

**BEFORE THE HEARINGS COMMISSIONERS FOR THE WAIKATO
DISTRICT COUNCIL**

UNDER the Resource Management Act 1991

AND
IN THE MATTER of hearing submissions and further
submissions on the Proposed Waikato
District Plan

Hearing 25 – Zoning Extent Hearing

PARTIES REPRESENTED **CSL TRUST AND TOP END PROPERTIES**
(89)

**STATEMENT OF GEOTECHNICAL EVIDENCE FROM FRASER NILE
DEANE WALSH FOR CHEN/POKENO WEST LTD**

11 NOVEMBER 2020

Counsel Instructed:

Peter Fuller
LLB, MPlan, DipEnvMgt, BHortSc.
Barrister
Quay Chambers
Level 7, 2 Commerce Street
PO Box 106215
Auckland 1143
021 635 682
Email:
peter.fuller@quaychambers.co.nz

QUALIFICATION AND EXPERIENCE

1. My name is FRASER NILE DEANE WALSH. I am a Consulting Geologist in the field of engineering geology and the Director of Ground Consulting Ltd.
2. My professional qualifications are a Bachelor of Science Degree in Geology and a Masters of Science Degree with Honours in Geology from the University of Auckland. I also am a chartered member of Engineering New Zealand (PEngGeol).
3. I have 21 years experience working in the field of engineering geology within the Auckland District. This includes the preparation of over 1,000 geotechnical reports for commercial, industrial and residential developments. The geotechnical reports provide detailed information for structural engineering design in regards to slope stability, foundation conditions, site earthworks and stormwater disposal.

CODE OF CONDUCT FOR EXPERT WITNESSES

4. I have read, understood, and have prepared this statement of evidence in accordance with the Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note. I also confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions I express.

PROJECT INVOLVEMENT

5. I was engaged to carry out a geotechnical feasibility assessment for the proposed development including 205 Helenslee Road during June 2018.
6. The majority of the investigations including a site walkover were carried out during June 2018.

SCOPE OF MY EVIDENCE

7. This geotechnical feasibility assessment has been prepared for the purpose of providing sufficient geotechnical information in order to develop and progress a proposed plan change to allow subdivision for residential purposes.

SITE INVESTIGATIONS

8. The investigations undertaken as part of this feasibility assessment have consisted of:
 - (a) Desktop study of the site including:
 - (b) Published Geology.
 - (c) Historic Aerial Photographs.
 - (d) Google Earth Imagery.
 - (e) Waikato Regional Council GIS Viewer.
 - (f) Site mapping and reconnaissance
 - (g) Previous Investigations
9. I consider that the site investigations undertaken have provided a sufficient assessment of the existing geological conditions.
10. I personally oversaw the site investigations, field mapping, analysis, and reporting associated with the site investigations.
11. I am unaware of any publicly available geotechnical investigations which have been undertaken within the proposed subdivision.

PROPOSED SITE DEVELOPMENT

12. Plan change development plans have been provided by Birch Surveyors Ltd. The plans in summary show the following with relevance to geotechnical aspects of this assessment:
 - (a) The majority of the subdivision consists of medium density residential housing which is accessed via. a series of new public roads off Helenslee Road to the east, Ridge Road to the west and proposed subdivisions to the south.

- (b) Countryside living areas consisting of small rural lifestyle blocks are located within the western portion of the proposed subdivision and are accessed via the aforementioned public roads.
- (c) Significant subdivision watercourses, overland flowpaths and native bush areas are to remain and will be utilised as reserve areas.
- (d) The subdivision will be progressively constructed in stages principally from east to west.
- (e) Stormwater will be managed by the existing significant watercourses and overland flowpaths.
- (f) Wastewater will be managed by a connection to the Pokeno reticulated wastewater system.

SITE CONDITIONS

Site Location

- 13. The subdivision is situated within Pokeno of the Waikato Region, located 10kms south east of Pukekohe town centre and 5km north of the Waikato River. The subdivision is accessible off Helenslee Road and Ridge Road.
- 14. The subdivision is currently surrounded by farmland and rural lifestyle development.
- 15. A site location map is presented on Drawing 001.

