Before an Independent Hearings Panel

The Proposed Waikato District Plan (Stage 1)

IN THE MATTER OF the Resource Management Act 1991 (**RMA**)

IN THE MATTER OF hearing submissions and further submissions on the Proposed Waikato District Plan (Stage 1):
Topic 25 – Zone Extents

PRIMARY EVIDENCE OF SHANE GARETH LANDER ON BEHALF OF HAVELOCK VILLAGE LIMITED

17 February 2021

BUDDLE FINDLAY

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1. SUMMARY OF EVIDENCE

1.1 My full name is Shane Gareth Lander. I am the owner and Principal Geotechnical Engineer at Lander Geotechnical Consultants Limited.

1.2 I am providing Geotechnical and Geological evidence in relation to proposed rezoning sought by Havelock Village Ltd ("**HVL**")[1] of land at 5 Yashili Drive, 88 Bluff Road, 242 (in part) and 278 Bluff Road, Pokeno (the "**Site**").

1.3 I have prepared an initial geotechnical overview to inform precinct design and planning processes and highlighted potential geotechnical constraints. In due course earthworks and construction plans to treat any areas requiring ground stability remediation will be developed for resource consent applications.

1.4 Once the ground model is proven commensurate with a development scheme, engineering solution concepts can be established. A range of geotechnical solutions (dependant on ground proving results) to treat perceived slope stability constraints are illustrated in my evidence **below**.

1.5 In summary, the site comprises topography and ground conditions that is steep in places and shows evidence of slope instability, and prone to settlement and/or liquefaction related issues in other places such as the low-lying areas and inverts of watercourses. Notwithstanding these constraints, I consider that the geotechnical characteristics of the Site are similar to others study areas nearby, such as the recently approved rezoning at the neighbouring Graham Block[2] (to the north–west, part of the overall Hitchen Road area under development by Dines Fulton Hogan Joint Venture).

1.6 In addition to the Graham Block there has been significant land modifications and development to the north and east of the Site over the past few years. This indicates to me that it is practical to develop the Site and address the relevant geotechnical risks at the time of resource consent. As with those sites, provided prevailing or perceived geotechnical issues are addressed during detailed site investigations for resource consent the Site is suitable for re-zoning to Residential use generally in accordance with the Havelock zone plans and provisions.

[1] Submitter 862 and further submitter 1291.
[2] Plan Change 24 to the Operative District Plan.

2. INTRODUCTION

2.1 My full name is Shane Gareth Lander. I am a Geotechnical Engineer.

2.2 I hold a NZCE (Civil) and BE(Civil; Hons 1st class, 1st div) and am a Chartered Professional Engineer. My work experience includes significant land subdivisions across South Auckland over the past 20 years on steep ground, including overseeing most geotechnical aspects related to large scale land use intensification and earthworks construction at Pokeno over the past 10 to 15 years, just to the north of this Site.

2.3 I hold the position of Managing Director and Principal Geotechnical Engineer at Lander Geotechnical Consultants Limited based in Manukau.

2.4 My previous experience includes the following relevant projects:

(a) Large scale residential land development (Dines Fulton Hogan Joint Venture) at Hitchen Rd, Pokeno.

(b) Large scale rural-residential land development known as Kowhai Downs, Pokeno.

2.5 I have been involved in the rezoning proposal by HVL since August 2018 and have prepared a Preliminary Geotechnical Appraisal Report (Ref No J01047, dated 3 October 2018) in relation to the proposal. That report excluded the area of 5 Yashili Drive, but this area has been included in my evidence. I last visited the site on 6 September 2018, and I am continuously on-site at the Pokeno residential developments, directly adjacent to the Havelock study area, and have not observed any changes to the Havelock landform since 2018.

Scope of evidence

2.6 My evidence addresses the following matters:

(a) Geotechnical Site context and characteristics of the Site, including the geotechnical constraints and risks at the Site;

(b) Geotechnical design and management approach;

(c) Management of effects including the nature and type of ground improvements needed to mitigate geotechnical risk; and

(d) Overall suitability of the Site for commercial and residential use.

