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By E-mail

Forbes Ecology
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Te Kapiti Trust
PO Box 5481
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Attn: Duncan and Susie Cheetham

Dear Duncan and Susie,

BACKGROUND

Forbes Ecology Limited was engaged by Duncan and Susie Cheetham to evaluate the nature and extent of RMA (1991) section 6c matters as they relate to their property on the southern boundary of Rongotea, Manawatu. On site it soon became clear that the issue needing investigation was the status of land regarding the Freshwater National Policy Statement definition of Natural Inland Wetlands.

METHODS

Dr Adam Forbes undertook a site visit on the 28 June 2022. Weather conditions on the day of the site visit were clear and fine. Rainfall[1] over the preceding 7, 14 and 30 days was 1 mm, 56 mm, and 162.5 mm respectively.

The site visit route was plotted using a handheld GPS (Fig. 1).

Observations were made regarding topography and vegetation to enable subsequent wetland delineation using MfE's best practice wetland delineation tools.

Wetland delineation was carried out subsequently using the following approach (Fig. 2) and tools.

- MfE wetland delineation protocols vegetation tool – https://environment.govt.nz/publications/wetland-delineation-protocols/
- Hydric soils field identification guide – https://www.envirolink.govt.nz/assets/R13-5-Hydric-soils-field-identification-guide.pdf
- Wetland hydrology tool – https://environment.govt.nz/assets/publications/wetland-hydrology-tool-final.pdf

[1] Rainfall records at Mangaone at Milson Line approximately 12 km to the southeast.

Reference was made to the soil characterisation report prepared by Hainsworth (2022) for the Rongotea Plan Change.

Figure 1. Site visit track log from handheld GPS.

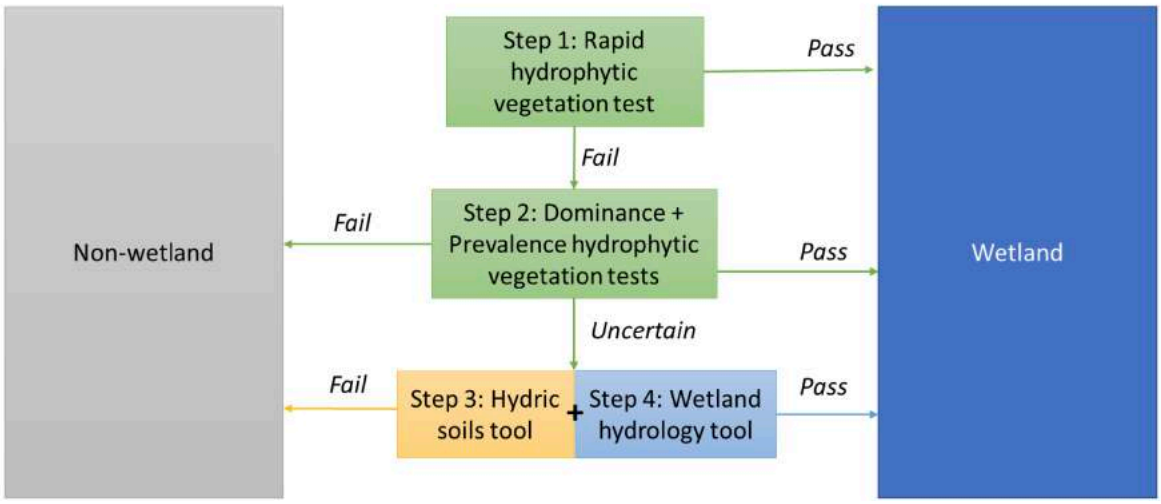

Figure 2. MfE's four steps for delineating wetland using the hydrophytic vegetation, hydric soils and wetland hydrology tools.

RESULTS AND DISCUSSION

Vegetation

Areas of wetland (OBL & FACLW) dominant vegetation

Examination of Google Earth Pro imagery over the period 2004-2022 confirms that the vegetation cover of the land, in particular the valley floor, have a history over many decades of pastural grazing and cultivation. Surface drains have been formed over the south eastern portion of the site. Colonisation of wetland vegetation appears to have been limited by the disturbance associated with grazing animals and pasture management/cultivation. This means only small areas of native rushes (*Juncus australis* FACW and/or *J. effusus* FACW) occur in drainage channels (Fig. 3). These rushes are palatable to stock and are heavily grazed. Other aquatic flora present in drains are duckweed (*Lemna minor*; OBL; Fig. 4) and green filamentous algae (Fig. 4).

Wet areas of pasture comprise up to approximately 30% cover of creeping buttercup (*Ranunculus repens*, FAC) and no obligate (OBL) or facultative wetland (FACW) flora (Figs. 5-7). The absence of wetland flora would be a result of disturbance from pastural land use.