Site Topography

- 16. The subdivision is located on three predominant landforms as shown on Drawing 002. The landforms are described as follows:
 - (a) Low Lying Slopes and Flats:
 - (i) Low lying slopes and flats are located within the south eastern portion of the subdivision. The flats are utilized for cropping and pastureland and are drained via a series of ditch drains and overland flowpaths and streams.

(b) Gently Rolling Slopes

- (i) The subdivision contains extensive areas of gently rolling slopes predominately within the eastern portion subdivision and decreasing progressively to the west. The gentle slopes are typically located over a series of ridge crests which extend down to the flow lying flats and intermediary flowpaths. The ridge crests are typically utilized as pastureland with some pockets of bush.
- (ii) The slopes contain pockets of moderately steep topography but given their size are not mapped on Drawing 002.

(c) Moderately Steep to Steep Slopes

- (i) The subdivision contains extensive areas of moderately steep to steep slopes predominately within the western portion subdivision and decreasing progressively to the east. The moderately steep to steep slopes are typically located over a series of sharp ridge crests and intermediary gullies which extend down to the flow lying flats. The slopes are typically utilized as pastureland with some pockets of bush.
- (ii) The slopes contain pockets of gently sloping topography but given their size are not mapped on Drawing 002.

Site Surface Water Features

- 17. The low lying flats contain a series of ditch drain and overland flowpaths which drain down to the south-eastern edge of the site. The ditch drains contained minor flows on inspection and may dry up in part over the summer months.
- 18. The series of gullies which extend down to the low lying flats contain watercourses of various sizes. The majority of catchments which feed the watercourses are small to moderate in size. It appears from the subdivision scheme plan provided, the majority of watercourses will remain.

Slope Instability Features

19. The low lying slopes and gently rolling slopes contain no observed slope instability features.
20. The moderately steep to steep slopes contain primarily regolith type slope instability features associated with shallow soil creep and slumping ground. The steeper slopes also contain semi-circular shaped gully head formations in places which may represent the remnants of old highly eroded landslides. These features become more apparent within the western portion of the subdivision off Ridge Road. Further investigation of these features is warranted for subdivision consent given the potential impact on subdivision development. Otherwise, the moderately steep slopes do not contain any deep-seated and/or large-scale slope instability features.

Aerial Photographs

21. Aerial photographs available from the Auckland Council GIS Viewer and Google Earth dating from 2004 to 2015 were studied to observe the site over time and assess the geomorphological setting. The review of historic aerial photography indicates that there has been no significant modification of the subdivision over this time period.

GROUND CONDITIONS

Published Geology

22. The Geological Map of New Zealand, Sheet 3, at a scale of 1:250,000 maps the low lying flats as being underlain by Holocene alluvial deposits. The lower foothills within the western portion of the subdivision are underlain by Mercer Sandstone consisting typically of massive sandstone. The remainder of the subdivision is mapped as the Kerikeri Volcanic Group of the South Auckland Volcanic Field. The South Auckland Volcanic Field consists of basalt lava, scoria, ash, lapilli and lithic tuff.

Sub-surface Conditions Inferred from Site Mapping

23. Sub-surface investigations have not been undertaken as part of this feasibility assessment, however, from site mapping undertaken we note the following with respect to ground conditions:
- (a) The low lying slopes and flats are likely underlain by alluvial deposits which typically consist of SILT and PEAT based soil. Alluvial soil can be weak, especially when combined with shallow groundwater levels as is likely the case across the majority of the flats.
 - (b) The gently rolling slopes are likely mantled with volcanic deposits associated with numerous volcanic centres located to the immediate west of the subdivision. The deposits likely consist of weathered volcanic ash with possible weathered volcanic tuff in the upper reaches.
 - (c) The lower (eastern) portion of the moderately steep to steep slopes are likely underlain by the Waitemata Group at depth. This locally consists of Mercer Sandstone.
 - (d) The upper (western) portion of the moderately steep to steep slopes are likely underlain by the volcanic deposits which covers the Waitemata Group at depth. This locally consists of significant volcanic tuff deposits which outcrop close to Ridge Road.