3. CODE OF CONDUCT

3.1 I have read the Environment Court's Code of Conduct for Expert Witnesses, and I agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence are 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.

4. SITE CONTEXT AND CHARACTERISTICS

4.1 Significant portions of the Site are steeply incised by gully features or steep sided ridgelines which display signs of shallow seated soil creep, slumping and large scale instability, and some places are low lying and associated with watercourses, which will contain soft and saturated sedimentary infill. Outside of such areas the Site is generally undulating to rolling and shows no obvious geomorphic signs of ground instability.

4.2 Inset (Figure 1) is the approximate extent of the Site and the various geologies.

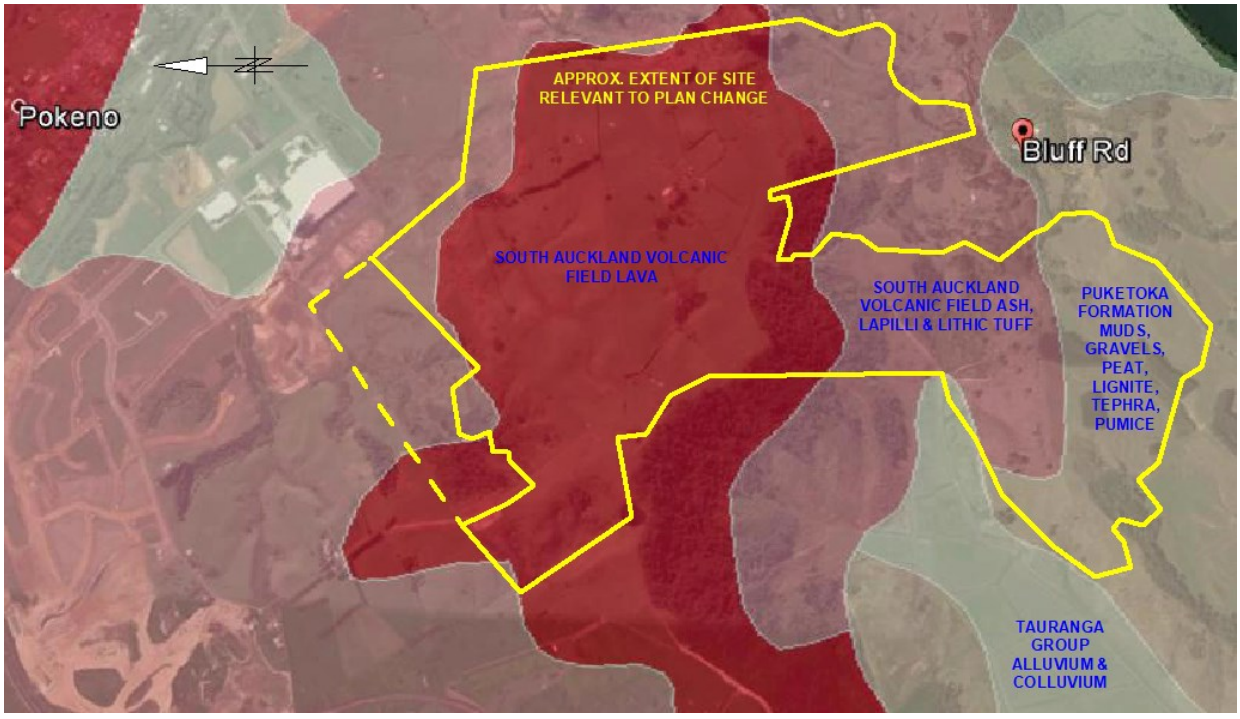

Figure 1: Geological Setting; source Lander report Ref No J01047 dated 3 October 2018. Number 5 Yashilli Drive is included via dashed line.

4.3 The Geological setting comprises:

(a) Tauranga Group (≤14,000 yrs; Holocene) Alluvium and Colluvium west and south-west of the Site; Puketoka Formation (3.6 Mya – approx. 0.5Mya) over the southern portion of the Site;

(b) South Auckland Volcanic Field (0.78 Mya – 14,000 yrs) Ash and Tuff over the central portion, eastern and northern edges; and

(c) South Auckland Volcanic Field (0.78 Mya – 14,000 yrs) Basalt (lava) rock beneath the elevated northern portion of the Site.

