

BEFORE THE HEARINGS PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of proposed Plan Change G: Aokautere Urban
Growth to the Palmerston North City Council
District Plan

**STATEMENT OF REPLY EVIDENCE OF ERIC BIRD ON BEHALF OF PALMERSTON NORTH CITY
COUNCIL**

TECHNICAL – GEOTECHNICAL

Dated: 28 November 2023

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REPLY EVIDENCE OF ERIC BIRD

A. INTRODUCTION

- [1] My name is Eric Bird.
- [2] I prepared a s 42A report dated 15 September 2023 on geotechnical issues (**s 42A Report**) on behalf of the Palmerston North City Council (**Council**) for proposed Plan Change G: Aokautere Urban Growth to the Palmerston North District Plan (**PCG**).
- [3] My experience and qualifications are set out in my s 42A Report.
- [4] I repeat the confirmation given in my s 42A Report that I have read and will comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023, and that my evidence has been prepared in compliance with that Code.
- [5] I attended a pre-hearing meeting on 27 September 2023 covering the topics of stormwater, erosion, hydrology/flooding, land stability, and ecology.

B. SCOPE

- [6] My reply evidence responds to points made in evidence by:
 - (a) Mr Thomas on behalf of CTS Investments Ltd, Woodgate Ltd, and Terra Civil Ltd regarding uncontrolled fill;
 - (b) Mr Fugle for Woodgate Limited and Terra Civil Limited regarding the applicability of slope stability setbacks;
 - (c) Mr Out on behalf of Heritage Estates (2000) Limited regarding the reliability of slope stability setbacks;
 - (d) Mr Moefili for Ngawai Farms Ltd regarding the extent of the rural residential overlay on the Waters' block;
 - (e) Ms Pilkington for Palmerston North Industrial and Residential Developments Ltd (now Brian Green Residential Developments Ltd) on rural residential zoning in Turitea Valley.

- [7] The fact that this reply statement does not respond to every matter raised in the evidence of witnesses on geotechnical issues should not be taken as acceptance of the matters raised. Rather, I rely on my s 42A Report to address these matters.

C. RESPONSE TO PAUL THOMAS REGARDING UNCONTROLLED FILL

- [8] Mr Thomas indicates that extensive investigations and assessment of the historic earthworks has been undertaken as part of the consenting process for the earthworks (excavation and filling) at the head of Gully 1.¹ And as such, “...an earthworks methodology including settlement monitoring has been approved.”²
- [9] I note that Engeo’s peer review³ of the geotechnical report undertaken by NZET Limited titled *Aokautere Subdivision – Pacific Drive – Proposed Retirement Village – Palmerston North* dated 09/07/2021 (both submitted as part of the 2022 Resource Consent application) concludes that further investigations (increasing both the density and depth), testing and engineering verification and sign-off is required to certify the existing fill. For example, they note that the maximum fill depth is 10 m but the CPT investigations carried out did not reach that depth; the deepest reaching 7.5 m. The need for further assessment/verification is consistent with the approach I have recommended in my s 42A Report generally. I am not aware of whether any additional investigations, testing or engineering verification has been carried out.
- [10] Earthworks for residential development are generally carried out in accordance with various NZ Standards and guidance. This process ensures that consistent controls are in place to actively monitor the process of placing fill material while it is being carried out, because once filling is completed, it is much more difficult to certify fill placement retrospectively.
- [11] In natural, undisturbed ground, inferences and extrapolations can be made about expected ground conditions based on knowledge of geology and geomorphology. For example, sedimentary material such as the elevated terraces at Aokautere are predominantly derived from a marginal marine and beach depositional environment.

¹ Statement of Evidence of Paul Thomas dated 27 October 2023 at [109].

² At [109].

³ Engeo, *Geotechnical Review, 131 Pacific Drive, Fitzherbert, Palmerston North* Project Number 20338.000.001, 21/06/2022.

As such, it is reasonable to assume that the material has been deposited in relatively horizontal layers and is likely to be consistent. However, for filled areas where filling has not been undertaken in accordance with NZ standards, such assumptions on the extent and consistency of ground conditions cannot be made.

