Boffa Miskell

Memorandum

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Attention:	Mr Gary Wilson
Company:	N/A
Date:	05.03.2019
From:	Dr Vaughan Keesing
Message Ref:	Glenfawin, farm, Swamp Road, Hinds.

Dear Gary

Introduction

You have asked me to provide an assessment of the past and future ecological effects of diverting a drain on your property and the relative efficacy for the purposes of avoiding remedying or mitigating any such effects, of reinstating the previous course or retaining the new alignment.

Expertise

I provide this assessment on the basis of the following expertise:

I am a Senior Ecologist and Partner with the consulting firm of Boffa Miskell Ltd. I have been a consulting ecologist for the last 20 years. I hold the qualifications of Doctor of Philosophy (PhD) in Ecology, BSc zoology (Hons 1st class), and a Diploma in Research Statistics.

My skills lie in community ecology. I have specialist skills in the areas of limnology and have worked extensively in freshwater systems.

During that time I have undertaken a wide range of ecological surveys of natural and semi-natural sites, incorporating floral and faunal values. These surveys have included on site data collection in over 300 separate streams and rivers across New Zealand. I have provided assessments of value and potential adverse effects for many Councils and private clients and provided remedial and mitigation actins and recommendations for of a range of activities.

My work has included:

- assessments of wetland, riparian systems and rivers include Hurunui irrigation project, Waitohi irrigation dams; Rakai WCO amendment, Hurunui WCO, Lake summer dam proposal, Ngaruroro WCO, Conway minimum flow regime, North Christchurch stream minimum flow assessments (macrophyte), Taramakau River riparian wetland assessment, The Wairau HEP scheme.
- determining significant wetlands of the West Coast Region; Ashburton SNA, Rangitikei PNAP, along with bush significance assessments (e.g. over 150 Franklin District Conservation lots, 50 Western Bay of Plenty lots, and many more across New Zealand).
- Large scale roading: McKays to Peka peka, Transmission gully, SH16-18 (North Shore, Auckland) and in particular the value and effects to intersected streams.

- Windfarms and Hydroelectric schemes: Westwind wind farm, Hurunui windfarm, Mill Creek wind farm, Hauāuru mā raki wind farm, Arnold hydro-electric power scheme, Wairau hydro-electric power scheme, Coleridge HEP.

- over 20 subdivisions (e.g. Omaha South (Darby Partners), Long Bay (Landco) Pegasus Bay (Infinity Co), Ravenswood at Woodend (Infinity) and a number of plan changes (e.g. Porters Ski field expansion),

Ecological Assessment

On Saturday 23rd of February 2019 I visited and walked your property, Glenfawin farm, Swamp Road. I walked the site to gain an appreciation of the drain affected by a diversion of water, to examine the water source, and the new drain formed. I was specifically looking to assess the ecological value of the dried drain, its downstream connection, and the state and path of the new drain.

My understanding is that you diverted the central northern entry drain to your property (without Council permission) by digging a new drain westward along the property boundary and filling in a section of the older drain that travelled east along the boundary before it headed west across the fields. The rest of the drain remains open. Water from the property north is the source of surface water to the drain system central to the property. It now flows west, not east at the entrance to Mr Wilson's property, and the field drain is now dry. The new drain has been dug to connect an old established water intake pond once used to sustain an irrigation pump. There is no surface connection between this pond (under exotic trees) and the Hinds River, but water discharged to that pond will enter the Hinds River by way of seepage through the river gravels.

I walked sections of the dried drainage system from the northern boundary to the southern boundary and under the rail culvert. I examined the filled drain section running along the northern boundary and the newly dug drainage system running west along the northern property boundary. That system turns south at the end of the cultivation area, travels further south and then into an old pit dug initially to house water extracted from the Hinds and the irrigation pump. I climbed through the undergrowth in search of a surface connection from this pit to the Hinds river but did not find one.

I examined the "Taylors" stream drain (also known as the swamp road drain) which is east of the affected drain, examining its channel, bed, substrate and flows, noting it too has been re-routed in the past.

