Before the Independent Hearings Panel
at Waimakariri District Council

under: the Resource Management Act 1991

in the matter of: Proposed private plan change RCP31 to the Operative Waimakariri District Plan

and: **Rolleston Industrial Developments Limited**
Applicant

Summary of evidence of Tim McLeod

Dated: 4 August 2023

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SUMMARY OF EVIDENCE OF TIM MCLEOD

1 My full name is Timothy Douglas McLeod. I am a Senior Civil Engineer at Inovo Projects Limited

2 My qualifications include a Bachelor of Natural Resources Engineering from Canterbury University (BE[NatRes]), and I am a Chartered Member of Engineering New Zealand (CMEngNZ) and Chartered Professional Engineer (CPEng).

3 I have over twenty-eight years' experience as a Civil Engineer working on a range of infrastructure and land development projects.

4 Consistent with my Infrastructure Assessment accompanying the Plan Change Request, my evidence demonstrates that:

4.1 A new wastewater reticulation system can be constructed to collect wastewater form within the development and convey to a centralised pump station, with a dedicated rising main required to convey the full development flow to the Rangiora wastewater treatment plant. Both conventional gravity reticulation or low pressure sewer are viable options for collection and conveyance of wastewater within the development area.

4.2 New water supply bores can be developed within the proposed plan change to provide sufficient potable water for the needs of the future residential properties. This can be supported with the transfer of existing water-take consents to Council or potentially a new community water supply take.

4.3 The site can be provided with adequate "on-demand" potable water by development of new water supply headworks for treatment, storage and pumping. This could be integrated with the existing Ōhoka water supply network to provide an improved water supply network to the wider Ōhoka area.

4.4 Stormwater treatment and attenuation can be provided on-site to mitigate the effects of residential development on stormwater quality and attenuate run-off to pre-development levels.

4.5 Flood conveyance across the site can be managed to ensure there is less than minor effect on neighbouring properties.

4.6 The power and telecommunication network can be extended or upgraded to supply the proposed development.

5 The evidence of Messer's O'Neill, Throssell, Veendrick and Steffens goes into the detail regarding three waters infrastructure.

RESPONSE TO SUBMITTER EVIDENCE

6 I have read the evidence of Dr. Greg Burrell (on behalf of Canterbury Regional Council) and note the concerns raised that urban development has the potential to adversely affect hydrology and more specifically spring flow and spring water levels.

7 I agree with the evidence of Mr. Bas Veendrick of Pattle Delamore Partners that urban development has the potential for drains, service trenches, and hardfill areas (road construction) to intercept shallow groundwater and re-direct groundwater flow away from springs. This is because service trenches and hardfill areas constructed as part of urban development can be much more permeable than the surrounding soils, and can result in interception and conveyance of groundwater.

8 Interception of groundwater can be avoided by various construction methods including;

- ensuring service trenches are kept shallow (typically no more than 1.2m deep);
- backfill excavated trenches using low permeability soils or constructing "water-stops" at intervals to prevent short-circuiting of groundwater along trench lines;
- using low pressure pumped sewer systems to avoid deep excavations for gravity sewer lines and pump stations;
- using open swales or partially drowned piped systems to avoid deep trenches for stormwater drainage;
- incorporate service crossings into bridge or culvert designs or directional drilling to install services at crossing points over waterways;
- using directional drilling or mole-ploughing instead of trench excavation for installation of PE pipelines and cables.

9 Pavement depth for road construction is expected to be approximately 0.6m and shallower than the installed services. Where subgrade improvement or replacement is required, then engineered soils with low permeability or incorporation of geotextiles instead of granular hardfill can be used to avoid potential short-circuiting of groundwater through pavement layers.

10 These sorts of design and construction methodologies are becoming common practice in areas of Christchurch that have similar ground conditions with high groundwater and springs. Recent subdivisions where these methodologies have been incorporated into the subdivision design include Halswell Prestige subdivision in Halswell, and Highsted and Tullet Park subdivisions in Casebrook.

