9. Tonkin + Taylor "Kotata Development– Geotechnical Review of Development Information – Stages 1-4 (Including 4C & 4D)" Dated 10 December 2019, T&T reference 1012149.002
10. Whangarei District Council "Notice of Review of Subdivision Consent Conditions" Dated 2 March 2020, WDC reference SL1800014, SL1800017, SL1900011, SD1800020.01

## 2.4 Site Description

The Kotata development is located on an area of sloping ground with the overall site sloping generally from High St in the north to Limeburners Creek to the south of the site. Kotata Rise comprises a main, north-south trending ridgeline, with a series of more southeast-northwest trending minor ridgelines. Gullies formed between ridges are typically open and drain to the south or southeast. The western boundary comprises a steeper, west facing slope off the main ridgeline.

The site has been extensively earthworked over the last ten years, with cuts from the main ridges and several gully heads or gullies filled in their entirety to form a series of platforms for future commercial or residential development. Stage 2 is in the north west section of the development and is bordered by moderately steep slopes to the west, and the Kotata Rise road corridor to the east (which runs in a north-south direction to the east of the ridge crest).

The western slopes are grass or scrub covered with some trees with the dominant landform comprising two arcuate features, separated by a minor spur (annotated on Figure No. 822-S2-004 in Appendix A). The northern and southern arcuate features are located to the north and south of Titiro Street. These areas are referred to herein as Northern Stage 2 and Southern Stage 2, respectively.

The overall Stage 2 site itself is tiered, with ground levels varying from 75 m RL to 50 m RL and generally falling from east to west and north to south. Stage 2 comprises 34 No. residential lots in total, together with roads and accessways. Lot sizes in Stage 2 are generally between about 400 $m^2$ and 800 $m^2$. At the time of writing, most sections in Stage 2 have been developed, generally with single storey housing, with only 4 lots of 34 yet to be built on. Figure 822-S2-002 in Appendix A shows the layout of the development.

## 2.5 Development History

The Stage 2 Geotechnical Completion Report (RS Eng 2018, Referenced Document 8), states that the earthworks were completed in the summer of 2007/2008, with the servicing of Stage 2 completed in 2017 and 2018. Additionally, works completed in 2017 and 2018 included the installation of counterfort drains in the southern part of Stage 2, to the west of Lots 17 to 22, 33 and 34 and a soldier pile wall in the northern part of Stage 2, to the southwest of Lots 12 to 15 (as shown on Figure No. 822-S2-200 in Appendix A). These works were carried out in response to a slope instability event which is summarised below.

The earthworks within Stage 2 has predominantly comprised cutting (up to approximately 5 m towards the crest of the ridgeline, based on comparisons with pre-development WDC 2m contours) and filling within the heads of the two arcuate features in the western slopes (Drawing 822-S2-003, Appendix A).

The 2017 Richardson Stevens report (Referenced Document 7) states that a "significant slope failure" occurred in the western part of Northern Stage 2 during construction. Richardson Stevens describes this failure as being approximately 30 m in width, 80 m in length and with a head scarp height of 5 m to 7 m. This failure appears to be visible on the January and September 2016 Google Earth satellite images (discussed further in Section 5). A soldier pile palisade wall was constructed to address this failure. The wall comprised 350 mm diameter, 6 m long timber poles as shown in the as-built drawing (Drawing Ref PWAI14556, Appendix A) and was constructed to the south west of Lots 12-15. We understand that the failure occurred within an area previously filled and was inferred by Richardson Stevens to have occurred on the soil-rock interface. Based on Drawing Sheet KHS-SPW (Appendix A), it is understood that a large part of the failure, including the head scarp was removed and regraded so

that final fill levels were considerably reduced compared to original completed earthworks levels prior to the failure occurring.

The 2017 report also recommended that, based on shallow stability modelling, counterfort drainage be installed to lower groundwater level to 3.5 m below ground level to improve the stability of lots adjacent to the southern arcuate feature (south of Titiro Street). The details of the counterfort drains (5 No. 110 mm Novaflo drains) are shown on the as-built drawing (Drawing Ref CDA14556, Appendix A). While not explicitly outlined in the RS Eng reporting, based on a review of the aerial imagery (discussed in Section 5) there appears to have been a re-activation of slope instability in the area to the west of the residential lots that abut this feature, circa 2016.

# 3. Geological Setting

The most recent published geological map for the area we are aware of is the 1:250,000 GNS QMap, Edbrooke & Brook (2009)[1]. This map indicates that the site is underlain by allochthonous/displaced Ruatangata Sandstone within the Northland Allochthon (as illustrated in **Error! Reference source not found.**). Displaced Ruatangata Sandstone comprises initially autochthonous Te Kuiti Group rock that has been displaced with the Northland Allochthon during its emplacement into Northland. The Ruatangata Sandstone is described as a greenish grey to dark green, calcareous, glauconitic muddy fined grained to medium grained sandstone with minor conglomerate.

The site is located in proximity to one of several thrust fault contacts that separate the Northland Allochthon mélange (a heavily sheared mixture of lithologies) to the west from the displaced Ruatangata Sandstone. The Whangai Formation of the Northland Allochthon is mapped to the north west of the site, primarily on the north side of the Morningside Road ridgeline. Holocene river deposits, associated with Limeburners Creek, are mapped to the south of the site.

The 1:25,000 GNS Whangarei Urban Area Geological Map (White and Perrin, 2003[2]) also maps the site area. While the geological boundaries presented on the 1:25,000 geological map are very similar, the site is mapped as Omahuta Sandstone of the Northland Allochthon, Motatau Complex (see **Error! Reference source not found.**). Omahuta sandstone is described as a calcareous glauconitic sandstone and interbedded sandstone and mudstone with minor conglomerate. According to Hayward, 2017[3] there is evidence that the initial deposition of the Ruatangata Sandstone and Omahuta Sandstone was geo-contemporaneous, with the deep water Omahuta Sandstone being fed by turbidity currents from the shallower shelf deposited Te Kuiti Group. Accordingly, the units can be expected to appear similar in composition.

An earlier unpublished Engineering Geological Map of Whangarei (Brown 1975) had mapped the site as Ruatangata Sandstone (See **Error! Reference source not found.**). Of note is that Brown mapped the boundary between the site's geology and the "Onerahi Chaos" (what would now be classified as Northland Allochthon Mélange) as immediately to the west of the site, down the gully between the subject site and the Semenoff site / Manuka Place to the west.

[1] Edbrooke, S.W.; Brook, F.J. (compilers) 2009 "Geology of the Whangarei area. Institute of Geological & Nuclear Sciences 1:250,000 geological map 2" Lower Hutt, New Zealand. GNS Science.
[2] White, P.J.; Perrin, N.D. 2003 "Geology of the Whangarei urban area. Scale 1:25,000. Institute of Geological & Nuclear Sciences geological map 26" Lower Hutt, New Zealand. Institute of Geological & Nuclear Sciences Limited.
[3] Hayward, B. 2017 "Out of the ocean, into the fire" Lower Hutt, New Zealand. Geoscience Society of New Zealand.

