considered a threatened habitat type and small degraded wetlands do occur along streams.

7.8 Freshwater habitats were assessed as having moderate to high values. Longfin eel (At Risk-Declining) is likely to be present in the Tanitewhiora Stream since this species has been recorded lower down the stream at the Munro Road bridge. Other common native fish including shortfin eel, banded kokopu and common bully are likely to be present and targeted stream surveys (SEV) may well detect a range of other native freshwater species of fish, invertebrates and molluscs.

7.6 In terms of the key ecological features of the site the proposed conversion of the site from rural to urban use will result in a minor shift away from baseline conditions since key watercourses and areas of indigenous vegetation will be retained and protected. Change arising from the alteration will be discernible, but the underlying character, composition and/or attributes of the key existing baseline ecological attributes will be similar to pre-development circumstances under the proposed concept plan.

7.7 The expected overall level of ecological effects is assessed as low under the EIANZ criteria and guidelines. This outcome assumes good management of key issues such as stormwater, erosion and sediment control and protecting terrestrial and freshwater habitats across the site.

## **8 PROPOSED ECOLOGICAL MANAGEMENT**

### **Vegetation**

8.1 Small areas of vegetation identified as Significant Natural Areas in the Proposed Waikato District Plan should be protected and integrated into the overall ecological restoration strategy for the site. These areas require weed removal and appropriate enhancement planting and buffer planting.

8.2 Individual mature native trees and small stands of native trees found across the site

should be mapped and retained as far as possible as part of the wider site landscape plan. These trees have moderate ecological values as habitat for native bird fauna and some are providing stream shading and bank stability. They could, for example serve as nuclei for areas of restoration planting on the western side of the site amongst the countryside living development.

### **Aquatic Habitat**

8.4

An increase in the impervious surface at the site will result in higher peak flows with potential scouring of watercourses and mobilisation of sediment. Design of stormwater infrastructure should therefore seek to maintain neutral hydrology with respect to the existing situation at the site.

8.5 Stormwater treatment should be follow best practice and could be integrated into the overall design of ecological corridors and greenspace for the site.

8.6 The Tanitewhiora Stream and its tributary streams require protection from land-disturbing activities associated with the construction stage of the development.

8.7 Permanent and intermitent streams should be maintained as open channels without significant piping. Any stream crossings should maintain fish passage for eels and native fish.

8.8 Ephemeral streams and overland flowpaths should be maintained in their natural state as much as possible on the western ide of the site..

8.9 All areas of native vegetation at the site and identified as SNA in the Proposed Waikato District Plan will be physically and legally protected and enhanced.

8.9 Appropriate protection of riparian margins and native restoration planting should be undertaken across the site as shown in the concept plan. Planting should be a minimum width of 10m, not including walkways or other structures and a width of 20m or more is desirable along the main Tanitewhiora Stream.

### **Wetlands**

8.10 Natural wetlands need to be delineated in accordance with the NES-FW protocols.

Identified wetlands should be protected and restored as part of the ecological restoration strategy for the site.

### **Native Fauna**

- 8.11 Surveys for native longtailed bats should be carried out prior to detailed development planning being undertaken to determine whether this critically threatened species is utilising any part of the site.

### **Ecological Management Plan**

- 8.12 A detailed site-wide Ecological Management Plan should be developed by a qualified and experienced ecologist to address the proposed ecological management set out in 8.1 – 8.11 above. This plan should interface with the Stormwater Management Plan and the Landscape Plan for the site to provide optimum ecological outcomes.

## **9 EXPECTED ECOLOGICAL OUTCOMES**

- 9.1 The biodiversity values of the site are maintained and enhanced through the development and implementation of a site-wide Ecological Management Plan. The principle of "No Net Loss" of biodiversity is demonstrated.
- 9.2 The cessation of livestock grazing will have immediate benefits for water quality and native habitats.
- 9.3 Identified SNAs, stands of native trees and individual mature native trees are retained and protected, contributing to the retention of indigenous vegetation in the wider landscape.
- 9.4 Riparian planting and landscape planting utilising native plants resulting in an increase in native vegetation across the site.
- 9.5 Natural watercourses and aquatic habitats are retained and protected from the effects of development. Piping of watercourses is minimised and no permanent streams are piped.
- 9.6 Fish passage is facilitated and maintained throughout the site.
- 9.7 The protection of water quality and aquatic habitat values is achieved through well-

designed riparian planting, sensitive stormwater design and best practice erosion and sediment control.

