Aquatic Ecology

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Dear Andy,

Wetland Delineation of Proposed Woodend Development, Woodwater Limited/ Urban Estates

Introduction/Proposal

Through a submission on the Proposed Waimakariri District Plan by Woodwater Limited (Submitter #215), a residential development is proposed for an area of rural land bordered by Petries Road, Copper Beech Road and Woodend Beach Road (App. I, Fig. i). The area is situated immediately south of the coastal Woodend township.

The existing development proposal requires the decommissioning of two indicative wetland areas. The following memorandum investigates the status of all potential wetlands in the proposed development area.

Delineation Methods

Prior to wetland delineation, a desktop review was undertaken of the survey area for indicative wetland areas using both historic aerial imagery (Google Earth, Retrolens). This was followed by a field reconnaissance and drone survey on the 12th February 2024. These preliminary surveys identified four indicative wetland areas requiring closer assessment (App. I, Fig. i), which was undertaken on 20th February 2024, with the last significant rainy period about 10 days prior (Fig. 1).

The procedure of assessing and describing wetland habitats, is called delineation, a hierarchical methodology well documented in Ministry for the Environment (2022), but summarised below. A vegetation assessment was firstly undertaken at each site, using the procedure prescribed by Clarkson (2013), which assigns almost all plant species a tolerance classification to wet conditions (i.e. upland, facultative upland, facultative, facultative wetland, obligate wetland). This assessment involved recording the plant species, percent coverage and wetland indicator status (Clarkson *et al.* 2021) of all flora within a representative 2 m^2 quadrat. The results were then interpreted using a botanical dominance test and a prevalence index calculation.

If the results of the vegetation assessment were unclear, assessments were conducted for the presence of hydric soils and overall wetland hydrology (Fraser *et al.* 2018; Ministry for the Environment 2021). Based on MfE guidelines, the assessed site must fail both hydric soil and wetland hydrology tests before it is excluded from a wetland status under the RMA 1991 definition. If an assessed site fails both the vegetation and hydric soils tests, but passes the wetland hydrology test, it is considered a wetland under the RMA 1991 definition.

All confirmed wetland habitat boundaries were then geo-referenced using a handheld GPS receiver (Garmin 64s), and assessed against the natural inland wetland definition in the NPS FM 2020.

