Aquatic Ecology

Phone: (03) 366-4070
Cell: 021 022-62517
Email: mark@ael.org.nz
Internet: www.ael.org.nz

11 February 2022
Bruce Van Duyn
Project Manager
Two Chain Road Ltd.

Dear Bruce,

Memorandum- Private Plan Change 80 Rolleston - Response to s92 – Request for Further Information, Two Chain Road Development

A review of the ecological assessment for Plan Change 80 has been received by the Selwyn District Council and is appended to this memo (App. I).

The purpose of this memorandum is to provide further information on damp-ground habitat on the property of 25 Two Chain Road, which was alluded to in our original memo dated 17 September 2021. At that time, this area was viewed from afar, and was not subject to close inspection. Additionally, access was recently provided to the property of 15 Two Chain Road allowing inspection of potential wetland habitat to the rear of the property.

Field Survey

A brief field survey of the areas at 25 Two Chain Road was executed on 09/12/2021 (Fig. 1). This involved walking most of the north-west boundary of 77 & 25 Two Chain Road, as access to 25 Two Chain Road was limited, although the areas of interest were within several metres of the fence line, and easily viewed from 77 Two Chain Road. During this survey, four areas were evaluated (Areas 1, 2, 3, 4, Fig. 1). On 31/1/22, an inspection was made of the raceway branch on 15 Two Chain Road to its terminus behind the residential property.

The decision tree provided in the recent MFE guide (Ministry for the Environment 2021a) was used to determine if the habitats were considered wetlands under the Resource Management Act 1991 (RMA). The decision tree is provided in App. II. A number of other recent MFE publications were used to assess potential wetland habitats, especially the most recent NZ wetland plant list (Clarkson *et al.* 2021).

Results for Areas 1-4 (as assessed on 9/12/21)

The area west of the 25 Two Chain Road boundary was in crop, whereas land east of the 77/25 Two Chain Road boundary was in pasture grass, composed of various dryland grass species. The pasture on 25 Two Chain Road was not entirely flat, but slightly undulated, which was presumed to be due to the landform of historic Waimakariri River braids traversing the area.

The results below refer to plants which differ in their degree of affinity for wetland habitats, and are indicative of wetland status. These affinities are associated with each species, and coded as below (Table 1).

Table 1. Wetland indicator status codes based on Clarkson *et al.* (2021).

Wetland affinity	Description
OBL	Obligate Wetland. Almost always is a hydrophyte, rarely in uplands (non-wetlands)
FACW	Facultative Wetland. Usually is a hydrophyte but occasionally found in uplands
FAC	Facultative. Commonly occurs as either a hydrophyte or non-hydrophyte
FACU	Facultative Upland. Occasionally is a hydrophyte but usually occurs in uplands
UPL	Obligate Upland. Rarely is a hydrophyte, almost always in uplands.

Area 1. This is an ephemeral channel (Fig. 2) which flows into the Plan Change Area from the north from a culvert under Two Chain Road. It has a length of c. 130 m, and flows south on the 25 Two Chain Road side of the boundary line with 77 Two Chain Road, and connects to the sinkhole at Area 2. The waterway forms a race terminus of a tributary of the Railway Road raceway of the Paparua irrigation network (Race F in Agriculture N.Z. Ltd 1997). The raceway is administered by the Selwyn District Council through Sicon Ltd.

At the time of survey, there were no true aquatic macrophytes along the bed, which is susceptible to drying. At the time of the site visit, the bed was damp and covered with still-green duckweed (*Lemna disperma, OBL*) which had not browned off, suggesting recent inundation. The flow in the waterway, and others in the raceway network, can be manipulated by Sicon depending on industrial or agricultural demand.

Marginal plants were dominated by introduced pasture grasses, but also introduced common plants associated with wet soils (i.e. hydrophytes) these included (water speedwell (*Veronica anagallis-aquatica, OBL*), celery-leaved buttercup (*Ranunculus sceleratus, OBL*) and a sub-dominance of other introduced soft herbs.

I considered that (easily) over 50% of the dominant species were obligate hydrophytes so (easily) passing the Dominance and Prevalence test. Based on the decision tree in App. II, the course would be considered a wetland under the RMA, and subject to setback rules under the Selwyn District Plan. This reach is constructed, and possibly of fairly recent origin as this flow path does not appear in Canterbury Maps drain network overlay, or in the earlier maps of the drain network (Agriculture N.Z. Ltd 1997).