11 An extensive groundwater level investigation and monitoring across the site is proposed to be undertaken prior to any detailed engineering design of the development. As noted in **Mr O'Neill's** evidence, the design of stormwater basins and treatment devices will be informed by the groundwater level investigation across the site. This groundwater level information will also inform design for wastewater pump stations as well as roading and trench design in any areas that are sensitive to groundwater levels.

12 I agree with the evidence of **Mr Shane Bishop** of Stantec New Zealand (on behalf of Waimakariri District Council) that there are viable means to provide potable water, wastewater and stormwater infrastructure for the proposed development, subject to certain criteria being met. I note that the configuration of three waters infrastructure is normally determined in consultation with Council at the subdivision consenting and detailed design for engineering approval stages.

13 With reference to paragraph 9 of **Mr Bishops** evidence, whether the new water supply network to the proposed development area is combined with the existing Ōhoka water supply scheme would be determined at subdivision design stage in consultation with Council. Combining the two schemes which would simplify scheme management and improve the reliability of the existing Ōhoka scheme. In my evidence I provided a schematic of how the two schemes might be combined, reproduced here as **Appendix 2**. If the existing Ōhoka scheme is combined then the existing supply well can be included for assessment of N+1 redundancy for the required number of bores.

23 JULY 2023 FLOOD EVENT

14 Anecdotal evidence provided by submitters of flooding in the area during the rainfall events of June 2014 and July 2022 illustrates localised low hazard flooding observed in the Ōhoka area. Reported flooding includes overtopping of drains, ponding in paddocks, and flooding of driveways and roads downstream of the PC31 site. I understand there was also a recent rainfall event in July 2023 which submitters are likely to raise in the course of this hearing. **Mr Throssell** also comments on this rainfall event.

15 The area is reliant on land drains which were developed by the early settlers who created the majority of the drainage network that exists today. Maintenance of the drainage network to remove vegetation and sediment build-up and blockages has been made more difficult by subdivision of the area into lifestyle blocks.

16 Maintenance of land drains is typically a low priority for lifestyle block owners as it requires specialised equipment or hiring contractors to complete the works, and therefore maintenance tends to fall behind until a flood event prompts action. My observation of the localised flooding of roads, driveways and paddocks downstream of the PC31 site during the July 2023 event was that flooding was exacerbated, if not caused by, lack

of maintenance of the drainage network within private properties. Some photos illustrating this are included in **Appendix 1**. It is noted that WDC had recently carried out drain clearance work on roadside drains which performed well except where the drain capacity downstream was restricted within private properties.

CONCLUSION

17 In summary, already planned infrastructure upgrades or new infrastructure constructed as part of the development of the plan change site can provide for the infrastructure needs, including Three Waters infrastructure, for the proposed Plan Change. The required infrastructure upgrades will be practicable to develop the plan change area in accordance with the proposed zoning.

18 Concerns raised by submitters about capacity of existing infrastructure will be addressed by provision of new infrastructure and upgrades to existing infrastructure to service the proposed plan change area.

