BEFORE THE INDEPENDENT HEARINGS PANEL
OF HAMILTON CITY COUNCIL

UNDER	the Resource Management Act 1991 ("**RMA**")
AND	
IN THE MATTER	of Private Plan Change 17 to the Hamilton City Operative District Plan ("**PC17**")

STATEMENT OF EXPERT EVIDENCE OF MARK ROBERT SINCLAIR ON BEHALF OF FONTERRA LIMITED

GEOTECHNICAL

7 OCTOBER 2025

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1. EXECUTIVE SUMMARY

1.1 The Geotechnical Investigation concludes the "**Plan Change Area**," being approximately 91 hectares of land surrounding Fonterra Limited's ("**Fonterra**") Te Rapa Dairy Manufacturing Site, to be geotechnically suitable for future development. The geotechnical constraints within the Plan Change Area will be subject to development-specific geotechnical investigation and assessment at the resource / building consent stage

1.2 The Plan Change Area is mapped as being underlain by Hinuera Formation alluvial soils of the Piako Subgroup. Soils generally comprise intermixed loose to medium density sands or silty sands and / or firm to very stiff sandy silts or silts with lesser amounts of clay and gravel.

1.3 No geotechnical natural hazards have been identified that will impede future development of the Plan Change Area and geotechnical constraints can be addressed by typical engineering design and construction methodology and / or ground improvement options to mitigate liquefaction-induced settlement.

2. INTRODUCTION

Qualifications and Experience

2.1 My name is Mark Robert Sinclair. I am a Principal Geotechnical Engineer and Technical Director at Geotechnical Engineering Limited (trading as Soil and Rock Consultants) ("**Soil & Rock**"). I have held the former position for eight years and the latter for one year.

2.2 I have approximately 30 years' experience in the field of geotechnical engineering in New Zealand with a particular focus on soils laboratory testing and analysis, site investigations, geotechnical analysis and design, management of investigation contracts, construction supervision, and project management.

2.3 I hold a New Zealand Certificate in Engineering from Carrington Polytechnic (1989), a Bachelor of Engineering from the University of Canterbury (2001), and obtained Chartered Geotechnical Engineer status in 2006.

2.4 I am a member of Engineering New Zealand and the New Zealand Geotechnical Society and am listed as a Producer Statement author with

Auckland Council.

2.5 I have previously been employed as:

(a) An Engineering Technician with Tonkin & Taylor Limited and subsidiary Geotechnics Limited (1987 – 1995) where I undertook various technician roles within their geotechnical, surveying, draughting, and civil / dam design sections. The five-year tenure within Geotechnics Limited involved both site-based (soil investigations / earthworks supervision) and laboratory technician roles (soil testing / reporting).

(b) A field and laboratory technician for Laing Technology Group in London, England (1996 – 1998) where I undertook both site-based and laboratory technician roles.

(c) A Geotechnical Engineer with AECOM NZ Limited (formerly Worley Consultants, then Maunsell) in Auckland (2001 – 2017), specialising in site investigations, geotechnical analysis and design, management of investigation contracts, construction supervision, and project management.

2.6 My experience within the civil engineering field, specialising in geotechnical disciplines, comprises a diverse portfolio of public and private sector clients. Throughout my career I have been heavily involved in varying capacities in a vast array of projects with a geotechnical component. This has included small and large scale subdivisions, extensive investigations and foundation design for residential and commercial buildings, and involvement in large scale infrastructure projects for clients such as the NZ Transport Agency Waka Kotahi, Transpower New Zealand Limited, Healthy Waters (Auckland Council), the Ministry of Education, and KiwiRail Holdings Limited. A parallel area of focus while at Soil & Rock has been Quality Assurance reviews of reporting prior to issue, high-level problem-solving and mentoring of junior / intermediate engineering staff, and final approval of PS4[1] and Geotechnical Completion documentation.

Involvement in PC17

2.7 I am the technical authoriser of the Geotechnical Investigation reporting to inform and support PC17, which seeks to rezone the Plan Change Area.

[1] PS4 stands for 'Producer Statement 4' and refers to an independent reviewer certification that construction work complies with the approved design and building standard.