- 9.8 Natural wetlands are delineated according to accepted protocols, restored and retained within the network of ecological corridors across the site.
- 9.9 A network of ecological corridors connecting watercourses and areas of native vegetation across the site leading to improved ecological connectivity and providing a range of terrestrial and aquatic habitats for native fauna.
- 9.10 The overall ecological impacts of the development are positive, providing improved aquatic and terrestrial habitat quality and increased areas of indigenous habitat. There will be no net loss and ideally a gain in biodiversity values for the site.

## **10 CONCLUSIONS**

In conclusion, the ecological values of the proposed Pokeno North development site have been degraded by historic and current land use practices resulting in damage wetlands, watercourses and native vegetation across the site. The proposed change in landuse from rural to urban will have a variety of potential ecological effects, however these effects can be addressed through best practice impact management. As part of the proposed development significant opportunity exists to restore degraded terrestrial and freshwater ecosystems at the site and to protect and enhance endangered and uncommon volcanic boulderfield and inland tuffaceous cliffs.

Jennifer Shanks MSc Hons MEIANZ

Director  
JS Ecology Ltd

December 2020



**APPENDIX 1**

**Significant Natural Areas**



## APPENDIX 2 EIANZ EVALUATION OF ECOLOGICAL IMPACTS

### Assessment Standards

The Ecological Impact Assessment Guidelines (EclAG), published by Environment Institute of Australia and New Zealand Inc. (EIANZ) (Roper-Lyndsay et al. 2018) have been used to assign ecological values and determine the magnitude of effects for terrestrial and freshwater ecosystems. The EclAG framework is generally used in impact assessments in New Zealand as good practice.

**Step 1:** Assess the **value** of the area, taking into consideration species (**Error! Reference source not found.**) and other attributes of importance for vegetation or habitats (**Error! Reference source not found.**) to assign an overall ecological value (**Error! Reference source not found.**). Table 6 provides a schedule of matters to be considered specifically when assigning value to freshwater habitats.

**Step 2:** Determine the **magnitude** of effect (Table 1). This step also includes consideration of the timescale and permanence of the effect, whereby temporary (< 25 years) and long-term (substantial improvement after 25 years) effects are distinguished from permanent (beyond the span of a human generation) effects (Roper Lyndsey et al. 2018).

**Step 3:** Evaluate the overall severity or **level of effect** using a matrix of the ecological value and magnitude of effect. The level of effect is then determined through combining the value of the ecological feature/attribute (**Error! Reference source not found.**) with the score or rating for magnitude of effect (Table 1) to create a criterion for describing the level of effects (Table 5).

The following evaluation tables have been excerpted from Chapters 5 & 6 of Roper-Lindsay et al 2018. They set out the criteria for evaluating terrestrial species and habitats and the overall level of ecological effects.

Table 1. Factors to be considered in assigning value to terrestrial species

Determining factors	
Nationally threatened species, found in the ZOI <sup>8</sup> either permanently or seasonally	Very High
Species listed as 'At Risk' – declining, found in the ZOI, either permanently or seasonally	High
Species listed as any other category of 'At Risk' found in the ZOI either permanently or seasonally	Moderate

<sup>8</sup> Zone of influence

Locally (ED) uncommon or distinctive species	Moderate
Nationally and locally common indigenous species	Low
Exotic species, including pests, species having recreational value	Negligible

Table 2 Attributes to be considered when assigning ecological value or importance to a site or area of vegetation / habitat / community

