Engineers & Consultants

Ecological Impact Assessment

13-15 Trig Road

Final Revision 2

Prepared for the Ministry for Education by Morphum Environmental Ltd
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Executive Summary

Morphum Environmental Limited was engaged by the Ministry of Education to prepare an Ecological Impact Assessment to support a Notice of Requirement for a school at 13-15 Trig Road, Whenuapai.

The Whenuapai Structure Plan anticipates the expansion of the Whenuapai urban area. Accordingly, The Ministry of Education has forecast the need for a new school to meet expected population growth. The site will initially be developed as an overflow school for 600 students to serve a shortfall in the school network capacity in Whenuapai North, Redhills and Hobsonville; and be situated toward the rear, eastern boundary of the site. The Phase 1 overflow school is planned to be operational from 2022. Phase 2 (anticipated for 2027) will establish a permanent school and early childhood education for 1,000 students, to serve the long term needs of the local adjacent school catchment as the adjacent area is live zoned and developed for urban purposes; and when the site is connected public reticulated wastewater network.

As with other areas in the Tamaki Ecological District, farming activities have cleared much of the site's original vegetation. The dominant land cover types present are associated with the past and current agricultural use of the site. Where present, vegetation is reflective of the agricultural use of the site, and the largest proportion of the site is pasture grassland. An area of mixed exotic and native woody vegetation in the southwest corner of the subject site remains.

Although the site has been heavily modified, it retains some ecological value. Ecological features of note include a small wetland on the southern site boundary and an area of mixed mature exotic and regenerating native vegetation in the southwestern corner of the subject site. Vegetation, where present, contributes to ecosystem services such as habitat provision for native fauna adapted to moving across agricultural landscapes. The paucity of quality habitat values and areas is reflected in the native species of birds and lizards considered likely to utilise the site. Avifauna species present are consistent with those that can comfortably travel distances over open fields between forested patches, or make use of fields, farmland, and shelter belt vegetation as habitat. Suitable lizard habitat was limited and, if present, lizard populations are likely limited to copper or plague skinks. The subject site contains no old growth trees with cavities or loose bark that may be utilised as roosts and is not proximate to any waterways that could be utilised as movement corridors by native long-tailed bats. No surface water was present within the subject site during the site visit, and given the absence of freshwater fish habitat, the site is not expected to support a native freshwater fish population. Whilst onsite fauna observations were limited to common species, the use of this area by threatened species such as long-tailed bats, on a temporary, foraging basis, whilst considered unlikely, cannot categorically be ruled out.

It is acknowledged that the construction and operation of a school has the potential to have adverse ecological effects. The redevelopment of the subject site would likely require the demolition and construction activities involving land disturbance, as well as, potentially minor vegetation clearance, with associated noise, vibrations, and traffic movements.

Notwithstanding the actual values identified, vegetation removal may affect the fauna that potentially utilise this area as habitat. The Wildlife Act (1953) already requires that wildlife protection and salvage actions are implemented, which would address potential effects to native fauna.

For all land disturbing activities, there is the potential for sediment to be discharged offsite the receiving environment. This potential effect would be addressed through the existing requirements (standard E11.6.2(2)) that industry best practice erosion and sediment controls are implemented.

The redevelopment of the site for educational purposes will increase impervious surface coverage. Unmitigated, increases in impervious surfaces have the potential to alter the quantity and quality of stormwater discharges from the site. The potential effects of stormwater discharge are addressed by

the existing regional provisions of the Auckland Unitary Plan: Operative in Part and supporting best-practice technical guidance from Auckland Council, that relate to stormwater management (Auckland Council Guideline Document 2015/004 Water Sensitive Design for Stormwater (GD04). These documents require an integrated approach to water quality management that would alleviate the identified potential effects ensuring that stormwater management is sensitive to ecological features.

The Phase 1 overflow school will require an on-site wastewater treatment system. Wastewater discharges could potentially alter the nutrient flux and hydrology in the receiving environment. Potentially leading to algae or bacterial blooms which could affect water quality parameters. A range of treatment systems are available that treat wastewater effluent to a high quality and reduce potential adverse effects on the environment. The existing regional provisions of the Auckland Unitary Plan: Operative in Part and supporting best-practice technical guidance from Auckland Council, that relate to wastewater management (Auckland Council Guideline Document 2018/006: On-site Wastewater Management in the Auckland Region (GD06)) describes designs to manage the potential effects from wastewater discharges from the site.

The redevelopment of the site provides an opportunity to improve the site's ecological values; through the reduction of agricultural nutrients and contaminants to the receiving environment, and the opportunity increase native vegetation and enhance the onsite wetland as part of the associated landscaping.

The magnitude of the effects of the proposed activities has been conservatively assessed as either Low or Negligible using the Environmental Institute of Australia and New Zealand's Ecological Impact Assessment Guidelines (2018). Considering the ecological values potentially present at the site, and the magnitude of impacts, the overall level of effects ranges from Low to Very Low.

As such it is not considered that any ecology-specific conditions are required on the Designation to address any of the identified potential ecological effects.

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1. Introduction

1.1 Purpose & Scope

Morphum Environmental Limited (Morphum) were engaged by the Ministry of Education (The Ministry) to prepare an Ecological Impact Assessment (EcIA) to support a Notice of Requirement (NoR) for the construction and operation of a school at 13-15 Trig Rd, Whenuapai (herein the subject site).

These new facilities will be used by The Ministry to accommodate the predicted increase in student population associated with the development and population growth of Whenuapai. The site will initially be developed for 600 students, to serve a shortfall in the school network capacity in Whenuapai North, Redhills and Hobsonville; and be situated toward the rear, eastern boundary of the site (referred to Phase 1). Phase 1 is planned to be operational from 2022. Phase 2 (anticipated for 2027) will establish a permanent school and early childhood education for 1,000 students, to serve the long term needs of the local adjacent school catchment as the adjacent area is live zoned and developed for urban purposes; and when the site is connected public reticulated wastewater network.

Morphum understands that an EcIA is required to identify the ecological values of the site, describe the potential impacts that the construction and operation of a school on the site may have on those values and recommend mitigation measures, including possible designation conditions.

Detailed design has yet to be completed; as such this assessment assumes that: all woody vegetation within the subject site will be cleared, large scale earthworks, as well as, on-site wastewater and on site-stormwater management will be required for Phase 1, with the site connected to the public reticulated network ahead of Phase 2.

1.2 Site Overview

The subject site is currently two addresses. 13 Trig Rd, a residential address with a single residential dwelling and associated gardens and 15 Trig Rd pasture grassland for low-density dry-stock cattle. The subject site was not stocked at the time of the site visit, although there were cattle in two of the adjacent properties and evidence of stock pugging within the subject site.

The site's original native vegetation has been heavily modified or removed through past and current farming activities. Current land use is shown in the site map in Figure 1. The remaining ecological features of note include a tree privet (*Ligustrum lucidum*) shelter belt along the north eastern boundary of the site and an area of exotic trees and shrubs interspersed with regenerating natives around the residential dwelling. The western property boundary, and the access driveway to 17 Trig Rd, is lined with a row of juvenile oaks (*Quercus sp.*) and magnolia (*Magnolia sp.*).

A small wetland area of approximately 75 m^2 was identified on the eastern property boundary, the wetland extends to the neighbouring property (approximately 600 m^2) as shown on Figure 1 and Appendix 1. The wetland area had no surface water at the time of the site survey. The wetland contained no obligate wetland plant species and had a low portion of facultative-wetland vegetation, being dominated by facultative and uphill vegetation species.

