

**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**

**POKENO WEST LIMITED (97)**

---

**STATEMENT OF ECOLOGICAL EVIDENCE OF  
JENNIFER CAROLYN SHANKS FOR POKENO WEST LIMITED**

**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 Bioreserches 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 Pokeno West Limited for the proposed urbanisation of the 160 hectare area of land at 53 & 53A Munro Road and 87, 119, 133, 145A and 145C, 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 and in Appendix 1. 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 West 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 160 hectare site lies within the Manukau Ecological District, a lowland district that is depauperate of native ecosystems and where waterways and wetlands have been degraded.
- 3.2 The majority of the rural site is grazed, improved pasture with seasonally some large areas of maize grown along the stream floodplain. A range of ecologically damaging land use practices have degraded wetlands, watercourses and native vegetation across the site.
- 3.3 Stands of native and exotic trees and individual trees are found throughout the site, mainly along the various streams. Small areas of SNA are found in the headwaters of the southernmost stream and along the western boundary of the site .at 53 Munro Road.
- 3.4 Terrestrial habitats were assessed as having generally low values across the site. The overall botanical values of the site are low with the exception of two small areas of SNA which have high values due to the presence of mature native trees and a native understorey.

- 3.5 The Tanitewhiora Stream and the network of tributaries that feed into it with their associated wetlands are the key ecological features of the site.
- 3.6 Water courses at the site have generally low 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.
- 3.7 No threatened or at risk species of plants, terrestrial or aquatic fauna have been recorded for the site other than longfin eel.
- 3.8 A network of ecological corridors connecting watercourses and areas of native vegetation is proposed for the site. 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.
- 3.9 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. Significant opportunity exists to restore degraded terrestrial and freshwater ecosystems at the site leading to improved ecological connectivity and providing a range of terrestrial and aquatic habitats for native fauna.

#### **4 THE PROPOSAL**

- 4.1 The site comprises an area of land some 160 hectares in extent to the west of the Pokeno urban area which is part of an area designated as "under discussion" in the Proposed Waikato District Plan. It includes 53 & 53A Munro Road and 87, 119, 133, 145A and 145C Helenslee Road which are currently zoned Rural in the Operative Waikato District Plan (OWDP) but have been identified as Residential 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 residential redevelopment of the Site would provide for approximately 1400 – 1600 lots.
- 4.3 The Concept Plan is set around a network of green corridors along the streams providing protection of riparian margins and small wetlands and linking small and isolated Significant Natural Areas (SNAs). Stormwater management and areas of greenspace will be integrated with the ecological network to maximise biodiversity and water quality benefits for the site.

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

- 5.1 Like the surrounding rural landscape the site is currently used for semi-extensive agriculture and horticulture with a low density of buildings and infrastructure. The Ridge Road Quarry lies directly to the west 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 several upper tributaries of the Tanitewhiora (Pokeno) Stream and is likely to have originally supported kahikatea floodplain forest on low-lying land close to the main stream grading up to podocarp broadleaved forest on

more elevated parts of the site. Today little native vegetation remains except within four very small areas of SNA, the largest of which lying near the southern boundary of the site is c. 2.2ha in area. Three other smaller areas all lie on the western boundary on the steeper uplands.

- 5.6 The site topography is flat to gently sloping in the east along the main Tanitewhiora Stream and its floodplain, rising to steeper land on the western side to about RL100 . A series of stream gullies run east from the main ridge along Ridge Road.

## 6 ECOLOGICAL VALUES OF THE SITE

### Vegetation

- 6.1 The majority of the site is grazed, improved pasture with seasonally some large areas of maize grown along the stream floodplain. There are stands of native and exotic trees and individual trees found throughout the site, mainly along the various streams. Native tree species are mainly totara and kahikatea while exotic trees are chiefly Monterey cypress (*Cupressus macrocarpa*), crack willow (*Salix fragilis*), Monterey pine (*Pinus radiata*) and poplar (*Populus deltoides*). These copses, shelterbelts and individual trees have no understorey and do not form a coherent plant community. One stand of c. 24 totara (*Podocarpus totara*) and kahikatea (*Dacrydium dacrydioides*) along the upper main stream provides important stream shading and bank stability, however.
- 6.2 There are substantial areas of low quality vegetation in the south west corner of the site where gorse, woolly nightshade, privet, barberry and hawthorn are dominant amongst grazed pasture.
- 6.3 Small areas of SNA are found in the headwaters of the southernmost stream (2.2ha), and along the western boundary of the site (.0451ha, 0.1751ha & 1.14ha) at 53 Munro Road (**Appendix 1**). All are impacted by pest plants and all but the largest are grazed to some degree. Possums (*Trichosurus vulpecula*) also have a presence.
- 6.4 The largest SNA lies in the lower part of a gully upstream of an artificial pond. It is dominated by a wetland in the bottom of the gully that contains mainly grey willow (*Salix cinerea*). Further up the gully the SNA contains tall kahikatea, rimu (*Dacrydium cupressinum*) and totara standing mainly on the northern side of the gully. A dense stand of more than a dozen exotic Monterey cypress stand high up on the southern

