



# memorandum

TO Tim Carter FROM Inge Martens and  
Nicki Papworth  
Carter Group Limited DATE 13 August 2025  
RE Wetland Assessment – 531 & 535 Mill Road, Ohoka

## 1.0 Introduction

Pattle Delamore Partners Ltd (PDP) was engaged by Carter Group Limited (CGL) to undertake a site-wide wetland delineation at 531 & 535 Mill Road, Ohoka (Figure 1). The specific objectives of this investigation were to identify and delineate the extent of wetland habitat on the property to support CGL's Fast track application to develop the land into a residential subdivision.

This memorandum outlines the methodology and findings of the wetland delineation performed by PDP ecologists (see Appendix A).

## 2.0 Wetland Definitions

### RMA:

As outlined in the RMA (1991), a **wetland** is an area that is intermittently or permanently saturated by water and supports natural ecosystems of plants and animals adapted to wet conditions.

### NPS-FM:

The NPS-FM 2020 (amended January 2024) definition of a '**natural inland wetland**' is a wetland (as defined in the RMA) that is not:

- (a) in the coastal marine area; or
- (b) a deliberately constructed wetland, other than a wetland constructed to offset impacts on, or to restore, an existing or former natural inland wetland; or
- (c) a wetland that has developed in or around a deliberately constructed water body, since the construction of the water body; or
- (d) a geothermal wetland; or
- (e) a wetland that:
  - (i) is within an area of pasture used for grazing; and
  - (ii) has vegetation cover comprising more than 50% exotic pasture species (as identified in the National List of Exotic Pasture Species using the Pasture Exclusion Assessment Methodology); unless
  - (iii) the wetland is a location of a habitat of a threatened species identified under clause 3.8 of this National Policy Statement, in which case the exclusion in (e) does not apply.

### 3.0 Methodology

Site visits for 535 Mill Road, the majority of the project site, were undertaken on the 28<sup>th</sup> and 29<sup>th</sup> of November 2024 to assess and delineate the extent of wetland habitat (Figure 1). A later visit was conducted on 3<sup>rd</sup> of June 2025 to investigate the potential for wetland presence at 531 Mill Road. This parcel of land was purchased following the original survey dates. Representative site photographs of both addresses are provided in Appendix B.

An initial desktop assessment using aerial imagery (Google Earth) was undertaken to assess the possible presence of wetlands within the property boundaries. Indicators of wetland presence in aerial imagery included visible surface water, sparsely vegetated land depressions, seasonal inundation, vegetation colouration, and vegetation composition. Areas with these features were prioritised for field delineation and all efforts were made to access these areas by foot to confirm the vegetation types present.

Areas suspected of containing wetlands were assessed as per standard wetland delineation protocols for New Zealand based on the presence or absence of hydrophytic vegetation as outlined in the Ministry for the Environment (MfE) wetland delineation protocols (MfE, 2020b). Exotic pasture species used for assessing the pasture exclusion provisions under clause (e)(ii) of the NPS-FM are those listed in the national list of exotic pasture species (MfE, 2020a).

The MfE protocols use the Clarkson (2014) methodology, which assesses the presence of wetlands based on the presence of hydrophytic plants and species adapted to wet conditions. Under this classification all species are assigned an indicator status depending on the likelihood of them occurring within areas of wetland. These categories are:

- ∴ **OBL: Obligate.** Almost always is a hydrophyte, rarely in uplands (estimated probability >99% occurrence in wetlands).
- ∴ **FACW: Facultative Wetland.** Usually as a hydrophyte but occasionally found in uplands (estimated probability 67-99% occurrence in wetlands).
- ∴ **FAC: Facultative.** Commonly occurs as a hydrophyte but occasionally found in uplands (estimated probability 34-66% occurrence in wetlands).
- ∴ **FACU: Facultative Upland.** Occasionally is a hydrophyte but usually occurs in uplands (estimated probability 1-33% occurrence in wetlands).
- ∴ **UPL: Obligate Upland.** Rarely is a hydrophyte, almost always in uplands (estimated probability <1% occurrence in wetlands).