4.4 Based on the geologic setting I consider the Site has the following constraints and risks:

(a) Slope instability associated with soil movement is a risk for the various steep sided incised gullies and sides of the elevated northern portions of the Site.

(b) The crest of the northern elevated ground (a tuff ring) contains welded tuff bluffs and/or outcropping Basalt rocks which create a risk of toppling and/or rock fall during earthquake shaking.

(c) Compressible organic and/or cohesive soils within or near valley / watercourse inverts resulting in long term consolidation settlement, which is typical of low-lying alluvial deposits.

(d) Liquefaction of saturated fine granular soils is a potential characteristic of the Tauranga Group deposits, although these fall largely outside the boundary of the Site (i.e. to the south and south-west).

5. GEOTECHNICAL DESIGN AND MANAGEMENT APPROACH

5.1 In order to assist the master planning of the Site, I developed series of maps (refer insets **below**; Figures 2 & 3), that classify the development suitability of the Site, based on landforms and geotechnical constraints. Three geotechnical zones are proposed.

5.2 The maps provides a high-level classification of the land suitability to inform the Precinct Plan as explained in paragraph 5.3 below:

(a) Green (Zone A) - low to some risk,

(b) Orange (Zone B) - moderate risk, and

(c) Blue (Zone C) - highest risk.

5.3 Each Zone has the following characteristics:

(a) Zone A – Low to Some Risk: Land on gently rolling hills, underlain by volcanic geology and wide plateaus on the ridges. Some moderately steep slopes but generally less than gradient 1(v) in 4(h) associated with the flanks of the ridges and valleys

(b) Zone B – Moderate Risk: Land underlain by young alluvium (e.g. recent sediments deposited in valley floor or gully inverts) and steeper slope than Zone A exhibiting some signs of minor slope instability (e.g. minor slips and soil creep)

(c) Zone C – High Risk: Very steep slopes or and in close proximity to such slopes, and/ or evidence of large-scale deep-seated slope instability, and/ or land in close proximity to such large scale features