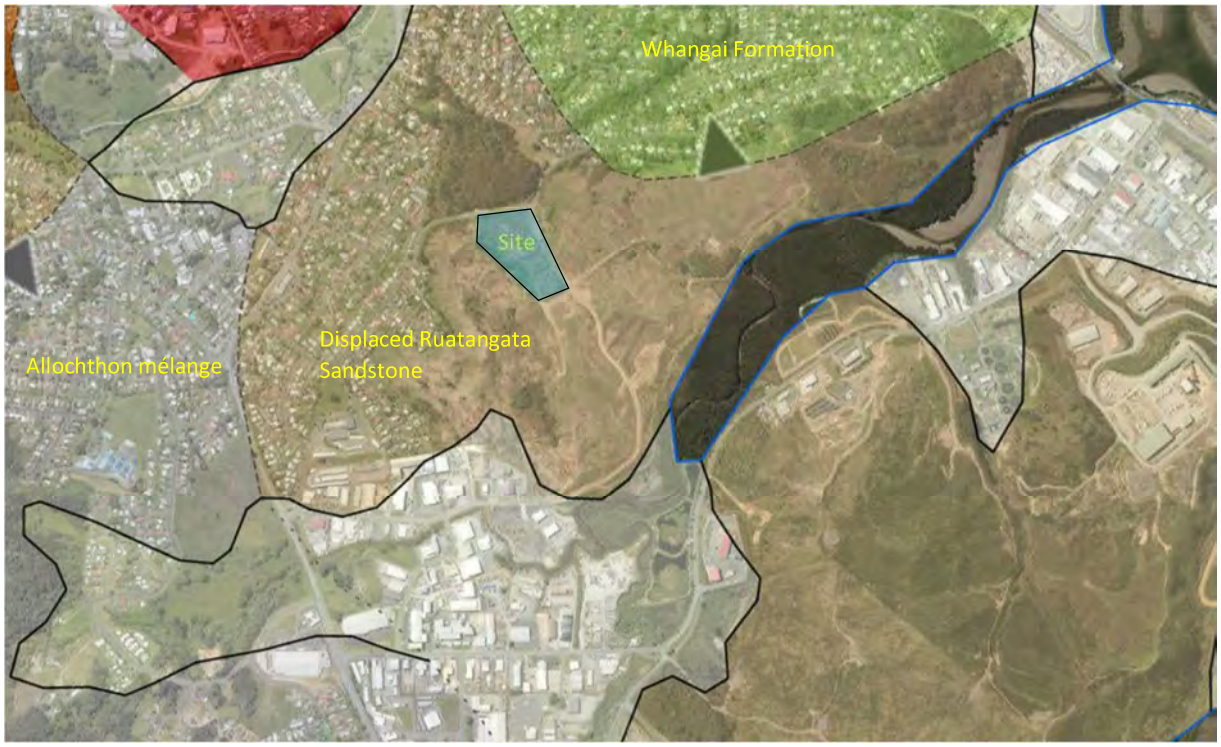


Figure 3-1: Published geological map illustrating the site and the underlying geological units (GNS Science New Zealand Geology Web Map).

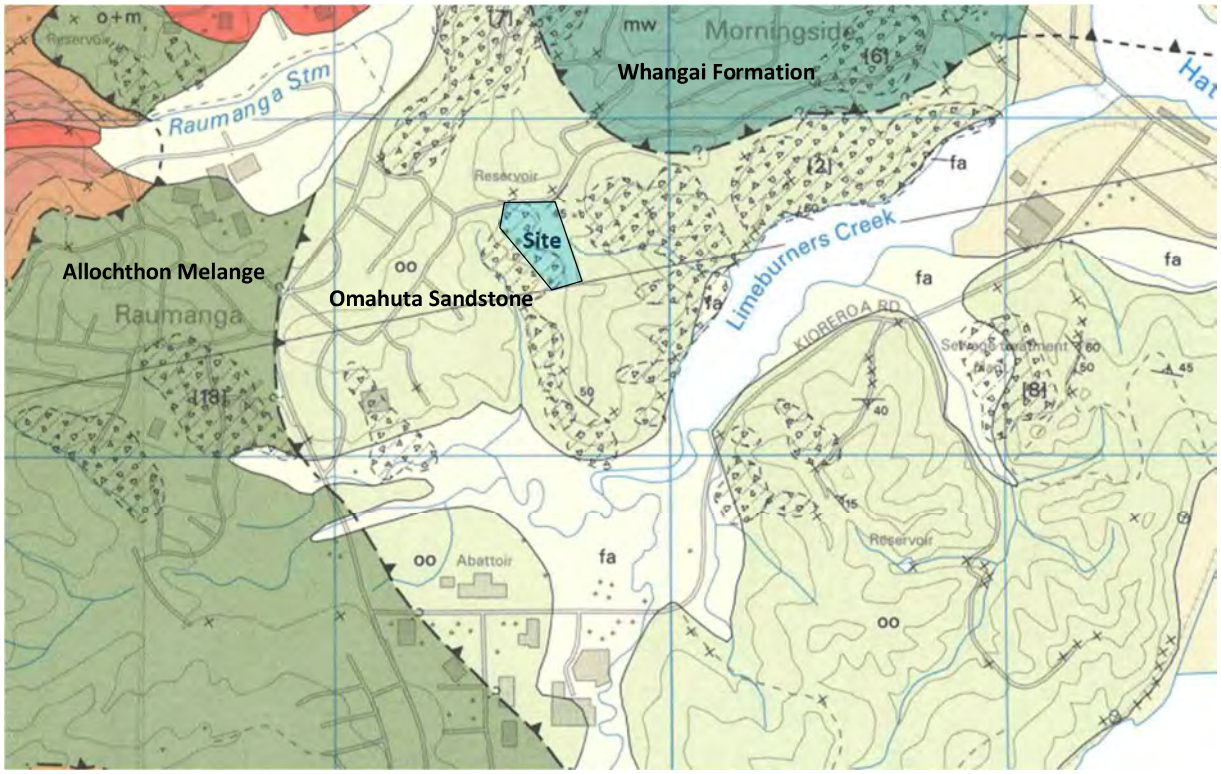


Figure 3-2: White & Perrin 2003 1:25,000 Whangarei Urban Area Geological Map


Figure 3-3: Brown 1975 1:20,000 Whangarei City Engineering Geology Map

# 4. Site Walkover Observations

A walkover of the site was carried out on 22 July 2020 by a Senior Geotechnical Engineer from Initia Limited, and a Senior Engineering Geologist from Baseline Geotechnical. This site walkover was carried out following two significant rainfall events as follows:

- On the 15th July 2020 - 81mm of rainfall was measured at the Northland Regional Council (NRC) Water St rain gauge in central Whangarei over about a 15 hr period.
- On the 17th July / morning of the 18th July 2020 – about 210 mm of rainfall was measured at the NRC Water St rain gauge in central Whangarei over about a 24 hr period, with peak intensity up to about 50mm/hr. (This was reported by media as a "1 in 500 year" rainfall event, however we have not confirmed this, or the event duration this annual exceedance probability relates to).

The site walkover included all four stages of the Kotata Development. Relevant observations made in the Stages 3 and 4 areas are discussed in the Initia Stage 3 and 4 report (dated 24 July 2020)

The observations made in the Stage 2 area of the development were consistent with the site description and site history described above. Notable observations are discussed below:

- Some of the timber piles for the palisade wall constructed in 2017 were visible in the Northern Stage 2 area. During the site walkover, the ground immediately below the palisade wall was waterlogged, with surface water from the development above appearing to be discharged onto the slope. A tension crack, approximately 10-20 mm wide, with no apparent vertical offset was observed in this area. The GPS surveyed extents of this tension crack are shown on Drawings 822-S2-004 (Appendix A).
- No surface cracking or notable signs of active instability were observed on the Southern Stage 2 slopes; however, it was noted that surface water discharge did appear to be occurring onto the slope from stormwater outlets that service the lots and roads within Stage 2 (see **Error! Reference source not found.** below).
- The lower parts of the Stage 2 slopes are visible from the Semenoff property to the west. These were observed on a separate site walkover on the 5th May 2020. The lower parts of the slopes lead down to an undeveloped platform/yard area on the neighbouring Semenoff property. These areas are relatively gently sloping and appear waterlogged and "hummocky"; however, it is not clear if these areas have been subject to historic earthworks (i.e. the hummocky appearance may in part be due to earthworks).

Figure 4-1: Northern Stage 2 Looking South.  Arrow shows approximate Tension Crack Location

Figure 4-2: Southern Stage 2 Looking North.

Figure 4-3: Southern Stage 2 Lower Slopes Looking East from Semenoff Site.

Figure 4-4: Stormwater Outlet on Slope Below Southern Stage 2

# 5. Geomorphology / Aerial Photography

As discussed above, much of the site has been earthworked which has obscured the pre-existing geomorphology. Accordingly, for the geomorphological assessment we have primarily relied on the WDC 2m contours and historic aerial photography. We note that a pre-development survey of the site was not undertaken.

We have reviewed aerial photography available from Retrolens (1982) and the Linz data service "Northland 0.75m Rural Aerial Photos" and the "Northland 0.1 m Urban Aerial Photos" flown in the summer of 2014/2015. Additionally, Google Earth satellite imagery between 2002 and 2020 has been reviewed. A stereo pair of 1982 photos have also been reviewed as part of this assessment.

The following observations are made:

- The 1982, 1999 and 2004 aerial photographs provide a guide to the pre-development geomorphology, with the wider area clearly the subject of significant historical slope instability (Drawing 822-S2-004, Appendix A).
- The two arcuate features on the western slopes show evidence of shallow instability with notably "hummocky" ground apparent.
- Eastern slopes within Stage 2 exhibit well-defined terracettes, interpreted to be the result of shallow instability.
- The September 2016 Google Earth satellite imagery (Figure 5-1) shows a failure within the northern most arcuate feature (to the southwest of Lots 12 to 16). The failure is discussed in Section 2.5 above. During this time, there also appears to be a re-activation of instability within the southern arcuate feature.