Under the RMA (1991), there is no distinction between natural and unnatural wetlands, and the Selwyn District Plan (SDP, definitions Part 1) is based on the more general definition of a wetland provided in the RMA." *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."* Recent clarification of the wording around the RMA definition ecosystems can be for plants, and/or animals (Ministry for the Environment 2021a). The Selwyn District Plan also alludes that the raceway network can provide ecological function.

A visit on the 2nd February 2022 revealed that the hydrophyte distribution did not extend along the long reach along the poplar line (Fig. 3), therefore the ephemeral wetland extends for a short (c. 10 m) distance near the roadside boundary of 77 Two Chain Road. Given its apparent ecological low value, and its location near the waterway terminus, an option is to decommission the short waterway and establish a soak hole near the property boundary.

Area 2. This was the largest area of interest, and it was possible to physically access the habitat at this location (Area 2, Fig. 1, Fig. 4). The wetland status of this habitat was subject to the decision tree procedure outlined in App. II.

The area consisted of a damp, but drying, area of approximately 7 m x 3 m. The central damp area lacked any true aquatic macrophytes, and possessed a sparse distribution of juvenile specimens of velvety nightshade (*Solanum chenopodioides,*), with occasional juvenile celery-leaved buttercup (*Ranunculus sceleratus, OBL*) and dock weed (*Rumex* sp,) (Fig. 5). The juvenile buttercup was positively identified by the distinctive leaf shape identified flowering in Area 1 (Fig. 2). Velvety nightshade (with some white flowers) is assumed to be an UPL species, as it is not listed in Clarkson *et al.* (2021) but is listed as FACU in *Morris (2021).*

Around the grassed periphery, common exotic dryland pasture species dominated the area, largely poplar saplings and gorse (Populus sp, *Ulex europaeus*, both FACU), with some large-leaved plantain (*Plantago major, UPL*). These species are obligate upland or facultative upland species. There were two small, isolated stands of *Juncus* sp, (based on flowering form *J. edgariae* and/or *J. australis,* FACW) which composed much less than 5% of the periphery, and quite sub-dominant. *Juncus* are considered a facultative wetland species. The grassed area around the periphery was slightly bunded, possibly due to excavation, but incorporated a concrete pad with threaded studs and an electrical earth strap fitted. In summary, it appeared the area has been constructed as an irrigation race sinkhole, but may have been used as an irrigation pond in which water was pumped. At times of high race flow the pond will possibly fill with irrigation water, but this drains away to the underlying alluvial gravels.

The soil profile in the dry pond area was also evaluated (Figs. 6a, b) in respect to the available field guide Fraser *et al.* (2018). The spade-excavated soil profile was dominated by a low chroma clay, and contained a thin brown humus layer consisting of partially rotted brown leaf matter with no peat formation (Figs. 6a, b). Rounded river stones were recorded at 25 cm below the surface. There were no signs of mottling or reddish sections indicative of hypoxic soils (Fraser *et al.* 2018), nor did the crumbling, fairly dry soil smell sulphurous. I consider that the soil is therefore unlikely to be classified as hydric soil, meaning the area is likely to only hold surface water for a short period each year.

In respect to hydrology, and in reference to the recent hydrology tools (Ministry for the Environment 2021b) , the soil was not water-saturated within the top 30 cm of soil, nor did the excavation fill with groundwater, with rounded river alluvium appearing at 25 cm depth. While surface cracking was quite evident, this in itself is not diagnostic of a wetland as it can occur temporarily, and the hydrology is susceptible to manipulation by Sicon Ltd.

Overall, the habitat was dominated by upland and facultative upland vegetation, and hydric soils were not present, as surface water drains freely into the shallow gravels.. Based on the decision tree in App. II, the habitat does not constitute a RMA wetland nor a wetland (natural or otherwise) under the NPS-FM, I note that a soakhole, being artificial, may not be considered a 'waterbody' under the Selwyn District Plan, nor subject to setback rules, as the definition of a waterbody specifically excludes "any artificial pond" from the definition, assuming a sinkhole is a form of artificial pond.

Area 3 & 4.

Areas 3 and 4 (Fig. 1) are depicted, in their entirety, respectively, in Figs. 7 and 8. The identified plant community, which contained both dryland and hydrophyte species, was similar for both habitats and are tabulated below (Table 2). Due to the plant mixture, the decision tree from the MFE wetland delineation guide (Ministry for the Environment 2020b) was used to assess its wetland status.

