Before an Independent Hearings Panel
Appointed by Waimakariri District Council

under: the Resource Management Act 1991

in the matter of: Submissions and further submissions on the Proposed Waimakariri District Plan and Variation 1

and: Hearing Stream 12: Rezoning requests (larger scale)

and: **Carter Group Property Limited**
(Submitter 237)

and: **Rolleston Industrial Developments Limited**
(Submitter 160 and 60)

Reconvened hearing statement of evidence of Bas Veendrick (Hydrology)

Dated: 17 October 2024

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RECONVENED HEARING STATEMENT OF EVIDENCE OF BAS VEENDRICK

INTRODUCTION

1 My full name is Bas Veendrick.

2 My area of expertise, experience, and qualifications are set out in my statement of evidence dated 1 March 2024 for this hearing stream. My primary evidence covers the potential hydrological impacts of the development on springs.

3 The purpose of this evidence is to respond to matters listed in paragraphs 7 and 8 of the Panel's Minute 40, and in particular the potential effect on groundwater resurgence of the proposed Ohoka development, including cumulative effects from other proposed developments.

CODE OF CONDUCT

4 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 9 of the Environment Court Practice Note 2023. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

EXPERT CONFERENCING AND SCOPE OF EVIDENCE

5 I attended the engineering conferencing for hearing stream 12D. In this evidence I will provide further explanation related to question 5 set out in the Joint Witness Statement (JWS):

> '*What is groundwater resurgence, and can the proposed development appropriately manage effects on and from any groundwater resurgence?*'

6 I also attended the stormwater conferencing for hearing stream 12C/12D. In this evidence I will provide further explanation related to question 1 set out in the Joint Witness Statement (JWS):

> '*Can groundwater resurgence be managed on-site in a manner that is not going to result in cumulative effects "downstream"?*'

7 My primary evidence does not cover groundwater resurgence as this matter was not raised in any expert evidence statements for hearing stream 12D. In this evidence I will cover the following matters to

provide further explanation related to the two questions set out above:

7.1 A summary of the hydrogeological setting, groundwater flow patterns and water table depth;

7.2 A brief description of groundwater resurgence and the relative contribution of groundwater flow to flooding;

7.3 A description of the potential effect of the proposed Ohoka development (covered in hearing stream 12C/12D expert conferencing) on groundwater resurgence; and

7.4 Commentary on the potential cumulative effects of the proposed developments (covered in hearing stream 12C/12D expert conferencing) on groundwater resurgence.

HYDROGEOLOGICAL SETTING, GROUNDWATER FLOW PATTERNS AND WATER TABLE DEPTH

8 The available soil information (S-map, Landcare Research[1]) indicates that the soil types underlying the Site predominantly consist of moderately deep clay, with small sections on the northern and southern parts of the Site consisting of deep clay and shallow clay respectively. Geotechnical investigations (Tetra Tech Coffey, 2021[2]) at the Site encountered silt and clayey silt to a depth of 0.6 to 1.5 m below ground level (bgl), and sandy gravel below this.

9 The soils determine the rate at which rainfall and associated stormwater infiltrate into the ground and recharge the underlying aquifer. S-map indicates that the soils on the Site are poorly drained.

10 On the Waimakariri-Ashley Plains, groundwater is dominantly sourced from infiltrating rainwater (i.e. land surface recharge) across the inland plains upgradient of the Site, together with some seepage losses from the Ashley and Waimakariri rivers (Brown, 2001[1]). The general direction of groundwater movement in the overall area, indicates that groundwater generally flows to the southeast, towards the coast. Groundwater discharges into spring fed streams, including Ohoka Stream and the Cam River/Ruataniwha.

11 The springs and springfed streams in the area and on the proposed Ohoka subdivision represent regional groundwater discharge points, and as a result the source of water for the springs is likely to

[1] S-map online, The digital soil map for New Zealand, Manaaka Whenua Land care Research. https://smap.landcareresearch.co.nz/

[2] Tetra Tech Coffey. (2021). 535 Mill Road, Ohoka - Geotechnical Assessment Report. Report reference number 773-CHCGE288040 prepared for Rolleston Industrial Developments Ltd. Dated 1 June 2021

represent a spatially large groundwater catchment that extends a substantial distance upgradient (i.e. north-west) from the Site. Given the relatively high (but variable) permeability of the deeper strata that makes up much of the Canterbury Plains, and the generally deeper groundwater table upgradient of the Site, a large overall spring capture zone is expected for the springs on the Site.

12 A more detailed description of the hydrogeological setting, groundwater flow patterns and water table depth is provided in my primary evidence.

GROUNDWATER RESURGENCE AND RELATIVE CONTRIBUTION OF GROUNDWATER FLOW TO FLOODING

13 During and following periods of high rainfall groundwater levels can rise resulting in increased discharges to springs and springfed surface waterways. This is sometimes called groundwater resurgence. Although this has the potential to increase the baseflow in waterways this component is a very small percentage of flow during flood events. This is because groundwater emerges in local springs and stream channels and there are natural limits on the extent to which groundwater will rise because of natural discharges into these springfed stream features. Therefore, groundwater flow during flood events will not have a significant impact on flooding. I note that this has been agreed by all experts (refer to JWS for hearing stream 12D dated 6 August 2024).

14 Although not all groundwater resurgence areas were mapped during the 2017, 2022 and 2023 flood events all experts agree that the main area where groundwater resurgence occurred/was reported is the general Mandeville area (refer to JWS for hearing stream 12C/12D dated 4 September). This is confirmed by the groundwater resurgence maps attached to the JWS which indicate that the main groundwater resurgence was observed/reported in and upstream (west) of Mandeville. There is no evidence available to suggest groundwater resurgence has occurred in Ohoka or on the proposed Ohoka development site at 535 Mill Road.