Figure 5-1: September 2016 Google Earth Image (Maxar Technologies)

The pre-development geomorphological features are marked on Figure 822-S2-005 in Appendix A and have also been overlaid onto the 1982 photo in Figure 822-S2-004. An assessment of the potential for deep seated instability associated with these features is discussed in Section 10 below.

In addition to the available aerial photography, White and Perrin (2003) mapped instability around the site on the 1:25,000 Whangarei Urban Area map (see **Error! Reference source not found.** above, hatched areas indicate mapped instability). White and Perrin have mapped instability within the arcuate features on the western slopes, consistent with our review of the historic aerial review above, and more extensive areas on the eastern side of the ridgeline.

# 6. Ground Investigations

## 6.1 Geotechnical Investigations by others

Several sources of historic geotechnical investigations in the vicinity of the site have been made available to us and have been referenced as part of this study. These are summarised below. Machine borehole locations are presented on Drawings 822-S2-001 to 822-S2-005 in Appendix A (other investigations made available to us are not shown, including hand augers, test pits and CPTs as they provide limited information of relevance to deep-seated instability risks).

***Cook Costello (2006)***

In 2006, Cook Costello carried out an investigation of a block of land that includes the current Stage 2 at Kotata, the Semenoff site to the west, and across the ridgeline to the east (including Stage 1 and Stage 1B). The purpose of the investigation was to support a rezoning application. The investigation included 27 No. test pits, 31 No. hand augers, and 5 No. machine boreholes to between 11 m and 24 m depth. The nearest borehole (CCMBH4) is located approximately 140 m to the southwest of the Stage 2 (at the base of the slope).

***Riley (2008)***

The 2008 Riley investigation was carried out on a block of land predominantly to the east of Kotata Stage 2 and included the Stage 1 area. The block of land investigated by Riley adjoins the block of land investigated by Cook Costello to the west. The purpose of the Riley investigation was also to support a rezoning application. The Riley investigation included 8 No. test pits, 15 No. hand auger boreholes and 3 No. machine boreholes – to depths of 15 m. The machine boreholes were located to the east of the Kotata Stage 2 area and are of limited value for specific assessment (other than to aid understanding in developing an overall geological model of the site).

***Richardson Stevens (2010)***

Richardson Stevens carried out an investigation in late 2010 across the Kotata site comprising 24 No. test pits and 1 No. hand auger. This investigation was to supplement the Cook Costello and Riley investigations and was to support development of the Kotata subdivision. One borehole (RSMBH9) was located within the northernmost arcuate feature on the western slopes, immediately to the south west of Lots 13/14. It appears this borehole was drilled following bulk earthworks but prior to regrading of the area undertaken to mitigate the effects of the slope instability discussed in Section 2.5.

***Opus (2014)***

Opus carried out an investigation of a landslip on High St to the west of Stage 2 in 2014. The investigations included 3 No. CPTs and 1 No. machine borehole to 12 m depth.

***Richardson Stevens (2017)***

Richardson Stevens/RS Eng carried out additional investigations in 2016 as part of the Stage 2 subdivision suitability report. These included 12 test pits and reference to a machine augered borehole (RSMBH9), located within the northern arcuate feature immediately to the south west of Lots 13/14.

***Northland Geotechnical Specialists (2019)***

Northland Geotechnical Specialists carried out an investigation on the Semenoff site to the west of Kotata in 2019; we understand this was to investigate land instability that had occurred at the site. This investigation included 10 No. test pits, 10 No. CPTs and 5 No. boreholes. The boreholes extended to depths of up to 25.5 m.

*Tonkin & Taylor (2020)*

Tonkin & Taylor carried out an investigation in 2020, also on the Semenoff site, and on Manuka Place to further assess the land instability that occurred on the Semenoff site. This investigation comprised 3 No. machine boreholes (as well as adjacent wash drilled boreholes for instrumentation installation). The boreholes were drilled to depths of between 20 m and 30 m.

## 6.2 Initia Geotechnical Investigations

### 6.2.1 General

Following the geotechnical investigation campaign for Stages 3 and 4 of the development, Initia carried out subsurface investigations within Stages 1 and 2 during June and July 2020, comprising 9 No. machine boreholes (5 No. specific to Stage 2). The boreholes were advanced with HQ or PQ triple tube techniques under the supervision of Initia Engineering Geologists. The recovered core was generally logged in accordance with NZGS guidelines[4]. In situ testing (such as SPTs) was not carried out to provide continuity of core.

The boreholes drilled (including Stages 1, 3 and 4) are summarised in Table 1 below. Test pits carried out as part of the Stages 3 and 4 investigation are summarised in Table 2 below. Geotechnical logs of borehole core and trial pits are included in Appendix B.

Table 1: Initia 2020 Machine Drilled Borehole Summary

| Kotata Stage | Reference | Easting (mE, Mt Eden 2000) | Northing (mN, Mt Eden 2000) | Ground surface elevation (mRL, NZVD 2016) | Termination depth (mBGL) | Standpipe Piezometer Screen Depth (mbgl) | |
|---|---|---|---|---|---|---|---|
| | | | | | | From | To |
| 2 | MBH19 | 359347 | 926134 | 61.6 | 30.0 | N/A[1] | N/A[1] |
| | MBH20 | 359402 | 926079 | 61.7 | 30.0 | 8.5 | 12.5 |
| | | | | | | 15.5 | 19.5 |
| | MBH31 | 359369 | 926056 | 49.9 | 22.3 | N/A[1] | N/A[1] |
| | MBH33 | 359345 | 926151 | 61.4 | 22.5 | 5.8 | 8.8 |
| | MBH34 | 359412 | 926003 | 52.5 | 24.0 | N/A[1] | N/A[1] |
| 1 | MBH21 | 359447 | 926232 | 69.7 | 30.0 | 14.5 | 18.5 |
| | MBH22 | 359543 | 926228 | 51.5 | 30.0 | N/A[1] | N/A[1] |
| | MBH30 | 359494 | 926250 | 60.9 | 22.5 | N/A[1] | N/A[1] |
| | MBH32 | 359498.7 | 926104 | 57.1 | 22.5 | N/A[1] | N/A[1] |
| 3 | MBH13 | 359426 | 925923 | 55.4 | 30.0 | 12 | 15 |
| | | | | | | 17.5 | 21.5 |
| | MBH14 | 359476 | 925707 | 56.5 | 30.0 | 7.5 | 10 |
| | MBH15 | 359583 | 925822 | 38.6 | 30.0 | 14.5 | 18.5 |
| | MBH17 | 359432 | 925930 | 55.1 | 21 | 3.5 | 6.5 |
| | MBH18 | 359436 | 925920 | 55.2 | 25 | N/A | N/A |
| | MBH23 | 389396 | 925925 | 55.5 | 30 | N/A | N/A |
| 4 | MBH16 | 359719 | 925804 | 22.7 | 30 | 16.5 | 22.5 |

[4] It is noted that the guidelines provide limited direction in logging some aspects of the allochthonous materials encountered at Kotata.

1. Inclinometer installed in MBH19 and MBH22, MBH30, MBH31, MBH32 and MBH34.

Table 2: Initia 2020 Test Pit Summary

| Kotata Stage | Reference | Easting (mE, Mt Eden 2000) | Northing (mN, Mt Eden 2000) | Ground surface elevation (mRL, NZVD 2016) | Termination depth (mBGL) |
|---|---|---|---|---|---|
| Stage 3 | TP1 | 359478 | 925948 | 53.5 | 1.5 |
| | TP2 | 359503 | 925813 | 55.2 | 2.1 |
| Stage 4 | TP3 | 359592 | 925979 | 46.0 | 1.8 |

### 6.2.2 Standpipe Piezometers

Single 32mm diameter standpipe piezometers, and pairs of piezometers – comprising 25mm diameter and 32 mm diameter standpipes - were installed in selected boreholes as outlined in Table 1. Screened intervals were backfilled with gravel (K2 gravel) with bentonite pellets used as a seal above and below. Standpipe piezometers have been monitored manually periodically since installation and down hole level-loggers have recently been installed. Manual monitoring results are presented in Table 4 below. We note that readings taken shortly after installation may not have reached equilibrium as the piezometers were not purged immediately after construction.

