

SUMMARY OF EVIDENCE OF ALLISON REIKO BAUGHAM - STORMWATER

PROPOSED PLAN CHANGE G – AOKAUTERE URBAN GROWTH

A. INTRODUCTION

- [1] My full name is Allison Reiko Baugham and I prepared a s 42A report with my colleague Tony Miller dated 15 September 2023 on stormwater (**s 42A Report**) and Statement of Reply Evidence dated 28 November 2023 (**Reply Evidence**) on behalf of the Palmerston North City Council (**Council**) for proposed Plan Change G: Aokautere Urban Growth to the Palmerston North District Plan (**PCG**).
- [2] In order to understand the purpose and importance of stormwater management in the PCG area, a review of the geology and potential constraints to development warrant a reminder.
- [3] As stated in our s 42A Report, the gully material is geologically young, consisting of recently laid and recently uplifted material to form the river terraces seen today. The material has not undertaken any cementation or binding or metamorphic processes, and is therefore highly susceptible to erosion. Erosion and downcutting can therefore be expected based on the soils present, which has also been evident during our site visits to the gullies.
- [4] Within this sensitive terrain, residential development has advanced, including earthworks within the gullies, which have led to poor stormwater outcomes. In order for further development to occur without further degradation of the gullies, a robust, coordinated stormwater management strategy is required to manage the effects of development on this sensitive receiving environment, and to ensure the poor outcomes and piece-meal stormwater management carried out to date within the area is not continued.
- [5] Following submissions, further work was undertaken to review the effectiveness of the mitigation measures that are required to manage development within this sensitive receiving environment. This work is described in the s 42A Report and Reply Evidence prepared for the plan change.
- [6] Overall, we are of the view that the mitigation measures provided as part of the Stormwater Management Strategy, supported by the further measures identified following submissions, are sufficient and appropriate to manage the effects associated with development under PCG.

B. UNRESOLVED MATTERS

Climate Change

- [7] A number of submissions touched on climate change and the potential impact this could have on both the PCG area and the area downstream of it. As discussed in our s 42A Report, the Stormwater Management Strategy has allowed for climate change and has indicatively sized the infrastructure for the 1% Annual Exceedance Probability (AEP) event.
- [8] A review of historic rainfall data, and the completion of a 5-year long-term simulation of the stormwater ponds operating with the historic rainfall data, has shown that the ponds still perform as required under the design criteria. The plan provisions will ensure that climate change is included in the assessment. A long-term simulation is required as part of the erosion threshold assessment.
- [9] I note that no specific climate change model has been mentioned in the plan provisions; instead, reference is given to PNCC's *Engineering Standards for Land Development (ESLD)*. This was done intentionally so that future resource consents would be required to use the latest projections given the constantly changing environment and improvement in modelling capabilities. The ESLD is updated on an annual basis to reflect this.

Gully Erosion and Effects on Adjacent Land

- [10] A number of submitters expressed concern around development above Moonshine Valley. A further assessment was carried out to help quantify the extent of erosion and downcutting in the streams over the 100-year design life – both with and without residential development – and determine the cumulative effects of all of the stormwater attenuation ponds releasing water simultaneously after a storm. The modelling results demonstrated the need for additional storage capacity within the ponds, resulting in the storage volumes being increased and recommendations to Ms Copplestone that further clarity be provided around the design criteria.
- [11] Based on the additional work carried out and amendments to the policy framework, we are of the view that the Stormwater Management Strategy, amended by our recommendations in our s 42A Report, provides an appropriate methodology for managing development with the PCG area, and confirmed that there are viable mitigation options.

Stormwater Perimeter Swale

- [12] Multiple submitters have expressed confusion around both the purpose and function of the stormwater perimeter swale. In addition, there are concerns around how the perimeter swale would be maintained to ensure blockage does not occur if located within private property.
- [13] To clarify the purpose of the swale, a new Figure 7A.1 was created for the s 42A Report, which was further amended for clarity as part of my Reply Evidence. In addition, R7A.5.2.2 (a) has been amended to clarify that the positioning of the perimeter swale would be dependent on geotechnical investigations and proposed earthworks. We remain supportive of the perimeter swale and its location, and consider it is appropriately provided for within the plan framework.
- [14] Ms Copplestone proposed amendments as part of the s42A report to provide flexibility as to whether the stormwater utility corridor in which the perimeter swale is to be located was either vested in Council or remain privately owned with an easement for Council access and maintenance. In my Reply Evidence, I recommended the provisions be updated to specify that continuous access is required for Council to maintain the perimeter swale.

Permeability Requirements

- [15] Some submitters requested a limit be placed on the impervious areas allowed in development and the use of other water sensitive design features (i.e., rainwater tanks, online storage, etc.). Minimum impermeable area limits of 40% for low density areas and 25% for medium density areas have been added to R10.6.1.5 (d) and R10.6.3.3 (iii), respectively.
- [16] While the use of water sensitive design features is encouraged in the policy framework, these features are not required to be relied upon for stormwater management. Reliance on certain types of water sensitive features alone (i.e., privately owned rainwater tanks) is not considered appropriate for a large greenfield development, especially given the criticality of having the stormwater effectively managed. No changes to provisions were recommended.

Stormwater Ponds

- [17] Multiple submitters raised concerns around the practicality of having detention ponds on the plateaus, vesting the gullies for development use, and the level of detail provided.

[18] The purpose of the Stormwater Management Strategy is to consider the flood risk, erosion risk and water quality requirements for the PCG area and recommend design criteria to inform future subdivision. A concept design was completed, supplemented by the additional work carried out to inform our s 42A Report, to a suitable level of detail to confirm the feasibility of development. This work then informed the structure plan and policy framework. While further work is required to develop the design of the stormwater attenuation ponds, it is not considered necessary for the purpose of a Plan Change. Our work demonstrates that stormwater can be appropriately managed from development under the provisions of the plan change.

Timing of Works

[19] Submissions highlighted the timing of critical stormwater infrastructure being delivered. The PCG framework, as notified and since amended, requires that the works within the gullies must be constructed before any habitable development can occur in the upstream catchment. In our view downstream infrastructure must be in place prior to development given the sensitivity of the receiving environment.

4 December 2023

Allison Reiko Baugham