POTENTIAL EFFECTS OF THE OHOKA REZONING REQUEST

Change in groundwater recharge as a result of the rezoning

15 The key potential effect of rezoning the land on groundwater levels and hence groundwater resurgence is the potential change in groundwater recharge at the site (i.e. the source of the groundwater). As detailed in my primary statement of evidence, urban development has the potential to change (reduce) groundwater recharge due to the increase in impervious surfaces (roofs and pavements) which is the source of the spring flow and groundwater resurgence.

16 As detailed in paragraph 21 of my primary evidence the available information indicates a spatially large groundwater catchment for

the springs that extends a substantial distance upgradient (i.e. north-west) from the site. In addition, the soils on the Site are generally poorly drained (refer to paragraph 17 of my primary evidence) indicating that in the current (rural) state of groundwater recharge from the development footprint area contributing to spring flow is likely to be small.

17 Based on these considerations I consider that the increase in impervious surfaces results in a reduction in groundwater levels and groundwater resurgence. However, the change in groundwater recharge contributing to groundwater resurgence as a result of the proposed rezoning is relatively small and likely to be negligible. My conclusion (i.e. a small overall decrease in groundwater recharge and hence groundwater resurgence) is consistent with the 'Mandeville San Dona Groundwater Assessment report' (Jacobs, April 2024) commissioned by Waimakariri District Council. I note that all relevant experts have agreed that the regional/catchment wide groundwater levels/resurgent flow is unlikely to be changed by development (refer to JWS for hearing stream 12C/12D dated 4 September 2024).

Potential localised downstream effects

18 I understand some submitters have raised concerns about the potential effect of the proposed Ohoka development on groundwater resurgence. Although no expert witness evidence on groundwater resurgence has been provided for the Site, Mr. Christopher Bacon and Mr. Colin Roxburgh (Waimakariri District Council) and Mr. Nick Keenan (Oxford Ōhoka Community Board) have indicated in the JWS (dated 6 August 2024 and 4 September 2024) that in their view groundwater resurgence still carries some risk.

19 As detailed in paragraph 8 above the surface soils on the site predominantly consist of silt and clay. In addition, the site is crossed by well-defined watercourses and springfed land drains which intercept the underlying water bearing gravels. These watercourses currently act as a discharge (relief) point for groundwater in these gravels and these watercourses will be maintained in the development.

20 Due to the Site being 'capped' with silt and clay the main connection between the groundwater and surface water is where springs and springfed streams intercept the gravelly water bearing strata beneath the plains. At times of high groundwater levels on the development site, groundwater in these gravels will dominate the discharge via existing springs and springfed watercourses. In contrast, the surface expression of flow on the land surface seeping through the overlying low permeability clay and silty soils is unlikely to be significant.

21 I understand from the evidence from Mr. O'Neill for the reconvened hearing that stormwater systems in Mandeville rely on soakage to ground. The resurgence issues identified in

Mandeville have arisen because of soakage to ground based stormwater systems which are ineffective when groundwater levels are high, resulting in extended durations of ponding in channels and low areas. Ohoka currently does not rely on soakage to ground and none is proposed for the proposed Ohoka development at 535 Mill Road. It is proposed that stormwater on the site will discharge to surface water rather than to ground.

22 Based on the considerations described above I consider that the proposed Ohoka development is not expected to result in increased groundwater levels or groundwater resurgence.

POTENTIAL CUMULATIVE GROUNDWATER EFFECTS

23 All experts have agreed that there are unlikely to be cumulative effects on the wider area related to groundwater resurgence (refer to JWS statement for hearing stream 12C/12D, dated 4 September 2024).

CONCLUSION

24 In my evidence I have considered groundwater resurgence including the key potential hydrological effects in relation to groundwater resurgence as a result of the rezoning request. I have also commented on potential cumulative effects.

25 In summary, I consider that:

25.1 Groundwater flow during flood events will not have a significant impact on flooding. This has been agreed by all experts in the JWS for hearing stream 12D.

25.2 There is no evidence available to suggest groundwater resurgence has occurred in Ohoka or on the proposed Ohoka development at 535 Mill Road.

25.3 The increase in impervious surfaces as a result of the Ohoka rezoning (or for the wider area proposed to be rezoned under the District Plan) will result in a change (decrease) in groundwater recharge contributing to groundwater resurgence. However, due to the relatively large groundwater capture zone this change is likely to be very small. This has been agreed by all experts for hearing stream 12C and 12D.

25.4 Due to the Site being 'capped' with clay the main connection between the groundwater and surface water is where springs and springfed streams intercept the gravelly water bearing strata. Therefore, at times of high groundwater levels on the development site, groundwater in these gravels will dominate the discharge via existing springs and springfed watercourses rather than the surface expression of flow at the land surface

seeping through the overlying low permeability clay and silty soils.

25.5 In Mandeville resurgence issues have arisen because of soakage to ground based stormwater systems which are ineffective when groundwater levels are high, resulting in extended durations of ponding in channels and low areas. The proposed stormwater disposal system at 535 Mill Road does not rely on soakage to ground. It is proposed that stormwater at the Site will discharge to surface water.

26 Based on the above, I consider that the proposed development is not expected to result in increased groundwater levels or groundwater resurgence.

Dated: 17 October 2024

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Bas Veendrick