No watercourses which met the definitions of a permanent or intermittent stream in the Auckland Unitary Plan: Operative in Part (AUP:OP) were identified within the subject site. A stormwater outlet on the eastern boundary of the subject site (SAP ID 2000738409) feeds an intermittent stream in the adjacent parcel, a tributary of Trig Stream (Morphum Environmental, 2016).

There are no Significant Ecological Areas (SEA's) or areas of mature native woody vegetation within the site. The nearest SEA is Manutewhau Walk (SEA_T_2040, SEA_T_4866) approximately 1.2 km to the south of the subject site.

Figure 1: Subject site land cover types

1.3 Whenuapai Structure Plan and Plan Change 5

The Whenuapai Structure Plan (Auckland Council, 2016) and outlines how Auckland Council envision the Whenuapai area will develop over the next 10-20 years. The Whenuapai Structure Plan outlines a general arrangement of various land uses (e.g. residential, commercial, and open spaces) and infrastructure (e.g. transport, stormwater, and wastewater), and how the area connects to adjacent urban areas and wider infrastructure networks. The subject site is anticipated for a school in the Whenuapai Structure Plan.

In addition to the Whenuapai Structure Plan, AUP:OP Proposed Plan Change 5: Whenuapai, shows an indicative collector road along the southern boundary of the subject site (between 15 and 9 Trig Rd). The effects of the construction and operation of the indicative collector road are outside of the scope of this assessment; however, it is noted that the indicative alignment proximate to the site wetland. Proposed Plan Change 5 also includes a stormwater management plan.

2. Current Ecological Values

A site walkover was undertaken on the 28th of January 2021. The site visit was undertaken by two suitably qualified and experienced Environmental Scientists. During this survey all vegetation types within the subject site were surveyed and all fauna observations were recorded. Potential watercourses within the subject site were classified and delineated.

2.1 Ecological Context

The subject site is within the Tamaki Ecological District. The Tamaki Ecological District is highly modified, with only 7% of indigenous cover remains in the district (Lindsay *et al.*, 2009). While this district historically supported extensive lowland kauri, pūriri, and coastal pohutakawa forests (Singers *et al.* 2017), these have largely been cleared to make way for urban development and agricultural land use. The largest proportion of land now being urban areas fringed by agricultural areas and limited pockets on remaining native vegetation.

The subject site is recorded as having an Ecosystem Potential Extent of WF7, Pūriri forest (Singers *et al.* 2017). WF7, Pūriri forest, has a Regional IUCN threat status of Critically Endangered (Singers *et al.*, 2017). Pūriri forest is a variable broadleaf forest type that occurs throughout the Auckland region dominated by pūriri (*Vitex lucens*) with a mixture of other broadleaf species including tītoki (*Alectryon excelsus*), kōwhai (*Sophora spp.*), karaka (*Corynocarpus laevigatus*), and karamu (*Coprosma robusta*). Pūriri forests have dense understories and historically would have provided habitat for a diverse range of native invertebrates, amphibians, reptiles, birds, and bats. The current vegetation does not reflect the WF7 habitat type.

Landcare Research Land Cover Database (LCDB) version 5 (Landcare Research 2020) describes the land cover of the subject site as "High Producing Exotic Grassland". High producing exotic grasslands are described by the Ministry for the Environment (2010) as exotic grasslands with highly productive vegetation likely to be predominantly used for agricultural grazing that cover 22% of New Zealand's land area. The LCDB description provides a generally accurate description of the subject site.

The immediate surrounding area is primarily rural agricultural land, although the area to the south of Hobsonville Rd (approximately 700 m to the south) has been largely developed for residential use with several additional developments under construction. There is no existing stormwater or wastewater infrastructure within the subject site.

2.1.1 Catchment and Receiving Environment

The Whenuapai stormwater catchment is 1,931 ha of primarily agricultural land (59%). The LCDB v5.0 describes the land cover as predominantly High Producing Exotic Grassland, intermixed with areas of Short-Rotation Cropland, Built-up Area, and Urban Parkland / Open Space, which is considered an accurate description. Built up areas are considered as commercial, industrial, or residential sheds, including associated infrastructure and amenities. The proportion of impervious surface cover in the catchment is 15%.

The subject site catchment is drained by Trig Stream, a tributary of the Waiorohia Stream, which reaches the coast at the Terrestrial SEA (SEA_T_4733) in the Waitemata Harbour.

2.2 Existing Vegetation

As with other areas in the Tamaki Ecological District, farming activities have cleared much of the site's original vegetation. The current land cover of the site is summarised in Table 1 and indicative site photos are provided in Figure 2 below.

The dominant land cover and vegetation type is pasture grassland. Pasture grasses are dominated by ryegrass (*Lolium sp.*) and kikuyu (*Pennisetum clandestinum*); interspersed with exotic herbaceous species such as birdsfoot trefoil (*Lotus corniculatus*), buttercups (*Ranunculus repens*), and broadleaf plantain (*Plantago major*). Small, isolated pockets of Juncus rushes (*Juncus spp.*) and water pepper (*Persicaria hydropiper*) are also present in the lowest areas of the site, the northeast corner and near the identified wetland.

The residential area features a range of mature exotic trees, regenerating natives and ornamental exotic shrubs. The exotic trees present in this area include American sweetgum (*Liquidamber styraciflua*), Japanese cedar (*Cryptomeria japonica*), Chinese fan palm (*Trachycarpus fortunei*), black wattle (*Acacia mearnsii*), and radiata pine (*Pinus radiata*) among others. Native species, including mapou (*Myrsine australis*), lemonwood (*Pittosporum eugenioides*), manuka (*Leptospermum scoparium*), and taupata (*Coprosma repens*), have been planted between the mature trees. Bracken fern (*Pteridium esculentum*) has filled in gaps in the understory with little overhead shading. Groundcover consists primarily of agapanthus (*Agapanthus praecox*) which lines the driveway and Trig Rd berm. Small areas of blackberry (*Rubus sp.*) and kikuyu grass (*Pennisetum clandestinum*) are also present. Exotic weeds have invaded areas of this land cover type, with several large woolly nightshade (*Solanum mauritianum*) and a dense matt of field bindweed (*Convulvulus arvensis*) which has begun to smother the black wattle canopy.

Outside of the subject site along the western property boundary, the driveway to 17 Trig Rd, is lined with a row of juvenile oaks (*Quercus sp.*) and magnolia (*Magnolia sp.*). Outside of the subject site along the northern property boundary stands a row of tree privet (*Ligustrum lucidum*).

The wetland area had no surface water at the time of the survey (Appendix 2). Wetland vegetation comprised a mixture of ryegrass, sharp-pointed rush (*junctus acutus*), buttercup, birdsfoot, Yorkshire fog, and a small proportion of clover (*Trifolium spp.*). The wetland showed evidence of substantial historic cattle pugging, and as the wetland was not separately fenced from the adjacent pasture grassland and is likely to face the same grazing pressure as other stocked areas of the subject site.