Areas that are dominated (>50% cover) by OBL or FACW plants satisfy the rapid hydrophytic vegetation (RHV) test for the presence of wetland vegetation. These are therefore considered to be wetlands without the need for further sampling or investigations of hydrology or soils. Areas that did not meet these requirements required a wetland survey plot (2x2 m) to assess the potential of meeting the criteria of a wetland habitat.

After wetlands were identified using the MfE protocol in the field, aerial imagery available from Google Earth, Retrolens and LiDAR was reviewed to check wetland vegetation historicity and to inform the assessment of extent. Wetlands were then geospatially digitised using ArcGIS Pro (v.3.4) and the dominant vegetation and structure recorded using the Atkinson system for describing structural classes.

## 4.0 Results

### 4.1 Site Description

The project area areas of saturation and a mosaic of hydrophytic species scattered among primarily pastoral, non-wetland vegetation. There was no need to undertake detailed ground assessments of a range of areas across the landscape where the dominant vegetation was primarily perennial ryegrass (*Lolium perenne*). This is a FACU and pasture species under the MfE (2020b) delineation protocols. It is noted that hydrophytic grass species such as marsh foxtail (*Alopecurus geniculatus*) and creeping bent (*Agrostis stolonifera*) were present in varying abundances across the whole property.

Several sites within the project site had features suggestive of wetland hydrology or vegetation visible in aerial imagery. At the time of the ground survey, these were found to be comprised of cut and carry pasture grasses. These recently mowed areas were not assessable, but we expect that they are the same composition as the surrounding areas that we assessed by foot (i.e., dominated by perennial ryegrass). The soil underneath the mowed areas were firm and there were no hydrology features indicative of wetland extent.

### 4.2 Vegetation

The field assessment identified 15 locations as wetland habitats (Figure 1, Table 1). Due to the dominant species and vegetation structure that was present, most wetland habitat sites met the rapid hydrophytic vegetation (RHV) test (MfE, 2020b). Hydrophytic species found within identified wetlands on the property are provided in Appendix C.

The 15 wetlands identified have been described in Table 1 based on their vegetation structure and hydrological features.

**Table 1: Wetland features identified at the Ohoka project site**

Wetland	Vegetation Type	Notes	Area (ha)
1	Marsh foxtail-creeping bent grassland-celery leaved buttercup grassland	This wetland was located in a depression on the south side of a stream to the west of the farm buildings. Pugging was significant as it appeared the area was also a common feed station spot for stock.	0.12
2	Marsh foxtail-creeping bent grassland	This wetland was located in a depression along the margins of a straightened watercourse and included an area of sparsely vegetated soils showing surface cracks and pugging. Soil was moist less than 10 cm below the surface. Other hydrophytic species included willowherb, and occasional blue sweetgrass.	0.03
3	Marsh foxtail-creeping bent-blue sweetgrass grassland	This wetland was located within a geomorphic depression possibly formed by either a realigned first-order watercourse or an intermittent surface water overland flow path. In some areas soil surface was wet, and significant pugging of soils by stock. Where the ground was firmer underfoot, soils were moist less than 10 cm below the surface.	0.54
4	Marsh foxtail-creeping bent-blue sweetgrass grassland	This wetland was located in another section of the same overland flow path as Wetland 3. A large sparsely vegetated concave surface was present, and bare soils had large surface cracks and moist soils underneath the dry surface.	0.39
5	Marsh foxtail-creeping bent grassland	This wetland was located in a depression to the west of another likely preferential surface water flow path. Aerial imagery showed frequent inundation and surface water at this location.	0.11
6	Marsh foxtail-creeping bent-blue sweetgrass grassland	This wetland was located in the overland flow path the east of Wetland 5. Surface water was present at the time of the survey.	0.79
7	Marsh foxtail-creeping bent grassland	<p>This wetland was located at the head and sides of a spring to the north of the farm buildings. Significant pugging (30-40 cm deep) was present at the seep head under a large willow (<i>Salix babylonica</i>) with standing water present in deeper holes. Exposed soils were still moist and were dark brown and humic. Blue sweetgrass was common closer to the spring sides.</p> <p>Wetland vegetation extended past a fence. Where stock were excluded, watercress was dominant, bordered by jointed rush and floating sweetgrass. Other hydrophytic species included wīwī, broom sedge, and celery-leaved buttercup.</p>	0.13