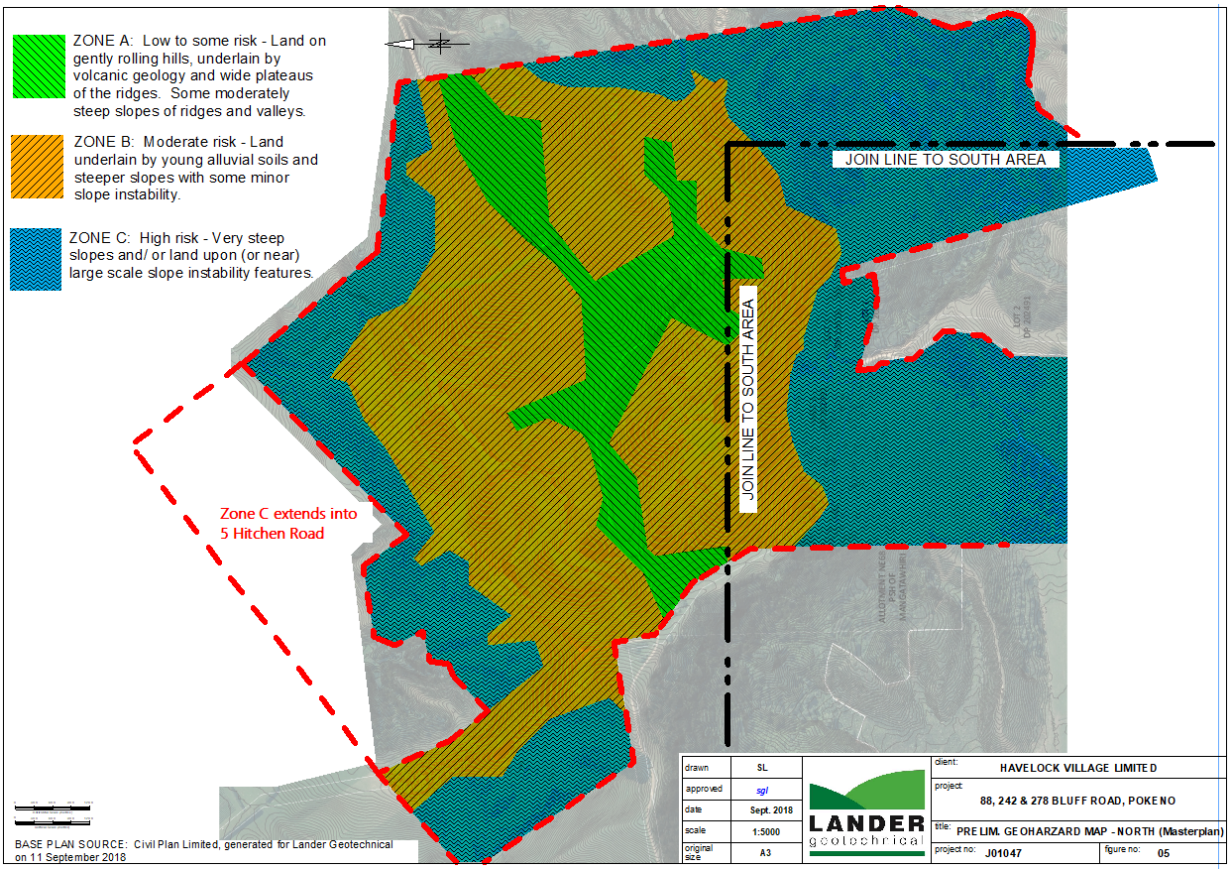

Figure 2: Geotechnical Zones North; source Lander report Ref No J01047 dated 3 October 2018. Number 5 Yashili Drive is included.