Table 3: Piezometer monitoring results

| Kotata Stage | Piezometer | Date of reading | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 12-Jun | 25-Jun | 1-Jul | 2-Jul | 6-Jul | 8-Jul | 14-Jul |
| 2 | MBH19 | | 4.1 | 3.9 | | | 3.7 | |
| | MBH20 (shallow) | | 0.5 | 0.5 | | | 1.8 | |
| | MBH20 (deep) | | 3.5 | 3.4 | | | 3.8 | |
| 1 | MBH21 | | 0.0 | 0.1 | 0.2 | 0.3 | 0.3 | |
| 3 | MBH10 | 3.1 | 3.1 | 3.2 | | | 3.3 | |
| | MBH11 | 4.2 | 3.8 | 3.6 | | | 3.6 | |
| | MBH13 (shallow) | 0.8 | 0.5 | 0.0 | | 0.5 | 0.3 | 0.2 |
| | MBH13 (deep) | | | | | | | 1.1 |
| | MBH14 | | 0.4 | 0.7 | | 1.5 | 1.0 | |
| | MBH15 | | 2.5 | 3.1 | 3.2 | 3.3 | 3.4 | |
| | MBH17 | 3.5 | 3.1 | 3.5 | | | 3.5 | |
| 4 | MBH12 | | | 8.6 | | | 6.0 | |
| | MBH16 | 9.5 | 9.2 | 9.2 | 9.2 | 9.4 | 9.3 | |

### 6.2.3 Borehole Inclinometers

Inclinometers comprising grouted 70 mm PVC casing were installed in boreholes MBH19, 31 and 34 (and MBH22, 30 and 32 Stages 1 and 1B). To date, three rounds of monitoring/survey have been undertaken (including a baseline reading) between mid-July and mid-August 2020, with baselining of

MBH31 and 34 occurring in early October 2020. Further monitoring is scheduled and will be issued as an addendum to this report. The results to date are included in Appendix D. With respect to Stage 2, the results have not identified significant or notable movement over the short monitoring period.

### 6.2.4 Downhole Geophysical Scanning

Downhole geophysical scanning was undertaken in most boreholes using an Acoustic Televiewer (ATV) by ScanTec. Scanning was undertaken to the full depth of boreholes MBH13-16, 19 ,20 ,22 and 23. The results of the ATV scanning relevant to Stage 2, (being MBH19 and 20) are presented in Appendix C and stereographic projections of the data are included in Appendix F.

### 6.2.5 Laboratory Testing

Laboratory strength testing was carried out on selected samples of Mudstone Mélange recovered from borehole core. A total of 3 No. multistage direct shear and 3 No. multistage consolidated undrained triaxial tests were performed on the mélange. These tests are summarised in Table 4 below and are presented in Appendix E. The direct shear tests were carried out on inferred weak defects within the mudstone or at the mudstone / sandstone interface. The triaxial tests were carried out on undisturbed mudstone core and were intended to test the "mass" strength of the mudstone (i.e. not the strength of specific weak surfaces). However, all three triaxial tests appeared to fail partially or wholly on previously unidentified weak surfaces within the samples. This is discussed further in Section 8 below.

Table 4: Laboratory Testing Summary

| BH Reference | Depth | Test type[1] | Stress Stages (kPa) | Effective cohesion, c′ (kPa) | Effective friction angle, Φ′ (°) |
|---|---|---|---|---|---|
| MBH13 | 11.2 | DS | 100, 200, 400 | 83 | 14.5 |
| MBH17 | 8.7 | DS | 80,160,320 | 24 | 9.5 |
| MBH17 | 9.3 | DS | 80,160,320 | 38 | 21 |
| MBH13 | 12.3 | CUP | 100,200,400 | 5 | 15 |
| MBH17 | 11.6 | CUP | 75, 150, 300 | 8 | 12 |
| MBH20 | 8.1 | CUP | 75, 150, 300 | 12 | 18 |

Note 1: DS = Direct Shear, CUP = Consolidated Undrained Triaxial

# 7. Geological Model

## 7.1 General

A geological model has been developed for the site to aid in addressing the risk of deep-seated instability. Accordingly, the model developed is primarily focussed on rock mass and defect properties; this model is presented below. A discussion of previous geological models for the site developed by others is presented in Section 9 below.

## 7.2 Lithology

As discussed in Section 3 above, the 1:250,000 published geological map indicates the site is underlain by Allochthonous/Displaced Ruatangata Sandstone within the Northland Allochthon. The geotechnical investigation results are considered to be broadly consistent with the published mapping, in that Allochthonous Ruatangata Sandstone was found in all investigation locations.

For the purposes of the geological model, the Allochthonous Ruatangata Sandstone encountered has been subdivided into the following material types, based on the degree of disturbance associated with rafting within the Allochthon:

- Glauconitic Sandstone, occasionally interbedded with lighter grey Siltstone.
- Glauconitic Sandstone intercalated with green/brown Siltstone.

Highly disturbed / sheared mudstone (inferred to be Northland Allochthon Mélange) was also encountered within boreholes in Stage 2.

The individual units are discussed in more detail in the sections below.

### 7.2.1 Glauconitic Sandstone

The glauconitic sandstone unit is typically weak, fine to medium grained, greenish grey and is occasionally interbedded with thin siltstone beds. Sandstone beds with significant thickness in Stage 2 were generally encountered at depth in MBH19 and MB20 (below 15 m depth).

The unit has occasional defects, which are typically steeply dipping and rough, occasionally with a polished veneer. Additionally, re-healed defects were commonly present throughout the sandstone. No instances of significant shear zones or planar smooth low angle defects were identified in this sandstone unit of the type that would be considered indicative of potentially persistent defect-controlled failure surfaces.

In contrast to Stages 3 and 4, the sandstone was significantly more closely interbedded with the intercalated sandstone/mudstone unit described below (Section 6.3) and less dominant overall.


Figure 7-1: Typical glauconitic sandstone core (MBH20 - approx. 22.5 mBGL, note minor lignite)

### 7.2.2 Glauconitic Sandstone intercalated with green/brown Siltstone

The intercalated glauconitic sandstone unit comprises glauconitic sandstone as described above with typically brown siltstone lenses and clasts. The contacts between the sandstone and siltstone, as well as within the siltstone unit itself, appear to have a predominant inclination and orientation (fabric), however this is not consistent, and the contacts are often curved even at the scale of the core, often healed and discontinuous. Defects are more common in the intercalated sandstone than the sandstone unit described above and shearing (i.e. polishing or slickensides) on defects is also more common. The defects are typically steeply dipping and rough/stepped even where sheared, however a polished clay veneer, or non-persistent polishing of the joint faces was often observed.

The intercalated unit has been exposed downslope of the Stage 2 area (in a Stage 4C/4D cutting and in test pits TP1 and TP3 carried out within the north of Stages 3 and 4). Within these exposures the unit appears relatively "blocky" with apparently discontinuous defects and highly deformed siltstone intercalations.

Within the Stage 2 area this unit was generally weaker and more heavily sheared in proximity to beds of the Mudstone Mélange (described below in Section 7.2.3).

### 7.2.3 Mudstone Mélange

The Mudstone Mélange encountered within borehole core in Stage 2 is typically extremely weak (sometimes approaching soil strength) with a highly disturbed and frequently pervasively sheared fabric. Mudstone Mélange was identified in significant thickness in MBH20, below the residually weathered material (from approximately 6 m below ground level) to a depth of approximately 13 m. Mudstone was also encountered in MBH33 below the residually weathered soils (from approximately 6 m depth to an end depth of 7.8 m) and in limited thickness in MBH19 (a 300 mm thick bed at approximately 7.5 m depth).

Typically, the mudstone exhibits a "shear fabric", with frequent fabric parallel polished / slickensided defects. The fabric parallel shear surfaces within the mudstone, generally had a dip magnitude of approximately 30° from horizontal. Within borehole MBH20, broken/crushed zones were identified within the mudstone.

Figure 7-2: Typical Extremely Weak Mudstone Mélange within MBH20 – approx. 7 mBGL, with fabric (left) defect surface (right).

Laboratory testing of the Mudstone Mélange (from MBH20 and boreholes within Stage 3) comprised direct shear and triaxial testing as summarised in Section 6.2.5 above. Figure 7-3 below presents a plot of normal and shear stress results along the specimen failure surfaces. Note that the normal and shear stress results for the CUP Triaxial Tests have been estimated based on the approximate measured failure surface inclination and its corresponding Mohr's Circle position.

The direct shear tests on MBH13 at 11.2 m and MBH17 at 9.3 m show significant cohesion likely associated with failure plane roughness. However, all of the triaxial tests, as well the direct shear test on MBH17 at 8.7 m (other than the high first stage result), are inferred to have failed along relatively smooth defects given the low cohesion and friction. The red dashed line is an assessed lower bound fit to this data, which is considered a reasonable reflection of the residual shear strength of defects within the Mudstone.