- [12] Where filling is accompanied by the appropriate level of investigation and appropriate engineering verification and sign offs, then it need not be treated as ‘uncontrolled’ fill. As noted in my s 42A Report, I am unaware of whether this is the case for the filled area at the head of Gully 1.⁴
- [13] Mr Thomas opines that the proposed gully crossing is likely to involve substantial earthworks and will potentially affect the stability of the adjoining land.⁵ As the gully crossing would be in Class D and E land, it is subject to the same proposed controls as for all other development on this land. This ensures that the appropriate level of engineering investigation and analysis is carried out to appropriately manage the slope instability hazard, while reflecting the specifics of the development. As detailed in my s 42A Report, part of this process requires demonstration that the proposed development will not accelerate, worsen or result in the land being subject to, or likely to be subject to, erosion or slippage.⁶

D. RESPONSE TO LES FUGLE REGARDING SETBACK LINES

- [14] Mr Fugle indicates that the proposed setbacks are “...unnecessary and unsuitable in terms of engineering methodology”, and that “Fixing a general distance fails to take account of actual land topography and stability and will result in the loss of developable land.”⁷
- [15] The proposed setbacks are not based on a set distance as Mr Fugle states; they are based on the topography of the land, as detailed in my s 42A Report.⁸ In simple terms, the analysis considers the topography throughout the site by projecting 20 and 30

⁴ Section 42A Technical Report of Eric Bird dated 15 September 2023 at [33].

⁵ Statement of Evidence of Paul Thomas dated 27 October 2023 at [115].

⁶ At [65].

⁷ Brief of Evidence of Les Fugle dated 4 November 2023 at [38].

⁸ Section 42A Technical Report of Eric Bird dated 15 September 2023 at [26-29].

degree lines upward from the base of slopes, and calculates setbacks based on that basis.

- [16] Mr Fugle notes that the Council has not undertaken 'core sampling' to support this analysis. In my view, ground investigations are not necessary at this stage. As outlined in my s 42A Report, it is most appropriate to undertake investigations and site-specific assessment at the point of subdivision.⁹ This is because it provides for consistent treatment of the hazard, it allows for any area-wide works to be carried out in a coordinated manner (for example ground re-contouring), and it prevents the subdivision of lots that may not be able to be built on due to a slope instability hazard.
- [17] Additionally, I note that ground investigations are not necessary to demonstrate there is a slope stability hazard; numerous instances of existing slope instability are evident on the steep terraces throughout the site.
- [18] The proposed setbacks do not prevent development; rather they introduce controls that reflect the level of likely slope instability hazard. The areas nearest the steepest slopes (Class D and E land) are more likely to have slope instability, so have more stringent requirements for investigation and assessment before any development can take place. I remain comfortable with this approach.

E. RESPONSE TO JACK OUT REGARDING SETBACK LINES

- [19] Mr Out infers that the classification *Liquefaction Category is Undetermined* creates doubt that the 20 and 30 degree setbacks are adequate for determining where house structures can be built.¹⁰
- [20] My s 42A Report concluded that the raised terraces in the northern part of the site (where the majority of residential development is proposed) are unlikely to be subject to liquefaction due to the soil type and their elevated nature.¹¹ This is the location where the 20 and 30 degree setbacks are proposed to apply, so is not affected by the liquefaction category.

⁹ Section 42A Technical Report of Eric Bird dated 15 September 2023 at [59].

¹⁰ Statement of Evidence of Jack Out dated 1 November 2023 at [10], p 7.

¹¹ Section 42A Technical Report of Eric Bird dated 15 September 2023 at [37].

- [21] The Turitea Stream valley is more recent geology, is lower lying, and has scarce geotechnical and groundwater information. The category of ***Liquefaction Category is Undetermined*** is therefore to be applied to the land within the Turitea Stream Valley. This area is proposed for Rural-Residential development only, which is generally appropriate from a geotechnical perspective, subject to my comments in response to Ms Pilkington, below.

F. RESPONSE TO PEPA MOEFILI REGARDING RURAL RESIDENTIAL EXTENT OF THE WATERS' BLOCK

- [22] While the land within the Waters' block is predominantly Class E, it is of hilly morphology, rather than elevated terraces. As such, the slope angle analysis methodology conducted may result in a conservative delineation of Class E from other classes of land. I discuss this matter in greater detail in my previous report.¹²
- [23] In addition, the proposed larger size of these lots (I understand the minimum lot size within the Rural-Residential Overlay is 1 hectare) should enable a building platform to be identified, or where necessary, engineered with earthworks.
- [24] I have no opposition to classifying this land as Rural-Residential.

G. RESPONSE TO CHRISTLE PILKINGTON REGARDING RURAL-RESIDENTIAL ZONING IN TURITEA VALLEY

- [25] The land in question is low lying and has been mapped by Tonkin and Taylor as being a water logged, swampy area. As such it is likely subject to soft ground, shallow groundwater, and possibly liquefaction issues.
- [26] In the absence of geotechnical evidence to the contrary, I do not support this land being rezoned to Rural-Residential, as in its current state it is unlikely to be able have housing built on it.

28 November 2023

Eric Bird

¹² Section 42A Technical Report of Eric Bird dated 15 September 2023, Attachment A: Tonkin+Taylor, *Aokautere slope stability: Considerations for consenting*, 12 May 2022, p 8.