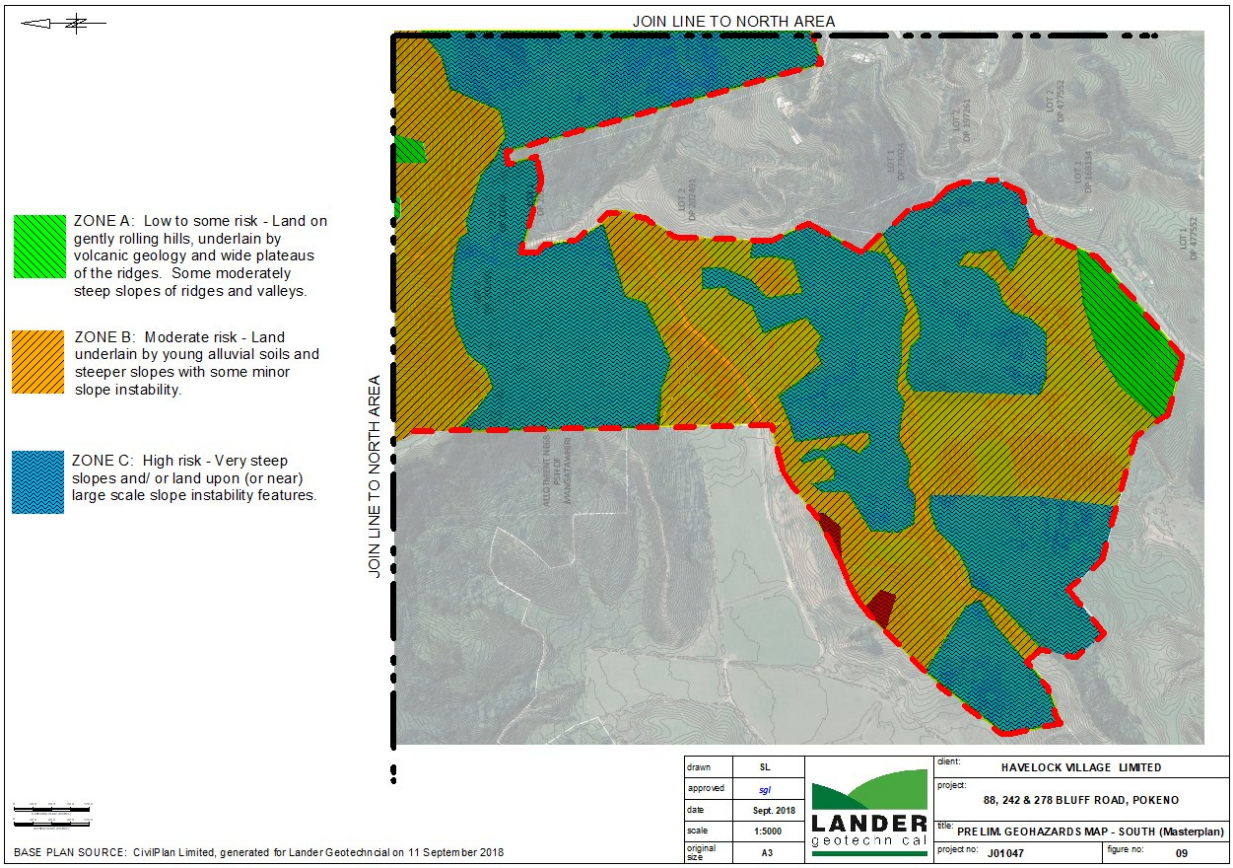

Figure 3: Geotechnical Zones South; source Lander report Ref No J01047 dated 3 October 2018.

6. GEOTECHNICAL ENGINEERING MANAGEMENT AND PROCESSES

6.1 As described **above**, the Site includes incised gully flanks and areas displaying signs of slope instability and in those locations development setbacks will need to be assessed and determined during detailed geotechnical site investigations of the land for subdivision and resource consents.

6.2 Areas that may be at risk from “rock” fall or toppling debris from any steep slopes above will need to be identified and risks to development below such areas established.

6.3 Low lying area and/ or areas containing soft sedimentary infill can be avoided to reduce ground stability risks from consolidation settlement or potential liquefaction (Flooding risks will be managed by design for subdivision engineering).

6.4 Where adequate setbacks cannot be achieved to mitigate slope instability risks, engineering intervention such as bulk earthworks (e.g. shear keys or buttress fills, and/ or remediation of slip areas), counterfort drains, palisade pile walls (i.e. in-ground retaining) can be designed and employed to mitigate slope instability (refer Inset;

Figure 4). In soft ground areas, drainage and/ or ground improvements techniques (such as removing soft soils and reinstatement with stronger materials, drainage and pre-loading, etc). All these measures are, in my experience, standard geotechnical industry approach and have been employed throughout the Auckland and Waikato region in similar geotechnical settings if warranted by developments.