GROUNDWATER CONDITIONS

24. Sub-surface investigations have not been undertaken as part of this feasibility assessment, however, from site mapping undertaken we note the following with respect to groundwater conditions:
- (a) The low lying slopes and flats likely contain shallow groundwater levels. The groundwater table appears to be partially controlled by a series of ditch drains which extend through the flats. The groundwater table may reach the ground surface within the flats for periods during the winter months.

- (b) The gentle to moderately rolling slopes likely contain depressed groundwater levels given the more elevated nature of the topography. Shallow groundwater levels are expected along the base of the intermediary gullies.

SUBDIVISION DEVELOPMENT FEASIBILITY

General

- 25. The subdivision has been divided into subdivision development zones as shown on Drawing 003. The subdivision development zones are based on the landform site mapping undertaken. The subdivision development zones provide general recommendations on allowable subdivision development and constraints which can be utilised to provide a subdivision scheme plan. The subdivision development zones are summarized as follows:

Subdivision Development Zone A

- 26. Zone A land is considered to be suitable for residential development and should provide safe and stable conditions. Zone A land is typically associated with:
 - (a) Gently sloping topography with slope angles of no steeper than 1(v) on 4(h).
 - (b) Topography which is not associated with high groundwater levels.
 - (c) Topography which is not associated with surface water flows and/or ponding.
- 27. The extent of Zone A land is shown on Drawing 003 and closely follows the “gently rolling slopes” landform.
- 28. Zone A land is likely underlain by competent ground conditions which are expected to provide “good ground” according to NZS 3604:2011.
- 29. Zone A is not expected to provide significant constraints on subdivision development earthworks.

30. Zone A is expected to provide suitable conditions for the disposal of stormwater generated from impervious surfaces. This can be accommodated by soakage structures and/or detention and slow release structures.

Subdivision Development Zone B

31. Zone B land is not suitable for residential development under existing conditions and includes the moderately steep to steep slopes. Zone B land, however, can provide suitable subdivision development conditions with appropriate remedial measures. Zone B land is typically associated with:

- (a) Moderately steep to steep topography with slope angles of steeper than 1(v) on 4(h).
- (b) Topography which is associated with surface water flows and/or ponding.
- (c) Topography which is associated with slope instability features.

32. The extent of Zone B land is shown on Drawings 003. We note that some portions of Zone B land may not reasonably be utilized for residential development given the likely prohibitive development costs associated with earthworks and ground stabilisation measures.

33. Zone B land can provide suitable subdivision development conditions with appropriate remedial measures. Such measures include:

- (a) Structural in-filling or re-grading of steep slopes in order to provide acceptable overall slope grades, that being slope angles of < 1(v) on 4(h).
- (b) Engineered retaining along the edge of the gullies. This enables development to at least the edge of the gully features.
- (c) Structural in-filling and diversion of the site overland flowpaths.