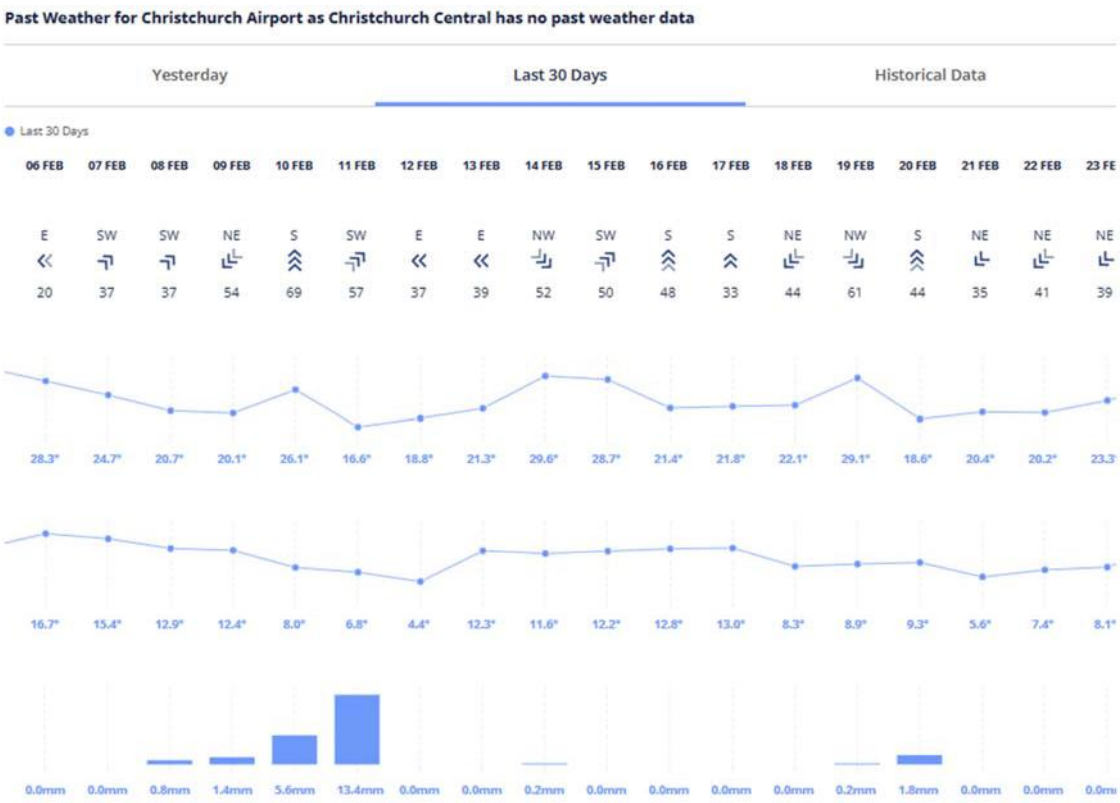

Figure 1. Hyetograph preceding the field survey (MetService website). The last significant rainy period was 9 days prior to the field survey (20/2/24).

Delineation Results

Site 1

The assessed area was located in a ground depression, with vegetation that differed from the surrounding pasture grass. Site 1 did not contain surface water at the time of survey (App. II, Figs. i, ii). However, recent aerial imagery indicated Site 1 can retain surface water, presumably following rain or high groundwater levels (Google Earth, imagery dated 17/12/2021).

The dominant flora species in this wetland was the facultative broadleaf dock (*Rumex obtusifolius*) (App. III, Table i). The prevalence of this species meant the results of a wetland vegetation assessment were inconclusive. The hydric soil assessment was also inconclusive. Loam soil was observed to a depth of 40 cm, with no mottles observed and an overall low moisture content.

Based on the historical online imagery, Site 1 was not inundated frequently enough in recent aerial imagery to be considered a wetland. Only 4 of a total 34 aerial images taken between 2004 and 2021 depicted Site 1 as inundated, the remaining 30 images clearly depict the area as dry (Google Earth imagery). Only one secondary hydrology indicator, geomorphic position, was met by this survey area. The FAC-neutral test, in the wetland hydrology protocols, was also considered inconclusive, as only 1% of flora coverage was not facultative (willow weed, facultative wet). Wetland hydrology was therefore not present. Site 1 was excluded from the definition of a wetland under the RMA 1991 and NPS FM 2020 definitions.

It is noted that Site 1 appears to be the lower reach of a historic natural channel, with the upper reach decommissioned prior to 1963 (Retrolens). This likely contributes to the naturally dry nature of Site 1, and a wetland reinstatement at this location is not considered possible.

Site 2

Site 2 did not contain surface water at the time of survey. This was a large, sparsely vegetated area, with deep cracking observed in the surface sediment throughout the site (App. II, Figs. iii - v). The site is known to retain surface water for approximately three months of each year, especially likely during winter (Andy Hall, DLS, pers. comm.).

The dominant flora species in the riparian zone of Site 2 was the obligate marsh yellowcress (*Rorippa palustris*) (App. III, Table i), and a vegetation assessment conducted in the riparian zone concluded that Site 2 was defined as a wetland under the RMA 1991 definition. However, it is noted that the deep cracking recorded in Site 2 is indicative of shrink-swell clays, and therefore does not imply the presence of a wetland (Indicator 2F *in* Ministry for the Environment 2021). Only one primary indicator of wetland hydrology was met, sparsely vegetated concave surface, along with two secondary hydrology indicators, geomorphic position and the FAC-neutral test.