Table 1: Subject area land cover classes

Land Cover Class	Area (m^2)	Percentage of Site Area (%)	Description
Pasture Grassland	37,707	93	This land cover class includes all the vegetation currently used for pastoral farming; it is comprised largely of pasture grass species used to support the grazing of stock.
Residential Area	2,602	7	This land cover class includes the residential dwelling, associated impervious surfaces, maintained lawn, and ornamental mixed exotic & native vegetation.
Wetland	76	<1	Wetland area characterised by pasture grasses interspersed with native and exotic herbaceous plants. There was no surface water during the site visit.
Total	**40,385**	**100**	

No site vegetation is considered to be of species-merit; and is of limited ecological value when assessed under the EIANZ criteria attributes of Representativeness, Rarity/distinctiveness, Diversity and pattern, Ecological context (Table 2). The natural ecological values of the site are supressed by the presence of cattle. Overall, the subject area is considered to have low ecological value.

Figure 2: Indicative site photographs: Clockwise from top left; View of the pasture grassland from the southeast corner of the site. Mixed exotic canopy species and native undergrowth adjacent to Trig Rd. Driveway of 15 Trig Rd. Wetland area with residential house in the background.

Table 2: Assessment of current terrestrial vegetation values		
Assessment Matter	**Ecological Value (EIANZ, 2018)**	**Reasoning**
Representativeness	**Low**	The current vegetation community is not representative of the historical Pūriri forest habitat type. Exotic species dominate, and the current vegetation is not consistent with the natural range of tiers and guilds.
Rarity/distinctiveness	**Low**	No mature native vegetation was recorded within the subject area. No nationally or locally threatened or uncommon plant species were identified during the site survey.
Diversity and pattern	**Low**	The subject area is dominated by exotic pasture grasses and herbaceous weeds. The area of greatest vegetation diversity is dominated by exotic species with a small proportion of regenerating natives. The current site species diversity is far below the expected level of natural diversity for the habitat that would have been present prior to human modification.
Ecological context	**Low**	The site has experienced a high level of modification and provides limited ecological function. The site is buffered by a large area of similarly modified agricultural land. The pasture grasslands present decrease ecological linkage and pathways, and have limited contributions to ecosystem services such as food provision, pollination & seed sources, and native genetic diversity.

2.3 Avifauna

The site supports only a small proportion of native or exotic woody vegetation (7%), with the majority of the site being used for agricultural activities. This is reflected in the species of birds recorded from the site, which are typical assemblage of species that can comfortably travel distances over open fields between forested patches, or make use of fields, farmland and shelter belt vegetation in rural settings. The birdlife that was observed from the subject area was largely associated with the existing vegetation at the southern and northern extents of the subject area (mixed exotic and native trees). No threatened or risk species were recorded (Table 3).

One native species, not observed, but which may be transiently present within the subject site is the paradise shelduck (*Tadorna variegata*). Paradise shelduck are not classified as Threatened or At Risk.

The citizen science platforms eBird and iNaturalist were searched for more detailed records. No observations were recorded on the subject site. The nearest avifauna observations are at Spinnaker Foreshore Reserve, Te Atatu Peninsula, and consist of common sea birds and exotic passerines.

Table 3: Bird species observed

Common name	Scientific name	Threat Status (Robertson *et al.* 2017)
Skylark	*Alauda arvensis*	Introduced and naturalised
Mallard	*Anas platyrhynchos*	Introduced and naturalised
Canada Goose	*Branta canadensis*	Introduced and naturalised
Australasian Harrier	*Circus approximans*	Not Threatened
Chaffinch	*Fringilla coelebs*	Introduced and naturalised
Australian magpie	*Gymnorhina tibicen*	Introduced and naturalised
Welcome Swallow	*Hirundo neoxena*	Not Threatened
Common pheasant	*Phasianus colchicus*	Introduced and naturalised
Pukeko	*Porphyrio melanotus*	Not Threatened
Song thrush	*Turdus philomelos*	Introduced and naturalised

2.4 Herpetofauna

Lizards were not systematically surveyed across the site. Given the lack of high-quality lizard habitat, it was considered a low likelihood that there are native herpetofauna present and subsequently that there was a low likelihood that any systematic survey would detect any native species. Casual observations and occasional searching of suitable habitat did not detect skinks. Geckos were not specifically searched for but are unlikely to be present given the history of vegetation modification on the site.

Suitable lizard habitat was limited to pockets of dense groundcover and woody debris in the southwest corner of the subject site. Agapanthus by itself does not represent good quality lizard habitat as the stems are spaced out and do not provide sufficient shelter or refugia. However, leaf litter and woody debris from the overhead exotic vegetation has filled in groundcover to produce low-moderate quality lizard habitat in some pockets (Figure 3).

It is considered possible that terrestrial lizards may be present on site, with copper skink (*Cyclodina arnea)* being the most likely. Copper skinks are known to persist in other parts of Auckland in similar habitat. Copper skink are not considered threatened or at risk by the Department of Conservation (Hitchmough *et al.* 2015).

Geckos are unlikely to have persisted due to historic vegetation clearance, farming, and land management.

The site's history of habitat modification and distance to any areas of substantial native vegetation make it extremely unlikely that native lizards would recolonise the site naturally.

The exotic plague skink (*Lampropholis delicata*) may be present, given its wide distribution in the Auckland Region.

Figure 3: Potential copper skink habitat. Woody debris piles within the agapanthus groundcover provide low-moderate quality skink habitat.

2.5 Bats

A detailed bat survey was not undertaken. Given the paucity of potential bat habitat across the site, it was considered that there was a low likelihood that any systematic survey would detect any native species.

Populations of the native long-tailed bat (*Chalinolobus tuberculatus)* are known in the west Auckland area, most notably the Waitakere Ranges. A small number of observations have been recorded in the Henderson Valley area, 10 km to the south. Native bats can forage over 50 km in a single night, putting the subject site within the theoretical home range of any West Auckland population.

Long-tailed bats prefer to roost in larger, older, canopy trees with cavities, epiphytes, and loose bark. No such habitat is present on the subject site. Old growth trees with cavities or loose bark that may be utilised as roosts are absent from the subject site. Any long-tailed bats present are therefore likely utilising the areas as temporary foraging. Long-tailed bats feed on the wing, utilising waterways and forest-edge as foraging grounds and movement corridors where invertebrate life is likely to be more abundant. As such the site is not considered high-quality foraging habitat.

Short-tailed bats prefer deep-forest habitat and are associated with old growth indigenous forest. The only known population of short-tailed bats known to the Auckland Region is found on Little Barrier Island. As such their presence within the subject site is considered extremely unlikely.

2.6 Freshwater Values

Freshwater habitat within the subject site is limited to the small wetland identified (Appendix 2). The vegetation is comprised of typical unkept pasture species ranges from facultative – wetland (i.e. Sharp-pointed rush, *juncus acutus* & Buttercup, *Ranunculus repens*) to facultative – upland species (i.e. Ryegrass, *lolium perenne* & clover, *Trifolium spp.*). No obligate wetland flora or fauna were observed. The wetland is not fenced from stock and there is evidence of cattle pugging and grazing throughout. While the ecological values of the site wetland are limited, wetlands still serve a hydrological function, which supports indigenous biodiversity values.

Figure 4: The site wetland. Vegetation present includes wetland species (i.e. Sharp-pointed rush, *juncus acutus* & Buttercup, *Ranunculus repens*) as well as upland species (i.e. Ryegrass, *lolium perenne* & clover, *Trifolium spp.*). Note the vegetation changes at the property boundary with 9 Trig Rd.

While the current ecological values of the site wetland are low, restoration activities (such as riparian planting and stock exclusion fencing) could improve the wetlands stormwater filtration, as well as, organic matter input and water temperature regulation function.