Area 3 failed the so-called Rapid Test (Step 2), as it certainly is not dominated by obligate aquatic hydrophytes based on a visually inspected area of 10 m x 10 m (Fig. 7). It also failed both the dominance and prevalence tests outlined in the delineation guide, as less than 50% of the identified species (i.e. only 1 species of 9, or 11%) are obligate, facultative wetland or facultative hydrophytes (i.e. dominance test) (Table 1). In respect to the prevalence test (Table 3), 6 facultative upland species form, conservatively, 90% of the plant cover. Accordingly, based on the wetland delineation guide, Area 3 is regarded as a "non-wetland" under the RMA definition and setbacks are not required. It would also be likely to fail the definition of a wetland under the NPS-FM definition as the area is within an area of improved pasture and is dominated by more than 50% exotic pasture species. The only rush, *Juncus effusus*, has an almost global distribution and naturalised in 1864 (NZ Plant Conservation Network).

In respect to the small patch of Area 4 (Fig. 8), the community was a mixture of *J. effusus*, pasture grasses and the herbs tabulated in Table 2. As the community was identical to Area 3, with likely test results similar to Table 2, it was considered that this habitat would also not be a wetland under the RMA nor subject to setbacks. The habitat ground was quite hard when prodded with a stick. It would seem that the soil does not retain a high level of water, and was considered unlikely to be hydric or possess wetland hydrology.

Both Area 3 & 4 would be excluded from the new natural wetland definition as they would represent an area of improved pasture dominated by more than 50% of exotic pasture species and subject to temporary rain-derived pooling (Ministry for the Environment 2020a). In a similar vein, the Canterbury Land and Water Regional Plan states that wetlands exclude "wet pasture, or where water temporarily ponds after rainfall".

Table 2. Dominant introduced grasses and weeds near Areas 3 & 4.

Common name	*Scientific name*	*Wetland plant indicator status from Clarkson et al. (2021)*
Perennial ryegrass	*Lolium perenne*	*Facultative upland*
tall oat grass	*Aathrrhenerum elatius*	*Assumed upland**
Rip-gut brome	*Bromus diandrus*	*Assumed upland*
Brown top	*Agrostis capillaris*	*Facultative upland*
Barley grass	*Critesion murinum*	*Facultative upland*
Sweet vernal	*Anthoxanthum odoratum*	*Facultative upland*
Cocksfoot	*Dactylis glomerata*	*Facultative upland*
Hawksbeard (similar to Dandelion)	*Crepis capillaris*	*Facultative upland*
Soft rush	*Juncus effusus*	*Facultative wetland*

* When plant species are not listed in Clarkson *et al.* (2021) , they are to be assumed to be upland (dry preference) species

Table 3. Prevalence Test calculations

Wetland status	Total % cover	Weighting	Index Product
OBL Species	0	1	0
Facultative wetland	5	2	10
Facultative	0	3	0
Facultative upland	90	4	380
Upland species	5	5	25
	100		**415**

Prevalence Index = 415/100 = 4.15 . Greater than 3 is indicative of a non-wetland.

Area 5 and Drain branch on road reserve land adjacent to 15 Two Chain Road.

This drain branch flowed through a short section of pampas grass on road reserve land until it reaches the property boundary of 15 Two Chain Road, where it appears to have been purposefully diverted eastwards along the fence line before it is passes along the east side of the dwelling (Figs. 9, 10). The land occupier had reported observing eels in the raceway. On private land, the stony substrate appeared to lack aquatic plants. Towards the rear of the residential dwelling, the waterwall spilled into an excavated pit forming a pond (Fig. 11). The land occupier said the pond had been lined for quite a time, and the liner was visible under the soil surface at two locations (Fig. 12). The water inflow at the time was about 1-2 L/s. This environment was heavily shaded by a canopy of tall, introduced trees. The only vestige of native riparian vegetation was a dead punga trunk, and a cabbage tree sapling.

Aquatic life, based on a brief observation, appeared very limited, possibly due to the deep shading and detrital fall from the surrounding wattle, eucalypt and macrocarpa trees. Rooted macrophytes were almost absent, except for growth of a solitary introduced plant, possibly an ornamental lily (Fig. 13). The unidentified plant may not be an obligate hydrophyte, plants with similar leaves were seen around the margin of the pond, and along the irrigation canal, and using this solitary plant to determine wetland status, under the RMA definition, is not conclusive without further ecological assessment.