side of the gully within the fenced ISNF. Mature tanekaha (*Phyllocladus trichomanoides*), tawa (*Beilschmiedia tawa*) and titoki (*Alectryon excelsa*) are also present. Native plants present in the understorey include karamu (*Coprosma robusta*), putaputaweta (*Carpodetus serratus*), mahoe (*Meliccytus ramiflorus*), mapou (*Myrsine australis*), and cabbage tree (*Cordyline australis*).

- 6.5 A small stand of native bush in a small steep sided basin in a gully head along the western boundary (0.1751ha) contains tall pukatea (*Laurelia novaezelandiae*), totara, kahikatea, and taraire (*Bielschmeidia tarairi*) amongst which are nikau (*Rhopalostylis sapida*), silver tree fern (*Cyathea dealbata*), mamaku (*Cyathea medullaris*), titoki, and rewarewa (*Knightsia excelsa*). Large eucalypts (*Eucalyptus* sp.) and pines stand around the edges.
- 6.6 Other small areas of SNA contain mixed exotic and native species including tree ferns with scattered mahoe and other common native shrubs amongst which are pest plants such as gorse, barberry and woolly nightshade.
- 6.7 The overall botanical values of the site are low with the exception of the two small areas of SNA described, which have high values due to the presence of mature native trees and a native understorey. Individual mature native trees and stands of native trees have moderate botanical values as seed sources and habitat for native fauna. Exotic trees have low ecological values since they do not generally provide good habitat or food for native fauna. The exception would be large old trees which are known to provide roost sites for native long tailed bats (*Chalinolobus tuberculatus*). Fauna surveys for native bats have not yet been undertaken but would be required as part of any resource consents for development of the site.

Fresh water aquatic values

- 6.8 The Tanitewhiora Stream and the network of tributaries that feed into it with their associated wetlands are the key ecological feature of the site (**Appendix 2**). 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.

- 6.9 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.
- 6.9 Water courses at the site have low to moderate 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. A substantial reach of the Tanitewhiora Stream is badly affected by straightening, bank erosion and channel modification associated with seasonal maize cropping at 53 Munro Road. Previous studies of water quality parameters<sup>1</sup>, instream habitat values and overall habitat quality at the downstream end of the Tanitewhiora Stream at Munros Road bridge returned low values for all of these aquatic habitat measures.
- 6.10 Stream shading is minimal for most of the watercourses over most of their length. The upper tributaries and top of the mainstem of the Tanitewhiora Stream are quite well shaded with woody vegetation however, as are the headwater streams on neighbouring properties to the north of the site. Good stream shading is associated with cooler water temperatures and higher oxygen saturation providing better quality habitat for native aquatic fauna and invertebrates.
- 6.11 Aquatic habitat values were low in the mainstem of the Tanitewhiora Stream with poor water clarity, high silt loading and lack of stream shading over much of the southern part of the reach. In the northern half of the reach stream shading is much better, however water clarity was poor and silt loading was high. This is a soft-bottomed stream with poor aquatic habitat diversity, unstable substrate and few pools, instream woody debris, rocks or riffles. Water clarity and shading are better in the top of the mainstem and the upper tributaries with more habitat diversity including pools, runs and a few riffles.
- 6.12 Native fish species previously recorded for the Tanitewhiora Stream<sup>2</sup> at the Munro Road Bridge include long finned eel (*Anguilla dieffenbachii*) adults and juveniles, common bully (*Gobiomorphus cotidianus*) and freshwater crayfish (*Paranephrops*

---

<sup>1</sup> Coffey and Associates Ltd (2008) Pokeno Catchment Management Plan Ecological Considerations

<sup>2</sup> Coffey and Associates Ltd (2008) Pokeno Catchment Management Plan Ecological Considerations



*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 upstream of the Munro Road Bridge or in headwater streams to the north. 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 and banded kokopu have a conservation status of “Not Threatened”. Mosquito fish (*Gambusia affinis*), a small introduced pest fish was observed at the site in shallow ponds.

