Private Plan Change Application 69 to the Selwyn District Plan

Ecology Report

Prepared for:
Selwyn District Council

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INTRODUCTION

1. My name is Gregory Peter Burrell. Selwyn District Council has contracted me to review ecological aspects of Private Plan Change Application 69 (PC69) to the Selwyn District Plan and provide input to the council's S42A report.

2. I hold a Bachelor of Science, Post Graduate Diploma in Science, and a Doctor of Philosophy (PhD) in Science, all majoring in Zoology (in particular Ecology) and all obtained from Canterbury University. I am a member of the New Zealand Freshwater Sciences Society, the North American-based Society for Freshwater Science, and I co-facilitate the Christchurch Ecology Group. I have published scientific papers and a book chapter on ecology in relation to groundwater-surface water interactions.

3. I am employed as a director and senior scientist at Instream Consulting Limited. I have worked in the role for the past seven years. My work is centred on freshwater ecology and water quality, including assessing ecological values, assessments of environmental effects, restoration, and catchment planning. I have over 20 years' experience working as an ecologist.

4. I am familiar with the site, having previously undertaken ecological sampling in Springs Creek, Liffey Stream, LI Creek, Lincoln Main Drain, and the Ararira / LII River for the Living Water programme. I have also undertaken fish sampling and fish relocation in Lincoln Main Drain and its tributaries for the Te Whāriki subdivision. I have no conflict of interest with this application.

5. This report was completed on 19 October 2021.

REPORT SUMMARY

6. The purpose of this report is to provide information and opinion for the assessment of the plan change application, in relation to effects on freshwater ecology. This report covers the following matters:

    a. Ecological values of the plan change area.

    b. Potential ecological effects associated with the proposed plan change.

    c. Points of agreement and disagreement with the applicant's ecological assessment.

    d. Waterbody protection and enhancement.

    e. Summary of ecology-related submissions.

7. This report does not extend to a detailed review of District Plan provisions or hydrology, as these matters are covered by other Council experts.

8. I have read the following documents when preparing this report:

    a. Plan change application Assessment of Effects (AEE), dated October 2020.

    b. Aquatic ecology report by Aquatic Ecology Ltd, dated October 2020.

    c. Aquatic ecology letter by Aquatic Ecology Ltd, dated 15 February 2021 (attached to the 18 February 2021 RFI response letter).

d. Revised plan change application, dated April 2021.

e. Manawhenua statement of Mahaanui Kurataiao Ltd, dated 17 December 2020 (attached to the revised plan change application).

9. As detailed further in this report, I consider that the key ecology-related issue with this application is the impact of urban development on springs, wetlands, and associated waterways. Springs and wetlands are threatened ecosystems and culturally significant. The development area includes the greatest density of springs within the Canterbury region and spring flows are highly sensitive to urban development. Overall, I consider it likely that the landuse change associated with PC69 will reduce the value and extent of wetlands and springs in the area. This is inconsistent with environmental policy and guidelines aimed at protecting and enhancing wetlands and springs.

ECOLOGICAL VALUES

10. The plan change area is generally bounded by West Boundary Drain to the west, Te Whāriki subdivision to the north, the Ararira / LII River to the east, and Collins Road to the south. Waterbodies potentially affected by the development include West Boundary Drain, Springs Creek, LI Creek, Lincoln Main Drain, the Ararira / LII River, unnamed drains that flow into Collins Road Drain, numerous springs across the eastern half of the site, and wetland areas associated with Springs Creek and a pond near the historic Chudleigh homestead.

11. Historic Black Maps from the mid-1800s show raupō (*Typha orientalis*) and harakeke (*Phormium tenax*) swamp in the vicinity of West Boundary Drain and extending from the historic homestead east and southwards to beyond the Ararira / LII River. Extensive drainage occurred throughout the area over 100 years ago, to make way for agriculture and settlements. However, aerial imagery from the Canterbury Maps Viewer website shows Springs Creek following a natural, winding course in imagery taken between 1940 and 1944. Aerials from that period also show that the downstream half of the creek was bordered by trees, and an extensive wetland area that covered approximately 13 hectares, where the creek joins the Ararira / LII River.

12. By the 1960s, much of Springs Creek had been straightened and trees only bordered the southern, downstream end of the creek. The Ararira / LII River was also realigned and straightened around this time. However, the large wetland area was still present and vegetated. Substantial vegetation clearance occurred between the 1960s and 1970s, with the total area of trees and shrubs in the lower wetland area reduced from 13 down to 2 hectares. The rest of the wetland was cleared of taller vegetation by the 1990s, along with most of the trees along Springs Creek.