Without the benefit of the plastic liner, it is debatable if this habitat would contain any water, and would then share a similar porous bed and basin hydrology of that of Area 2, 270 m to the west. Under the Operative Selwyn District Plan definitions, this habitat should be considered a constructed pond and not a waterbody (Definition Sec. 3). In the setback rules for Earthworks and Buildings, the setbacks are considered in respect to the waters' edge of waterbodies, and setbacks may not apply in this instance if the habitat is considered a constructed pond.

However, setback rules may apply to the water race which feed the pond/soakhole. From a number of ecological studies in the Selwyn District, water races have the potential to contain at least moderate ecological values depending on their location, riparian habitat and their ecological connectivity with other habitats. From AEL's local recent work (Tennyson Street Raceway, Rolleston), the perennial races have the potential to contain surprising numbers of juvenile trout and native bullies, and the ecological value of artificial waterways is noted in the District Plan.

Based on these aspects along the short reach within the property of 15 Two Chain Road, I would regard the reach as possibly having low, but potentially some, ecological value. It may be possible to re-route the waterway and modified soak-hole/pond to a more suitable location and where ecological values can be enhanced with a natural indigenous canopy and riparian planting. Furthermore, the plan change applicant could apply for this portion of the irrigation/stock water race to be closed and go through the formal process with Selwyn District Council.

Conclusion

I have undertook a brief survey of aquatic habitats on the property of 15 & 25 Two Chain Road. The roadside portion of the raceway segment of Area 1 would be regarded as a wetland under the RMA, and would be subject to setback rules (recommendation of 10m) under the Operative District Plan. The linear section between Area 1 and Area 2 does not appear to be a wetland under the RMA definition, nor does Areas 3 and 4, and would not be subject to setback rules.

The ponded section of Area 5 is constructed/excavated and lined with plastic, presumably to artificially retain water, and due to its artificial ponded nature, may not be regarded as a waterbody in the Selwyn District Plan and not subject to setback rules. It is currently unknown if it forms a wetland under the RMA, as there was little apparent aquatic life, and has not been ecologically surveyed. What is clear is that the lined pond is not a natural wetland under the new NPS-FM (Ministry for the Environment 2020a).

If the setbacks are undesirable given the proposed Plan Change, and given the current low-value state of Areas 1 and 5, there would be ecological argument in directing the raceways and sinkholes to a suitable greenfield area where they can be naturalised and enhanced.

The updated Outline Development Plan shows Area 1 and Area 5 as areas which require further investigation at the time of subdivision stage to provide final direction.

Yours sincerely,

Mark Taylor

References

Agriculture N.Z. Ltd, G. P. L., Pattle Delamore Partners Ltd 1997. Paparua Water Race; system review. Christchurch. 83 p.

Clarkson, B., R.; Fitzgerald, N. B.; Champion, P.; Forester, L.; Rance, B. D. 2021. New Zealand Wetland Plant List 2021. Manaaki Whenua - Landcare Research, *LC3975*. 58 p.

Fraser, S.; Singleton, P.; Clarkson, B., R. 2018. Hydric soils – field identification guide. LandCare Research, Wellington. 83 p.

Ministry for the Environment 2020a. National Policy Statement for Freshwater Management, pp. 70 (*Issue*): 70.

Ministry for the Environment 2020b. Wetland delineation protocols. Ministry for the Environment, Wellington. 10 p.

Ministry for the Environment 2021a. Defining 'natural wetlands' and 'natural inland wetlands'. Wellington. *ME 1590*. 25 p.

Ministry for the Environment 2021b. Wetland delineation hydrology tool for Aotearoa New Zealand. Wellington. *ME 1575*. 63 p.

Morris, J. 2021. New Zealand Wetland Plant Indicator Status Ratings April 2021.