- 6.13 Fish passage is an important consideration when assessing aquatic habitat values. Poorly designed or installed instream structures such as culverts can pose a barrier to fish migration preventing migratory fish from completing their lifecycle. The Tanitewhiora Stream is bridged in two places and one large (1.8m diameter ) culvert (**Appendix 2**) carries the stream under the driveway at the upper end of the site between 145A and 145B Helenslee Road (Culvert 7). None of these structures present a barrier to fish passage. There are at least six inline culverts on tributary streams across the site. All of these culverts are perched on the downstream end with a drop to the stream below of 30 - >50cm and most are undercut, presenting a significant barrier to migration for any fish species that are poor climbers. Such species are unlikely to be present however as set out in para 6.12.
- 6.13 Tributary streams are for the most part, soft-bottomed lowland streams, although small rocks and boulders are evident in some places. Water clarity in these streams is moderate in most places except for within on-line artificial ponds found along three of the tributaries. Silt loadings are low to moderate depending on weather conditions. Iron staining was observed at culverts along some streams indicative of iron leaching into the watercourses.
- 6.14 Tributary streams generally have low to moderate aquatic habitat values. Lack of woody riparian vegetation for shading, and pugging of stream banks and channels by livestock are the main contributors to loss of aquatic habitat values for these watercourses. Stock exclusion and riparian restoration planting have the potential to significantly improve both water quality and aquatic habitat values.

#### Wetlands

- 6.15 Small areas of wetland are common throughout the site and there are numerous areas

of marshy pasture that is seasonally wet and supports rushes, pasture grasses and moisture tolerant species such as buttercup (*Ranunculus repens*) and reed sweet grass. Small wetlands also occur in association with artificial ponds on several tributary streams. Except for wetland habitat within the largest SNA in the southern part of the site these areas of marshy pasture are all grazed and their ecological values are generally very low.

6.16 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. Wetlands generally lie along the floodplain of the Tanitewhiora Stream and tributary stream gullies in areas proposed for riparian restoration and enhancement in the concept plan for the site (**Appendix 2**).

6.17 The wetland associated with southern SNA occurs around an artificially created pond and it is dominated by grey willow and a range of weedy exotic plants. It is however, mostly fenced into the ISNF and does contain native plants such as sedges, tree ferns, mapou and karamu. It is surrounded by the mature trees within the ISNF on the northern and western sides but there are significant issues with invasive weeds such as gorse and grey willow. The aquatic ecological values here are moderate because it is protected from grazing within the fenced ISNF and it is providing additional habitat types for the natural feature. There is good potential for improvement through weed control and restoration planting.

#### Terrestrial Fauna

6.18 No threatened species of terrestrial fauna were recorded for the site. Common species of native birds were observed and small areas of habitat exist for the common copper skink (*Oligosoma aenum*). Habitat for other lizard species such as arboreal geckos is limited as areas of native bush and scrub are small and 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. Large native and exotic trees at the site, particularly in the ISNF could conceivably provide bat roosts however the widespread loss of indigenous habitat in the local landscape and the small size of remaining forest fragments make this unlikely. Long tailed bats have a National Threat status of "Nationally Critical". Terrestrial fauna values at the site are low.

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

7.1 The site has been significantly modified with loss indigenous vegetation, modification

of waterways and impacts of livestock and horticulture 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 longfin eel (At Risk-Declining).

- 7.2 Development of the site for 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>3</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 3**.
- 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.
- 7.5 Terrestrial habitats were assessed as having generally low values across the site. No threatened species or community types were recorded. Wetlands are considered a threatened habitat type and small degraded wetlands do occur along streams. Freshwater habitats were also assessed as having low values despite the recorded presence of longfin eel (At Risk-Declining) in the Tanitewhiora Stream at the southern boundary of the site.
- 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.

---

<sup>3</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.

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 to very low under the EIANZ criteria and guidelines. This outcome assumes good management of key issues such as stormwater, erosion and sediment control and maintaining ecological connectivity 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.

- 8.3 Native species should be used where possible for street trees, amenity planting and constructed stormwater wetlands.

### 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 A number of stormwater treatment wetlands are proposed within the development area. These should be designed to be off-line to the natural stream channels to prevent any adverse effects on stream water quality. Constructed stormwater wetlands could be integrated into the overall design of ecological corridors and greenspace for the site however.

- 8.6 The Tanitewhiora Stream, its floodplain and the tributary streams require protection from land-disturbing activities associated with the construction stage of the development. The Erosion and Sediment Control Plan that is developed for the site should identify sensitive aquatic and terrestrial habitats that require protection during construction. Land disturbance should be minimised.
- 8.7 Permanent and intermitent streams should be maintained as open channels without significant piping. As part of the ecological restoration strategy for the site channelized and straightened stream reaches should be restored to a more natural morphology with increased sinuosity and habitat heterogeneity. Any stream crossings should maintain fish passage for eels and native fish that are competent climbers.
- 8.8 Ephemeral streams and overland flowpaths should be maintained in their natural state as much as possible.
- 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. The key objectives of riparian planting are to provide a buffer between watercourses and the urban built environmetn, stability to erodible stream banks and stream shading provide cooler water temperatures.