No streams were recorded during the site survey and the wetland had no surface water. However, as the site visit was undertaken at the height of a dry summer, there is a possibility that there may be surface water intermittently present during the wetter months of the year. If surface water is present for an extended period, the wetland may provide an area of temporary, low-quality fish habitat.

2.7 Pest Animals

No pest animals were noted on site. It is considered likely that, at a minimum, rabbits (Oryct*olagus cuniculus*), rats (*Rattus rattus*, *Rattus norvegicus, Rattus exulans*) and mice (*Mus musculus*) are present.

2.8 Summary of Ecological Values

The current ecological values of the site have been described based from on-site observations in conjunction with a review of the available literature and databases. A summary of this information is presented in Table 4 based on the EIANZ 2018 Ecological Impact Assessment guidelines set out in Appendix 3. Onsite fauna observations were limited to common species. Due to the minimal native habitat values provided by the site, the use of this area by threatened species, such as long-tailed bats and native freshwater fish, is considered unlikely.

Table 4: Summary of subject site ecological values

Impact	Ecological Value (EIANZ, 2018)	Reasoning
Vegetation	**Low**	Area rates Low for all assessment matters (Representativeness, Rarity/distinctiveness, Diversity and pattern, Ecological context). Vegetation is comprised primarily of exotic pasture grass and exotic herbaceous weeds. The area of woody vegetation consists largely of mature exotic tree species interspersed with regenerating natives.
Avifauna	**Low**	Species presence limited to nationally and locally common indigenous species. Limited ecological value other than as for habitat for tolerant native species, or those species moving across the landscape.
Herpetofauna	**Moderate**	Actual species presence is likely to be limited to not threatened or pest species. Although without detailed surveys the presence of other species cannot be categorically ruled out.
Bats	**Moderate**	Actual species presence is unlikely, although potential intermittent use by long-tailed bats cannot be categorically ruled out; notwithstanding actual habitat and foraging values are low.
Freshwater Values	**Moderate**	Freshwater habitat within the subject site consists of a low-quality pugged wetland. The current values of the wetland have been assessed as low (representativeness, diversity and pattern, ecological context). However, due to the scarcity of natural wetland habitats, and the potential for wetland restoration, the overall freshwater values have been assessed as Moderate.
Native Freshwater Fish	**Negligible**	Freshwater fish habitat is unlikely to be present within the subject site on a more than transient basis during the wet, winter months of the year, and as such is not considered likely to support native fish populations.

Overall, the subject area is considered to have Moderate - Low current ecological values.

3. Proposed Activities and Potential Effects

This EcIA has been prepared to support the lodgement of a NoR for the construction and operation of a school at 13-15 Trig Road, Whenuapai.

For Phase 1, the site is proposed to be initially developed for 600 students, and situated toward the rear, eastern boundary of the site. Phase 1 is planned to be operational from 2022; with Phase 2 anticipated for 2027.

At the time of writing no detailed design has yet been undertaken. A feasible design for Phase 1 is provided by Jasmax (2021).

The types of activities considered to likely be required in the construction and operation of a school include:

- Construction of school buildings and facilities. i.e. classrooms, hall, library, gymnasium, and sports fields.
- Construction of infrastructure services. i.e. water, wastewater, stormwater, and telecommunications.
- Earthworks and vegetation clearance to facilitate site development.
- Vehicular, pedestrian and cycle traffic.

The hours when classes will be held on site are expected to be similar to most other schools, core teaching hours being weekdays between approximately 8:30am - 3:30pm. Some activities, such as community education (night classes), school sporting or cultural events may occur outside of core school hours.

3.1 Construction Activities

3.1.1 Land Disturbance

The current topography (rolling hills, minimal flat area) of the site means that substantial earthworks are anticipated to prepare the building platforms, outdoor play areas, and parking areas. Earthworks and construction activities would involve the use of machinery and traffic that will generate dust, noise, and vibrations for the duration of construction. Dust, noise, and vibrations may reduce the habitat quality for any species present and lead to their avoidance of the area.

For all land disturbance activities, there is a risk of uncontrolled sediment discharge to the receiving environment. Sediment is a contaminant as defined in the Resource Management Act (RMA) and has the potential to cause a range of adverse effects in the receiving environment including smothering of benthic habitat, direct mortality of native freshwater fish through asphyxiation from clogged gills, and changes to water quality, including physio-chemical indicators pH and clarity.

Sediment related effects would not only occur within the subject site but could accumulate in the wider receiving environment, including Trig Stream.

3.1.2 Vegetation Clearance

It is anticipated that, due to its position adjacent to the road, the entirety of the mixed exotic native vegetation will be cleared to facilitate the construction of the school and make way for site access and parking. A significant proportion of the pasture grassland is also expected to be removed. Vegetation clearance is considered to generate low-moderate adverse environmental effects on vegetation and fauna values given the species present and ecological value as assessed in Section 2. Exotic species can provide habitat functions, as such vegetation removal may affect the fauna that potentially utilise this area as foraging and habitat. Vegetation clearance could result in the direct mortality of individuals,

displacement of nesting sites, reduced connectivity between foraging and nesting areas and potentially impacting reproductive success.

3.2 Operational Activities

3.2.1 Traffic and Noise

Traffic can create a range of anthropogenic disturbances such as movement, noise, and light disturbance. The ongoing operation of the school may generate noise disturbance. Anthropogenic disturbances may reduce the quality of any retained vegetation as habitat for any native species, reducing habitat quality through the determent of nesting sites and foraging, potentially impacting reproductive success. The level of effect of such anthropogenic disturbances will depend on the habitat retained and the landscaping of the site during construction, notwithstanding the existing habitat values of the site and the large extent of similar habitat in the surrounding catchment.

3.2.2 Onsite Wastewater Treatment and Disposal

For Phase 1, the initial development will be serviced by an on-site wastewater system. A feasibility study has been undertaken by Tonkin & Taylor (2021) for Phase 1, with Phase 2 of the school development to occur when a public connection is available to the site and the on-site wastewater disposal system will be removed.

Concept level calculations have been undertaken, based on Auckland Council Guideline Document: On-site Wastewater Management in the Auckland Region (GD06), to confirm the site can accommodate an onsite disposal field system for Phase 1 through a range of potential measures.

As identified by Tonkin & Taylor (2021) primary wastewater treatment, the separation of suspended material from wastewater by settlement will be provided through storage tanks. Secondary treatment will likely be required, with the type of secondary treatment to be included in any future resource consent application. GD06 gives reference to a range of land application systems, the requirements in the AUP:OP lead to a pressure compensating drip lines being the preferred system (Tonkin & Taylor, 2021). Tonkin & Taylor (2021) have confirmed that a disposal field can be sited on-site, with a 50 % reserve field, outside the floodplain and outside a 20 m setback from the wetland. Tonkin & Taylor (2021) recommend further work to confirm the wastewater solution be undertaken during the resource consent process.

Even with treatment, wastewater disposal can modify site hydrology and introduce additional nutrients to the environment. A range of commonly applied measures are identified in GD06 to minimise such potential effects, including:

- Treatment to reduce the level of contaminants discharged.
- Land disposal via pressure compensating drip lines to minimise hydrological changes.
- Increasing the topsoil depth to allow for maximum evapo-transpiration and increased de-nutrification in the soil.
- Planting the disposal field to allow for increased nutrient removal.
- Buffer planting in and around the wetland for increased nutrient removal and improve resiliency to any biophysical changes.
- Setback wastewater disposal fields from the wetlands to increase separation distances and increase evapotranspiration and volatilisation.