Surface water is visible in Site 2 in the earliest aerial imagery accessible, taken in 1942. The site does not show signs of modification or artificial construction, and Site 2 is therefore defined as a natural inland wetland under the NPS FM 2020 definition. However, this highly ephemeral wetland does not provide habitat for fish fauna, and would likely only facilitate short-lived aquatic macroinvertebrates such as non-biting midges, mosquitos, and encysting micro-crustacea. The high sand content in the substrate means the wetland area has a high level of drainage, and native wetland plants such as *Juncus* sp. are unlikely to thrive in this location.

A drainage channel was also observed during a site visit, forming a connection between Sites 2 and 3, and historically the Mcintosh Drain rises downstream of Site 3. However, this channel was dominated by upland pasture species at the time of survey, and no wetland flora was observed. The drainage channel was natural in appearance, and likely only contained surface water during rainfall events.

Site 3

At the time of survey, Site 3 did not contain surface water. This site surrounded an irrigation device (App. II, Fig. vi), and the presence of wetland plant species may have been partially caused by leaking underground pipes. No flow or surface water connectivity was observed during the site visits.

Vegetation in the assessed area at Site 3 was dominated by, in order of abundance, marsh foxtail (*Alopecurus geniculatus*), broadleaf dock (*Rumex obtusifolius*) and willow weed (*Persicaria maculosa*) (App. III, Table i). Both marsh foxtail and willow weed have wetland indicator statuses of facultative wetland, and broadleaf dock is considered facultative. Therefore, this area passed the wetland vegetation assessment and was defined as a wetland under the RMA 1991 definition.

Most of the historic aerial imagery available for this location, excluding the most recent (2021) imagery, depicts Site 3 as dry. However, the presence of wetland-specific flora indicates the site may have remained damp for extended periods in recent years. This is likely due to the irrigator located within the assessed wetland area. This means Site 3 is defined as an induced wetland under the NPS FM 2020 definition, as it was likely created as a result of anthropogenic modification. An induced wetland has the same legal status as a natural inland wetland in the NPS FM 2020. For ease of understanding, this site has therefore been depicted as a natural inland wetland in this memorandum.

Site 3 did not provide habitat for aquatic fish fauna at the time of survey, and had no surface water connectivity with nearby waterways or wetlands.

Site 4

Site 4 did not contain surface water at the time of survey (App. II, Figs. vii, viii). However, when surface water was present during wet periods, this site was likely directly connected to the nearby McIntosh Drain. Vegetation at Site 4 was dominated by willow weed, marsh yellowcress, and marsh foxtail (App. III, Table i). Willow weed and marsh foxtail have facultative wetland indictor statuses, and marsh yellowcress is considered obligate. Site 4 therefore passed the vegetation tests, and was considered a wetland under the RMA 1991 definition. Historic aerial imagery indicates this wetland habitat is naturally occurring, and is therefore a natural inland wetland under the NPS FM 2020 definition.

Discussion

The ecological values of the wetlands at Site 2 and Site 3 were low, and unlikely to be improved through protection, buffer strips or native planting. The well-drained nature of Site 2 means native wetland plants are unlikely to grow well, and the wetland status of Site 3 appears to be tied to the presence of an irrigator, which will be removed as a consequence of land development. These wetlands are therefore not good candidates for retention or improvement. Under Rule 45C of the NES-F 2020 (Ministry for the Environment 2020), earthworks within a natural inland wetland for the purpose of urban development is a discretionary activity. The wetlands at Site 2 and Site 3 could therefore potentially be decommissioned with consent from Environment Canterbury.

However, the ephemeral wetland at Site 4 could improve significantly in ecological value following protection and native planting. This wetland area is naturally occurring, and has connectivity to the nearby Mcintosh rain during wet periods. Improvements to this wetland could include the removal of all exotic trees, to be replaced with native tree and shrub species such as harakeke (*Phormium tenax*), *Austroderia toetoe*, *Hebe salicifolia* and cabbage trees (*Cordyline australis*). The possibility of a covenant on this wetland area has also been suggested, to ensure the longevity of this ephemeral habitat (Andy Hall, DLS, pers. comms.).