Matters	Attributes to be considered
<b>Representativeness</b>	<p><i>Criteria for representative vegetation and aquatic habitats:</i></p> <ul style="list-style-type: none"> <li>• Typical structure and composition</li> <li>• Indigenous species dominate</li> <li>• Expected species and tiers are present</li> <li>• Thresholds may need to be lowered where all examples of a type are strongly modified.</li> </ul> <p><i>Criteria for representative vegetation and aquatic habitats:</i></p> <ul style="list-style-type: none"> <li>• Species assemblages that are typical of the habitat</li> <li>• Indigenous species that occur in most of the guilds expected for the habitat type</li> </ul>
<b>Rarity/distinctiveness</b>	<p><i>Criteria for rare/distinctive vegetation and habitats:</i></p> <ul style="list-style-type: none"> <li>• Naturally uncommon or induced scarcity</li> <li>• Amount of habitat or vegetation remaining</li> <li>• Distinctive ecological features</li> <li>• National Priority for Protection</li> </ul> <p><i>Criteria for rare/distinctive species of species assemblages:</i></p> <ul style="list-style-type: none"> <li>• Habitat supporting nationally threatened or At Risk species, or locally uncommon species</li> <li>• Regional or national distribution limits of species or communities</li> <li>• Unusual species or assemblages</li> <li>• Endemism</li> </ul>
<b>Diversity and Pattern</b>	<ul style="list-style-type: none"> <li>• Level of natural diversity, abundance and distribution</li> <li>• Biodiversity reflecting underlying diversity</li> <li>• Biogeographical considerations- pattern, complexity</li> <li>• Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation</li> </ul>
<b>Ecological context</b>	<ul style="list-style-type: none"> <li>• Site history and local environment conditions which have influenced the development of habitats and communities</li> <li>• The essential characteristics that determine an ecosystems integrity, form, functioning and resilience (from 'intrinsic value' as defined in RMA)</li> <li>• Size, shape and buffering</li> <li>• Condition and sensitivity to change</li> <li>• Contribution of the site to ecological networks, linkages, pathways and the protection and exchange of genetic material</li> <li>• Species role in ecosystem functioning - high level, key species identification, habitat as proxy</li> </ul>

Table 3. Assigning ecological value

Value	Description
Very High	Area rates High for three or all of the four assessment matters listed in Table 11 Likely to be nationally important and recognised as such.
High	Area rates High for two of the assessment matters listed in Table 11 Moderate and Low for the remainder, or Area rates High for one of the assessment matters, Moderate for the remainder. Likely to be regionally important and recognised as such.
Moderate	Area rates High for one matter listed in Table 2. Moderate and Low for the remainder, or area rates Moderate for two or more assessment matters Low or Very Low for the remainder Likely to be important at the level of the Ecological District.
Low	Area rates Low or Very Low for majority of assessment matters and Moderate for one. Limited ecological value other than as local habitat for tolerant native species.
Negligible	Area rates Very Low for three matters and Moderate, Low or Very Low for remainder.

Table 1. Criteria matrix for describing magnitude of effects (Roper-Lyndsay et al. 2018)

Magnitude	Description
Very High	Total loss of, or very major alteration, to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element / feature.
High	Major loss or major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element / feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element / feature.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances/patterns; AND/OR Having a minor effect on the known population or range of the element / feature.
Negligible	Very slight change from existing baseline condition. Change barely distinguishable, approximating to the “no change” situation; AND/OR Having a negligible effect on the known population or range of the element / feature.

Table 2. Criteria matrix for describing level of effects (Roper-Lyndsay et al. 2018)

<b>Ecological Value → Magnitude ↓</b>	<b>Very High</b>	<b>High</b>	<b>Moderate</b>	<b>Low</b>	<b>Negligible</b>
<b>Very High</b>	Very High	Very High	High	Moderate	Low
<b>High</b>	Very High	Very High	Moderate	Low	Very Low
<b>Moderate</b>	High	High	Moderate	Low	Very Low
<b>Low</b>	Moderate	Low	Low	Very Low	Very Low
<b>Negligible</b>	Low	Very Low	Very Low	Very Low	Very Low

Table 6. Matters that may be considered when assigning ecological value to a **freshwater site** or area

Matters	Attributes to be assessed
Representativeness	<ul style="list-style-type: none"> <li>• Extent to which site/catchment is typical or characteristic</li> <li>• Stream order</li> <li>• Permanent, intermittent or ephemeral waterway</li> <li>• Catchment size</li> <li>• Standing water characteristics</li> </ul>
Rarity/distinctiveness	<ul style="list-style-type: none"> <li>• Supporting nationally or locally<sup>21</sup> Threatened, At Risk or uncommon species</li> <li>• National distribution limits</li> <li>• Endemism</li> <li>• Distinctive ecological features</li> <li>• Type of lake/pond/wetland/spring</li> </ul>
Diversity and pattern	<ul style="list-style-type: none"> <li>• Level of natural diversity</li> <li>• Diversity metrics</li> <li>• Complexity of community</li> <li>• Biogeographical considerations - pattern, complexity, size, shape</li> </ul>
Ecological context	<ul style="list-style-type: none"> <li>• Stream order</li> <li>• Instream habitat</li> <li>• Riparian habitat</li> <li>• Local environmental conditions and influences, site history and development</li> <li>• Intactness, health and resilience of populations and communities</li> <li>• Contribution to ecological networks, linkages, pathways</li> <li>• Role in ecosystem functioning – high level, proxies</li> </ul>