In conjunction with compliance with GD06 and any requirements of the AUP:OP, the potential actions listed above will minimise the potential changes to site hydrology and nutrient values; especially given the runoff from the current agricultural land use.

3.2.3 Increase in Impervious Surfaces

The redevelopment of the subject site for educational purposes would result in an increase in impervious surfaces. As a positive effect, this is likely to lead to the prevention of further agricultural runoff (nutrients and sediment) from the site. However, an increase in impervious coverage, unmitigated, has the potential to alter hydrology resulting in increased peak flow discharges and adversely impact water quality. Changes in hydrology can have adverse effect on streams within the catchment, including accelerating river and stream erosion and bank instability, that generate sediment that can accumulate in the receiving environment.

As discussed in the feasibility study undertaken by Tonkin & Taylor (2021) the proposed stormwater approach for the site is in-line with the Stormwater Management Plan prepared for the catchment. A low impact design approach will be taken with a focus on at-source treatment and management across the site.

Hydrology mitigation through both retention and detention for all impervious surfaces is proposed. A range of possible options are available to meet the stormwater quantity objectives that also provide the maintenance of watercourse hydrology. Stormwater quality treatment is also proposed, the Tonkin & Taylor (2021) feasibility study demonstrates that site can accommodate swales, the stormwater quality device with the largest physical footprint, constructed in accordance with the relevant technical guidance Auckland Council Guideline Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01).

Auckland Council provides guidance on applying Water Sensitive Urban Design (WSUD), a stormwater management approach that seeks to promote stormwater management practices that balance land development with the ecosystem services necessary to support it, in Auckland Council Guideline Document 2015/004 Water Sensitive Design for Stormwater (GD04). A WSUD approach reduces the potential for adverse effects from point-source stormwater discharges and those associated with a change in land use to occur.

3.2.4 Potential Positive Effects

The development of the site has the potential to improve ecological values. The removal of stock and subsequent landscaping with native vegetation could be utilised to improve habitat provision, and connectivity for native species, as well as, improving the ecological functions (shading and water temperature regulation function) of the onsite wetland.

3.3 Summary of Proposed Activities

It is acknowledged that the construction and operation of a school has potential adverse ecological effects. The redevelopment of the subject site would likely require the demolition and construction activities involving land disturbance and potentially minor vegetation clearance and associated noise and vibrations. The operational activities of the school are envisioned to included traffic movements, noise generating activities, and onsite wastewater treatment and disposal (temporary until the subject site is connected to the Auckland wastewater network). The development of the site has the potential to improve ecological values.

4. Ecological Impact Assessment

The current ecological values of the site have been described based on in-field observations in conjunction with a review of the available literature and databases as set out in Section 2 of this report. The likely activities have been described and set out in Section 3. This section utilises the findings of Sections 2 and 3 to provide an assessment of the ecological effects based on the EIANZ guidelines, set out in Appendix 3.

As part of this assessment it is important to highlight to the reader that this EcIA has been prepared to support The Ministry for the NoR to enable the construction and operation of a new school. Should the Ministry of Education be successful, the provisions of the National Environmental Standard for Freshwater 2020 (NES:FW), the regional provisions of the AUP:OP and the requirements of the Wildlife Act (1953) will still apply. Further details on these relevant matters have been provided below.

4.1 Relevant Planning Provisions

The NES:FW regulates certain activities that pose risks to the health of freshwater and freshwater ecosystems. The NES:FW aims to:

- stop further degradation of our freshwater.
- start making immediate improvements to water quality.
- reverse past damage to bring our waterways and ecosystems to a healthy state within a generation.

The NES:FW contains provisions that could potentially relate to the activities envisioned to construct and operate a school. Activities such as clearing vegetation with 10m, as well as earthworks and the diversion or discharge of water within a 100 m of a natural inland wetland require regional consents.

Should any resource consent be required for any of the activities identified, then Auckland Council would have the ability, through the usual resource consenting process, to place conditions on the consent to mitigate any identified effects.

The construction and operation of a school would not be able to apply for a consent for the reclamation of a wetland as this is a prohibited activity under Regulation 53 of the NES:FW. It is noted that wetland reclamation may be performed as a discretionary activity if it is for the purpose of constructing specified infrastructure (NES:FW Regulation 45), which may include the indicative collector road to be constructed by others, following a separate process.

The existing regional provisions of the AUP:OP that would apply to the likely activities that would be undertaken in the construction and operation of a school would remain in effect. Should any resource consent be required for any of the activities identified, then Auckland Council would have the ability, through the usual resource consenting process, to place conditions on the consent to mitigate any identified effects.

Given the values identified in this report it is not considered that any specific conditions are required on the designation in relation to vegetation clearance.

For land disturbance, standard E11.6.2(2) would require that industry best practice erosion and sediment controls (Auckland Council Guideline Document GD2016/005) are in place to address the effects from potential sediment discharges to the receiving environment.

The relevant stormwater provisions would depend on the stormwater management approach undertaken which is subject to detailed design. The AUP:OP also includes a range of provisions that relate to stormwater management include chapters: E1, E8 and the supporting best-practice technical guidance Auckland Council Guideline Document GD2015/004 and GD2017/001. It is also possible that

stormwater discharges from the site could be authorised by way of the Region wide Stormwater Network Discharge Consent held by Auckland Council Healthy Waters.

The relevant wastewater provisions would depend on the wastewater management approach undertaken which is subject to detailed design. The AUP:OP also includes a range of provisions that relate to wastewater management include chapters: E1, E5 and the supporting best-practice technical guidance GD2018/006.

4.2 The Wildlife Act 1953

The Wildlife Act (1953) absolutely protects all native lizards, bats, and birds (unless listed as a in Schedule 5). Consequently, a permit under the Wildlife Act would be required for any (potential) harm to these species.

4.3 Summary of Ecological Impact Assessment

The current ecological values of the areas that would be impacted by the likely activities are summarised and assessed in Table 5 below. Table 5 provides an interpretation of effects, assuming ecologically threatened species are temporarily present on site, although the actual likelihood or their presence is low. Magnitude is determined by a combination of scale (temporal and spatial) of the effect and degree of change that will be caused in or to, the ecological component and is assessed here with the relevant planning provisions forming a baseline.

The current site vegetation consists primarily of pasture grassland and an area of mixed exotic vegetation. The current ecological value of the subject site vegetation has been assessed as low. The level of effect of the anticipated vegetation clearance has been assessed as "very low", representative of a minor shift from current baseline conditions. There is potential for redevelopment landscaping to include native vegetation and increase the proportion of native vegetation present, such that the actual overall level of effect could be negligible.

The highest level of effect within the scope of the assessment undertaken relates to herpetofauna, where the level of effect is described as a conservative moderate without mitigation. This assessment assumes the highest possible impact, that the site supports populations of threatened native lizard fauna and that suitable lizard habitat is cleared. The Wildlife Act 1953 would require that any such vegetation clearance would require lizard search and salvage be performed, to relocate any lizards present within the subject site. As such it is considered that the level of effect would be reduced to low and that no conditions need to be placed on the designation to address this potential effect.

Effects on avifauna and native freshwater fish have been considered as very low and based on the interpretation of Table 12 (in Appendix 3).