I also crossed the SH and inspected the dug drain that is used to carry the water of several properties (once including Mr Wilson's) parallel to the SH and rail, the bulk of which turns south at a small weir before discharging (after some water takes) a further 1km to the Hinds River. The small portion that does not turn at the weir continues parallel with the SH until the Hinds River.

I was provided several older plans showing the affected drain in several configurations through the paddocks, all of which had been dug by others. These, and the NZ 1:5000 (1985 and 1998 revision) topographic map, show no sign of an original channel across the centre of the property and on the ground there was no evidence of a natural path across the property of this system.

I understand that the water that enters the property from the north comes from a central drain to the north, which is fed by runoff and tile drains.

It has been related to me that one of the issues at hand is the potential for the diversion of water to have resulted in some form of aquatic ecological value loss or harm, and I focus on this question, but also consider the downstream and new diversion effects.

The dried drains – Description and likely ecological value.

This north to south central property drain passes through the cropping area centrally and has a number of right angle turns. It was dug sometime in the past to convey water and it has been re-routed several times along several routes through the years, the last recorded route having been reportedly dug about 10 years ago by the previous owner. The channels have been dug as shallow trapezoid "box" channel (300-500mm

deep and 1.2m wide in the main (deeper in some northern areas)). It is evident that the channel was not formed to establish gradient changes or other hydrological variation, it is a uniform, slow fall system south. The bed is predominantly the soils found at digging and there are some scatted cobble in places related (I believe) to in-fall from the banks dug. Compared to the Taylors stream bed east, which has more natural and deep cobbles, the drain has no aquatic system substrate representation.

The drain was managed and cleared twice a year of vegetation and the riparian edge spayed for weeds – so it was typically in a bare state. There was little in the way of substrate or aquatic macrophyte to support aquatic life. Furthermore, the drains regularly dried to surface dry each year in late summer (your pers com.).

The following montage of photographs is generally from south to north showing examples of the dry drain reaches as at the 23rd.023.2019. While not with water, the context, the substrate, the channel form and riparian condition are evident.

Southern end, the now dry drain, looking towards the rail culvert and just outside of the cropping area.

Southern reach (shallow, open and bare with cropping up to the edges).

Central reach of the dry drain.

Northern reach of the dry drain, a little deeper than southern sections.

Typical farm track crossing of dry drain.

Southern most - drain path under the rail and then SH1.

Aquatic Habitat Value

It is very clear to me (from my 25 years of experience) that these drains did not, when in flow, support any form of valued aquatic indigenous community. At best the fauna would have been represented by opportunistic snail, worm, collembola and fly taxa (mostly chironomid and blackfly) set amongst short term macrophyte presence: i.e. monkey musk, and starwort - (exotic) with some duck foot (*Lemna*). I would expect an MCI in the mid 40's (based on 5 taxa). It is highly unlikely any fish were present, both given the route to get into the drain, but also the basic nature of the then available habitat (warm water in summer, devoid of cover, and poor in anything but the most basic food web).

I have looked through what historic aerial photography I can find to examine if a stream or other system is evident in the past. There is no evidence of a stream or even drains in many older photos, but Taylors stream is often visible with its meander. It seems evident that there was no aquatic system presence as a permanent aquatic feature and so no aquatic values.

Canterbury maps web site – historic aerials 1965-1969.

Conclusion on value affected.

The key factors that allowed me to reach the conclusion that the now dry drain was not aquatic habitat of permeance, quality or notable ecological value, were:

- the discovery that there was on going significant drain management activities incompatible with development of any significant ecological values in the drain;
- that the channel was shallow and uniform structured;
- the substantive difference in the substrates between Taylors “stream” (deep gravels and cobble, versus soil and scatter cobble);
- the flow differences and the permeance of flow in the Taylors stream versus the more ephemeral nature of the drain;
- the absence of taxa connectivity.