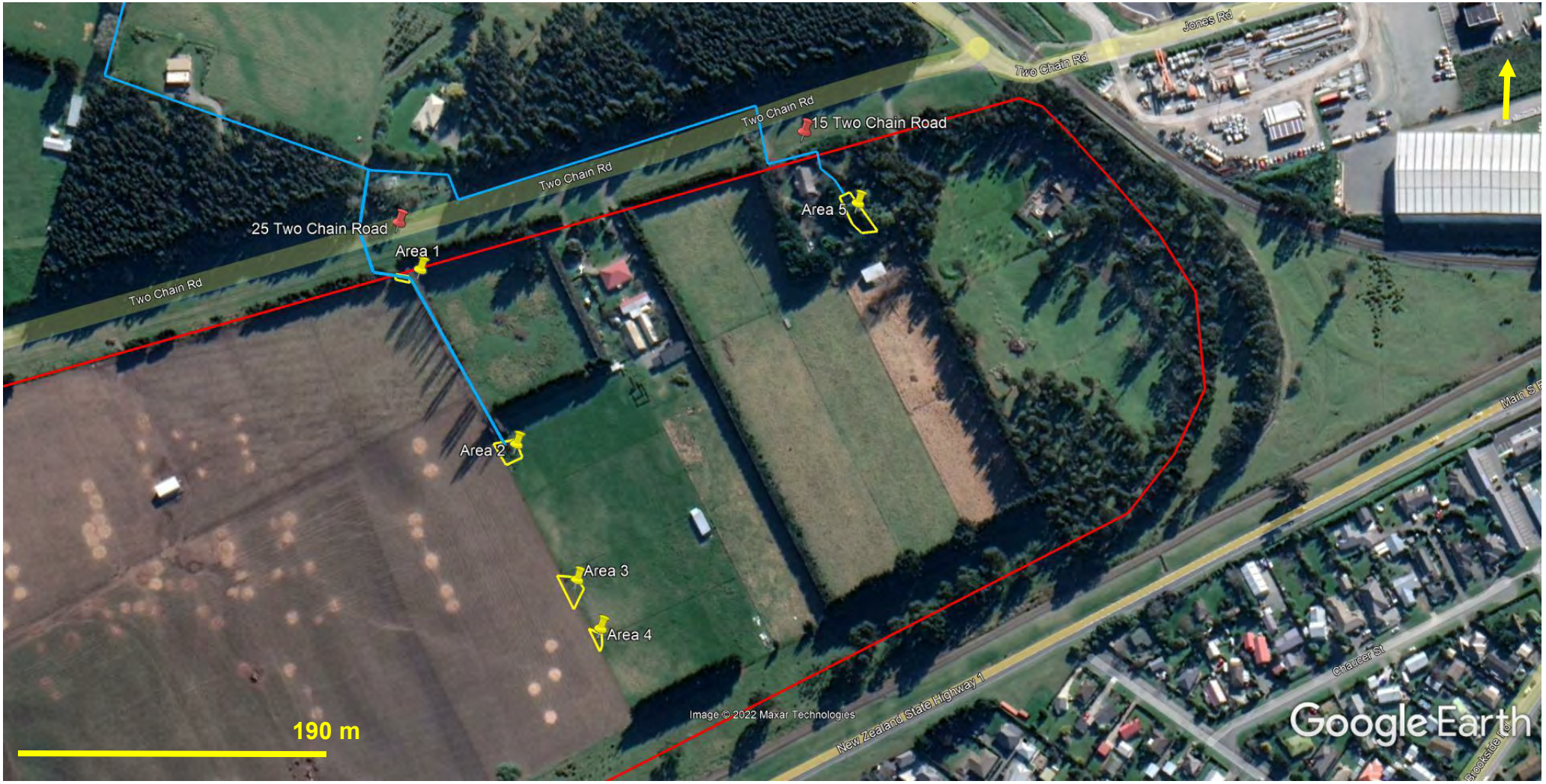

Figure 1. Google Earth imagery of the five potential wetland habitats evaluated on the 9/12/21, and 31/1/22. The blue line indicates the ground-truthed path of the irrigation race.

Figure 2. A branch of the Railway Road irrigation race enters the development area (Area 1 on Fig. 1). Most of the plants in this photo are obligate hydrophytes (Duckweed, .

Figure 3. Hydrophytes were lacking in the Railway Road irrigation race which followed the poplar line southwards away from Two Chain Road (photo 2022.02.02).

Figure 4. Area 2, the largest area of interest on 25 Two Chain Road. A lone stand of native rush (*Juncus sp*) can be seen on the left side of the area.

Figure 5. Area 2 lacked aquatic macrophytes, but had a sparse distribution of velvety nightshade with some celery-leaved buttercup.