13. Currently, all waterbodies within the plan change area are affected to varying degrees by channelisation, lack of riparian trees and shrubs, and insufficient buffering from adjacent landuse. Indigenous plant cover is minimal across the site, and mainly restricted to sparse patches of sedges (*Carex* spp.), rushes (*Juncus* spp.), and harakeke alongside wetland areas. Despite the degraded habitat, waterways support at least five native fish species, including longfin eel (*Anguilla dieffenbachii*) and inanga (*Galaxias maculatus*), which both have an At Risk – Declining conservation status (Dunn *et al.* 2018). Eels and inanga are also significant mahinga kai species.

14. The spring and wetland habitats across the site are ecologically significant, despite their degraded state. That is because springs and wetlands are threatened ecosystems and they are often biodiversity hotspots. Review of data from the Canterbury Maps Viewer website indicates that the area of proposed development has the greatest density of mapped springs within the Canterbury region[1]. While the springs and wetlands across the site are degraded in terms of indigenous plant cover, they still possess the ability to provide other important ecosystem services. The term 'ecosystem services' refers to the economic, social, environmental, and cultural benefits provided by wetlands. In addition to the habitat they provide, ecosystem services provided by wetlands include provision of food, moderation of extreme events (floods and drought), regulation of flows, water purification, maintenance of soil fertility, and various measures of cultural wellbeing. New Zealand's remaining wetlands, and the important ecosystem services they provide, are threatened by many factors, including urbanisation (Clarkson *et al.* 2013).

POTENTIAL ECOLOGICAL EFFECTS OF THE PLAN CHANGE

15. I consider that the key ecological issue associated with the proposed plan change is the impact of urbanisation on hydrology of threatened spring and wetland ecosystems. That is because, as stated by Sorrell and Gerbeaux (2004), *"Hydrology is the single most important factor controlling the establishment and maintenance of wetlands, constraining which organisms grow where, and how productive they are."* In addition, swamps, such as the remnant wetlands within the proposed development area, often have the greatest species diversity of all wetland types, due to a combination of hydrology, soil, and nutrient supply factors (Sorrell and Gerbeaux 2004). This means that impacts of the development on wetland hydrology could greatly hinder the restoration potential of wetlands and springs within the development area.

16. The key issue is less about reduced groundwater recharge from the increased impervious area, and more about the short-circuiting of groundwater flowpaths caused by hard fill, drains, and service trenches. This short-circuiting results in groundwater flows being channelised away from headwater springs and wetlands, into constructed stormwater facilities. While the net supply of water to downstream waterways such as the Ararira / LII River may remain the same before and after development, the flow source to headwater springs and wetlands is reduced. As noted in the Aquatic Ecology Ltd letter, dated 15 February 2021, intersection of groundwater flowpaths by the Northwood subdivision was likely a major factor contributing to the springfed headwaters of Kā Pūtahi Creek (formerly Kaptone Creek) drying up.

17. To avoid potential impacts of urban development on wetland hydrology, it is important to both adequately delineate wetlands, and to delineate the zone of influence caused by urbanisation, so that adequate buffer zones can be placed between wetlands and urban developments. Buffer zone size will depend on local soils and groundwater conditions. In general, the size of the buffer zone to protect against adverse impacts on hydrological conditions will be greater than the buffer size needed for more localised impacts, such as vegetation clearance.

[1] The precise location and number of actual springs may vary from those mapped, but the number of springs provides an indication of the spring density in a general area.

18. General guidance on wetland buffer zone size can be drawn from the National Environment Standards for Freshwater 2020 (NES-F). The NES-F includes numerous rules regarding management of activities in relation to 'natural wetlands'. The current definition of a natural wetland is restricted to wetlands with <50% cover with exotic pasture species. This definition is currently being consulted on, and there is strong debate amongst ecologists as to whether this definition adequately protects wetlands. That is because, as noted above, wetland values extend beyond plant biodiversity values and because the definition also limits the ability to protect and restore wetlands.

19. Regardless of the native plant-based definition, the NES-F includes varying buffer sizes to protect wetlands from human activities. In general, the NES-F requires that activities that involve earthworks or vegetation clearance are restricted within 10 m of a wetland, while activities potentially affecting wetland hydrology (take, use, dam, or divert) are restricted within 100 m of a wetland. This suggests that activities potentially affecting wetland hydrology, such as filling, draining, and trenching, should be restricted within 100 m of wetlands.