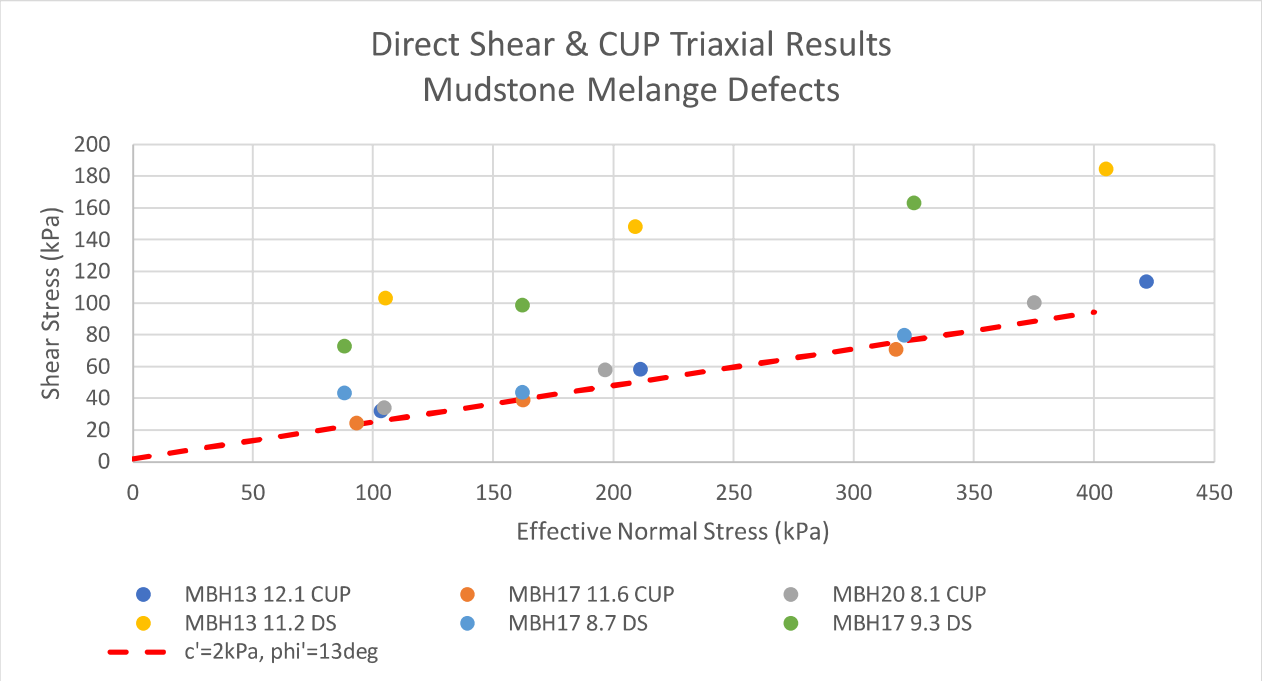


Figure 7-3: Mudstone Mélange shear strength testing

### 7.2.4 Comparison with adjacent sites

We note that the underlying conditions within the Semenoff site landslip area, as identified by the T+T and NGS boreholes. appear to be significantly more mudstone dominant (as opposed to the glauconitic sandstone) and suggests that the mudstone becomes more prevalent to the west. This is considered generally consistent with the geomorphology and published geology of the wider area and our observations made over the entirety of the Kotata Rise site.

The topography of the area to the west of site, where the Semenoff site is located and that which was mapped by Brown (1975) as Onerahi Chaos, has a more muted pre-development topography, with relatively low slope angles typical of Mélange topography. As the mélange boundary is mapped to the west of the site, more Mélange and less intact Ruatangata Sandstone could be expected in closer proximity to this boundary, given the mode of emplacement of the Ruatangata Sandstone.

## 7.3 Geological Structure

Structure parallel defect measurements recorded by the Acoustic Televiewer (ATV) survey within MBH19 and 20 are limited and the results were difficult to correlate against the borehole core in some locations, primarily due to the typically highly intercalated and sheared nature of the materials encountered. Within MBH19 the relatively low angle ATV measurements have been inferred as fabric parallel, with stereonet plots indicating average dip and dip direction in the order of 30°-60°/260°-350°(northwest). The results from MBH20 similarly include the strongest cluster of structural orientations averaging 40°/290°. The defect data is presented on stereonet net plots in Appendix F. We note that the ATV data also indicates that there is a concentration of steeply dipping defects orientated to the south-southwest. Based on correlation with the borehole core, we have inferred these as being representative of joints and not parallel to the shear fabric.

While a range of structural orientations are recorded in the ATV data, the difficulty in picking up defects with the downhole tool may mask or reduce the pole concentrations around the predominant shear fabric. This is particularly apparent within the mudstone lithology, where few defects were recorded.

In addition to the ATV data, we have considered geological and structural information from the northern extent of Stage 3. In this area the upper surface of a Mudstone Mélange unit was encountered in MBH13, 17 and 18, located to the southwest of the Southern Stage 2 arcuate feature.

Structural contours were developed for the upper surface of the mudstone unit in MBH13, 17 and 18 to assess the unit's overall orientation. These structural contours indicate a dip and dip direction of approximately 30° - 35° towards 305° (northwest). This orientation is generally consistent with ATV structural orientations from MBH20 and 23, despite some evidence of a wider distribution in this data.

Additionally, geological structure observed in cuts at the foot of the western slopes on the Semenoff site were measured adjacent to the Stage 2/Stage 3 boundary. These were measured as dipping at about 30-40 degrees to 300 and 350 degrees respectively (north west to north); consistent with this inferred structural orientation.

In addition, the site geomorphology appears to be consistent with this orientation. The southern flank of the southernmost arcuate feature in Stage 2 has a trend of approximately 040° (northeast), with a slope plunging towards about 310°. Additionally, the Titiro Street (central) spur also appears to be aligned along this trend i.e. in a south west to north east direction.

## 7.4 Summary of Geological Model

A key part of the overall geological model is the location and orientation of the thick, continuous mudstone units. Given the overall deformation of the various lithologies the sandstone and intercalated sandstone/mudstone units cannot be correlated between borehole locations with a high degree of confidence.

Mudstone mélange was encountered in MBH19, MBH20, MBH33 and MBH34 in the Stage 2 area. Mudstone was absent from MBH31 which is located at a lower elevation to the other boreholes within the centre of the southernmost arcuate feature in Stage 2.

In addition, mudstone was encountered in the northwest of Stage 3 (boreholes MBH13, MBH17, MBH18 and MBH23). When considering the structural orientations developed based on MBH13, MBH17 and MBH18 (discussed in Section 6.3), that overall structural trend allows for an 'along strike' correlation between mudstone logged in MBH23 and that logged in MBH20.

The lack of mudstone in MBH31 is considered to be due to the large scale historical failure in this area (the southern accurate feature). The failure appears structurally controlled and may have developed by progressive instability of locally weaker materials retrogressing eastward (whereby the Mudstone Mélange is inferred to have acted as a side release and basal surface on the southern side of the feature). The extent of the instability appears to have been constrained by more competent sandstone blocks to the north and south resulting in the arcuate nature of the feature. The failure appears to have displaced any mudstone from MBH31 as debris evacuated over time from the failure path.

Overall, for the larger part of the western slopes of Stage 2, we have interpreted a series of thick beds or persistent lenses of mudstone dipping at 30-40° towards the northwest. Geological cross sections that illustrate our interpreted geological model for Stage 2 are presented in Drawings 822-S2-101 to 103 in Appendix A.

# 8. Geotechnical Material Properties

For the purpose of future quantitative slope stability analysis, suggested material properties for the geological units are presented in Table 5 below. Strength parameters for defect parallel failures in the mudstone are based on the laboratory test results presented in Figure 7-3 above as well as based on experience in similar materials on other projects. Rock mass strength in the mudstone is based on experience from other projects. Rock mass strength properties for the glauconitic sandstone and intercalated sandstone/siltstone units have been derived based on Hoek-Brown failure criteria. Assessed GSI ranges are shown on

Figure 8-1 below.