Figure 6a. Soil profile from Area 2 at 25 Two Chain Road. This is not considered hydric soil.

Figure 6b. Area 2 closeup of soil horizon of brown decomposing leaves, but which have not become peat.

Figure 7. Area 3 a damp area (c. 100 m^2) in a paddock at 25 Two Chain Road is dominated by introduced pasture grasses (*Festuca* spp.), but with some yellow flowering hawkesbeard.

Figure 8. Area 4, a second mixed plant community area (c. 2m m^2) of *J. effusus*, with ingrowth of pasture grasses and hawkesbeard growing near the fenceline of 25 & 77 Two Chain Road.

Figure 9. The irrigation race on the property of 15 Two Chain Road.

Figure 10. The irrigation race on the property of 15 Two Chain Road.

Figure 11. The excavatated lined pond/soakhole on the property of 15 Two Chain Road.

Figure 12. Exposed plastic liner at the soak pit at 15 Two Chain Road.

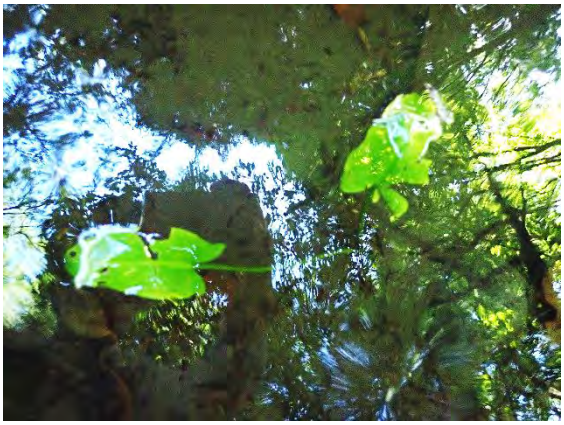

Figure 13. The only submerged plant observed was an unidentified lily. The photo has been brightened for clarity.

Appendix I.

File Reference: 21430201

MEMORANDUM

Date: 5 November 2020

From: Dr Greg Burrell (Instream Consulting) To: Liz White (LandWaterPeople)

Subject: Review of Ecological Assessment for PC80 Rolleston

1. INTRODUCTION

Selwyn District Council (SDC) is processing PC80, a private plan change application in Rolleston. The application was accompanied by the following ecological assessment report from Aquatic Ecology Limited (AEL):

Taylor, M. (2021). Ecological values in the Two-Chain Road Block (Two Chain Road Ltd.). Letter to Bruce van Duyn at the Carter Group, dated 17 September 2021.

This memorandum reviews the above AEL report. The purpose of this review is to assess whether the ecology assessment is sufficient to meet the requirements of the Resource Management Act and to identify any matters that may need to be further addressed.

I am familiar with the location, having previously undertaken fish sampling and fish salvage at multiple locations along the Paparua Water Race network, including sites near Rolleston. I have no conflict of interest with this application.

2. ECOLOGY REPORT REVIEW

The ecology report assesses ecological values based on a desktop review of existing information and a walkover site visit. In my opinion, this type of assessment is appropriate for a high-level ecological assessment in this setting, where ecological values are anticipated to be relatively low.

I agree with the AEL summary in terms of ecological values associated with the Paparua water race, the recommendation to enhance instream and riparian habitat of the water race, adherence to 10 m waterway setback rules, and the recommendation against piping it.

The AEL assessment mentions a “minor blind raceway” at 15 Two Chain Road and “vegetation associated with damp ground” near 25 Two Chain Road. Aerial photographs show areas of open water and distinct vegetation that suggests both these features are wetlands. However, neither of these wetland areas have been assessed for their ecological significance using recognised criteria, such as those in the Selwyn District Plan or in the National Environmental Standards for Freshwater. Given the national decline and rarity of wetlands, I consider that the ecological significance of these wetlands needs to be assessed before any change to the current land zoning can occur. This information can then be used to help guide any revisions to the proposed Outline Development Plan and associated environmental protection.

I agree with the ecological report’s conclusion that negative ecological impacts of the development on the Paparua water race should be low, assuming waterway setback rules are adhered to. However, I do not agree with their conclusion regarding low impacts on wetland areas, given the lack of information on their ecological significance.