2.8 I am familiar with the Plan Change Area having overseen the geotechnical team that carried out the field investigation over the period 17-20 July 2023 ("**Field Investigation**"). I attended a site visit of the Plan Change Area on 3 October 2025..

2.9 Due to access constraints, the Field Investigation was limited to the land owned by Fonterra within the Plan Change Area at the time of the investigation (see Figure 1). This is the majority of the Plan Change Area (approximately 84.5 ha) and provides sufficient information for investigations to assess the whole of the Plan Change Area.

Figure 1: Plan Change Area Boundaries – Fonterra-owned Land (red boundary) (Underlay source: Linz Data Service).

Code of Conduct

2.10 I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and I agree to comply with it while giving oral evidence before the Hearings Commissioners. Except where I state that I am relying on the evidence of another person, this written 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 expressed in this evidence.

3. PC17

3.1 The majority of the Plan Change Area is currently zoned Te Rapa North Industrial Zone under the Hamilton City Operative District Plan ("**ODP**") but is overlaid with the Deferred Industrial Zone Area. The Plan Change Area is

currently used for rural and residential uses.

3.2 PC17 seeks to remove the Deferred Industrial Zone Area overlay to achieve live zoning (Te Rapa North Industrial Zone) for the Plan Change Area. This will enable the Plan Change Area to be developed for industrial use. The Plan Change Area is made up of three distinct areas (see Figure 1), described as:

(a) West Block: Section 1 & 3 SO 456626, Part Lot 1 DPS 10804, Lot 1 DPS 34481, Part Lot 2 DPS 10804, Lot 1 – 6 DPS 11087;

(b) North Block: Lot 1 DP 551065 and Lot 1 DPS 8230; and

(c) South-East Block: Lot 5 DPS 18043, Lot 1 DPS 85687 and Lot 1-3 DPS 61136.

3.3 Te Rapa Stream flows from south to north through the centre of the West Block. The stream channel is reasonably narrow (typically less than 3.0m wide) with vegetated banks.

3.4 The topography of the Plan Change Area broadly comprises a central near-level floodplain with the slopes of the floodplain descending towards the stream at inclinations generally ranging between < 10^{o} and 18^{o}.

3.5 The Plan Change Area contours are shown in Figure 2.

Figure 2: Plan Change Area Contours – 1m Contour Intervals (Source: LINZ Data Service).

3.6 The North and South-East Blocks are generally near-level, however steep slopes are present at the eastern margins forming the banks of the Waikato River.

3.7 Fonterra engaged Soil & Rock to identify any geotechnical constraints to PC17 and provide preliminary high-level geotechnical recommendations for potential future development of the Plan Change Area.

4. SCOPE OF EVIDENCE

4.1 This statement of evidence will:

(a) outline the existing geological environment;

(b) outline the geotechnical natural hazards and general constraints;

(c) summarise the key geotechnical design guidance from the Geotechnical Investigation undertaken in relation to PC17;

(d) respond to geotechnical matters raised in the Hamilton City Council ("**Council**") Officer's Section 42A Report ("**Section 42A Report**");

(e) respond to geotechnical matters raised in submissions; and

(f) provide an overall conclusion on Fonterra's application for PC17 from a geotechnical perspective.

5. EXISTING GEOLOGICAL ENVIRONMENT

5.1 In a broad geological context, the Plan Change Area is mapped as being underlain by Hinuera Formation alluvial soils of the Piako Subgroup, with recent alluvium present within the floodplain surrounding Te Rapa Stream in the northern portion of the Plan Change Area.

5.2 Soil & Rock's Field Investigation confirmed the presence of Hinuera Formation alluvial deposits across the Plan Change Area, comprising intermixed loose to medium density sands or silty sands and firm to very stiff sandy silts or silts, with lesser amounts of clay and gravel.

6. GEOTECHNICAL CONSTRAINTS AND HAZARDS

6.1 With regard to the likelihood of geotechnical natural hazards[2] affecting the Plan Change Area, only earthquake-induced liquefaction and potential minor landslip instability in the vicinity of the steeper slopes in the eastern portions of the North and South-East Blocks would require further assessment at the resource / building consent stage. Overall, I consider no geotechnical natural hazards were identified that would impede future development of the Plan Change Area or that cannot be addressed by typical engineering design and construction.