Subdivision Development Zone C

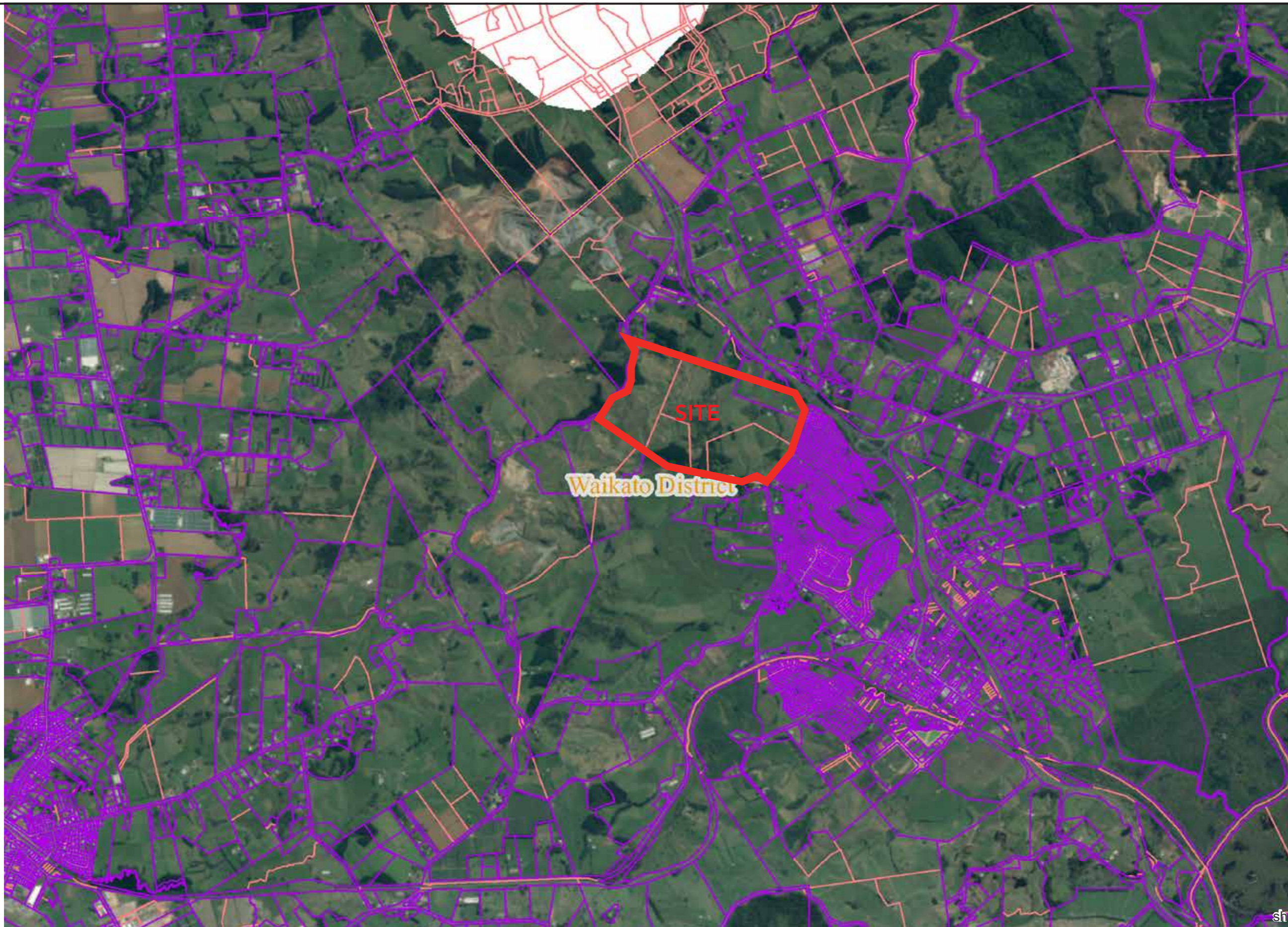
34. Zone C land may not be suitable for residential development under existing conditions and includes the low lying slopes and flats. The suitability of

building within Zone C is dependant on the strength and saturation of the alluvial deposits which likely underlie this zone. Zone C land, however, can provide suitable subdivision development conditions with appropriate remedial measures.

35. The extent of Zone C land is shown on Drawing 003.
36. Zone C land can provide suitable subdivision development conditions with appropriate remedial measures. Such measures include:
 - (a) Structural in-filling, draining or re-grading of low-lying areas to provide acceptable groundwater table clearances.
 - (b) Structural in-filling and diversion of the site overland flowpaths.
 - (c) Removal of alluvial deposits and replacement with engineered fill.
 - (d) Pre-loading of alluvial deposits to provide engineered building platforms.
 - (e) Engineered foundation design to accommodate low bearing capacity soils.