3. CONCLUSIONS

Overall, I do not consider that the ecology report provides sufficient ecological information to support the PC80 application and meet the purposes of the Resource Management Act. The key information requirement is an ecological assessment of the potential wetland areas identified in the ecology report. The assessment should include use of appropriate protocols for wetland assessment, comparison against appropriate ecological significance criteria, and discuss what mitigation measures are needed to protect the wetlands from potential negative impacts of landuse change.

Appendix II. A process to assess 'natural wetland and 'natural inland wetland' status

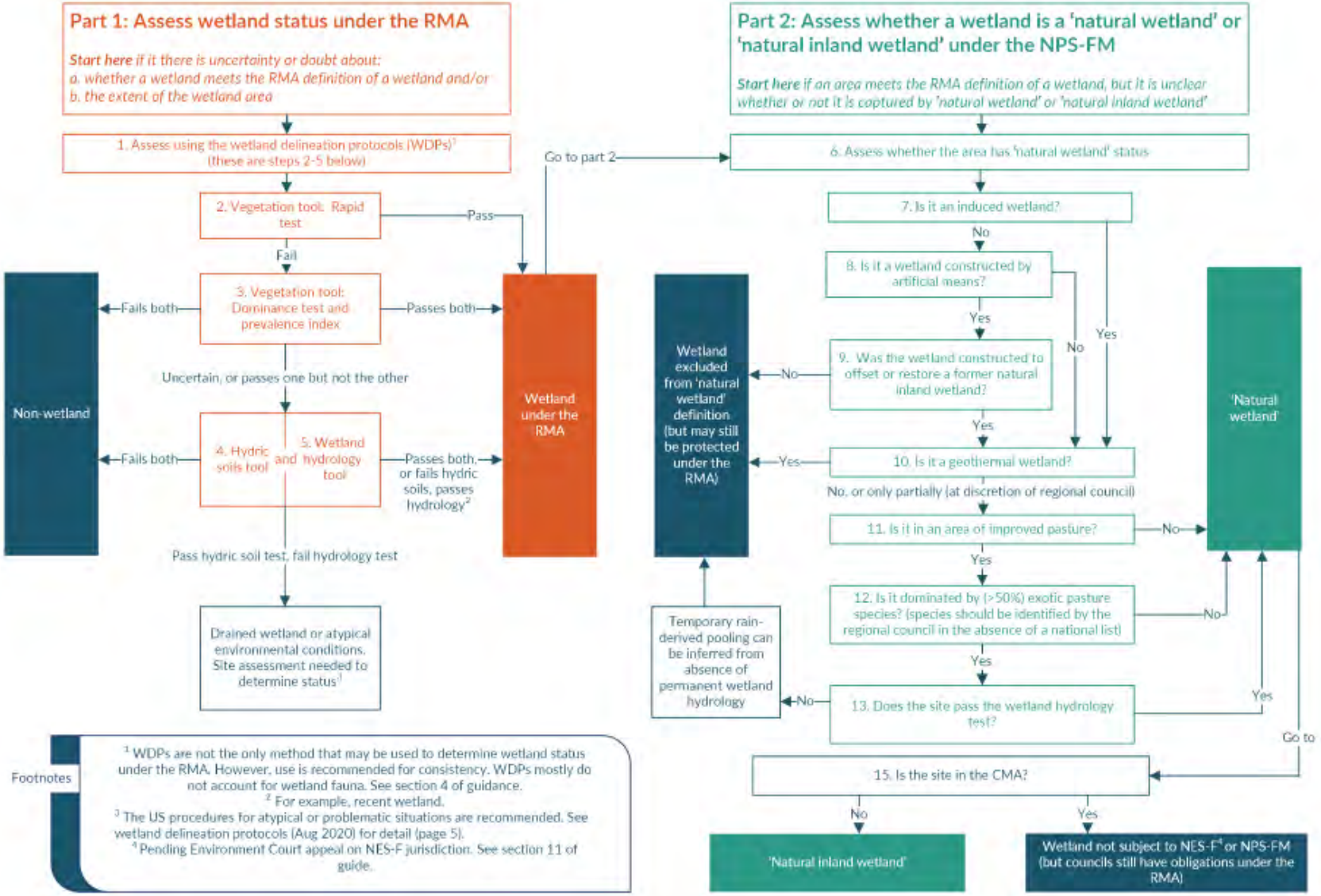

Figure i. The decision tree from Ministry for the Environment (2021a).