20. I recognise that a 100 m buffer may seem excessive in this instance, and a smaller buffer may be warranted, given the degraded state of the wetlands, springs, and other waterbodies. A local example provided in the Christchurch City Council Urban Design Guide is Redwood Springs, in northern Christchurch. In that development, a buffer of at least 70 m is present between all roads and residential properties and the Styx River and a mapped spring. Another, more local example, is the Liffey Springs subdivision. In the Liffey Springs development, the buffer width between springs and the upper Ararira / LII River (also known as the Liffey) is typically around 20 m. However, it is worth noting that in that instance, urban development is currently restricted to one bank of the waterway and the other bank remains in rural landuse. There are two open water wetland areas north of the plan change boundary, to the north of the historic Chudleigh homestead. Based on property parcels, the buffer between the wetland water edge and residential sections is typically 20-30 m, although it appears to be as narrow as 5 m for a short section. As with the Liffey Springs example, the current rural landuse to the south of the wetlands provides additional buffering.

21. It is difficult to recommend a defensible buffer width for springs, wetlands, and other waterbodies, without detailed information on soils, hydrology, and vegetation. However, it is clear to me that a 10 m buffer is unlikely to be adequate. Given the high-level guidance provided in the NES-F and examples in local developments, it is likely that an appropriate buffer between roads, buildings etc and springs, wetlands and other waterbodies should be somewhere in the range of 30-100 m. Creating a buffer of this size around springs, wetlands, and other waterbodies will both buffer against hydrological effects and also help improve ecological connectivity and integrity of the wetland area, by increasing the overall reserve size.

22. Other potential effects associated with the proposed plan change include construction-related effects, impacts on fish passage, and impacts of stormwater discharges on receiving water quality. Overall, I consider these potential effects could be adequately addressed, with appropriate engineering design and construction methodologies.

THE APPLICANT'S ECOLOGICAL ASSESSMENT

23. In general, I agree with the applicant's assessment that ecological values on the site are impacted by historic and current landuse, and I agree that there are opportunities for improving and restoring ecological values. In particular, I agree with the statement on page 4 of the Aquatic Ecology Ltd letter of February 2021, which states, *"If discharge can be preserved, when combined with a wider, more biodiverse riparian buffer, ecological values in the springs and wetlands can be protected and enhanced."* Unfortunately, neither of the two Aquatic Ecology Ltd reports comment on whether the proposed development plan adequately buffers against impacts on hydrology. As discussed above, I consider that the level of buffering proposed is inadequate.

24. Paragraph 97 of the revised application states *"The proposed ODP incorporates large green space buffers adjacent to watercourses on the site and any waterbodies on the site will be protected by a 10 m setback requirement for development."* A footnote attached to this statement notes, *"Rule 2.1.1.4 stipulates a 10 m setback for earthworks within 10 m of any waterbody."* Based on this statement, it appears that the applicant is relying on waterway setback buffers to protect waterways from earthworks impacts. As noted above, buffer sizes should be substantially larger to protect against hydrological impacts. As such, I do not agree with their conclusion that 10 m setbacks from waterways will be adequate, particularly given the large number of springs, wetlands, and other waterbodies on the site.

25. Aside from the buffer size issue, the only issue I have with the ecological assessment relates to the delineation and assessment of wetlands and springs. The Aquatic Ecology Ltd letter of February 2021 states that all potential waterbodies, including springs, on the site were visited. However, the location of the visited waterbodies was unclear from the maps provided with the assessment. In addition, the description of wetland condition was focussed on fish and fish habitat, which is unusual. The three primary methods to describe wetland condition and extent are via plant community composition, soils, and hydrology (Ministry for the Environment 2020). With none of these methods being referred to, the current extent and condition of wetlands in the area remains uncertain. This is important, because the location and condition of wetlands should be well understood prior to any development, given the sensitivity of wetlands to impacts on hydrology, soil, and vegetation.

WATERBODY PROTECTION AND RESTORATION

26. Freshwaters in New Zealand are afforded protection via various pieces of legislation, plans, and policies. At the highest level, the Resource Management Act (RMA), Section 6 (Matters of National Importance), clause (a) requires *"the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development*." Section 6 (c) also requires *"the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna."* Section 2 of the RMA defines wetlands as, *"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."*

27. Sitting below the Resource Management Act, the NES-F and the National Policy Statement for Freshwater Management 2020 (NPS-FM) each provide more direction as to how freshwater ecosystems should be protected. Amongst other things, the NES-F and NPS-FM seek to avoid further reductions to the extent and ecosystem health of rivers and wetlands. A complementary desired outcome of the New Zealand Biodiversity Strategy 2020 is restoration of wetland and other freshwater ecosystems to a "healthy functioning" state.

28. The Canterbury Regional Policy Statement 2013 (CPRS) recognises the loss of riparian and wetland habitats as a significant freshwater management issue. Policy 9.3.2 of the CPRS states that priorities for protection within the region include areas of significant indigenous vegetation and habitats of threatened and at risk indigenous species. Policy 9.3.1 states that significance, with respect to ecosystems and indigenous biodiversity, shall be determined by assessing representatives, rarity or distinctive features, diversity and pattern, and ecological context. These matters are further expanded in Appendix 3. Policy 9.3.4 includes the requirement to promote ecological enhancement and restoration. Policy 9.3.5 relates specifically to wetland protection and enhancement.

29. I consider that the complex of springs and wetlands within the proposed development area meet the criteria for ecological significance laid out in Appendix 3 of the CPRS. This is primarily because they meet the criteria of representatives (the site includes the greatest density of mapped springs within the region) and rarity/distinctiveness (less than 20% of the former extent of wetlands remains within the region).

30. Within the Canterbury Land and Water Regional Plan (LWRP), there are numerous policies, objectives, and rules relating to freshwater protection. Of particular relevance to this plan change are policies specific to the Selwyn-Te Waihora zone, which includes the Ararira / LII River catchment. For example, Policy 11.4.21 is to, *"Enable catchment restoration activities that protect springheads, protect, establish or enhance plant riparian margins, create restore or enhance wetlands and target removal of macrophytes or fine sediment from waterways."*

31. Within the Selwyn District Plan, Objective B1.3.1 requires that areas of significant indigenous vegetation and significant habitats of indigenous fauna are recognised and protected as townships expand. Rule 12.1.4.26 requires that subdivision of land that contains any waterbody includes mitigation to protect the hydrological characteristics and any ecological values of the waterbody.

32. A report on the hydrology and ecology of the Ararira / LII River catchment as part of the Living Water programme includes priorities for ecological protection and restoration (Golder Associates 2015). The first restoration goal in the report is *"Locate, protect, and restore spring habitats"*. The rationale given for this goal is, *"Springs are 'biodiversity hotspots' and are culturally significant, plus restoring spring habitat is consistent with the restoration principle of focussing on headwater areas. Springs are generally poorly protected in the catchment and have degraded physical habitat."* The second restoration goal is, *"Improve ecological condition of existing wetlands and increase overall wetland extent."* The rationale given for this goal is, *"Wetlands are threatened ecosystems nationally and regionally, and provide important habitat for native plants and animals."*

SUMMARY OF ECOLOGY-RELATED SUBMISSIONS

33. I have reviewed submissions to the plan change application, and the following themes were brought up regarding ecological matters (submission numbers in brackets):

    a. Lack of greenspace (1, 47, 226)
    b. Noise and light pollution (4)
    c. Erosion of soil stockpiles (4)
    d. Impacts of proposed roads on reserves and waterways (41, 44, 45, 54, 57, 61, 72, 73, 86, 106, 129, 139, 38)
    e. Impacts on springs, wetlands, and other waterbodies (72, 102, 131, 137, 189)
    f. Insufficient wetland identification and protection (201)
    g. Inconsistent with NPS-FM 2020, in relation to impacts of realigning waterways, interception of springs and groundwater (72, 102, 121)
    h. Lack of information regarding cumulative effects (230)
    i. Lack of sufficient mitigation (230)

34. The largest number of submissions were in relation to roads cutting across existing reserves and waterways. I agree that this can result in adverse impacts on both land-based (terrestrial) and aquatic ecosystems. The two key issues of concern from an ecological perspective are the direct impact of habitat loss and the indirect impact of habitat fragmentation. This latter impact is a significant issue in urban environments. The best ways to avoid habitat fragmentation and disruption of migratory corridors along waterways is to provide sufficient buffering around waterways and to minimise roads cutting through reserves and over waterways.

35. A general theme for most of the other submissions was concerns about the degree of protection of springs, wetlands, and other waterbodies. This is a concern I also share, as described throughout this report.

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