Appendix F

Ecological Assessment

Aquatic Ecology

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Dear Bruce

Ecological values in the Skellerup South Block (Rolleston Industrial Developments Ltd.)

Thank you for your email dated 20th August 2021.

I have undertaken a desktop consideration of ecological values, as it pertains to aquatic habitats, in the vicinity of a rural lot South of Rolleston. The Skellerup South Block is located on the corner of Selwyn Road and Dunns Crossing Road, with an approximate development area of 28 Ha (Fig. 1).

This rural section is traversed by a water race which forms part of the Paparua irrigation network (blue line in Fig.1). This historic (1887) water race network, administered by the Selwyn District Council, draws from the main stem of the Waimakariri River, at the end of Intake Road (Fig. 2)(Agriculture N.Z. Ltd 1997). This raceway network was originally for stock water purposes, but more recently it has been used for irrigation where agriculture has become more intensified. The water source is also required for the freezing works at Islington. Branches of the water race network approach residential developments west of Christchurch, which have been naturalised and receive treated residential stormwater. This particular race way terminates (i.e., flows into the ground) within the 28 Ha subsection of the proposed development area (termed a soak pool in Fig. 1).

Information for this report has been gathered from the New Zealand Freshwater Fish Database (NZFFD), the Paparua irrigation raceway network (Agriculture N.Z. Ltd 1997), and AEL recent ecological investigations in the vicinity.

Possible ecology of the Skellerup South Block

A site visit has not been undertaken at this early stage, largely due to the recent Level 4 Covid lockdown. However, recent images suggest the waterway upstream (at the corner of Brookside and Edwards Roads) possessed stable fenced bank structure with the selective spraying of bankside gorse and broom (Fig. 3). The channel has floating rafts of (probably) water cress and/or monkey musk, common herbs in the Paparua Network. The hydraulic drag of these rafts enhances flow depth and provides fish refuge, and a grazing substrate for aquatic snails and other aquatic fauna.

Within the Skellerup block, the channel was well shaded by trees, except for the terminal 500 m, but appeared to be fenced from stock. The water race goes to ground in a soak pit, approximately 74 m north-west of Selwyn Road (Fig. 1).

There is evidence of an old fluvial channel, possibly an old course of the Waimakariri River when it discharged through to Te Waihora/Lake Ellesmere, but there was no large pond present prior to 2011 (Fig. 4a). After 2013, the water race appears to have been deliberately diverted into an area where the area of the old fluvial channel and consequently produced a distinct larger water body depicted in the most recent image (2019, Fig. 4b). There is also another smaller widened area, arrowed in Figs. 4a, b, which is present in all the Google aerials since imagery was available in 2008.

Inferences can be made on aquatic macroinvertebrate and fish fauna in the impacted reach, based on NZFFD entries and previous AEL ecological surveys in other parts of the Paparua network. This is because the habitats share a common Waimakariri River water source, and the physical habitats and geology are broadly similar.

AEL also has reliable data on aquatic macroinvertebrates in similar habitats from two past surveys of the Paparua Irrigation Network. These samples showed an abundance of two snail species, *Potamopyrgus antipodarum* and *Physa acuta*. The 2019 sample also identified a number of riffle beetles (*Hydora*) in both the hard and soft substrate samples. In stony habitat, this species is considered sensitive to pollutants (MCI ≥ 7.0). The macroinvertebrate community index (MCI) is used to make inferences on stream health, based on the aquatic macroinvertebrates present in a sample. The overall MCI values from all samples in the Paparua Irrigation Network were between 60 and 80. An MCI of < 80 is considered "poor" stream health (Stark & Maxted 2007). This is consistent with the limited habitat availability and likely high nutrient levels associated with waterways that flow through stock farms. Based on this, the waterway within the Skellerup South boundary is unlikely to contain invertebrates of importance or exhibit good stream health.

A recent (February 2020) fish translocation of the Rolleston Raceway along Tennyson Street (c. 400 m) was carried out by AEL. During this translocation, a total of four species were identified (Table 1), the most numerous being the introduced (brown trout) and three others native species. None of these species had a significant conservation status (Dunn *et al.* 2017).