**Table 1: Wetland features identified at the Ohoka project site**

Wetland	Vegetation Type	Notes	Area (ha)
8	Marsh foxtail-creeping bent-blue sweetgrass grassland	This wetland was located on the eastern side of the spring to the north of the farm buildings. The wetland extent was confined on its southern side by a slight rise in the landform.	0.08
9	Marsh foxtail-creeping bent-blue sweetgrass grassland	This wetland was located on the eastern side of the spring to the north of the farm buildings. It is a small extension of Wetland 8 and contains similar characteristics, but it separated by a vehicle/animal crossing.	0.01
10	Marsh foxtail-creeping bent grassland	This wetland was located within the same overland flow path as Wetland 12 but separated from it vegetatively by farm roads. Soils were heavily pugged, and ground water was at the soil surface in some small areas.	0.37
11	Marsh foxtail-creeping bent grassland	This wetland was located in a depression to the north of the main house. Soils were saturated and surface water was present. Pugging was common around the edges of the area of surface water.	0.04
12	Marsh foxtail-creeping bent-blue sweetgrass grassland	This wetland was located in a probable preferential surface water overland flow path near the main house and was hydrologically connected to the pond on the house grounds.	0.47
13	Marsh foxtail-creeping bent grassland	This wetland was located within a continuation of the overland flow path where Wetland 12 was identified.	0.90
14	Marsh foxtail-creeping bent grassland-celery leaved buttercup grassland	This wetland was located in a low area on the northern side of Ohoka Stream. A large sparsely vegetated concave surface was present, with surface water cracks and algal mats present on soil surface. Soils were moist less than 10 cm below the surface.	0.14
15	Marsh foxtail-creeping bent grassland	This wetland was located where Ohoka Stream exited the property under Whites Road within a small depression.	0.17

One plot survey was undertaken at Wetland 14 to confirm areas of uncertainty where it failed the RHV test around its margins. Results showed 41% pasture species in the area tested. Due to the clear dominance of pasture species past the testing point, it was decided that this area formed the boundary of the wetland inside of which was clearly dominated by hydrophytic vegetation.

More areas showed indications of wetland presence during the aerial review stage, and LiDAR imagery showed multiple land surface depressions. However, when investigated during site surveys many of these were pasture dominant (i.e., not wetland at that time) or consisted only of a sparsely vegetated depression with no hydrophytic vegetation. Areas of surface water pooling on roads showed pugging in the paddocks on either side, but no hydrophytic vegetation were present in these areas. It is likely ephemeral wetland extent is present on the site, however it is unknown how extensive this area is. Ephemeral wetland values are likely to be very low.

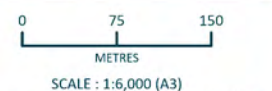
A 0.32 ha pond is present in the centre of the project site adjacent to the main house and Wetland 12. A large part of the pond, especially in its western extent, appears to have been artificially created through excavation in the mid 2000's. It is our understanding the eastern extent of the pond is spring-fed and historic imagery from the late 1970's suggests it once formed the head of a small stream. Currently the pond is surrounded by amenity trees such as weeping willow and European oak (*Quercus robur*), and some planted indigenous species such as harakeke (*Phormium tenax*) and pūkio (*Carex virgata*). The area currently contains low values in regard to the diversity of native hydrophytic species. Due to its artificial nature, the pond has not been classified as natural inland wetland as per the NPS-FM.

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**KEY :**

-  POND
-  WETLAND
-  531 MILL ROAD
-  SITE BOUNDARY



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 2. CADASTRAL/TOPOGRAPHICAL INFORMATION AND INSET DERIVED FROM LINZ DATA.  
 3. WETLANDS DERIVED FROM PDP SITE VISIT NOV 2024.