#### Wetlands

- 8.10 Natural wetlands need to be identified and 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 Managemetn Plan should be developed by a qualified and experience ecologist to address the proposed ecological management set out in 8.1 – 8.8 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 and cultivation of the land for horticulture 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 West development site are currently low. A range of ecologically damaging land use practices have degraded 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 and significant opportunity exists to restore degraded terrestrial and freshwater ecosystems at the site.

Jennifer Shanks MSc Hons MEIANZ

Director  
JS Ecology Ltd

December 2020

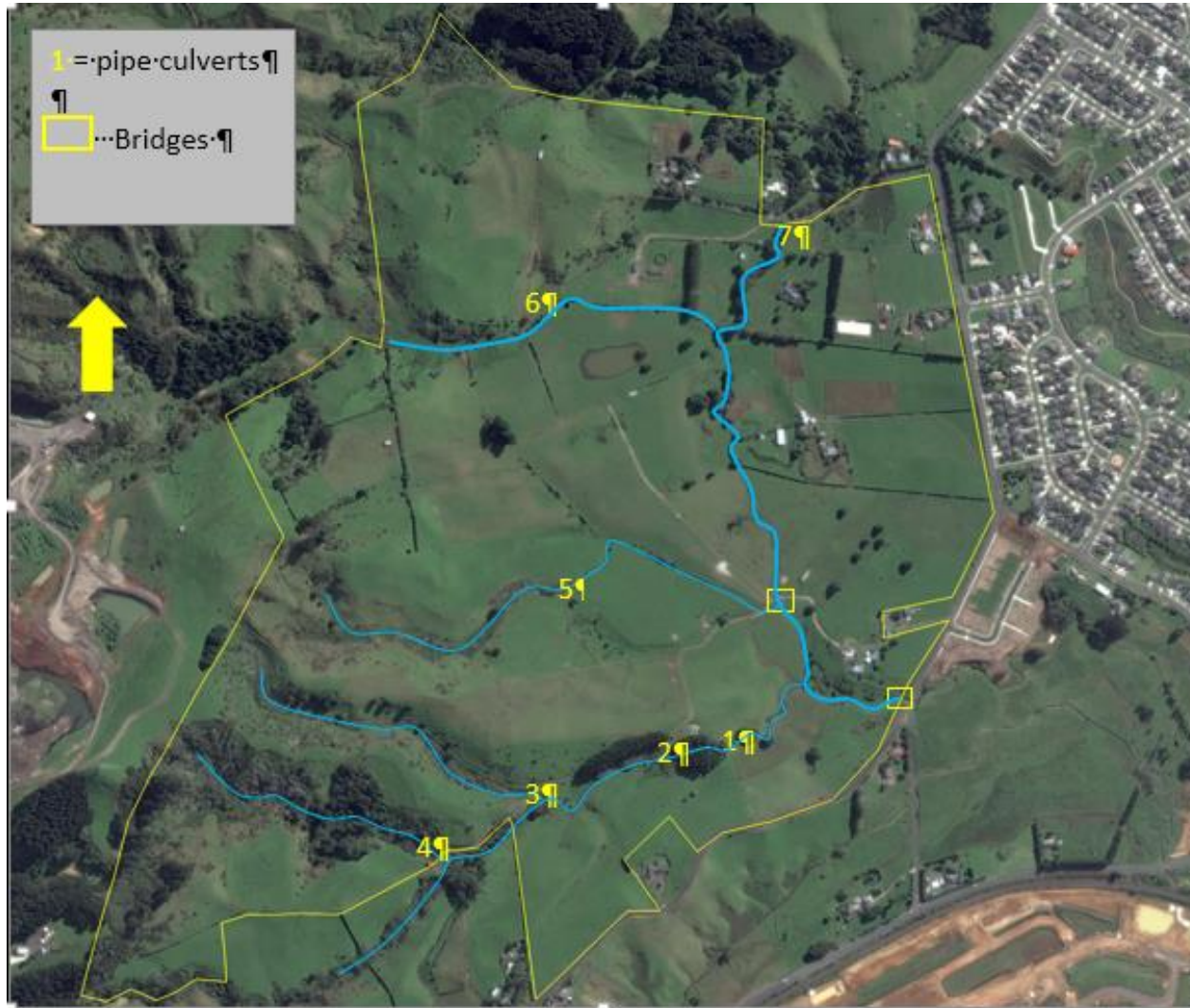
APPENDIX 1

Significant Natural Areas





## APPENDIX 2 WATERCOURSES AND STREAM CROSSINGS



## APPENDIX 3 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>4</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>4</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</b> → <b>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>