No suitable native bat roosting sites were identified within the subject site and the site provides limited feeding opportunities, so it is considered unlikely that native bats are present on more than an infrequent transient basis. The clearance of site vegetation and construction of a school is therefore considered to produce a low level of effect on native bat values.

There is a risk of uncontrolled sediment discharge to the receiving environment during all land disturbance activities. Auckland Council Guideline Document: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05) provides guidance on reducing the potential for erosion to occur and measures to minimise sediment discharged offsite. Redevelopment of the site provides the opportunity to bring the site's stormwater management approach in-line with current industry best practice (WSUD), and reduce agricultural runoff; such that overall changes to the stormwater discharge are expected to be negligible compared to the rural baseline.

Wastewater discharges can modify site hydrology and introduce additional nutrients to the environment, which can have an effect on the plant communities present and the water quality of the receiving environment. An effective wastewater treatment system following Council guidance (GD06) will minimise the potential changes to site hydrology and nutrient values and reduce the potential adverse effects of on-site wastewater disposal on the ecological values of the subject site.

It is considered that if best practice stormwater and wastewater management guidelines are implemented, then the impacts of these activities on site water quality and freshwater values will be not be discernible, and the level of effect has been assessed as Low.

The development of the site will also provide the benefit of removing stock access to the wetland and could include wetland enhancement planting. It is anticipated that the construction and operation of the school will avoid reclamation of the wetland, due to the prohibited activity status under the NES:FW.

Overall, the level of effect on the site's ecological values from the proposed activities has been assessed as Low – Very Low (Table 5); EIANZ provides a description of Low-level effects: potentially noticeable but that will not cause any significant adverse impacts.

Table 5: Assessment of Level of Effect of the proposed activities			
Impact	**Ecological Value (EIANZ, 2018)**	**Magnitude of Effect and Reasoning**	**Level of Effect**
Vegetation	Low	Low – minor shift away from baseline condition, predominantly pasture grassland and exotic vegetation. Redevelopment landscaping could potentially increase native vegetation present, such that actual overall level of effect could be negligible.	**Very Low**
Avifauna	Low	Low – minor shift away from baseline condition given the paucity of habitat onsite and the wide spatial extent of similar habitat (rural land use) in the immediate surrounds. At a species level, any changes would likely be to common species and be subject to the provisions of the Wildlife Act.	**Very Low**
Herpetofauna	Moderate	Low – minor shift away from baseline condition given the paucity of habitat onsite and the wide spatial extent of similar habitat (rural land use) in the immediate surrounds. At a species level, any changes would likely be to common species and be subject to the provisions of the Wildlife Act. Lizard search and salvage should be implemented to mitigate any potential risk to native lizards.	**Low**
Bats	Moderate	Negligible – given the limited roosting and foraging opportunities it is considered that the magnitude of any impacts on bat populations would be barely distinguishable.	**Very Low**
Freshwater Values	Moderate	Low – The development of the site will need to comply with WSUD principles, employ best practice erosion and sediment control measures, and manage the hydrological and water quality effects of stormwater and wastewater discharges; such that any changes to the freshwater values is likely to be negligible compared to the existing situation. The development of the site provides an opportunity to enhance the wetland such that actual ecological effects could be a net-gain.	**Low**
Native Freshwater Fish	Negligible	Negligible – there is limited fish habitat within the subject site so effects on native fish are unlikely.	**Very Low**

5. Conclusions and Recommendations

It is acknowledged that the construction and operation of a school has the potential to have adverse ecological effects. The magnitude of these effects has been considered as either Low to Negligible using the EIANZ Ecological Impact Assessment guidelines. Considering both the ecological values and the magnitude of impacts, the overall level of effect ranges from Low to Very Low. EIANZ guidelines describe Low to Very Low-level effects as "not normally of concern" and "no more than minor", although normal design, construction and operational care should be exercised to minimise adverse effects.

Farming activities have cleared much of the site's original vegetation, the current land cover present is typical and consistent with the past and current agricultural use of the site. The largest extents of vegetation are pasture grasslands (93%) and a smaller area of mature exotic trees interspersed with regenerating natives (7%). Exotic pest plants such as woolly nightshade, field bindweed, and agapanthus are also common.

Although the site has been heavily modified, it retains some ecological value. Ecological features of note include the area of woody vegetation and identified wetland. Vegetation, where present contributes to ecosystem services such as habitat provision for native fauna adapted to moving across agricultural landscapes. The paucity of quality habitat values and areas is reflected in the native species of birds, lizards, bats, and fish considered likely to utilise the site. Avifauna species present are consistent with those that can comfortably travel distances over open fields between forested patches, or make use of fields, farmland, and shelter belt vegetation as habitat. Suitable lizard habitat is limited and, if present, lizard populations are likely limited to Copper or Plague Skinks. The subject site contains no old growth trees with cavities or loose bark that may be utilised as roosts and is not proximate to any waterways that could be utilised as movement corridors by native long-tailed bats. Given the absence of fish habitat, the subject site is not expected to support native freshwater fish populations. Whilst onsite fauna observations were limited to common species, the use of this area by threatened species such as long-tailed bats, whilst considered unlikely, cannot categorically be ruled out.

The redevelopment of the subject site would likely require the demolition and construction activities involving land disturbance and potentially minor vegetation clearance and associated dust, noise, vibrations, and traffic movements. Given the values associated with the vegetation identified in this report the level of effect for any vegetation clearance would be Very Low. The provisions of the Wildlife Act will also remain in effect to ensure that any loss of habitat for native avifauna, lizards and bats is appropriately managed. For all land disturbance activities, such as building demolition and construction, there is the potential for sediment to be discharged from the site to the receiving environment; this would be addressed through the existing requirement for industry best practice erosion and sediment controls during any land disturbance. The redevelopment of the site for educational purposes could result in increased in impervious coverage. The potential effects of changes to the quantity and quality of stormwater discharged from the site would be addressed through the stormwater management approach developed for the site. The potential effects of changes to site hydrology and nutrient values as a result of on-site wastewater treatment and disposal will be addressed by implementing Auckland Council best practice guidelines (GD01, GD05 and GD06).

Overall, the effects of the proposed activities are considered here as Low - Very Low. As such it is not considered necessary to recommend any ecology-specific conditions to address any of the identified effects.

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Appendix 1 Site Map

TRIG RD ECIA - SITE OVERVIEW

Z:\Projects\Government\Ministry for Education\P02914 13-15 Trig Rd\GIS\ArcPro\P02914 Trig Rd EcIA Layout: Trig Rd EcIA - A3 Site Overview

Desktop Streams

Existing Land Cover Type

- Pasture Grassland
- Residential Area
- Wetland

Client MINISTRY FOR EDUCATION

Project **13-15 TRIG RD ECIA**

0 50 100 m

Project no. P02914

Date 9 Feb 2021

Drawn DB

Approved JS

Appendix 2 Site Wetland Delineation

As part of the 13-15 Trig Rd Ecological Impact Assessment Morphum was engaged to identify and assess potential wetlands against the wetlands definitions of the Resource Management Act (RMA) and National Policy Statement for Freshwater Management 2020 (NPS:FM).

The RMA definition of a wetland includes *permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.*

The NPS:FM definition of a natural inland wetland includes:

> ***natural wetland*** *means a wetland (as defined in the Act) that is not:*
>
> *(a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or*
>
> *(b) a geothermal wetland; or*
>
> *(c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling*

The classification methodology used aligns with the Wetland Delineation Protocols as specified in the NPS:FM.