6.2 With regard to specific geotechnical constraints requiring consideration by development designers, I consider the following aspects will require development-specific geotechnical investigation at the resource and building consent stages (as appropriate):

(a) **Liquefaction** – The Plan Change Area is considered to have a medium liquefaction vulnerability. Specific liquefaction assessment of vertical liquefaction-induced settlements and lateral displacements will be required for any proposed earthworks or future development to determine the extent of any mitigation measures required.

(b) **Groundwater** – Monitoring of standpipe piezometers following the Field Investigation showed a groundwater table across the area at depths ranging between 0.6m and 3.8m below ground level. Any bulk excavations during future development will likely require dewatering during construction. Temporary support and a specific methodology are likely to be required for deeper excavations given the sandy nature of the soils.

(c) **Static Settlement** – Fill placement has the potential to induce settlement of the underlying ground. Specific analysis of static settlement will likely be required where any cutting or filling exceeding 1.0m deep / thick is proposed, and significant 'mucking out' of unsuitable material in the vicinity of the stream channel is likely to be required prior to any filling operations. Settlement monitoring during and following earthworks may be required.

(d) **Slope Stability** – Slopes throughout the Plan Change Area are typically gentle except for the banks of the Te Rapa Stream channel,

[2] For example, an earthquake, coastal / bank / sheet erosion, volcanic and geothermal activity, landslip, subsidence and sedimentation.

floodplain, and the eastern portions of the North and South-East Blocks. While the risk of large-scale 'global' instability is considered to be negligible outside of the eastern portions of the North and South-East Blocks, future development (including bulk earthworks) in the vicinity of Te Rapa Stream and floodplain banks will require further consideration. Specific stability analysis will be required for future development in proximity of the eastern portions of the North and South-East Blocks.

(e) **Earthworks** – The soils encountered during the Field Investigation were sandy (generally non-cohesive) and therefore particularly susceptible to mechanical disturbance and / or exposure to the elements. With regard to their re-use as an engineered fill material these soils are generally expected to be suitable, and capable of achieving the placement and compaction requirements of the relevant engineering standards. However, moisture conditioning of the borrow materials is likely to be required in combination with a specific earthworks methodology / specification.

(f) **Bearing Capacity** – The near-surface soils typically comprise loose to medium-dense sands or firm to stiff sandy silts and clayey silts, however, very loose saturated sands and soft clayey silts were encountered in some areas within the Plan Change Area. As such a reduced bearing capacity may be appropriate in some areas and additional geotechnical investigation is required in this regard to determine the area extent.

(g) **Expansive Soils** – The near-surface soils are typically comprised of sand or sandy silts, therefore significantly expansive soils are not expected to be present over the Plan Change Area. Further expansivity testing carried out at the building consent stage is appropriate as it would better reflect an actual development proposal and post-earthworks ground conditions.

7. KEY GEOTECHNICAL DESIGN GUIDANCE

7.1 With regard to geotechnical guidance for future development concept design, the following set out my preliminary recommendations:[3]

[3] Further specific geotechnical assessment will likely be required to confirm or modify this guidance as appropriate for any proposed development given the constraints outlined in Section 6.0.

(a) **Earthworks** – Any proposal to create cuts or fills greater than 0.8m in height should be the subject of specific design advice as groundwater and settlement constraints should be assessed. The soils are expected to be suitable for use as engineered fill, however moisture conditioning is likely to be required in combination with a specific earthworks methodology / specification. That specification should be informed by specific testing including New Zealand Standard Compaction testing. All fills, regardless of depth, must be placed in accordance with the relevant New Zealand Standard with respect to subgrade preparation and standard of compaction.

(b) **Ground Improvement** – Ground improvement may be required to mitigate liquefaction and / or lateral spreading effects in the vicinity of Te Rapa Stream. The potential effects of ground improvement on the seismic response of adjacent properties and structures should be considered in future design. Additional detailed geotechnical investigation and laboratory testing will be required to assess and / or confirm the appropriate ground improvement method, and liaison with a specialist contractor to assess the investigation and analysis findings would need to be undertaken to prepare a suitable ground improvement design.