Concerning this last point, the great majority of evidence suggests that when water was in this drain it was a simple weed edged and ephemeral system of likely tolerant aquatic invertebrate fauna based on sediments and occasional macrophyte, the disestablishment of which has caused less than minor (indeed negligible) adverse effect. This conclusion considers a negligible ecological value was present and a negligible catchment level effect as the magnitude (Following EIANZ 2018 method of assessments) - At a local level (the site) it might be considered a negligible value set against a very high magnitude of effect – which would result in a low significance of effect. However it would be unusual to consider an artificial waterway at a small site like this as the basis for the magnitude assessment, and it would be more usual to consider the effect to this section as a low magnitude at the sub-catchment level.

The Wider Context

The water once travelled south and entered the main drain (Ca. 1km south) which conveyed that water to water take users and then eventually the Hinds River. Now it does not do that, but enters the Hinds river 2km upstream via the pond and subsurface flows. The loss of this water to that rad side drain has been balanced by the addition of a neighbour’s water and the flows in that drain are not diminished because of this change. That said, the aquatic system present in that conveyance drain along SH1 is not such that the loss of this small contribution of water would make any measurable difference. Now the water in question is more rapidly conveyed to the Hinds River, while being filtered by the old water take pond and the gravel-

subsurface path it must take. Indeed any sediment coming from the new channel, as it "heals" will be trapped in the old pond, and cannot pass into the Hinds River. The shorter path to the river also reduces the opportunity for nutrient runoff from cropping areas through which the previous drain ran. The combined effect is therefore that it is likely to result in more water of better quality being in a longer stretch of the Hinds River than prior to the diversion.

It seems reasonable to suppose that the water from the north only enters this property and this path because of the tile drains and central drain directing the water south. In the absence of these drains that water is likely to have remained as an often wet area with little drainage, and / or connected to the Taylors stream rather than in the current drainage.

Enhancements

You inform me that you intend to ensure that the batters of the newly dug drain's banks will be managed (by this I assume planted) in order to reduce further the risk of any sediment loss. We discussed and I consider it appropriate that a margin between the drain and fence could be beneficially planted in a manuka / kanuka focused feature which would secure the northern side. I agree that this will be beneficial, although only for water quality in the pond, as any sediment will be removed by filtration as the water seeps through to the Hinds River. You also stated that you intend to do native planting around the pond area. I do not see such an activity as being especially valuable unless a large area of the exotic weed are removed from around the pond in the first instance or else any such planting will be overtaken in short order. I do not see that activity as being required from an "effects" basis. That said an appropriate planting and management regime could establish a useful habitat enhancement providing not only enhanced nutrient uptake but habitat of a far higher quality than the negligible values that might have existed in the previous alignment. I am happy to review and approve a planting plan to ensure that such enhancements are effective.

Reinstatement

On the basis of the above analysis it is my view that recreating the drain that existed for the previous ten years could, at best in the long term, re-establish the prior situation, which had negligible ecological value. It would however preclude the better water treatment offered by the new drain and infiltration pond (of both sediment and nutrient) and place back a water system sprayed and affected by normal farming products. I am unaware of any filtering mechanism such as that provided by seepage from the pond, that would be capable of removing sediment or any other contaminants from the flows from such a reinstated drain.

Overall Conclusion

The diversion of the water further upstream into the Hinds River and via an old pond (because of the new diversion created) has not removed aquatic habitat of any value in the dried central drain. It has not deprived any values further downstream. The creation of the new drainage channel has been done well and is of an appropriate size and any sediments generated and lost will affect the old irrigation pond, not in the Hinds River.

The activity undertaken has not caused any lasting ecological damage or loss of any consequence. As a result the overall ecological effects of the works have been minimal.

Therefore, the overall adverse ecological effects of retaining the new (now present) alignment will be less than minor and is a better than the pre-existing case in terms of overall water quality and the delivery of that water to the Hinds River. A net water quality gain (to the Hinds River) does not require any additional "mitigation" actions such as planting.

Dr Vaughan Keesing

Boffa Miskell

26.02.2019