Overall, obligate (OBL) or facultative wetland (FACW) flora are confined to drainage channels and make up only a small area of coverage (Fig. 8).

Figure 3. Native rushes colonising artificial drainage channel to the east of the site.

Figure 4. Duckweed and green filamentous algae in one of the artificial drainage channels.

Figure 5. Creeping buttercup and exotic pasture grass growing in a waterlogged site.

Figure 6. Surface ponding amongst pasture.

Figure 7. Surface ponding amongst pasture.

Figure 8. Approximate extent of native wetland vegetation.

Hydric soils

An investigation (Hainsworth, 2022) into the soil characteristics of the terrace systems determined the valley floor (alluvial basin; brown polygon in Fig. 9) on the true left of the stream (at the south east of the site) features peaty soils (see Fig. 5 in Hainsworth, 2022) and a rising water table near the surface causes very poor drainage. These organic soils indicate a long history of wetland vegetation colonising the site in pre-human times. These wet organic soils are hydric soils.

Figure 9. Extent of peaty organic soils transposed from Hainsworth (2022).

Other areas of valley floor are low lying and receive runoff from higher ground. Surface ponding was widespread at the time of the site visit (Fig. 10). The soil surface was in places pugged and featured wheel track depressions from a 4WD previously passing over (Fig. 11). A relict stream channel is present on the true right south of the T-shaped convergence in the existing drain. Artificial drains have been formed elsewhere on the true right of the valley floor. Hainsworth (2022) reports soils in these valley floor areas[2] to be Typic Perch-Gley Pallic (shallow)[3]. Cores appear low chroma and iron residues were noted 25-45 cm below ground level (Hainsworth, 2022).

[2] Core IDs 70 and 71.

[3] Gley soils are strongly affected by waterlogging. Perch-gley features are the morphologic indicators of saturation and reducing conditions caused by a water-table perched on a slowly permeable layer within the soil profile.

Figure 10. Extent of surface ponding at the time of the site visit.


Figure 11. 4WD tracks across waterlogged soils on the valley floor.

Wetland hydrology

Site assessment of hydrology indicators showed that extensive areas of the valley floor had surface water ponding (a primary indicator confirming wetland presence). The soil types present indicate prolonged soil saturation (a primary indicator confirming wetland hydrology). Reduced iron is present within 30 cm of the soil surface, inundation is visible on satellite imagery (Fig. 12), the geomorphic position of the valley floor is predisposed to forming wetland conditions and relict flow paths are discernible on the ground surface. Each of these characteristics are secondary indicators of wetland hydrology.

Figure 12. Google Earth Pro imagery showing surface ponding in former waterway alignments on the valley floor.

Wetland status

Step 1 – Rapid hydrophytic vegetation test. Only small areas of the valley floor feature hydrophytic vegetation meaning that most of the area failed to indicate wetland status based on vegetative indicators alone. The reason for this is the disturbance regime

associated with pastoral land use has prevented colonisation of wetland flora and as such vegetation is not a reliable indicator of wetland extent on the valley floor.

Step 2 – Dominance + prevalence hydrophytic vegetation tests. Due to site disturbance vegetation is not a reliable indicator of wetland extent at this location, so the hydric soils and wetland hydrology tools were applied.

Step 3 – Hydric soils tool – Part of the valley floor features peaty organic soils which confirms hydric soils are present. Peaty soils indicate that this area has a long history of wetland vegetation occupancy prior to agricultural land use. Hydric soils are indicated across the remainder of the valley floor by topography, the extent of surface ponding, pugging and depressions in the soil's surface, relict stream channels, artificial drainage, Typic Perch-Gley Pallic (shallow) soils with cores that appear low chroma and iron residues occurring 25-45 cm below ground level. The surface ponding across extensive areas of the valley floor is a primary indicator of wetland hydrology. Four secondary indicators of wetland hydrology also apply to the valley floor.

Application of the three wetland delineation tools has resulted in delineation of 3.96 ha of natural inland wetland (light blue perimeter in Fig. 13).

Restoration of the natural inland wetland is encouraged. Restoration should involve active interventions and management to restore the natural hydrology and reinstate swamp vegetation across the site.

Figure 13. Natural inland wetland extent (light blue line) with areas of noted surface ponding (dark blue line), native wetland vegetation (green fill) and peaty soils (brown line).

CLOSING

Please do not hesitate to contact me should you have any questions on this report.

Yours Sincerely

Dr Adam Forbes

Principal Ecologist
Forbes Ecology Limited