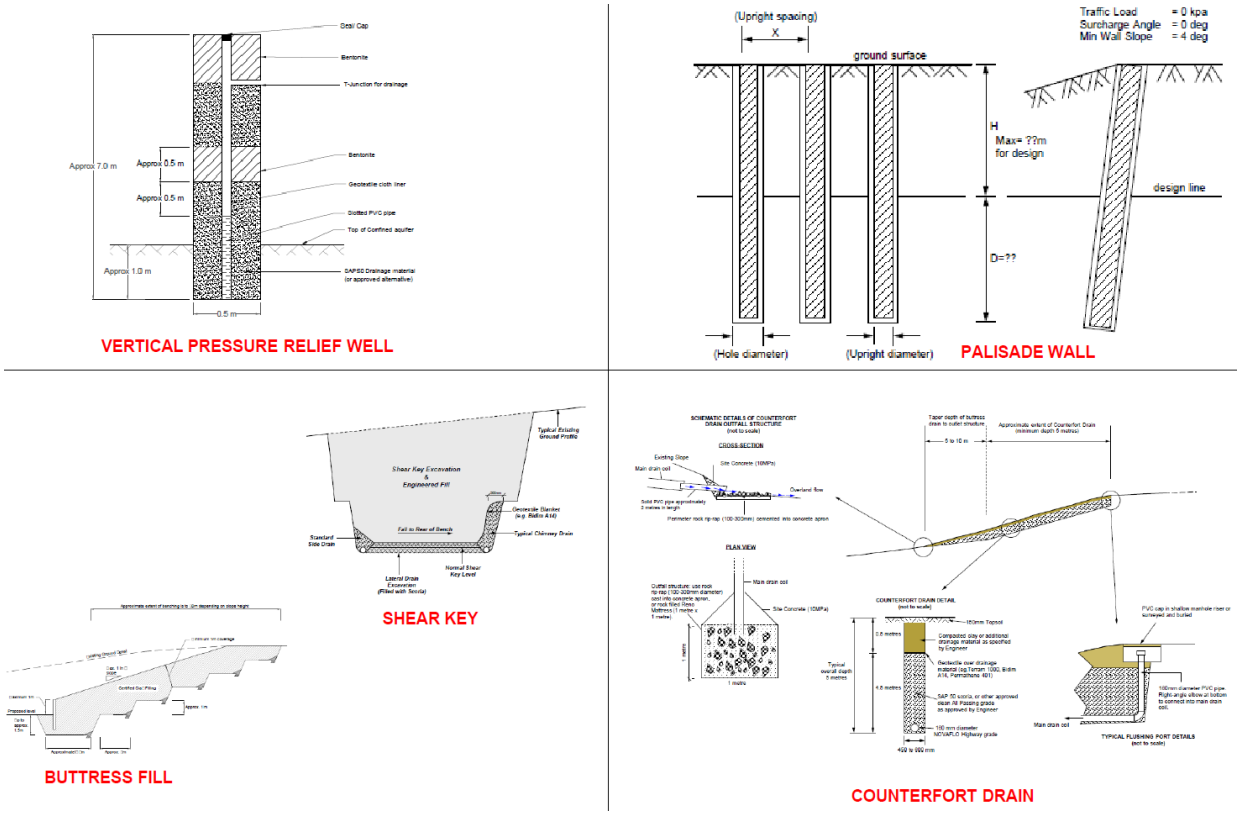

Figure 4: Geotechnical Engineering Concepts; source Lander report Ref No J01047 dated 3 October 2018

6.5 Other geotechnical matters, such as foundation bearing capacity for residential buildings and earthworks design, are matters for resource consent and are considered once ground proving investigations are completed.

7. PROPOSED HAVELOCK PRECINCT PLAN PROVISIONS

7.1 I have reviewed the proposed Havelock Precinct Plan and provisions[3] as they relate to geotechnical matters and I am satisfied that they accurately recognise the potential geotechnical constraints on the Site and make provision for them to be appropriately investigated in a future development phase (e.g. during subsequent resource consent and subdivision phases of the development). The Precinct Plan (Figure 5 below)

[3] As included in the evidence of Mr Tollemache, which includes the proposed Slope Residential Overlay and proposed Rule 16.4.17.

overlays illustrates the relationship with the geotechnical zones described earlier in my evidence (which has been overlaid on the Precinct Plan).