Methodology

A site visit for the EcIA was undertaken on 28th January 2021. Potential wetlands were assessed using the procedure described in the Wetland Delineation Protocols (Ministry for the Environment, 2020). The nearest Auckland Council rainfall monitoring point, Whenuapai Air Base approximately 3 km away, recorded no significant rainfall events over the preceding week (Table 6).

Table 6: Dates and Depth of Rainfall Over the Previous Week (Mt Albert Grammar)

Date	Daily Rainfall (mm)
22/01/2021	0.5
23/01/2021	0
24/01/2021	0.5
25/01/2021	0
26/01/2021	0
27/01/2021	0
Total Rainfall (mm)	**1**

On the site visit, 2 areas were identified for further investigations. Potential Wetland 1 and Potential Wetland 2 were identified for featuring vegetation distinct from the surrounding area and for being at the bottom of the hillslope, an area where wetlands are likely to occur. Potential Wetlands 1 and 2 are shown on Figure 5 and representative site photos are provided in Table 9.

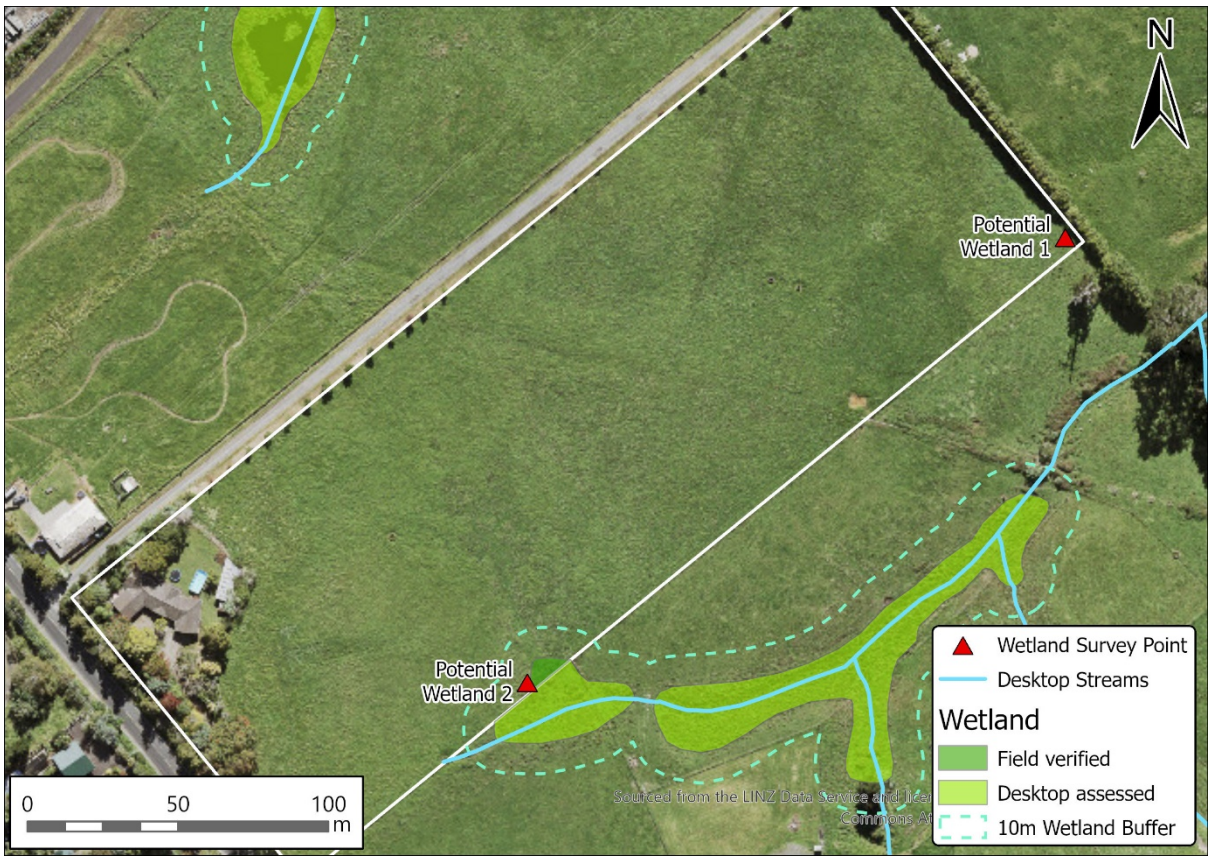

Figure 5: Subject site and potential wetlands. Potential Wetland 1 was assessed as 'not a wetland', and Potential Wetland 2 was found to meet the definition of a wetland under the RMA and NPS:FM.

Neither the distinct vegetation nor the location below a hillslope are grounds in and of themselves to conclude that a feature is a wetland. Wetlands have many distinguishing features, the most notable being the presence of water at or near the surface, vegetation adapted to or tolerant of saturated soils and distinctive hydromorphic soils. Assessing indicators of the presence of each of these features is widely accepted as a valid way to identify wetlands.

Surface Water

There were no signs of surface water being present in this location during the site visit. The water level was not encountered at either Potential Wetland 1 or Potential Wetland 2 during hand auguring (to a depth of 500 mm).

Vegetation Assessment

Past land-use management, including vegetation clearance, and potentially the sowing of pasture species has removed the natural vegetation. The remaining vegetation is comprised of typical unkept pasture species ranges from Facultative – Wetland to Facultative – Upland species.

The Wetland Delineation Protocols apply a "Rapid Test" and "Dominance Test" to a plant community to determine whether the vegetation is hydrophytic (wetland). The on-site vegetation fidelity to wetlands was taken from Clarkson (2013). A representative 1 x 1 m quadrat was established near the middle of each wetland; and moved outwards at 3 – 5 m intervals until the vegetation was consistent with that of the surrounding pasture. Table 7 provides a summary of the Rapid and Dominance Tests.

The on-site vegetation displayed some fidelity to wetlands, all four survey points failed the Rapid Vegetation Test. Given the dominance of Facultative species present, Potential Wetland 1 and Potential Wetland 2 passed the Dominance Test. The Wetland Delineation Protocols require the soils be assed for indicators of hydric soils.

Table 7: Vegetation Assessment

Location	Species Present	Fidelity to Wetlands	Coverage	Rapid Test Outcome	Dominance Test Outcome
Wetland 1 Plot 1	Sharp-pointed rush (*junctus acutus*)	FACW (exotic)	25	Fail – Dominant species are not Obligate or Facultative Wetland species; requires dominance test	Pass - > 50% vegetation is Facultative; requires soil and wetland hydrology assessment
	Rye grass (*lolium perenne*)	UPL	25		
	Buttercup (*Ranunculus repens*)	FAC	20		
	Birdsfoot (*Lotus pedunculatus*)	FAC	20		
	Broadleaf plantain (*Plantago major*)	FACU (Exotic)	5		
	Water pepper (*Persicaria hydropiper*)	FACW (exotic)	5		
Wetland 1 Plot 2	Birdsfoot (*Lotus pedunculatus*)	FAC	60	Fail – No obligate and Facultative Wetland species present; requires dominance test	Pass - > 50% vegetation is Facultative; requires soil and wetland hydrology assessment
	Buttercup (*Ranunculus repens*)	FAC	20		
	Rye grass (*lolium perenne*)	UPL	15		
	Yorkshire fog (*Holcus lanatus)*	FAC (Exotic)	5		
Wetland 2 Plot 1	Rye grass (*lolium perenne*)	UPL	55	Fail – Dominant species are not Obligate or Facultative Wetland species, requires dominance test	Fail - < 50% vegetation is Facultative; requires soil and wetland hydrology assessment
	Sharp-pointed rush (*junctus acutus*)	FACW (exotic)	10		
	Buttercup (*Ranunculus repens*)	FAC	10		
	Red Clover (Trifolium pratense)	FACU (exotic)	10		
	Broadleaf Dock (*Rumex obtusifolius)*	FAC (exotic)	5		
	Birdsfoot (*Lotus pedunculatus*)	FAC	5		
	White Clover (*Trifolium repens*)	FACU (exotic)	5		