Table 5: Adopted Material Properties

| Material Property | Glauconitic Sandstone | Intercalated Sandstone/ Siltstone | Mudstone Mélange Rock Mass | Mudstone Mélange Defect Parallel |
|---|---|---|---|---|
| **Unit weight** | 22 | 22 | 20 | - |
| **Effective friction angle (°)** | 35 | 25 | 20 | 13 |
| **Effective cohesion (kPa)** | 80 | 40 | 20 | 2 |
| **UCS (MPa)** | 3 | 1.5 | - | - |
| **GSI** | 40 | 30 | - | - |
| **mi** | 12 | 10 | - | - |

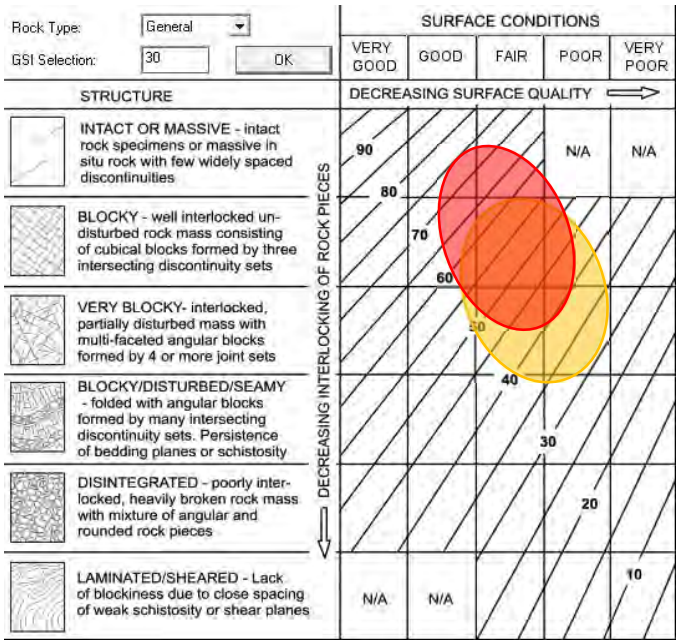


Figure 8-1: Assessed GSI for Allochthonous Ruatangata Sandstone (Red is Sandstone, Orange is intercalated Sandstone / Siltstone)

# 9. Previous Engineering Geological Models and Stability Assessments

## 9.1 Previous Engineering Geological and Geotechnical Models

Previous engineering geological assessments including the Stage 2 area of the site have been reported by Cook Costello, 2006 (Referenced Document 1) and within the RS Eng 2016 suitability report (Referenced Document 6).

The analysed models developed by Cook Costello generally comprised soils overlying the Omahuta Sandstone rock mass with a weak zone at the transition between soil and rock. No deep-seated failure mechanisms within the rock mass appeared to be included in the Cook Costello geotechnical model. The RS Eng models appear to be conceptually similar and present analyses that incorporate a mode of failure at the soil/rock interface.

## 9.2 Previous Slope Stability Assessments and Analysis

Slope stability assessments of the Stage 2 western slopes have previously been carried out by RS Eng as presented in the 2016 report. The analysis was carried out prior to the 2016 slope failure and subsequent remedial works, which include the soldier pile wall and re-grading of the slope. Within the southern arcuate feature, RS Eng analyses indicate that to achieve an acceptable Factor of Safety (FoS – defined by RS Eng as >1.3 during extreme groundwater conditions) groundwater level should not be allowed to rise within 3.5 m of ground surface levels.

The geotechnical model prepared for the site by Richardson Stevens/RS Eng did not specifically address the occurrence of, or slope instability risks associated with, the sheared mudstone within the rock mass (as defined in this report). On this basis specific slope stability analyses were not undertaken for a deep-seated failure mechanism with a basal shear surface within the thicker beds of pervasively sheared mudstone that exist beneath parts of Stage 2.

# 10. Deep Seated Slope Instability Assessment

## 10.1 General

A qualitative assessment of deep-seated slope instability for Stage 2 has been carried out based on the site geomorphology and geotechnical investigation results. Stage 2 has been divided into three distinct geomorphological regions and these are discussed respectively below.

## 10.2 Southern Stage 2

As discussed in Section 7, our interpretation of the geology within the Southern Stage 2 area infers a series of typically north-westerly dipping alternating Mudstone Mélange and intercalated sandstone/mudstone beds/units.

Due to historic instability and regression, the overall slope angle has been reduced to approximately 12° (for western slopes) and appears to have reached an equilibrium geometry. While the geomorphology does suggest that shallow slope movement processes are ongoing, the geometry of the slope and dominant structural orientation is such that we do not consider the area to be at significant risk of further large scale deep-seated instability episodes.

However, where the ground conditions are locally adverse, such as in locations where unfavourably oriented Mudstone Mélange is present, there is considered to be a risk of local instability affecting house sites. This is inferred to be the case in the vicinity of MBH20 as shown on Drawing 822-S2-102 in Appendix A, where thick mudstone is present immediately below the soil/rock interface which may allow failure westwards on a flat or gently west plunging apparent dip.

## 10.3 Northern Stage 2

Based on the subsurface investigations and geomorphological interpretation, we have not identified evidence to suggest that the large northern arcuate feature (i.e. the feature that is bounded by Kotata Rise and High St) has been developed by or is subject to deep-seated instability. This is primarily due to the lack of deep sheared surfaces within MBH19 and MB33 which have been drilled in the centre of this apparent feature. Further, the overall geomorphology suggests a constrained southwest direction of movement, while structure is interpreted to be northwest dipping.

However, localised parts of the lower slopes are clearly more active based on pre-construction aerial photography and underlying mudstone in these areas may present a more complex failure mechanism.

The failure that occurred within the formerly extended fill area and the development of recent tension cracking described in Section 2.6 within the lower slopes is considered to present an ongoing risk of slope failure. The failure mechanism in this area was inferred by RS Eng to be a failure at the soil / rock interface (inferred by RS Eng to be about 2.5m below finished level at the wall location), and the soldier pile wall designed by RS Eng was intended to address this slip.

Based on the inferred depth of sheared mudstone in this area (in the order of 6 m depth), it is possible that the instability was controlled by the underlying mudstone unit rather than a shallower failure surface as inferred by RS Eng. The unloading that was undertaken as part of the remedial works may have stabilized the failure, but if this alternative instability mechanism exists, then the solider pile wall would not be embedded sufficiently deeply to address the long-term instability risk. In this case, the western most lots in this area are likely to have a level of stability below that commonly accepted, despite their performance over the last 4-5 years. Lots 14 and 15 are yet to be developed in this area. Based on our findings, we consider that the potential risks relating to a deeper failure mechanism would need to be addressed as part of the development of these lots. This is expected to take the form of a deeper, in ground palisade wall near the crest of slope.

## 10.4 Eastern Slope Stability

As reported in our Southern Stage 1 letter report (dated 24 September) the slopes on the eastern side of Kotata Rise that may affect the Stage 2 development have been extensively modified by earthworks including cutting the head of the (former) gully by approximately 6 m and filling of the lower part of the gully. This has reduced the overall slope angles from about 15° to 20° (original slope based on WDC 2 m contours) to slope angles in the order of 11°.

Given the improved stability afforded by the earthworks and the nature of the materials encountered within MBH32 (reported in our Southern Stage 1 letter report), we do not consider that the eastern lots (Lots 23 to 30) are subject to an elevated risk of deep-seated instability.

# 11. Discussion and Conclusions

## General

Based on our inferred geological model for the site, the presence of sheared Mudstone Mélange is considered the primary risk factor associated with deep-seated instability.

The distribution of Mudstone Mélange across Stage 2 appears to be structurally controlled (as discussed in Section 7.3) and manifests as a series of predominantly north westerly dipping beds or persistent lenses of mudstone between glauconitic sandstone and intercalated siltstone.

The Mudstone Mélange is considered particularly susceptible to instability due to: a) its low in situ strength owing to its pervasively sheared nature (as demonstrated by the laboratory testing), and b) The prevalence low strength shear surfaces within the unit.

The geomorphology of Stage 2 appears consistent with this geological model, and it is inferred that the arcuate features in the west developed through regression with the Mélange acting as a side release and basal surface for this regression of the western slopes.

## Southern Stage 2

For the southern arcuate feature, it appears that regression has resulted in a landform which has reached a state of pseudo-stability, and this area does not appear be at risk of further large scale, deep-seated instability. However, there is the potential for localised regression to continue where the weaker Mudstone Mélange is present on the upper slopes, particularly if this structure is adversely orientated. This is considered a potential risk at the western extents of Southern Stage 2 where lots abut the edge of the historic instability features. Figure 822-S2-400 in Appendix A identifies lots interpreted to have a potentially elevated risk of deep seated slope instability. Further discussion on specific lots is set out below.

**Lots 20-22 and 31-34** in Southern Stage 2 fall into this category.

The risk of deep-seated instability could be confirmed or discounted on these lots (or areas of lots) by further geotechnical investigation. It is noted that ground conditions in MBH20 (located on Lot 21) are consistent with an elevated risk of deep-seated instability.