However, the NZFFD contains entries pertaining to this tributary of the Paparua Irrigation Network, although further upstream. These recent entries, all from 2018 and 2019 (NZFFD cards 103027, 103049, 115169), confirm the presence of upland bullies and shortfin eels in the irrigation network, but also the presence of longfin eels (*Anguilla dieffenbachii*). Longfin eels have a New Zealand conservation status of "at risk-declining" (Dunn *et al.* 2017).

Table 1. Possible fishes in the Skellerup South Block based on a census from a nearby Rolleston Raceway, Feb 2020, and data on the NZFFDB, (in red).

Fish Species	Conservation Status (Dunn *et al.* 2017)
Shortfin eel (*Anguilla australis*)	Not threatened
Longfin eel (Anguilla dieffenbachii)	(national population) Declining
Brown trout (*Salmo trutta*)	Introduced
Common bully (*Gobiomorphus cotidianus*)	Not threatened
Upland bully (*Gobiomorphus breviceps*)	Not threatened
Total	

Discussion

The aquatic habitat is situated nearly approximately 24 km from the Paparua Race inlet on the Waimakariri River inlet near Kirwee, (see Figure 2) and goes to ground within the development area. It is significantly further from the Waimakariri River than the Rolleston Raceway (mentioned above), but also significantly further downstream from the NZFFDB record entries. Therefore, I consider that sea-migrating fish, like eels and common bullies, will be rare, if not totally absent, as juvenile eels (elvers) will adopt habitats closer to the intake, or eaten by larger fish, particularly trout which are resident in many waterways in the Paparua network. Moreover, mature eels cannot migrate downstream to the sea, as the flow enters a soak hole (see Fig. 1). Only upland bullies are likely to be present in the Skellerup South Block waterway, as they breed and rear in the raceways, and may be locally abundant if cobbles are present.

There are three ponded habitats in the 28 Ha block; the soak hole mentioned above, and two constructed habitats; the smaller one possibly representing a historic soak hole, and the more recent one of currently unknown function. These are likely to collects fines and because the sunlit water will contain dissolved nutrients from the upstream catchment of irrigation race, they are likely to be weedy, at least in the margins. The habitats are artificial, and not of natural origin. As such, they are not defined as wetlands under the LWRP (Definitions p. 45).

Summary

In summary, I expect that there will be limited aquatic ecological value in the waterway through this land block, and that aquatic values present are also available further upstream. I also expect there is abundant habitat space upstream of the land block because of poor fish access, and sufficient food for any translocated fish. These expectations could be verified by means of a brief ecological field survey. If these expectations are verified by the field survey, then I consider it acceptable to translocate the fauna, except for eels, and decommission the waterway through the land block prior to or as part of subdivision works. However, if any eels are to be found, it is recommended they should be translocated into the neighbouring Te Waihora/Lake Ellesmere catchment so they can access the sea and complete their life cycles. To accommodate the raceway terminal flow, I recommend that a new soak hole be located in or near the location depicted in Fig. 1.

Therefore, from a plan change/rezoning perspective, if the above recommended actions are implemented, the likelihood of negative ecological impacts is low.

Yours sincerely, Mark Taylor

References:

Agriculture N.Z. Ltd, G. P. L., Pattle Delamore Partners Ltd 1997. Paparua Water Race; system review. Christchurch. *No*. 83 p.

Dunn, N. R.; Allibone, R. M.; Closs, G. P.; Crow, S.; David, B. O.; Goodman, J. M.; Griffiths, M.; Jack, D.; Ling, N.; Waters, J. M.; Rolfe, J. R. 2017. Conservation Status of New Zealand freshwater fishes, 2017. Department of Conservation, Wellington. *No*. 15 p.

Stark, J. D.; Maxted, J. R. 2007. A User Guide for the Macroinvertebrate Community Index. Cawthron Institute, Nelson. *Cawthron Report No*. *No. 1166*.p.

Figure 1. The Skellerup South Block (c. 28 Ha), illustrating the waterway reach for faunal translocation and decommissioning (red), and the proposed relocation of the terminal soak pit.