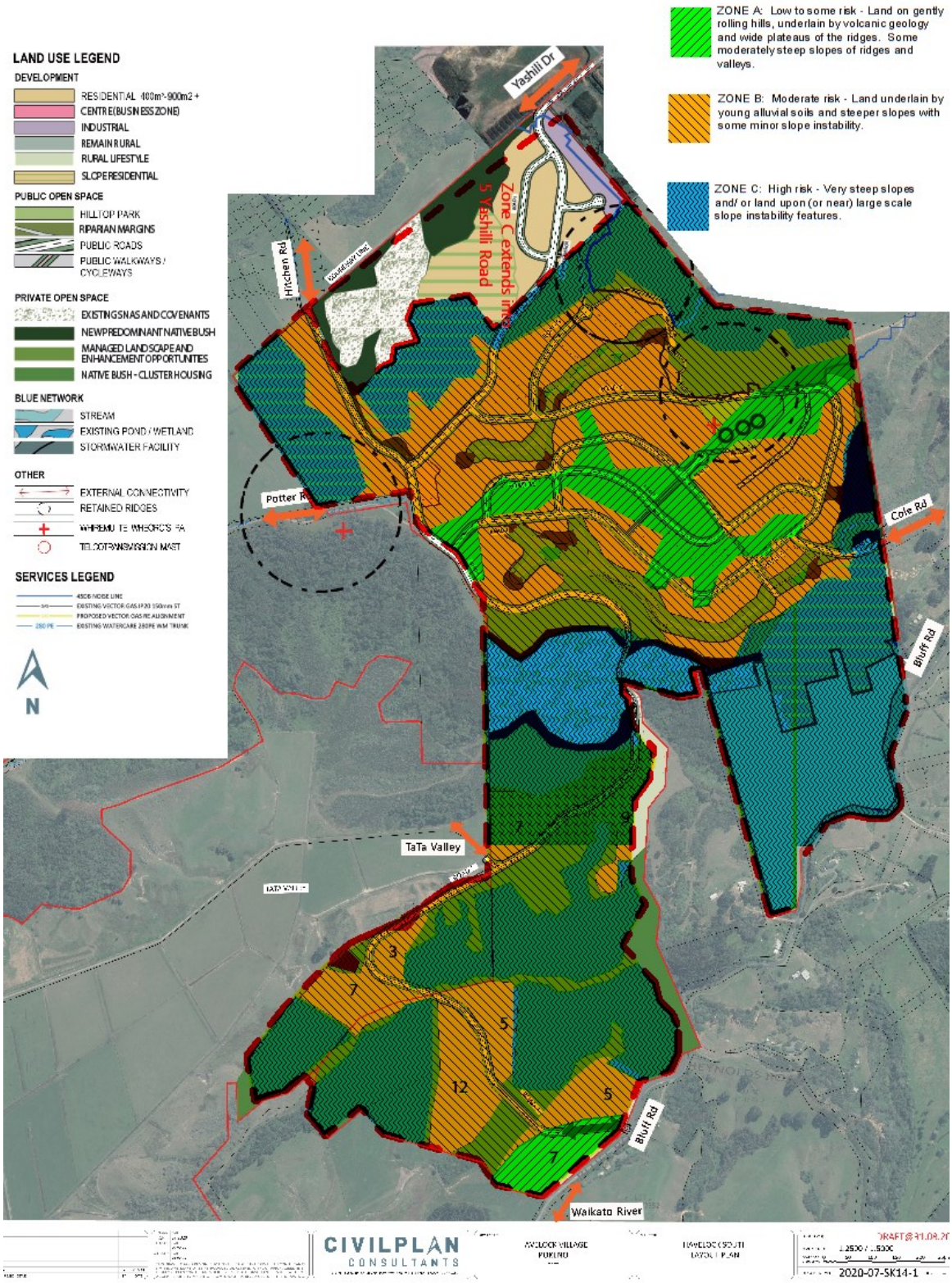

Figure 5: Geotechnical Zones A to C overlaid onto the Havelock Concept Plan[4].

[4] As included in the evidence of Mr Munro.

8. CONCLUSION AND OVERALL SUITABILITY OF THE SITE

8.1 I have prepared an initial geotechnical overview to inform precinct design and planning processes and highlighted potential geotechnical constraints. In due course earthworks and construction plans to treat any areas requiring ground stability remediation will be developed for resource consent applications.

8.2 Once the ground model is proven commensurate with a development scheme, engineering solution concepts can be established. A range of geotechnical solutions (dependant on ground proving results) to treat perceived slope stability constraints are illustrated on Figure 4 inset in my evidence **above**.

8.3 In summary, the Site comprises topography and ground conditions that is steep in places and shows evidence of slope instability, and prone to settlement and/or liquefaction related issues in other places such as the low-lying areas and inverts of watercourses. Notwithstanding these constraints, I consider that the geotechnical characteristics of the site are similar to others study areas nearby, such as the recently approved rezoning at the neighbouring Graham Block[5] (to the north–west, part of the overall Hitchen Road area under development by Dines Fulton Hogan Joint Venture).

8.4 In addition to the Graham Block there has been significant land modifications and development to the north and east of the Site over the past few years. This indicates to me that it is practical to develop the Site and address the relevant geotechnical risks at the time of resource consent. As with those sites, provided prevailing or perceived geotechnical issues are addressed during detailed site investigations for resource consent the Site is suitable for re-zoning to residential use generally in accordance with the Havelock zone plans and provisions.

Shane Gareth Lander
17 February 2021

[5] Plan Change 24 to the Operative District Plan