**CLIENT**  
 ROLLESTON INDUSTRIAL DEVELOPMENTS LTD

**FIGURE**  
 FIGURE 1: WETLAND DELINEATION, OHOKA.

**PROJECT**  
 OHOKA DEVELOPMENT WETLAND DELINEATION

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## 5.0 Conclusions and Recommendations

Fifteen wetlands on the Ōhoka project site at 531 and 535 Mill Road met the definition of 'natural inland wetland' under the NPS-FM (MfE, 2020a & 2020b). Wetland extent totalled 4.29 ha and was associated with overland flow paths in land surface depressions, or were at the margins of spring heads and waterways. Marsh foxtail, creeping bent, and blue sweetgrass were the dominant species in almost all wetland environments. The largely uniform vegetation types are indicative of the degraded state of the wetlands due to existing and past land uses and grazing. Wetland vegetation types were more diverse at stream margins where stock were excluded, however these areas were few (e.g., at the springhead of Wetland 7).

Although a larger proportion of the property displayed potential wetland features on aerial imagery and LiDAR, these were found to not meet the criteria for either natural inland wetland or wetland as per the RMA at the time of the survey. Ephemeral wetlands may be present seasonally at the project site, but if present, their values are likely to be very low. The pond at the centre of the property has been artificially created and it currently contains low wetland vegetation values. Its eastern extent is spring-fed and likely supported greater wetland values prior to its excavation approximately 20 years ago. Due to its artificial nature, the pond does not meet the definition of 'natural inland wetland' under the NPS-FM.

We understand that the proposed development of the site into residential lots may result in the loss of wetland extent. It is our recommendation that wetland loss is mitigated through the instatement of new wetlands, and enhancement or protection of wetlands to be retained. Specifically:

- ∴ Springhead wetland habitats should be protected and enhanced by buffers planted with indigenous hydrophytic vegetation.
- ∴ Any loss of wetland extent<sup>1</sup> should be mitigated by the instatement of new areas of high quality wetland totalling no less than the area loss (i.e., a ratio of at least 1:1).
- ∴ Low lying stream margins should be considered for planting with wetland vegetation species.
- ∴ Wetland enhancements, including planting plans, should be informed by a detailed Enhancement Plan prepared by a qualified ecologist.

If these recommendations are followed, wetland extent across the project site will be maintained or increased. When coupled with effective enhancement planting and management, wetland values should overall improve as a result of the proposed subdivision.

## 6.0 References

- Atkinson, I. A. E. (1985). Derivation of vegetation mapping units for an ecological survey of Tongariro National North Island, New Zealand. *New Zealand Journal of Botany*, 23(3), 361–378. <https://doi.org/10.1080/0028825X.1985.10425343>
- Clarkson, B. (2014). *A vegetation tool for wetland delineation in New Zealand*. Landcare Research Contract Report: LC1793.
- Ministry for the Environment (2020a). *National Policy Statement for Freshwater Management (as amended in January 2024)*. Available at: <https://environment.govt.nz/acts-and-regulations/national-policy-statements/national-policy-statement-freshwater-management/>
- Ministry for the Environment (2020b). *Wetland Delineation Protocols (amended February 2023)*. Wellington, Ministry for the Environment.

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<sup>1</sup> Wetland extent as defined in Table 1 of this memorandum.

## 7.0 Limitations

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## Appendix A: Project Team bios

The assessments outlined in this memorandum were undertaken by the following qualified ecologists:

### **Nicki Papworth (Senior Wetland Ecologist)**

Nicki is a botanist and wetland ecologist with five years' experience working in the private sector. She graduated from Victoria University with a Master of Science (Ecology and Biodiversity) in 2022. This followed a Post-graduate Diploma in Ecology and Biodiversity attained in 2019. She is a member of both the Environmental Institute of Australia and New Zealand (EIANZ) and New Zealand Plant Conservation Network (NZCPN).

Nicki has extensive expertise in wetland assessments and delineation, ecological impact assessments, botanical surveys, and terrestrial habitat and vegetation surveys. She has a strong technical skillset, including a high level of experience undertaking a variety of terrestrial and wetland ecological field assessment methodologies, technical reporting, and an understanding of policies affecting ecological outcomes at local, regional, and national scales

Since joining PDP in 2022, Nicki has conducted dozens of wetland delineations and impact assessments for a variety of clients. These range across the public, agricultural, urban development and industrial sectors. Her project experience includes (but is not limited to) wetland assessments for the Miramar Links Golf Club redevelopment, Waka Kotahi biodiversity offsetting and threatened plant surveys, and North Canterbury vineyards consenting processes.