19 Overall, I remain of the view that the proposed plan change can be supported from an infrastructure perspective.

Dated: 4 August 2023

Tim McLeod

Appendix 1 – Photos

1. Wilson Drive - Build-up of turf in roadside swale preventing drainage of the carriageway

2. Jacksons Road – Example of Vegetation restricting drain flow and access for maintenance.

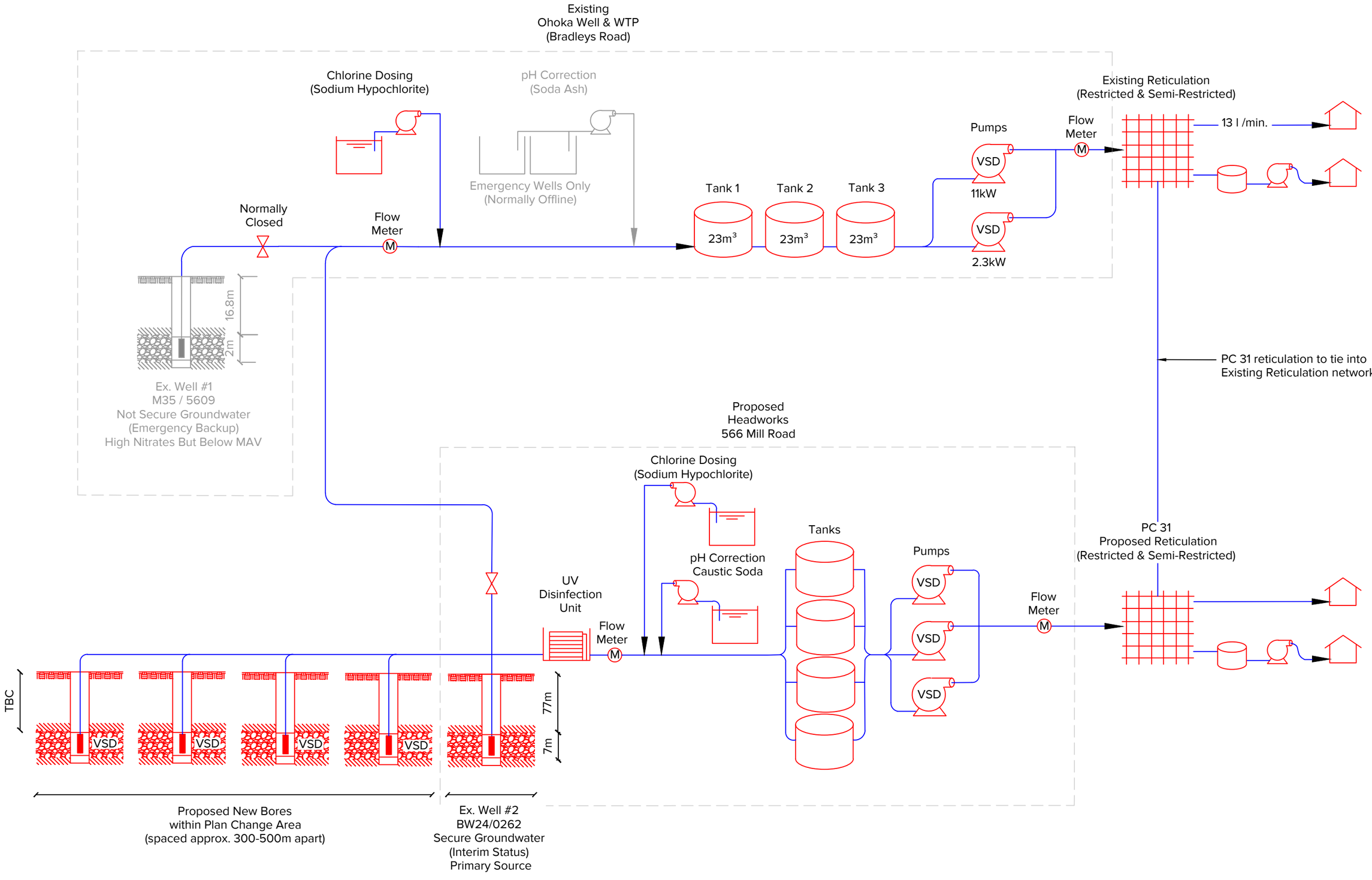
3. Jacksons Road – Example of poorly maintained section of drain, evidence of localised flooding of driveway.

4. Jacksons Road – Evidence of maintenance of roadside drains.

5. Jacksons Road – Evidence of peak flood flows diverting through paddock

6. Jacksons Road –Blocked drain along edge of flooded paddock (drain not functioning).

APPENDIX 2



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A	PRELIMINARY ISSUE	MHS	15.06.23

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Drawn: MHS
Approved: TMcL
Date: 15.06.23

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Project: **PLAN CHANGE 31 MILL ROAD, OHOKA**

Drawing Title: **PROPOSED WATER SUPPLY SCHEMATIC**

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