ATTACHED DRAWINGS

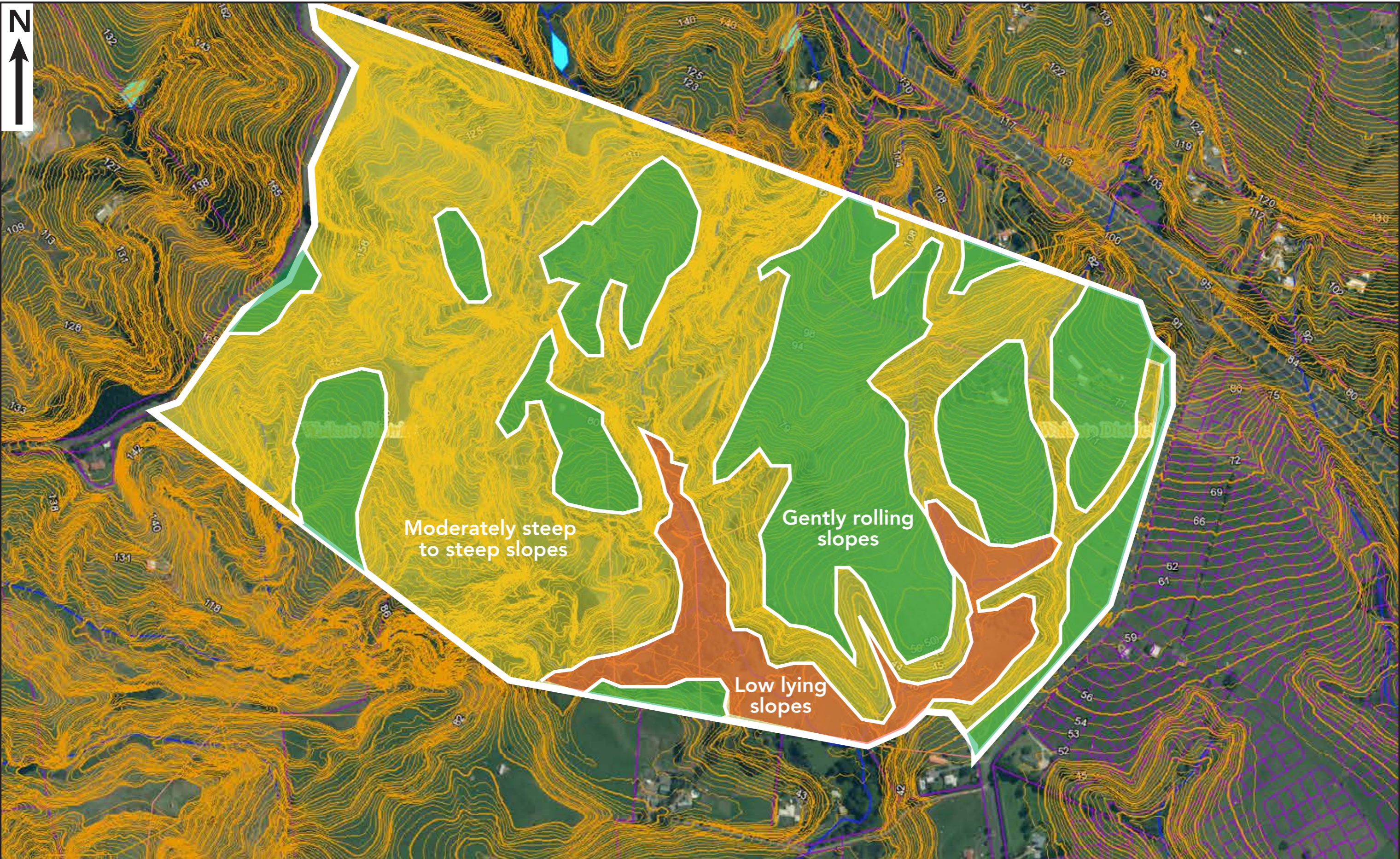
Drawing 001	Site Location Plan
Drawing 002	Site Plan: Landforms
Drawing 003	Site Plan: Subdivision Development Zones