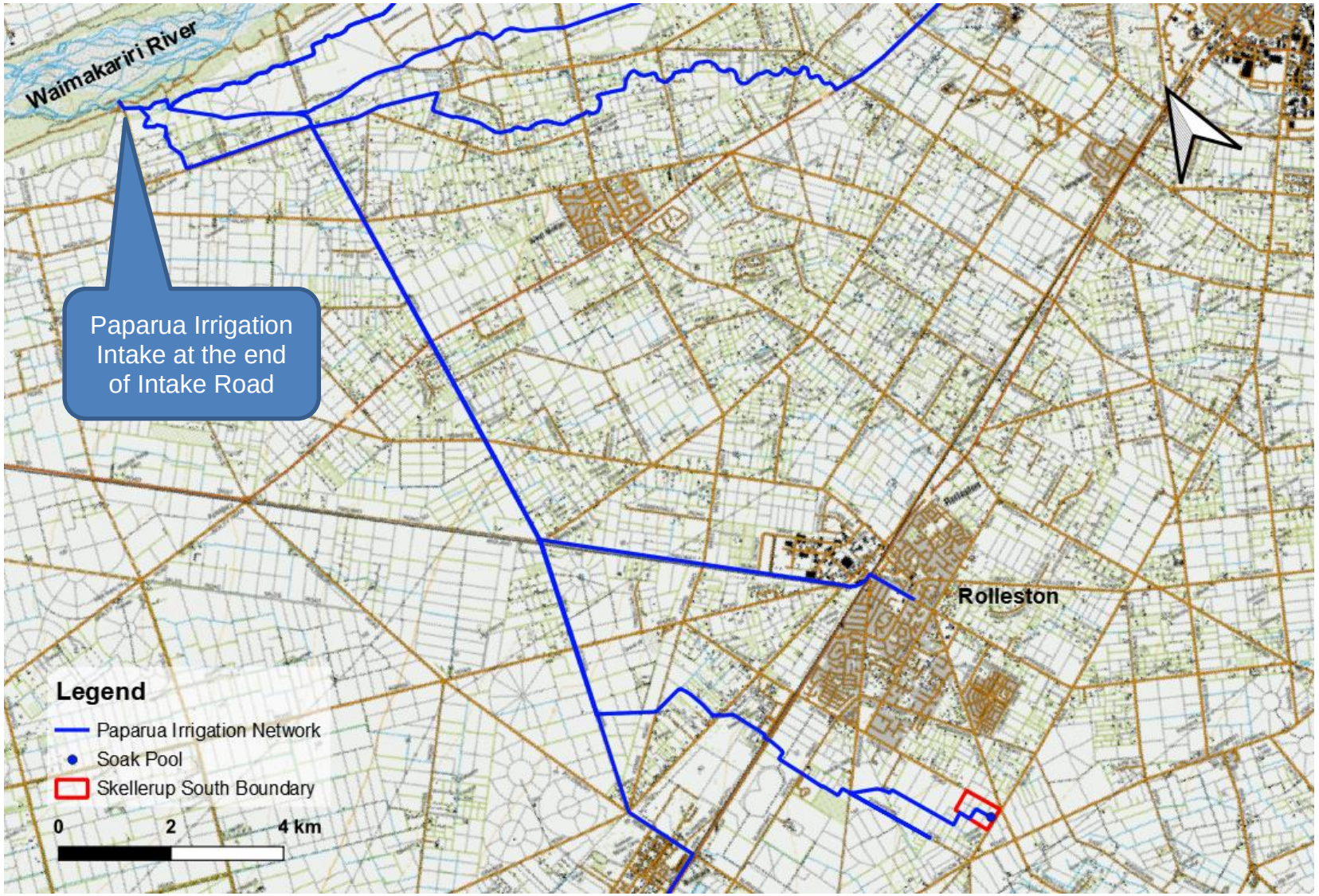

Figure 2. The connectivity of the waterway in the Skellerup South Block (bottom right) with the Paparua Irrigation Network, and ultimately the Waimakariri River.

Figure 3. The Skellerup waterway (further upstream) on eastern side of Edwards Road near Brookside Road corner (source Google Earth Street View, 2019).

Figure 4a. Prior to April 2011, no large pond was present in the land parcel (photo: 28 March 2011). The small waterbody (red arrowed), always seems to have been present from at least 2008.

Figure 4b. Ponded area, (yellow pin central to property) was constructed after April 2011 (image 13 June 2020). The small waterbody (red arrowed) was present prior to 2008.