The riparian zone on the true right bank of McIntosh Drain is also likely to be impacted by the proposed development. A setback of at least 10 m is recommended for the entire impacted reach of this waterway, with dense native riparian planting throughout. Planting should adhere to the guidelines set by Environment Canterbury (2011), with low, shade providing plants such as *Carex* sp. planted near the wetted margin, and shrubs and trees further up the bank for bank stabilisation and waterway shading.

A significant buildup of debris was observed alongside the upper reach of the McIntosh Drain. This debris included numerous vehicles and vehicle parts, many of which are likely to leach hydrocarbons and harmful substances into the waterway. The removal of this debris could significantly improve the overall quality of Mcintosh Drain, both in the vicinity of the debris and in the downstream catchment.

A council-owned stormwater retention basin adjacent to the proposed development may also require enlargement during the development process. At the time of survey numerous native wetland species were present in this stormwater basin, including raupo (*Typha orientalis*), *Juncus* sp., and *Potamogeton cheesemanii*. This retention basin was constructed in 2017, and appears to provide permanent habitat for aquatic plants (Google Earth imagery), and quite possibly fish, especially eels. The northern end of the basin appears to be directly connected to the upper McIntosh Drain. The enlargement of this basin will increase permanent habitat availability for all aquatic fauna present in the catchment. The combination of permanent surface water and native wetland plants means the basin would provide significantly higher ecological value than that of Site 2 and Site 3, and would offset the loss of any loss of wetland values at Sites 2 and 3. The addition of a proposed stormwater retention basin to the south of Site 4 (App. I, Fig. i), if planted with native wetland species, will also help to offset any habitat and ecological value lost from the decommissioning of Site 2 and Site 3, and enhance the true right (west) bank of McIntosh Drain.

Recommendations

- The decommissioning of wetlands at Sites 2 and 3 could be sufficiently offset by the improvement of wetland and aquatic habitat at Site 4 and the McIntosh Drain riparian zone.
- Site 4 – surrounding exotic trees should be removed and replaced with native riparian species.
- If permanent or near-permanent surface water is expected in the proposed new southern stormwater retention basin, this should be planted with native wetland plants, and should be accessible for fish via McIntosh Drain.

Yours sincerely, 

Mark Taylor, Riley Payne, Lucy Barltrop

References:

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Appendix I. Site Map.

Figure i. The proposed development area, and field-delineated wetland habitats.

Appendix II. Site Photographs (20/02/2024).

Figure i. Site 1, looking north.

Figure ii. Site 1, looking south.

Figure iii. Site 2 overview.

Figure iv. Site 2 riparian vegetation, dominated by marsh yellowcress

Figure v. Deep cracking of sediment at Site 2.

Figure vi. Site 3, showing the irrigator within the wetland area

Appendix II (cotd.). Site Photographs (20/02/2024).

Figure vii. Site 4, looking west.

Figure viii. Site 4, looking east toward McIntosh Drain

Appendix III. Wetland delineation plant species.

Table i. Plant species identified during each wetland delineation. Green indicates presence, orange indicates absence. The dominant species at each location are labelled.

Scientific name	Common name	Indicator status	Site 1	Site 2	Site 3	Site 4
Overall Wetland Status			**Non-wetland**	**Natural inland wetland**	**Natural inland wetland**	**Natural inland wetland**
Rorippa palustris	Marsh yellowcress	OBL		Dominant		Dominant
Ranunculus sceleratus	Celery-leaved buttercup	OBL				
Alopecurus geniculatus	Marsh foxtail	FACW			Dominant	Dominant
Cyperus eragrostis	Umbrella sedge	FACW				
Persicaria maculosa	Willow weed	FACW			Dominant	Dominant
Polygonum aviculare	Prostrate knotweed	FAC				
Ranunculus repens	Creeping buttercup	FAC				
Rumex obtusifolius	Broadleaf dock	FAC	Dominant		Dominant	
Plantago major	Common plantain	FACU				
Trifolium repens	White clover	FACU				
Chenopodium album	Fathen	N/A				
Tripleurospermum inodorum	Scentless mayweed	N/A				