



*Co-creating a thriving ecosystem*

# Teitei Drive Wetlands

## Ecological Impact Assessment

---

**Final**

Prepared for Kaianga Ora



## Document Control

**Client Name:** Kaianga Ora  
**Project Name:** Teitei Drive Wetlands  
**Project Number:** P04109  
**Document:** Ecological Impact Assessment


## Revision History

Status	Date Issued (dd/mm/yyyy)	Author	Reviewed By	Released By
For Client Review	21/06/2023	Andrew Rossaak	Matt Conley	
Final	22/06/2023	Andrew Rossaak	Matt Conley	Stu Farrant

---

### Reviewed by:

**Reviewer:** Matt Conley

**Signature:** 

### Released by:

**Reviewer:** Stu Farrant

**Signature:** 

# Contents

Contents.....	ii
1. Introduction.....	4
1.1. Purpose and Scope .....	4
1.2. Site Overview.....	5
1.3. Methodology.....	6
2. Current Ecological Values.....	12
2.1. Ecological Context.....	12
2.2. Wetland.....	12
3. Proposed Activities and Potential Effects .....	13
3.1. Erosion and Sedimentation Effects .....	13
3.2. Wetland and Freshwater Effects .....	14
3.2.1. Water Quality.....	14
3.2.2. Water Quantity .....	14
3.2.3. Habitat, Aquatic Life, Ecological Processes.....	14
3.2.4. Biodiversity and hydrology .....	15
3.2.5. Effects summary .....	15
4. Ecological Impact Assessment and Management.....	16
4.1. Erosion and Sedimentation.....	16
4.2. Loss and Degradation of Wetland Habitat.....	16
5. Summary and Recommendations.....	18
6. References .....	19
Appendix 1 EIANZ Assessment Methodology.....	20

# Figures

Figure 1: Proposed residential development location and layout.....	4
Figure 2: Proposed development site looking from the southeast corner to the north west.....	5
Figure 3: Proposed development site looking northeast from the south western section. ....	6
Figure 4: NES:F wetland determination flow diagram (MfE 2022).....	7
Figure 5: Potential wetlands for further assessment as identified by Kahu. ....	8
Figure 6: Wetland assessment points and area assessed as wetland.....	9
Figure 7: Soils in potential wetland area 4 illustrating dry lower horizon and red colours. ....	9
Figure 8: Potential wetland area 3.....	10
Figure 9: Aerial image of the site from 1963 showing railway to the north and earthworks into the north west of the site. ....	11

# Tables

Table 1: Summary of ecological values for wetland onsite. .... 12

Table 2: Summary of level of effect of the proposed activities prior to, and including, implemented controls..... 17

Table 3: Assigning value to species, vegetation, and habitats (summarised from EIANZ, 2018) ..... 20

Table 4: Criteria for describing magnitude of effect (summarised from EIANZ, 2018) ..... 21

Table 5: Criteria for describing level of effects (from EIANZ, 2018) ..... 21

# 1. Introduction

## 1.1. Purpose and Scope

Morphum Environmental Limited (Morphum) was engaged by Kaianga Ora to prepare an Ecological Impact Assessment (EclA) of the wetland to support a resource consent application for the proposed residential development at Teitei Drive in Ohakune (the site, Figure 1). This EclA follows an initial request to provide an assessment on the potential presence and status of any wetlands on site, which was supported by a memo (Morphum 2023).

This assessment is to support an ecological assessment of the site and associated watercourses that excludes wetlands that is being undertaken by Kahu (Kahu 2023) and expands on the wetland and stormwater memo provided by Morphum to include effects assessment on the wetlands on site.