CSL TRUST
HELENSLEE ROAD, POKENO
SITE LOCATION PLAN

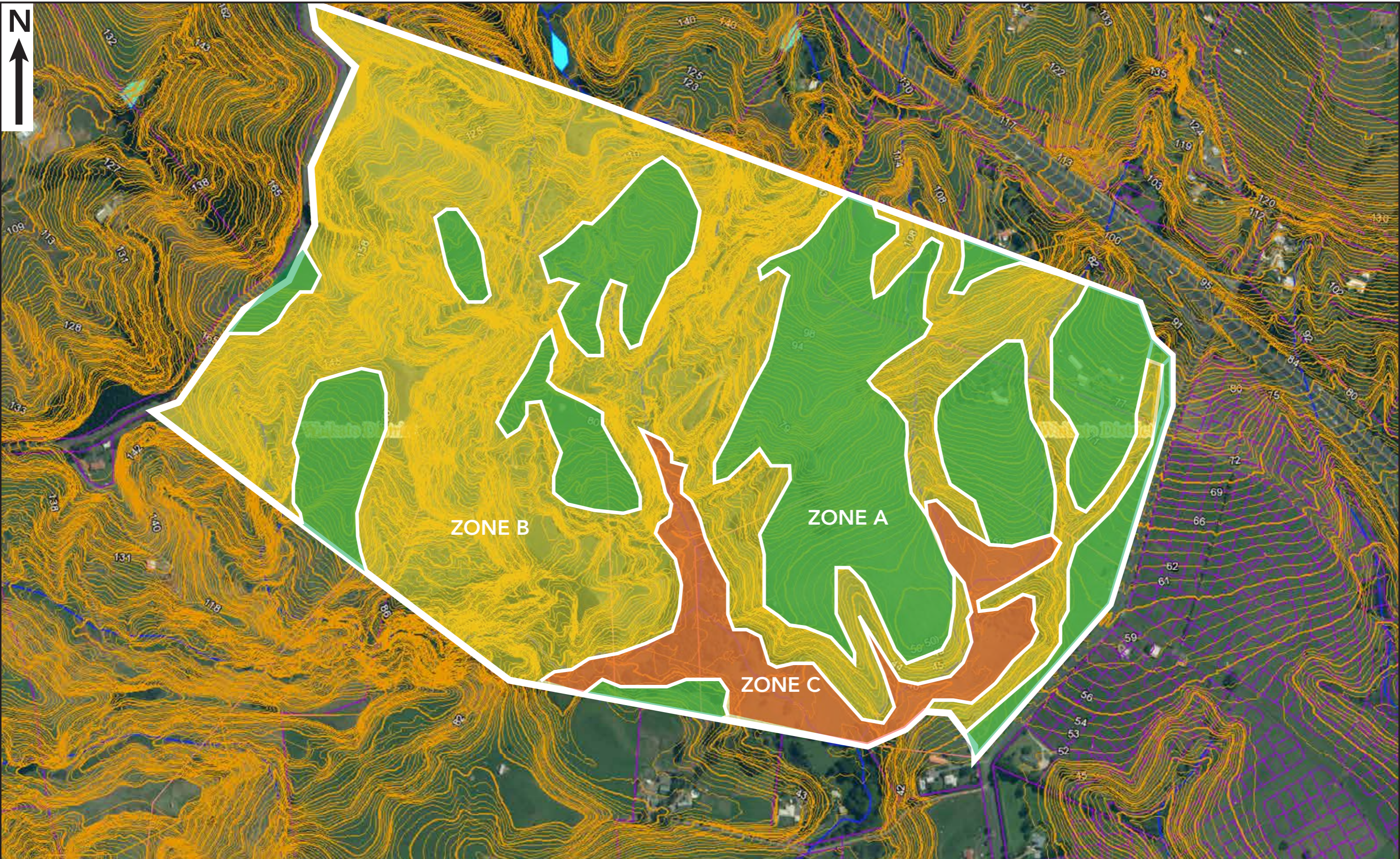
Rev	Date	Status	Drafted	Reviewer
A	06/06/2018	Issued	L.K	FW

File Ref. MAC://Projects_3000/3396/R3396-1/R3396-1-DRW002cdr
Scale (A4) 1:20,000
0 4 20 40m
Project No. 4006
Report Ref. R4006-1
Drawing No. 001



CSL TRUST
 HELENSLEE ROAD, POKENO
SITE PLAN: LANDFORMS

Rev	Date	Status	Drafted	Reviewer	File Ref.
A	06/06/2018	Issued	L.K	FW	MAC://Projects_3000/3396/R3396-1/R3396-1-DRW002cdr
					Scale (A4) 1:5000
					0 20 100 200m
				Project No. 4006	Drawing No. 002
				Report Ref. R4006-1	



CSL TRUST
HELENSLEE ROAD, POKENO
SITE PLAN: SUBDIVISION DEVELOPMENT ZONES

Rev	Date	Status	Drafted	Reviewer
A	06/06/2018	Issued	L.K	FW

File Ref. MAC://Projects_3000/3396/R3396-1/R3396-1-DRW002cdr
Scale (A4) 1:5000
0 20 100 200m
Project No. 4006
Report Ref. R4006-1
Drawing No. 003