Therefore, options for addressing the potential risk at these lots could include:

- Additional geotechnical investigations on a lot specific basis to confirm or otherwise the presence of a potential risk. This would involve borehole drilling to identify the presence and distribution of sheared mudstone underlying the site.
- Ongoing monitoring of the area to determine if movement is occurring. Further monitoring recommendations are presented below.

### Lots 16 to 18

These lots are present on the south-western end of the Titiro Street spur and are provisionally identified as having an elevated risk of deep-seated slope instability. Based on the geomorphology, and inferred geological model, the Titiro Street spur is expected to be underlain by Ruatangata Sandstone or Intercalated Sandstone / Siltstone. The risk may therefore be lower than indicated in this area; however, these lots have been included in the elevated risk category as no investigation has been carried out in proximity to the lots to adequately qualify the risk of instability.

Options for addressing the potential risk at Lots 16 to 18 are the same as for Lots 20-22 and 31-34 above.

### Lots 19, and 23 to 30

These lots are not considered to have an elevated risk of deep-seated instability based on the assessment undertaken. These lots generally are generally sited on the ridge crest or eastern side of the pre-development Kotata ridgeline which has been reduced in elevation by cut earthworks.

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## Northern Stage 2

As discussed in Section 10.3, the wider gully head bounded by Kotata Rise and High Street is unlikely to be associated with a large-scale, deep instability feature. However, active local instability on the lower slopes on the western side of Northern Stage 2 may present an ongoing risk of complex instability including basal shear within the mudstone, despite the mitigation measures undertaken in 2017.

The existing soldier pile wall constructed here may have reduced some of the residual risk for this instability. However, it is possible that the failure actually occurred at a greater depth than that considered by RS Eng and that the unloading (excavation and battering) that was undertaken as part of the remedial works is primarily responsible for stabilising the landslip. If the latter mechanism is correct, there is a potential for slope displacements to occur beneath the wall piles which are only 6 m deep. Therefore, it cannot be definitively demonstrated that these achieve commonly accepted levels of slope stability for development.

### Lots 12 to 15

Based on the depth of mudstone encountered in the boreholes, geomorphology and slope geometry, this risk of instability is expected to be limited to the western most lots, specifically **Lots 12 to 15**, as shown on Figure 822-S2-400. It may be feasible to mitigate this risk by constructing a deeper palisade wall, extending below the failure depth.

Accordingly, options for addressing the risk at Lots 12 to 15 include:

- Installation of a deeper palisade wall as discussed above. This would need to be specifically designed and would likely require additional geotechnical investigations to inform the design. The alignment of the wall would need to be confirmed based on the practicality of construction and design requirements, but could be installed upslope of the existing wall alignment.
- Alternatively or additionally, ongoing monitoring of the slope could be considered. Further monitoring recommendations are presented below.

### Lot 11

Lot 11 has been provisionally identified as having a potential risk of instability on Figure 822-S2-400. While more remote from the 2016 failure and existing soldier pile wall, similar ground conditions are anticipated. The lack of specific slope instability mitigation measures employed during earthworks and the geomorphology of the slope pre-development define this risk. We note that the wider Stage 2 ground investigation data is located some distance from Lot 11 and it is possible that specific targeted future investigation may confirm a lower risk profile than provisionally indicated here.

Accordingly, the options for Lot 11 include:

- Additional geotechnical investigations to confirm or otherwise the presence of a potential risk. This would involve borehole drilling to identify the presence and distribution of sheared mudstone underlying the site.
- Ongoing monitoring of the area to determine if movement is occurring. Further monitoring recommendations are presented below.

### Lots 1 to 10

These lots are not considered to have an elevated risk of deep seated slope instability due to their location away from the unstable feature in the west of Northern Stage 2.

## Other Recommendations

### Stormwater Discharge

As described in Section **Error! Reference source not found.**, stormwater discharge and runoff appear to be occurring over the western slopes below both Northern and Southern Stage 2. It is recommended that stormwater flows be diverted away from the slope / or formalised / piped to the base of (and beyond) the slopes to reduce the risk of instability associated with surface water infiltration. Similarly, it is recommended that all subsoil drainage be conveyed in sealed piles to the base of the slopes.

### Monitoring

As discussed above, medium to long term monitoring of the slopes in the Stage 2 area should be considered as part of a risk monitoring / management strategy for the Stage 2 area for WDC. Monitoring will not reduce the risk of slope instability however it will have the following potential benefits:

- Identification of creep movement. If such movement is identified early, stabilisation measures could be installed before severe damage occurs to properties and infrastructure;
- If movement does occur, an established monitoring programme may aid in the assessment/interpretation of movement and the design of stabilisation measures if required.
- Monitoring will help to determine the actual risk at the site. A record of monitoring, over an extended period without significant movement, will indicate a reduced risk at the site. Monitoring frequencies could also be reduced.

The following monitoring recommendations are made:

- Inclinometers already installed in boreholes MBH19, 31 and 34 should continue to be monitored regularly to provide more information on the performance of the slopes. A monitoring frequency of monthly in the winter and bi-monthly in summer is recommended initially. Monitoring of these inclinometers could be incorporated into a risk monitoring/management system for the slopes.
- Precise survey monitoring should also be considered to supplement the existing inclinometers and allow monitoring over a wider area. Survey monitoring would involve the installation of a number of monitoring pins distributed across the site on suitable and accessible locations (e.g. on concrete kerbs, and footpaths). After baselining the monitoring points, regular, precise survey monitoring would then be undertaken to identify any lateral or vertical movement. A similar monitoring frequency to the inclinometer monitoring could be considered.
- Monitoring may need to extend over a period of years. WDC will need to establish responsibilities for the surveying and monitoring of results.

# 12. Applicability

This report has been prepared for our client, Kotata Developments Limited, with respect to the brief provided to us. The advice and recommendations presented in this report should not be applied to any other project or used in any other context without prior written approval from Initia Limited.

Report prepared by:

pp

Mark Huntley
**Engineering Geologist**

Report reviewed by:

Matthew Wansbone
**Senior Geotechnical Engineer**

**Document control record**

| Report Title | | Kotata Development, Stage 2<br>Geotechnical Investigations and Engineering Geological Review | | | |
|---|---|---|---|---|---|
| Initia Project Reference | | P-000822 | | | |
| Client | | Kotata Developments Limited | | | |
| Revision | Date | Revision detail | Author | Reviewer | Approved by |
| A | 9/10/20 | First Issue | M. Huntley | M. Wansbone,<br>N. Speight | M. Wansbone |
| B | 6/11/20 | Final | M. Huntley | M. Wansbone,<br>N. Speight | M. Wansbone |
| | | | | | |
| | | | | | |
| Current Revision | | B | | | |

## LEGEND

**INITIA INVESTIGATIONS (JUN - JULY 2020)**

- MBH13 — MACHINE BOREHOLE
- TP3 — TEST PIT

**HISTORICAL INVESTIGATIONS**

- MBH11 — MACHINE BOREHOLE (CIVIL GEO - 2020)
- CCMBH4 — MACHINE BOREHOLE (COOK COSTELLO )
- RCMH1 — MACHINE BOREHOLE (RILEY CONSULTANTS)
- RSMBH1 — MACHINE BOREHOLE (RICHARDSON STEVENS)
- TTBH2 — MACHINE BOREHOLE (T+T, FEB 2020)
- NGSBH6 — MACHINE BOREHOLE (NGS, OCT 2019)
- OPUSBH1 — MACHINE BOREHOLE (OPUS, AUG 2014)
- SITE STAGE BOUNDARY
- PROPERTY BOUNDARY
- 10.0 — ORIGINAL GROUND CONTOUR (2m INTERVAL)

NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATE DATUM: MOUNT EDEN 2000
3. LIDAR 2m CONTOUR TAKEN FROM KOORDINATES.
4. PROPOSED STAGE 1 TO 4 PROPERTY BOUNDARY SUPPLIED BY "RS ENG LTD", DATED FEB 2020, REFERENCE "15288 STAGE 1 TO 4 BDYS.DWG"

SCALE A3 1:4000
0 20 40 60 80 100 120 140 160 180 200m

FOR INFORMATION

| Rev | Revision Description | Designed | Drawn | Checked |
|---|---|---|---|---|
| A | FIRST ISSUE (01/10/2020) | MW | JG | MW |

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APPROVED:
DATE:
Scale AS SHOWN Original Size A3