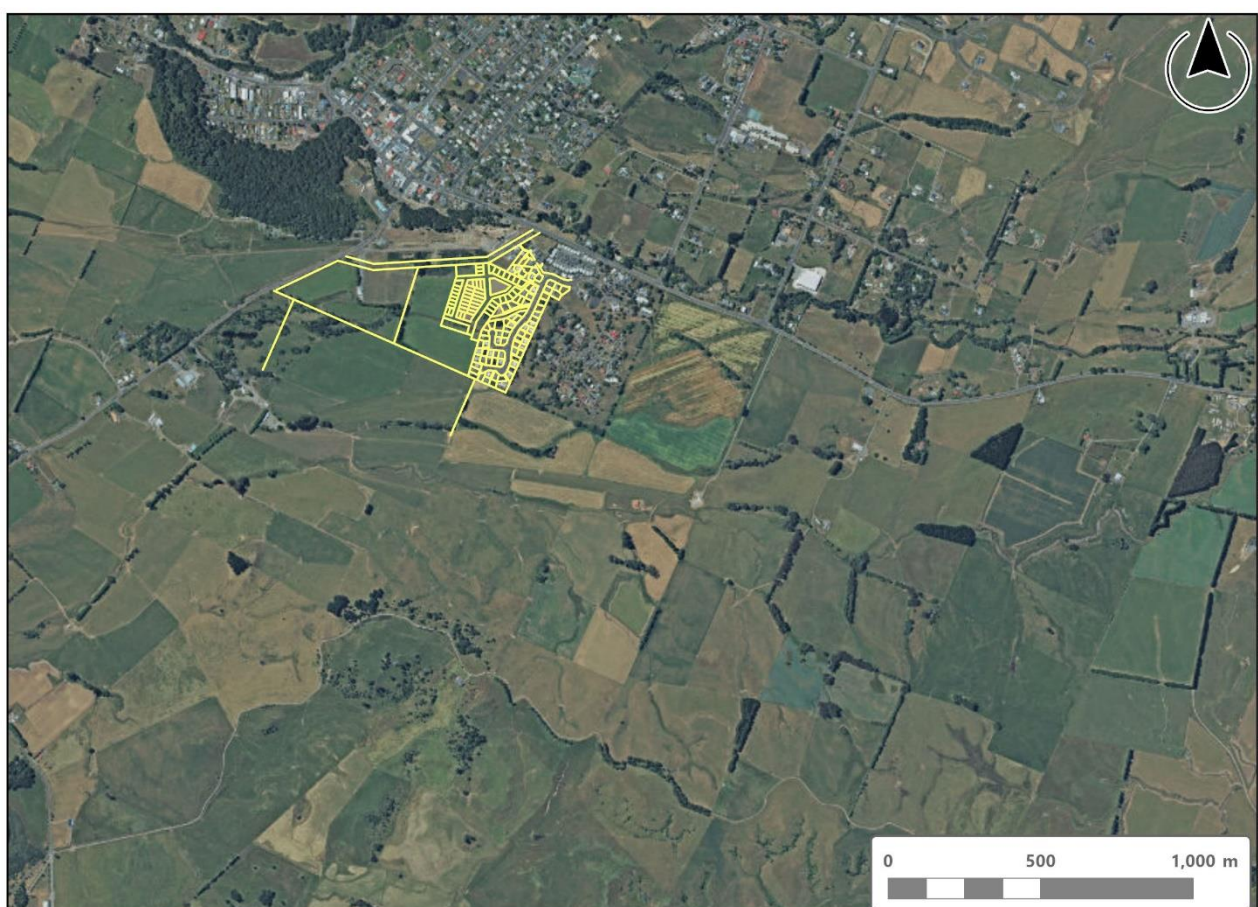


Figure 1: Proposed residential development location and layout.

This assessment has been undertaken following the effects management hierarchy required to be assessed under the National Environmental Standards for Freshwater (NES:F) and the National policy Statement for Freshwater (NPS:F). The assessment of effects has been undertaken in accordance with the Environmental Institute of Australia and New Zealand EclA Guidelines (2018, second edition) (EIANZ guidelines).

The scope of this EclA is limited to an assessment of potential wetland features on the subject site and any adverse effects of the proposed subdivision and development on the wetland(s).

## 1.2. Site Overview

The proposed development site is located at the southwest end of Teitei Drive, off Rangataua Road (State Highway 49), approximately 500 metres southeast of the Ohakune town centre. The proposed activities include the construction of roading and other services to the proposed subdivisions.

The site does not appear to have been used for stock grazing, but rather is used to cut hay/silage (Figure 2, Figure 3). The site has well established pasture grasses with silage pit areas on the central fence-line running north-south. Areas of the site remain uncut either due to proximity to waterways or for an apparent presence of a plant unpalatable to stock.



Figure 2: Proposed development site looking from the southeast corner to the northwest.



Figure 3: Proposed development site looking northeast from the southwestern section.

Landcare Research Land Cover Database (LCDB) v5.0 (Landcare Research, 2022) classifies the land cover of the site predominantly as *High Producing Exotic Grass Land*, and does not record any wetlands. This is considered to be an accurate high-level description of the land cover onsite. The immediate surrounding area is in a similar agricultural land use pattern, with some residential development to the east

Additional ecological context is provided in the primary EclA (Kahu 2023).

### 1.3. Methodology

Morphum visited site on 10 May 2023. The nearest rain gauge (Waiharuru, 6 km to the southeast) recorded 15 mm total rainfall over the 10 days prior; however, on the day of the site visit, heavy falls were recorded and over 23 mm fell throughout the day.

The Ministry for the Environment's Wetland Delineation Protocols (2022) (WDP) were applied to sites that could potentially be a wetland (Figure 4).

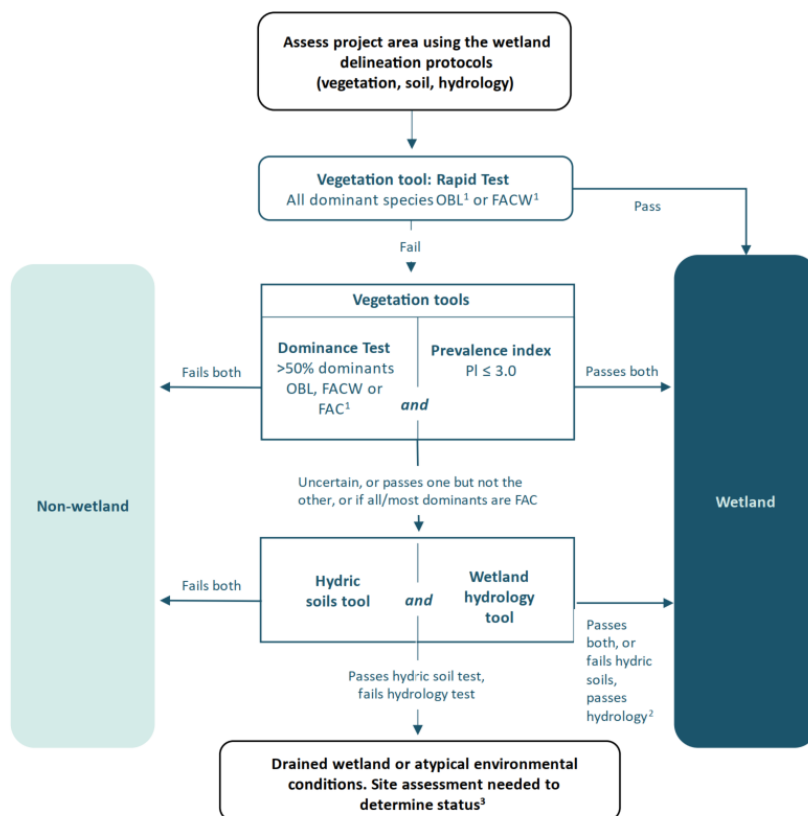


Figure 4: NES:F wetland determination flow diagram (MfE 2022)

Preliminary ecological assessments by Kahu had identified 4 potential wetland areas on or close to the site (Figure 5). Three of these are along a watercourse/gully system forming the northern boundary of the site and the fourth is in the south of the site (Figure 5).

Eight potential wetland points were investigated within the areas identified by Kahu during the site visit. In each location a vegetation assessment and soil core assessment were undertaken. In all cases the plants on site were exotic pasture species and weeds. Soil samples were taken at these plots in accordance with the Hydric Soils – Field Identification Guide (Fraser *et al.* 2018).





Figure 5: Potential wetlands for further assessment as identified by Kahu.

The potential wetland in the south of the site (labelled wetland 4) is a roughly triangular shape and is bordered on the southeast and southern extent by a modified stream. The western extent follows a fence-line, and the northern extent follows a farm track. The vegetation consisted of rank pasture grass (tall fescue, *Lolium arundinaceum*) with patches of *Ranunculus acris*, an exotic species that is easily spread by stock and machinery and is commonly known as meadow buttercup or giant buttercup. This species often grows in moist areas, but is not a determination of wetland, being noted as a facultative species on the wetland plant indicator status rating (Clarkson *et al.*, 2021). It is also considered to be poisonous to livestock and avoided by dairy cattle, which could explain why this area is not included in the hay/silage harvesting conducted on the site. With both *Ranunculus acris* and tall fescue being noted as being facultative (FAC) on the indicator status list, assessment using vegetation alone is inconclusive for wetland determination or delineation (and would provide inconclusive results for either dominance or prevalence tests). For this reason, further assessment of the vegetation as a wetland indicator at this transformed site was not undertaken. In accordance with Figure 4, an assessment of hydric soils and wetland hydrology was, therefore, undertaken.

The potential wetland 4 site was slightly downslope, and a stream bordered one side, however, there were no indicators of inundation. Soil augers were undertaken in three locations (points P1, P2 and P3, displayed in Figure 6). The soils were damp near the surface (due to dense vegetation), but dry and friable at a depths of 150 to 300 mm with a colour indicating there was no gleying (Munsell 10YR 5/4) (Figure 7). No mottles were present. This indicates that this area is not a wetland as it lacks wetland hydrology and hydric soils. It is likely that this area is vegetatively different from the rest of the paddock as it has not been mown and allowed to grow rank with resulting increased moisture in the vegetated matter.



Figure 6: Wetland assessment points and area assessed as wetland (point 7 in standing water and points 5, 6 & 8 denote the edge of the wetland. Points 1 to 4 no wetland was found).



Figure 7: Soils in potential wetland area 4 illustrating dry lower horizon and red colours.

Potential wetland 1 (Figure 5) is likely a wetland. This is upstream of the site and more than 10 m for expected earthworks. As such it is not considered likely to impact the works, and the works are unlikely to affect the hydrology of this wetland. Further assessment was not undertaken to confirm its wetland status or determine whether it is constructed or a natural wetland.

Potential wetland 2 (Figure 5) was noted as a flooded gully area downstream of the culvert under the access path to the site. There was a mix of exotic species here including willows (*Salix* spp.) and blackberry (*Rubus fruticosus*). The pasture grasses on the edge of this area were flooded at the time of our site visit. There were areas that indicated sustained inundation and pooling of water, indicating a wetland using the hydrology tool. There is an access track separating wetland areas 2 and 3 which did

not appear to have any pipes or culverts installed, but composed of mixed gravel aggregate (road base) placed in the gully. The wetland is partially induced as a result of this accessway (the upstream portion). This does not, however, alter the status of wetland 2 as a natural wetland under the NES:F or under the RMA. (points 5, 6 and 8 are on the wetland edge)

Potential wetland 3 is immediately downstream of wetland 2. It was also flooded into the pasture grass edge at the time of the site visit (Figure 8). Vegetation is similar to wetland 2 and based on the evidence of regular flooding and very wet soils, this too is considered a **natural wetland under the NES:F**.



Figure 8: Potential wetland area 3.

This wetland area was delineated primarily using the wetland hydrology present, and supported with hydric soil assessments; this is shown in Figure 6 with supporting assessment points (P5 to P8).

Wetland 3 was followed downstream where the surface water disappeared. Following the watercourse was restricted by the dense vegetation and, as such, there is uncertainty as to the fate of this water flow. Further assessment may be required. It was noted that there were dry soils in the gully at the western extent of potential wetland 3 (point 4, Figure 6).

The northern gully area was irregular at the western end (point 4, Figure 6) and it is suggested that this area may be an old waste fill area. Historical imagery from Retrolens<sup>1</sup> shows a railway line existed near this location and that there is likely to have been earthworks and other land transformation activities at this location in the past (Figure 9). There is currently no railway in this location.

---

<sup>1</sup> Retrolens.co.nz



**Figure 9: Aerial image of the site from 1963 showing railway to the north and earthworks into the north west of the site.**

We recognise that wetland extents can vary seasonally. Our delineation is conservative in this respect where the topography was flat, however, the majority of this wetland edge transitions abruptly into rising ground at the edge of the gully, providing a clear hydrology change.

Following our site visit and desktop review, the EIANZ guidelines have been utilised to describe the current ecological values of the wetland within the site. For reference, the EIANZ guideline methodology summary tables are presented in Appendix 1.

## 2. Current Ecological Values

### 2.1. Ecological Context

The site is located southern part of the Tongariro Ecological District (ED) and historically would have been covered with a mix of podocarp tree species. Original land cover has been substantially modified by human activity, primarily agriculture, and this site appears to have been managed as pasture for more than 80 years. Additional historical context is provided in the EclA.

Ecological values assessed are limited to those of the identified wetland on the northern boundary of the site.

### 2.2. Wetland

The wetland is well shaded (in summer), with a few regenerating natives (including mānuka), but is dominated by several weed species such as willows, blackberry, and broom (*Carmichaelia australis*) (Figure 8). The vegetation to the south and on the edge of the wetland area is consistent with the LCDB classification as "high producing exotic grassland".

Works are not proposed over the majority of this wetland, however, access to the site will impinge on the upstream extent of the wetland.

Table 1 below provides an assessment of the ecological values of the wetland, utilising the assessment matters from the EIANZ guidelines. The ecological value of the wetland and associated vegetation has been considered **Very Low** due to the dominance of exotics and weeds and its induced formation.

**Table 1: Summary of ecological values for wetland onsite.**

Feature	Ecological Value (EIANZ, 2018)	Reasoning
Representativeness	<b>Very Low</b>	Wetlands dominated by exotic species with facultative pasture vegetation on the edge. Not representative of natural wetland vegetation community.
Rarity/Distinctiveness	<b>Low</b>	Wetland habitat is threatened regionally and nationally, however, none of the species present are considered threatened, nor of botanical note.
Diversity and Pattern	<b>Very Low</b>	Highly modified environment, the current native species diversity is low, and below the expected level for natural wetland habitat.
Ecological Context	<b>Low</b>	Wetland is likely a result of modification resulting in limited ecological function. Not likely to support nationally or locally threatened or uncommon species. May provide low-quality habitat for avifauna, however, appears to be isolated with no apparent hydrological connectivity, therefore, there is limited habitat for aquatic fauna.

The potential value of the wetland is low due to its induced nature, past land use, and that it is isolated. Further, there is no apparent hydrological connectivity to the other watercourses on the site. It is recognised that the wetland could be enhanced to increase its biodiversity and habitat for fauna.

### 3. Proposed Activities and Potential Effects

An assessment of the potential ecological impacts resulting from the proposed activities has been based on the resource consent plans by Cheal (Kainga Ora Homes and Communities, 6 Teitei Drive, Ohakune. Dated 23/05/2023), Engineering services report (Cheal, revision 1 dated 2 June 2023) as well as the construction methodology details supplied in discussions with the project team. The proposed site development and subdivision will include the following activities:

- Earthworks for roading and lot layout within 10 m of the wetland
- Access road development, including the replacement of a culvert which is adjacent to the wetland.
- Wetland reclamation in the extension of the replacement culvert under the access way.

It is acknowledged that the proposed works have the potential to result in adverse ecological effects to the wetland. Effects are likely to be both temporary; related to construction activities, and permanent; related to the loss of wetland extent.

The following potential effects are expected to be associated with the proposed activities and are discussed further below:

- Erosion and sediment effects from land disturbance.
- Wetland effects.

The access way culvert (23 m long, 1.05 m diameter) is planned to meet permitted activity standards under the NES:F (S70), being 25% imbedded, 1.3 times the width of the stream. The culvert, being upstream of the wetland, is not anticipated to have an adverse effect or drain the wetland. The imbedded culvert will allow for fish passage, however, there is a low likelihood of any fish being present due to limited downstream connectivity.

Earthworks within 10 m of the wetland for the lot development will be restricted to the removal of pasture vegetation.

Wetland vegetation and loss of extent through the development (expansion) of the site access road.

#### 3.1. Erosion and Sedimentation Effects

Earthworks will be required for the development of the site, inclusion services and roading.

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.

As there is limited downstream connectivity, it is considered there is limited dispersal range for any sediment discharge to the wetland. Furthermore, due to the limited available aquatic habitat, and the absence of any known species sensitive to sediment disturbance, the magnitude of effect of unmitigated sediment discharge on the wetland is considered as **Low**.

## 3.2. Wetland and Freshwater Effects

The access road will be partially through an upstream extent of an induced but natural wetland under the NES:F. The works will require earthworks and vegetation clearance within this wetland.

With regard to the natural wetland, this assessment is framed in respect of the potential effects on the values as set out in subpart 3, specific requirements of the NPS:FM, being:

- Ecosystem health (Water quality, Water quantity, Habitat, Aquatic life and Ecological processes).
- Indigenous biodiversity.
- Hydrological functioning.

The magnitude of potential effects on the wetland biophysical values are outlined and discussed below. Duration and timescale (permanence) of proposed construction and effects on the natural wetland have also been considered. Considering the below assessments, and noting the absence of sensitive or threatened species and limited downstream connectivity, the overall magnitude of effect of the proposed activities on the wetland has been assessed as **Low**.

### 3.2.1. Water Quality

The construction works and ongoing operation of the residential development has the potential to result in the discharge of various contaminants into the freshwater environment. Earthworks water quality effects were discussed in section 3.1. above.

As works will be within 10 m of parts of the wetland and within the wetland at the upper extent, there is a risk for spills of contaminants such as cement-laden water. Concrete or cement can impact water quality by increasing pH and alkalinity, leading to chemical burns and mortality in aquatic flora and fauna. Even small volumes of concrete contamination can substantially alter the water chemistry and take a long time to recover.

Additionally, there is risk of spills of fuels and lubricants associated with machinery during construction, and during the ongoing operation due to the transmitter building (including diesel storage tank) and its location upgradient of the wetland. These substances are ecotoxic; spills of sufficient volume could kill aquatic fauna and degrade aquatic habitats.

### 3.2.2. Water Quantity

The existing site watercourse feeds the wetland after flowing through the access path culvert.

The earthworks are not anticipated to require diversion of water away from the wetland. There may be some delay to overland flows resulting from impoundment associated with sediment controls and the installation of the culvert, however, this is not expected to result in discernible effects on wetland hydrology. The construction of the impermeable surfaces will result in localised diversions of overland and stormwater flows, however, these are all downslope of the wetland and unlikely to alter the hydrological regime within the wetland.

### 3.2.3. Habitat, Aquatic Life, Ecological Processes

The proposed works will involve vegetation clearance within the wetland and replacement with a culvert and roading. Vegetation to be cleared is a mixture of exotic pasture grass and associated weeds, as well

as willows and broom. The approximate area of proposed culvert and access way in wetland area is approximately 350 m<sup>2</sup>. In total, this represents less than 15% of the induced wetland. This is not expected to result in any distinguishable effects on ecological processes of the wetland.

#### 3.2.4. Biodiversity and hydrology

The wetland is dominated by exotic and weed species and works within the wetland is not expected to adversely affect the biodiversity. The disconnected nature of the wetland from any other watercourse means that it is unlikely there will be any native fish present.

The hydrology of the wetland is maintained by the flow from the stream (originating in the urban area to the northeast of the site) and the gravel fill for the pathway across the gully in the location of the wetland. The proposed works will not alter either of these features. Inflow from the site is low with no defined channels. Temporary diversions for sediment control and the installation of the culvert may have temporary effects on the wetland hydrology, however, over the longer term the wetland hydrology is expected to remain similar to existing.

The accessway culvert will be installed to meet NES:F permitted activity standards and is unlikely to have any adverse effects on the wetland.

#### 3.2.5. Effects summary

The expected level of ecological effects of the proposed activities on the wetland, prior to implementing effects management methodologies, have been assessed as **Low**.



## 4. Ecological Impact Assessment and Management

The current ecological values of the wetland have been described based on field observations in conjunction with a review of the available information. The likely activities and level of effect (pre-any effects management) have been described and set out in Section 3. This section discusses proposed effects management methodologies and utilises the findings of Sections 2 and 3 to provide an assessment of the post-mitigation level of ecological effects based on the EIANZ guidelines.

### 4.1. Erosion and Sedimentation

Sedimentation effects related to earthworks are to be mitigated through implementation of best practice erosion and sediment control methodologies, such as those within Auckland Council's Guideline Document 2016//005 *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region* (GD05). The use of best practice erosion and sediment controls would be considered appropriate to address any potential sediment impacts on water quality. There are no known site-specific constraints that would prevent erosion and sediment control being in accordance with best practice.

### 4.2. Loss and Degradation of Wetland Habitat

The access to the site, zoned as residential, is required off the existing Teitei Drive. This access needs to be widened and will necessitate the loss of some wetland. The wetland habitat loss resulting from the access way will be a small percentage of the overall wetland area. Furthermore, the current condition of the wetland is highly modified as a result of agricultural and past land use, and is induced in nature, with a dominance of exotic vegetation. For these reasons, it is considered the loss of habitat will not discernibly impact the wetland functioning.

Nevertheless, the National Policy Statement for Freshwater requires that activities will not result in the loss of extent or values of a natural wetland. It is considered that planting of the wetland in association with the proposed activities would increase biodiversity values and that native planting in the wetland would likely result in an overall net ecological gain. Wetland planting with locally sourced native species should be incorporated into the sitewide planting plan.

The loss of extent of the partially induced wetland can be addressed through increasing the wetland extent on the southwestern edge, which is within the subject property. There is ample room in this location to address any potential loss and it is contiguous with the lost area. The area of wetland extension should equal or be greater than that lost as measured on the completion of works.

The low effect on biodiversity, dominance of exotics and isolated nature suggests there is a low likelihood of native fish and therefore fish salvage is not expected to be required.

The mixing of concrete and similar products should only be undertaken in the dry to minimise the potential for any spillage; the use of ready-mix concrete is encouraged to minimise cement works onsite. Additionally, an area should be identified onsite, away from any watercourses and with adequate containment, to receive any excess concrete material prior to disposal. No washing or cleaning of wet cement material or equipment should be undertaken onsite where runoff could enter site watercourses. Once cured, concrete would be inert and not be expected to generate contaminants.

Refuelling of machinery during construction should be undertaken away from watercourses. To further minimise the risk of a spills to the environment, a spill kit should be kept on site (during both the construction phases) and all staff trained in its appropriate use.

With the water quality and water quantity within the wetland unchanged, native planting in the wetland, and potential to retain extent, it would not be expected that the access way and subdivision development would substantially alter the current ecological values of the wetland. Accordingly, the post-management magnitude of effect for the wetland has been assessed as **Low** (see Table 2).

The small loss of wetland habitat is unlikely to alter the wetlands underlying character and composition, and it is considered that there would be no residual adverse effects. For this reason, and given the post-management magnitude of effect, it is not considered that any offsetting or compensation would be required for the loss of habitat.

**Table 2: Summary of level of effect of the proposed activities prior to, and including, implemented controls.**

<b>Impact</b>	<b>Ecological Value (EIANZ, 2018)</b>	<b>Magnitude (after effects management)</b>	<b>Level of effect with management</b>
Loss and degradation of wetland habitat	<b>Low</b>	<b>Low</b> – In addition to erosion and sediment control, any fuels or lubricants required to be stored will have best practice containment. Refuelling will be undertaken away from waterways. Spill kits will be kept on site. There will be a small loss of wetland habitat as a result of the required culvert and access way, therefore, there will likely be a localised discernible effect, but this is unlikely to alter the underlying character and composition of the wetland. Wetland planting will likely provide net gain.	<b>Very Low</b>

## 5. Summary and Recommendations

This Ecological Impact Assessment has been prepared to support the lodgement of a Resource Consent application for the proposed subdivision and residential development at Teitei Drive in Ohakune.

An overarching ecological assessment for the site has been undertaken by Kahu. This assessment supports the Kahu EclA with the inclusion of an assessment of the potential wetlands on site. Only one wetland met the NES:F definition of a natural inland wetland, and this is at least partially induced.

An assessment utilising the EIANZ Ecological Impact Assessment Guidelines (2018) has been undertaken on the wetland in order to determine the ecological values, as well as the magnitude and level of effect resulting from the proposed construction activities.

The wetland is considered to be of low ecological value due to the presence of exotic and invasive plants and its highly modified nature, not resembling of the natural environment expected for the area.

Potential effects have been considered as the following:

- Erosion and sediment effects from land disturbance.
- Effects of wetland habitat loss and degradation.
- Effects on wetland hydrology

Effects management measures include:

- Implementing best practice erosion and sediment control methodologies.
- Containment of fuels and cement.

The following recommendations are provided, in addition to the preliminary construction methodology, to further mitigate ecological risks:

- Any temporary sediment stockpiling or machinery refuelling is undertaken away from site watercourses.
- Maintain a fully stocked spill kit on site, during both construction and operations phases, and ensure staff are trained in its appropriate use.
- Planting enhancement off the induced wetland area. This should be incorporated into a site wide planting plan.
- Maintenance of wetland extent through extension of southwest wetland edge.

The overall level of effect (with effects management) for the proposed works has been assessed as very low. As per the EIANZ Guidelines, a low or very low level of effect should not normally be of concern, provided normal design, construction and operational care is exercised to minimise any adverse effects, and any impact management developed during project planning is implemented as intended.

## 6. References

Auckland Council (2016). Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, Guideline Document 2016/005 (GD05).

Clarkson, B. (2013). A vegetation tool for wetland delineation in New Zealand. Landcare Research.

Environment Institute of Australia and New Zealand Inc. (EIANZ) (2018) Ecological Impact Assessment (EiA): EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems (2nd Edition). EIANZ, Melbourne, Australia.

Fraser, S., Singleton, P., & Clarkson, B. (2018). Hydric soils – field identification guide. Landcare Research

Kahu (2023). Stream Assessment Report for The Proposed Development At 6 Teitei Drive Ohakune. Prepared by Rachel Griffiths of Kahu, dated 15 June 2023.

Landcare Research (2020). Land Cover Database (LCDB) version 5, Mainland New Zealand. Retrieved from LRIS portal: <https://lris.scinfo.org.nz/layer/48423-lcdb-v5.1-land-cover-database-version-5-mainland-new-zealand>. Accessed 17/02/2023.

Ministry for the Environment (2022). Wetland delineation protocols. Wellington: Ministry for the Environment.

## Appendix 1 EIANZ Assessment Methodology

**Table 3: Assigning value to species, vegetation, and habitats (summarised from EIANZ, 2018)**

<b>Value</b>	<b>Species Values</b>	<b>Vegetation/Habitat Values</b>
Very High	Nationally threatened species found in the (Zone of Influence) ZOI <sup>2</sup> 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

<sup>2</sup> The Zone of Influence (ZOI) refers to all land, water bodies and receiving environments that could be potentially impacted by the project.

**Table 4: Criteria for describing magnitude of effect (summarised from EIANZ, 2018)**

<b>Magnitude</b>	<b>Description</b>
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 underlying 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 5: Criteria for describing level of effects (from EIANZ, 2018)**

<b>Ecological Value</b>	<b>Very High</b>	<b>High</b>	<b>Moderate</b>	<b>Low</b>	<b>Negligible</b>
<b>Magnitude</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
<b>Positive</b>	Net gain	Net gain	Net gain	Net gain	Net gain

# MORPHUM

environmental

## NEW ZEALAND

### Auckland

Level 4, 18 Sale St,  
Auckland Central, Auckland 1010

Tel: +64 9 377 9779

### Nelson

3 Wensley Road, Richmond 7020

### Wellington

9 Tory Street, Te Aro,  
Wellington 6011

Tel: +64 4 802 4987

### Waikato

65 Victoria St, Hamilton 3204

## AUSTRALIA

### Melbourne

Level 17, 31 Queen Street,  
Melbourne 3000

Tel: +61 3 9111 5640

[info@morphum.com](mailto:info@morphum.com) | [www.morphum.com](http://www.morphum.com)