Location	Species Present	Fidelity to Wetlands	Coverage	Rapid Test Outcome	Dominance Test Outcome
Wetland 2 Plot 2	Rye grass (*lolium perenne*)	UPL	15	Fail – No obligate and Facultative Wetland species present, requires dominance test	Pass - > 50% vegetation is Facultative; requires soil and wetland hydrology assessment
	Yorkshire fog (*Holcus lanatus)*	FAC (Exotic)	20		
	Birdsfoot (*Lotus pedunculatus*)	FAC	40		
	Red Clover (Trifolium pratense)	FACU (exotic)	10		
	Buttercup (*Ranunculus repens*)	FAC	15		

Soils Assessment

Wetland soils display hydromorphic characteristics resulting from prolonged and repeated saturation. These processes result in distinctive characteristics that persist in the soil during both wet and dry periods, making them particularly useful for identifying hydric soils in the field. Evidence of hydric soils is indicated by the presence of gley soil; the presence of iron mottles, and/or an abundant accumulation of organic carbon in the topsoil (i.e. peat).

At Potential Wetland 1 there was a uniform layer of top-soil with a transition to the underlying clayey layer at approximately 250 mm (Plot 1) – 400 mm (Plot 2). The topsoil layer at Potential Wetland 1 was extremely dry and friable. Similarly, the clay at Potential Wetland 1 was dry with little plasticity. The sample depth was extended to 500 mm, due to the sample location being down-gradient of a hillslope and the potential for fill to have washed into this location. Below 400 mm the clay layer was uniform. At no stage was the presence of any mottles, signs of organic enrichment noted. Overall, the soil core did not appear gleyed as high chroma colours were still present.

At Potential Wetland 2 there was a uniform layer of topsoil for approximately 150 mm. The soil layer at Potential Wetland 2 was moist and rich in organic matter. The sample depth was extended to 500 mm, due to the sample location being down-gradient of a hillslope and the potential for fill to have washed into this location. Below 200 mm there was a noticeable increase in soil clay content down to a depth of approximately 300 mm after which clay became the dominant substrate. Between 350 – 500 mm the clay layer showed high plasticity (Figure 6). Soil mottling and signs of organic enrichment were observed as far down as the clay layer at 450 mm. Overall, the soil core appeared gleyed; and high chroma colours were absent from deeper soils.

The water level was not encountered at either sampling location.

Table 8: Soil Assessment

Location	Gleyed	Mottles	Carbon / Organic enrichment	Soil Outcome
Potential Wetland 1	No	No	No	Hydric soils absent
Potential Wetland 2	Yes	Yes	Yes	Hydric soils present

As shown in Table 8, indicators of hydric soils and wetland hydrology were present at Potential Wetland 2, and as such in applying the Wetland Delineation Protocols methodology the vegetation on at this point is assessed as 'wetland vegetation'. Following the Wetland Delineation Protocols, the vegetation at Potential Wetland 1 was assessed to be 'non-wetland vegetation'.

Figure 6: A soil core at Potential Wetland 2 found clay soils with a high degree of plasticity and some mottling.

Overall Assessment

The data collected and the Wetland Delineation Methodology were used to classify the two potential wetlands under the definitions in the RMA.

At Potential Wetland 1 the vegetation is dominated by facultative vegetation; indicators of hydric soils and wetland hydrology are absent. Having applied the Wetland Delineation Protocols methodology the vegetation in this area is assessed as 'non-wetland vegetation', therefore Potential Wetland 1 does not support a natural ecosystem of plants and animals that are adapted to wet conditions.

At Potential Wetland 2 the vegetation is dominated by facultative vegetation; however, indicators of hydric soils and wetland hydrology are present. Having applied the Wetland Delineation Protocols methodology this area has been assessed as a 'wetland vegetation', therefore displays evidence of being intermittently wet and supports a natural ecosystem of plants that are adapted to wet conditions, consistent with the RMA definition of a wetland.

Table 9: Wetland Delineation

	Landscape context	Vegetation	Soil Profile
Wetland 1 Point 1			
Wetland 1 Point 2			

	Landscape context	Vegetation	Soil Profile
Wetland 2 Point 1			
Wetland 2 Point 2			

Appendix 3 EIANZ Assessment Methodology

Table 10: Assigning value to species, vegetation, and habitats (summarised from EIANZ, 2018)

Value	Species Values	Vegetation/Habitat Values
Very High	Nationally threatened species found in the (Zone of Influence) ZOI[1] either permanently or seasonally	Area rates High for 3 or four attributes (Representativeness, Rarity/distinctiveness, Diversity and pattern, Ecological context). Likely to be national important and recognised as such
High	Species listed as At Risk – Declining, found in the ZOI either permanently or seasonally	Area rates High for 2 of the attributes, Moderate and Low for the remainder, or Area rates High for 1 assessment matters, Moderate for the remainder Likely to be regionally important and recognised as such
Moderate	Species listed as any other category of At Risk, found in the ZOI either permanently or seasonally, or Locally (ED) uncommon or distinctive species	Area rates High for 1 assessment matters, Moderate and Low for the remainder, or Area rates Moderate for 2 or more of the attributes, Low or Very Low for the remainder Likely to be important at the level of the Ecological District
Low	Nationally and locally common indigenous species	Area rates Low or Very Low for majority of assessment matters and Moderate for 1 Limited ecological value other than as for habitat for tolerant native species
Negligible	Exotic species, including pest species having recreational value	Area rates Very Low for 3 matters and Moderate, Low or Very Low for remainder

[1] The Zone of Influence (ZOI) refers to all land, water bodies and receiving environments that could be potentially impacted by the project.

Table 11: Criteria for describing magnitude of effect (summarised from EIANZ, 2018)

Magnitude	Description
Very High	Total loss of or major alteration to key features of the baseline condition causing a fundamental change or complete loss of the character, composition, or attributes of the site.
High	Major loss or major alteration to key features of the baseline condition causing a fundamental change of the character, composition, or attributes of the site.
Moderate	Loss or alteration of one or more key features of the baseline condition causing a partial change to the character, composition, or attributes of the site.
Low	Minor shift away from baseline conditions. Change may be discernible, but underling character, composition, or attributes of the site will be similar to pre-development.
Negligible	Very slight change from existing baseline condition. Change barely distinguishable.

Table 12: Criteria for describing level of effects (from EIANZ, 2018)

Ecological Value Magnitude	Very High	High	Moderate	Low	Negligible
Very High	Very High	Very High	High	Moderate	Low
High	Very High	Very High	Moderate	Low	Very Low
Moderate	High	High	Moderate	Very Low	Very Low
Low	Moderate	Low	Low	Very Low	Very Low
Negligible	Low	Very Low	Very Low	Very Low	Very Low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain