Before an Independent Commissioner
appointed by Selwyn District Council

Under	the Resource Management Act 1991
In the matter of	an application to change the Selwyn District Plan (Plan Change 62 to rezone 60 Ha from a mixture of Living 1 (deferred), Living 2 (deferred) and Outer Plains Living to Living 1 and Living 2)

Supplementary statement of evidence of James Matthew Phelps Hopkins

14 September 2020

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Qualifications and experience

1 My name is James Hopkins. I prepared a statement of evidence pertaining to stormwater management dated 11 August 2020. My qualifications and experience are set out in that statement.

2 In preparing this supplementary evidence I have considered the following documents:

(a) Evidence submitted by Harts Creek Streamcare Group and Ellesmere Sustainable Agricultural Incorporated.

(b) Environment Canterbury (ECan) Land and Water Resources Plan (LWRP);

(c) Christchurch City Council (CCC) Waterways Wetlands and Drainage Guide (WWDG); and

(d) ANZECC Freshwater guidelines

(e) Application (CRC151343) to change conditions of CRC092128.1 and the appendices.

Code of Conduct for Expert Witnesses

3 While this is not a hearing before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2014 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

4 My supplementary evidence responds to points raised in the Harts Creek Streamcare group and Ellesmere Sustainable Agriculture Incorporated evidence. In particular, I address stormwater treatment and the ability to achieve water quality objectives of the receiving freshwater environment; and stormwater attenuation and the ability to manage stormwater flows in a manner that does not have adverse effects on the receiving environment.

Response to evidence submitted by Harts Creek Streamcare Group

5 The Harts Creek Streamcare Group evidence makes reference to increase in contaminates including copper and zinc entering Birdlings Brook and Leeston Creek and aquifers.

6 Heavy metals, such as copper and zinc, are key stormwater quality parameters due to both their prevalence in established urban environments and their toxicity to receiving water bodies. Paragraph 38 of my Evidence in Chief identified the common sources of these contaminants.

7 A presentation by Brough, Brunton, England and Eastman (WaterNZ Stormwater Conference 2012) shows that the concentrations of heavy metals in modern residential developments is substantially lower than that of established urban environments. Many of the contaminants that exist in established mixed urban environments (such as the existing Lincoln township) do not exist in modern residential developments due to gradual improvements in materials being used. This is a result of growing recognition of environmental impacts of those products. Examples are reduction in the use of copper and zinc in roofing materials, removal of lead in petrol and roofing nails and phasing out of copper in brake pads.

8 For simplicity, all concentrations in the following paragraphs will be stated in mg/m^3, with the exception of TSS which will be stated in g/m^3. Some sampling and some publications present these figures in other units, such as g/m^3 or ug/L. When comparing figures care is needed to ensure that the same units are being utilised and conversions made (simply multiplying or dividing by 1,000 as necessary).

9 Monitoring results[1] show that the water quality in Leeston Creek and Birdlings Brook already exceeds the ANZECC guidelines for species protection (freshwater). The following key parameters were of note:

(a) Copper 1.1 mg/m^3 to 3.5 mg/m^3 (95% protection guideline 1.4 mg/m^3).

(b) Zinc 7 mg/m^3 to 50 mg/m^3 (95% protection guideline 8.0 mg/m^3).

10 A review of monitoring[2] of a recently established stormwater management facility in a new residential development located in southwester Lincoln, which discharges to a spring fed creek within the Te Waihora catchment

[1] Refer Annexure C of the Harts Creek Streamcare group

[2] Refer to application for CRC151343, prepared by RMG for Lincoln Land Development Limited

identified that Copper concentrations in untreated runoff at the inlet was in the range of 1.0 to 6.2. mg/m³. After treatment (with an average removal efficiency of 62%) this was reduced to an average of 0.5 mg/m³ at the outlet, which is less than half the ANZECC guideline for 95% species protection trigger level for freshwater.

11 A review of zinc in the same system indicated that the concentration of zinc in untreated runoff was in the range of 1.5 to 9 mg/m³ and the average treated runoff zinc concentration of 1.8 mg/m³ was below the 95% protection trigger level of 8.0 mg/m³. (average removal efficiency of approximately 50%).

12 Thus it is concluded that a modern treatment train for a development in a similar setting is already achieving an appropriate water quality as prescribed by the Canterbury LWRP for the receiving water body (i.e. the ANZECC 95% level of protection trigger levels).

13 Brough Et al presented concentrations of zinc and copper in runoff from modern residential subdivisions, which are congruous with the above figures.

14 Total Suspended Solids (TSS) is a common problem during the construction (earthworks phase) of new developments and there is no doubt that particular care will need to be taken during construction. However there are a wide variety of well accepted and effective solutions available for managing TSS in runoff during the construction phase.

15 These include the use of sediment retention ponds, flocculants and appropriate management of the exposed earthworks area and appropriate management of both clean and sediment laden runoff during construction.

16 Elevated TSS risk reduces greatly upon completion of the development civil works, however intermittent risk of TSS sources continues during the first few years while new dwellings are being constructed. However, by this time the permanent stormwater management areas will be operational and be capable of capturing any errant TSS discharges.

17 In the long term TSS is very low in modern residential subdivisions as there are typically not any areas of disturbed soils. Standard treatment trains are capable of removing at least 75% of TSS. Brough Et al. indicate that TSS in residential subdivisions is typically below 20 g/m³ (The ECan limit for freshwater bodies is 50 g/m³).

18 Monitoring results[3] for Dissolved Reactive Phosphorous (DRP) results in Leeston creek varied between 8 mg/m³ and 39 mg/m³ whereas the guideline is identified in the same report as 16 mg/m³. Note phosphorous is not necessarily toxic, but is a stressor and promotes growth of undesirable aquatic plants when it exceeds certain values. Phosphorous is generally below guidelines in modern residential developments with results typically below 1 mg/m³. In cases where higher results have been identified this has anecdotally been attributed to wind-blown phosphorous rich particulate matter, likely from adjacent rural land or naturally biologically available phosphorous in leaf fall.

19 There is a wide variety of solutions to managing stormwater contaminants. A typical treatment train can remove in excess of 99% of target toxicants, which given the relatively low concentrations in modern residential development runoff will ensure that appropriate freshwater protection guidelines are met. The treatment trains often include combinations of the following:

(a) Trapped and syphoned sumps which remove bulk/coarse sediment and trap hydrocarbons.

(b) First flush basins which remove sediment (TSS) and entrained heavy metals.

(c) Wet or dry ponds which remove further sediment (TSS) and entrained heavy metals

(d) Polishing wetlands that remove finer sediments and entrained heavy metals and phosphorous and/or nitrogen.

(e) Raingardens which remove heavy metals and TSS.

(f) Proprietary (manufactured) devices which can also remove sediments and metals in accordance with a variety of adopted standards in NZ (as well as other contaminants).

20 Harts Creek Streamcare Group's submission questions whether Rule 5.93 of the LWRP would be applicable to any future application for stormwater charge. Consent. After seeking clarification from ECan I am of the understanding that rule 5.93 would apply.

21 Harts Creek Streamcare Group have identified at paragraph 5.15 of their evidence concern about issues that SDC appear to be having obtaining a

[3] Annexure C of the Harts Creek Streamcare group

consent for the existing Leeston Township. While I have not looked into this in detail, and therefore it would likely be that this is a matter for the appropriate SDC representative, it would appear that ECan requires data that was not available at the time of the original application and will take time to collect. The fact that SDC is in a predicament of retrospectively obtaining a consent for a long established discharge, which far more complex parameters does not leave my surprised by the level in information that will be required and the requisite amount of time required to obtain that information. This is not a situation that is experienced with designing and consenting new residential development stormwater discharges.

22 Harts Creek Streamcare Group have identified at paragraph 5.16 their concern about flow rates and flooding. At the time of ECan stormwater discharge consent the consent applicant will need to evaluate a variety of rain events (of varying return period and varying duration). Typically, the outcome of these analyses is as per my original evidence. Storms shorter than 24 hours have the flow rate so substantially over attenuated that the increased duration of outflow is offset by the greatly reduced flow rates (as the reduced flow rate reduces the likelihood or extent of flooding in the downstream waterways). Developments throughout the Canterbury region have provided stormwater attenuation solutions to achieve adequate flow mitigation, including in locations where groundwater is a constraint, thus the ability to achieve this is not of sufficient concern to preclude approval of the plan change.

23 Harts Creek Streamcare Group have identified at paragraph 5.17 their concern regarding potential contamination of groundwater. While a valid concern, this is a matter that will be considered and managed at the time of specific design and consenting. As I stated to in my original evidence the ODP sizing of the stormwater management areas has assumed that no discharge to ground will be possible.

24 Examples of stormwater treatment and attenuation systems in Lincoln consist of stormwater treatment wetlands that are connected to groundwater. In essence the ongoing presence of groundwater flows ensures the wetlands do not stagnate, while the presence of wetland plant species provides treatment of introduced stormwater prior to a portion of the stormwater discharging back to groundwater in combination with discharge of surplus flows to surface water bodies.

25 Paragraphs 5.19 and 5.20 of the Harts Creek Streamcare Group evidence refers to additional flows to the bypass network. For avoidance of doubt the proposed plan change area is almost entirely downgradient of the bypass, therefore there is no proposed discharge of stormwater to the bypass.

Conclusion

26 Stormwater runoff from modern residential developments has been demonstrated to have lower levels of contamination than what is currently present in the receiving environment. Further to this, after treatment in accordance with current best practice, the water quality will exceed the ANZECC guidelines prescribed in the LWRP. It has been demonstrated that this type of treatment is practicable in the Te Waihora catchment, thus the plan change can be approved with confidence that the ultimate stormwater solution will not have adverse effects on the receiving environment.

27 While no site specific detail has been provided (as this can only be provided at the time of detailed design and consenting), this supplementary evidence, together with my original evidence provides sufficient certainty that there are practicable solutions available to manage the stormwater quantity and quality for discharges from developments within the proposed plan change area.

28 The process associated with obtaining retrospective resource consent for the existing stormwater discharges in the Leeston Township does not provide any inhibition for a new residential development with its own stormwater management system to obtain resource consent for its own discharge(s), as it has been demonstrated that a development could achieve stormwater discharge quality and quantity limits required to avoid adverse effects on the receiving environment.

Dated this 14 day of September 2020

James Hopkins