### **Inge Martens (Ecologist)**

Inge is a freshwater ecologist with two years' experience working at PDP. She graduated from the University of Canterbury with a Master of Science (Ecology) in 2023 and is a member of the New Zealand Freshwater Sciences Society (NZFSS).

Inge's masters research focused on how environmental DNA could be used as a biomonitoring tool in braided rivers. She investigated how sampling environmental DNA from one location of a braided river may be able to provide information at the larger scale. Inge is also a capable field ecologist, with experience in conducting standard freshwater and wetland ecosystem monitoring (i.e., macroinvertebrate, water quality, habitat and vegetation surveys). She also has experience in data analysis using R, python, and Microsoft Excel.

Since joining PDP, Inge has been involved in a variety of projects for both private and public clients. These include conducting wetland delineations across multiple sites in North Canterbury for wastewater discharge and water use consent applications.



## Appendix B: Site Photographs



**Photograph 1:** Wetland vegetation behind an electric fence to exclude stock at Wetland 7, 535 Mill Road.



**Photograph 2:** Pugging consistent with the extent of Wetland 13, 535 Mill Road.



**Photograph 3:** Surface water pooling at Wetland 6, 535 Mill Road.



**Photograph 4:** Wetland 4 located within a likely overland flow path, 535 Mill Road.



**Photograph 5:** Sparsely vegetated depression in land surface at Wetland 4, 535 Mill Road.



**Photograph 6:** Pugging indicating the extent of Wetland 3, 535 Mill Road.



**Photograph 7:** Surface water and pugging at Wetland 11, 535 Mill Road.



**Photograph 8:** Vehicle tracks in wet soils near Wetland 8. Surface cracking indicates the disturbance was not recent, 535 Mill Road.



**Photograph 9:** Marsh foxtail-creeping bent grassland, Wetland 10. This vegetation was typical of many wetlands identified onsite, 535 Mill Road.



**Photograph 10:** Pasture grasses typical of the site at 531 Mill Road.



**Photograph 11:** Overgrown pasture grasses situated behind the unoccupied dwelling at 531 Mill Road.



**Photograph 12:** Small amount of creeping buttercup (*Ranunculus repens*) growing within pasture grass within a small depression at 531 Mill Road.



## Appendix C: Wetland Plant Species

Wetland plant species identified at the Ohoka project site		
Name	Common Name	Hydrophytic Ranking
<i>Agrostis stolonifera</i>	Creeping bent	FACW
<i>Alopecurus geniculatus</i>	Marsh foxtail	FACW
<i>Callitriche stagnalis</i>	Starwort	OBL
<i>Carex scoparia</i>	Broom sedge	FACW
<i>Carex virgata</i>	Pūkio	OBL
<i>Glyceria declinata</i>	Blue sweetgrass	OBL
<i>Glyceria fluitans</i>	Floating sweetgrass	OBL
<i>Juncus articulatus</i>	Jointed rush	FACW
<i>Juncus bufonius</i> var. <i>bufonius</i>	Toad rush	FACW
<i>Juncus edgariae</i> (syn. <i>gregiflorus</i> )	Wīwī	FACW
<i>Myosotis scorpioides</i>	Water forget-me-not	FACW
<i>Nasturtium microphyllum</i>	One-rowed water cress	OBL
<i>Nasturtium officinale</i>	Watercress	OBL
<i>Persicaria hydropiper</i>	Water pepper	FACW
<i>Persicaria maculosa</i>	Willow weed	FACW
<i>Phormium tenax</i>	Harakeke	FACW
<i>Ranunculus repens</i>	Creeping buttercup	FAC
<i>Ranunculus sceleratus</i>	Celery-leaved buttercup	OBL
<i>Salix babylonica</i>	Weeping willow	FACW
<i>Stellaria alsine</i>	Bog stitchwort	FACW