(c) **Temporary Stability** – The shallow depth to groundwater and sandy nature of the Plan Change Area soils will necessitate the use of temporary support if and where bulk excavations are proposed. The use of sheet piling, or similar sealed support systems, are likely to be required for all bulk excavations related to building construction including temporary excavations for service trenches. In-ground barrier-pile or ‘soldier-pile’ walls may be considered with respect to the stability of development areas in close proximity to the Te Rapa Stream banks.

(d) **Retaining Structures** – The Plan Change Area’s soils are generally suited to all types of retaining, however, bored excavations for retaining poles will be susceptible to collapse due to groundwater ingress and temporary casing will most likely be required where traditional bored excavations are proposed. Use of Continuous Flight Auger for bored holes or construction of Mechanically Stabilised Earth or other gravity walls are likely to be easier to construct, particularly where supporting engineered fill.

(e) **Floor Slabs and Pavement Areas** – All topsoil, non-engineered fill, vegetation, organic or otherwise unsuitable material will be required to be removed from under floor slab and pavement areas prior to construction. All exposed subgrade surfaces will be required to be protected from desiccation, rain damage, and plant-trafficking immediately upon excavating or filling to grade. Under-slab drainage (or 'tanking') will be required should excavations below the groundwater table be proposed.

(f) **Shallow Foundations** – The natural soils in the Plan Change Area are generally considered suitable for the use of shallow foundations supporting typical industrial structures from a static design perspective. Shallow foundations would typically comprise "waffle" or "rib-raft" slabs (surface-supported, no embedment) or traditional spread footings subject to liquefaction and settlement considerations. The use of shallow (spread) foundations is subject to lot specific requirements to mitigate liquefaction risk. In the absence of broader ground improvement, reinforced gravel rafts extending outside of the building footprint are likely to be required for the purposes of mitigating intolerable liquefaction-induced settlement effects. For concept design purposes I expect a Design (Dependable) Bearing Capacity of 150kPa (Strength Reduction Factor, Øbc, of 0.5 applied) is likely to be available for Ultimate Limit State Design of shallow foundations. However, the in-situ soils may present a reduced bearing capacity or increased static settlement risk in some areas, and additional geotechnical investigation at resource consent stage will be required to determine the extent of these areas.

(g) **Pile Foundations** – Pile foundations will be required for the future development in the following situations:

(i) where structural or civil design calls for bridging of public underground services;

(ii) where bearing capacity requirements are greater than those available for shallow foundations;

(iii) where significant depths of non-engineered fill or other unsuitable material is to remain in-situ; and

(iv) for the mitigation of intolerable static or liquefaction-induced settlement.

(v) Pile foundations would likely require embedment depths in excess of 12m to penetrate beyond liquefiable soils. Specific geotechnical investigation in the form of machine boreholes and detailed analysis will be required to inform pile parameters, and design should be followed by installation of 'test' piles.

8. SECTION 42A REPORT

8.1 I have reviewed the geotechnical matters raised in the Section 42A Report.[4]

8.2 I concur with the geotechnical reviewer's recommendation that a more intensive geotechnical investigation is required, as well as further modelling at the detailed design stage. This is reflected in our preliminary reporting, and my evidence, where I reiterate some geotechnical aspects will require development-specific geotechnical investigation at the resource and building consent stages. I also concur with the reviewer's geotechnical comments[5] and consider that we both broadly align in respect to the Plan Change Area requiring further clarification as part of subsequent subdivision and land use consenting processes.

9. RESPONSE TO SUBMISSIONS

9.1 The submissions received on PC17 have not raised concerns relating to geotechnical matters.

10. CONCLUSION

10.1 No geotechnical natural hazards have been identified that will impede future development or that cannot be addressed by typical engineering design and construction or via ground improvement options suitable for the mitigation of liquefaction-induced settlement.

10.2 I consider the Plan Change Area to be geotechnically suitable for future development. The geotechnical constraints outlined above can be addressed

[4] Section 42A Report, Sections 5.0 and 6.0, and Appendix D.
[5] Section 42A Report, section 6.34.

and mitigated through development-specific geotechnical investigation and assessment at the resource and building consent stages.

Mark Sinclair
7 October 2025