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KOTATA DEVELOPMENTS LIMITED

KOTATA DEVELOPMENT, STAGE 2

GEOTECHNICAL INVESTIGATION
SITE PLAN
(WHANGAREI 2m CONTOURS CIRCA 2000)

Initia Project ref: P000822
Figure Number 822-S2-001
Revision A



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## LEGEND

INITIA INVESTIGATIONS (JUN - JULY 2020)

- MBH13 — MACHINE BOREHOLE
- TP3 — TEST PIT

HISTORICAL INVESTIGATIONS

- MBH11 — MACHINE BOREHOLE (CIVIL GEO - 2020)
- CCMBH4 — MACHINE BOREHOLE (COOK COSTELLO )
- RCMH1 — MACHINE BOREHOLE (RILEY CONSULTANTS)
- TTBH2 — MACHINE BOREHOLE (T+T - FEB 2020)
- NGSBH6 — MACHINE BOREHOLE (NGS - OCT 2019)
- OPUSBH1 — MACHINE BOREHOLE (OPUS - AUG 2014)

- SITE STAGE BOUNDARY
- PROPERTY BOUNDARY
- 10.0 — 2020 GROUND CONTOUR (1m INTERVAL)
- AS-BUILT COUNTERFORT DRAIN (COUNTERFORT DRAIN LOCATIONS ARE APPROXIMATE ONLY AND ARE BASED ON INFORMATION PROVIDED BY KOTATA DEVELOPMENTS LIMITED)

NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATE DATUM: MOUNT EDEN 2000
3. SURVEY TOPO 2020, SUPPLIED BY "RS ENG LTD", REFERENCE "15288 KOTATA GROUND TIN 200218.DWG"
4. PROPOSED STAGE 1 TO 4 PROPERTY BOUNDARY SUPPLIED BY "RS ENG LTD", DATED FEB 2020, REFERENCE "15288 STAGE 1 TO 4 BDYS.DWG"

SCALE A3 1:1,500
0 20 40 60 80m

MAPPED TENSION CRACK (22 JULY 2020)

HIGH STREET

STAGE 1

STAGE 1B

STAGE 2

STAGE 3

STAGE 4

TITIRO STREET

KOTATA RISE

EVERGREEN PLACE

MILLVIEW PLACE

MBH11 MBH13 MBH17 MBH18 MBH19 MBH20 MBH21 MBH22 MBH23 MBH30 MBH31 MBH32 MBH33 MBH34 CCMBH4 RCMH1 RSMBH6 RSMBH7 RSMBH9 TP1

FOR INFORMATION

| Rev | Revision Description | Designed | Drawn | Checked |
|---|---|---|---|---|
| A | FIRST ISSUE (07/10/2020) | MW | JG | MW |

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KOTATA DEVELOPMENTS LIMITED

KOTATA DEVELOPMENT, STAGES 1 AND 2

GEOTECHNICAL INVESTIGATION
SITE PLAN
(TOPO 2020)

Initia Project ref: P000822

Figure Number 822-S2-200

Revision A



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# Appendix E Laboratory Test Results

GEOTECHNICS

Our Ref: 1100448.0000/Rep1
Customer Ref: P-000822
17 July 2020

Initia Ltd
PO Box 47647
Ponsonby
Auckland 1144

Attention: Matt Wansbone

Dear Matt

# Kotata

# Laboratory Test Report

## Customer's Instructions

We were instructed to perform the shear box tests along the bedding / existing shearing plans and CU triaxial tests on the samples selected by the customer.

## Sampling Procedure

Samples have been tested as received from the customer.

## Sample Location Plan

Not applicable.

## Samples

Several core samples were received. All samples were labelled with client's project name, project reference number, machine borehole number and depth.

## Date of Sample Receipt

3 June 2020 19 June 2020

## Test Method(s)

ISO 17892:2018 Part 9 - Consolidated triaxial compression tests on water saturated soils

ASTM D3080-11 - Direct Shear Test of Soils under Consolidated Drained Conditions

NZS 4402: 1986 Test 2.1 - Water Content

## Material Description

Sample descriptions are provided in the presentation pages.

## Test Results

Test results are attached on page 3 to page 29.

## Test Remarks

Test remarks are included in the presentation pages.

## General Remarks

Samples not destroyed during testing, will be retained for one month from the date of this report before being discarded.

Descriptions are enclosed for your information, are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Initia Ltd, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

Please reproduce this report in full when transmitting to others or including in internal reports.

If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of the letterhead page.

GEOTECHNICS LTD

Report prepared by:

Helen Wang

.....

Helen Wang
Triaxial Laboratory Manager
Approved Signatory

Authorised for Geotechnics by:

Steven Anderson

.....

Steven Anderson
Project Director

Report checked by:

Steven Anderson

.....

Steven Anderson
Operations & Technical Manager

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

17-Jul-20
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# FAQ

## What happened to trigger this?

In 2019 land slipped on the hillside below Manuka Place, as a result a home was damaged, and the owners evacuated. Council assets were also damaged as a result of the slip. Council, EQC and the developer agreed to share investigation data between experts to understand the cause and extent of the land movement. As similar geomorphology existed in the Kotata Development a review of the documentation for this subdivision was triggered.

## Why am I receiving this letter now?

Council, the developer and their experts have carried out investigations to determine whether there are concerns regarding deep seated stability within the Kotata Development. Council now has enough information to share with homeowners and their experts. The developer also has this information.

## Why was my building consent suspended?

Council suspended applications for Building Consents in areas being investigated to allow time for information generated by investigations to be considered.

## Will my building consent be granted?

While Council has approved the subdivision, it is still obliged under the Building Act 2004 to refuse to grant a building consent if the land on which the building is to be constructed is subject to, or likely to be subject to, a natural hazard such as subsidence or slippage. If Council is not satisfied on reasonable grounds that any building would be structurally secure, then a building consent should not be issued. This is a mandatory directive of the Building Act.

## Is my house safe? (for those who have existing houses within the subdivision)

To date there has been no obvious movement affecting houses built on the Kotata development and no concerns have been raised that would prevent the continued occupation of existing homes.

## Do I need to contact my insurer?

Please check with your insurer in the interests of full disclosure.

## What happens next?

Council is in contact with the developer and their engineers to determine what forward works are intended to be carried out and potential engineering solutions if required.

Council will continue to update affected property owners as we are made aware of any developments.

## Where do I go for more information?

Hopefully you have all the information you need but if you have further questions please contact Alison Thompson, Alison.Thompson@wdc.govt for queries related to engineering or Paul Cook, Paul.Cook@wdc.govt.nz for queries related to building consents.

19 November 2020

Jemma Ola Margaret Stevenson
Joseph Phillips Andrew Stevenson
28 Parry Road
RD 8
Whangarei 0178

Whangarei District Council
Forum North, Private Bag 9023
Whangarei 0148, New Zealand
P +64 9 430 4200
F +64 9 438 7632
E mailroom@wdc.govt.nz
www.wdc.govt.nz

**Land stability update and notification that this letter and reports will be attached to the property information and feature in Land Information Memorandums**

**Property Number:** 168932
**Site Address:** 2 Suncrest Lane, Whangarei 0110

Dear Homeowner/occupier,

In August 2019 a landslip within a property lying between Southend Avenue and High Street was brought to Council's attention. That landslide resulted in a house in Manuka Place being damaged by subsidence.

As a result of that land movement Council and its experts, Tonkin + Taylor reviewed the subdivision at the end of Manuka Place and the subdivision undertaken by Kotata Developments Limited as both properties have similar underlying geological formations.

Council has been working with both developers and independent consulting engineers to study the underlying geological formations to satisfy itself that if building consents were granted, any buildings erected on the approved lots could be safely built.

When council began the review in September 2019 there were 2 approved stages of subdivision in Kotata for which titles had been issued. They were in effect stages 1 and 2 of a 5-stage subdivision. Council has received building consent applications for both approved stages of the Kotata subdivision as the plans had deposited and titles issued for individual lots.

Council has now re-evaluated the engineering opinions provided in support of the application prior to granting of consent. The review of investigations and monitoring to date have satisfied council that no deep-seated geological issues have been identified for your property and expect that site-specific issues (if any) can be addressed as part of the building consent process.

Council will continue to keep you up to date with any developments it is made aware of regarding your property. Council's Geotechnical consultant, Tonkin + Taylor, has prepared a summary of the investigation outcomes to date. A report by Initia Geotechnical Specialists, titled **Kotata Development Stage 2 –Geotechnical Investigations and Engineering Geological Review** is also available on request.

The T+T summary is attached to this letter and both reports will also be attached to your property record held by Council.

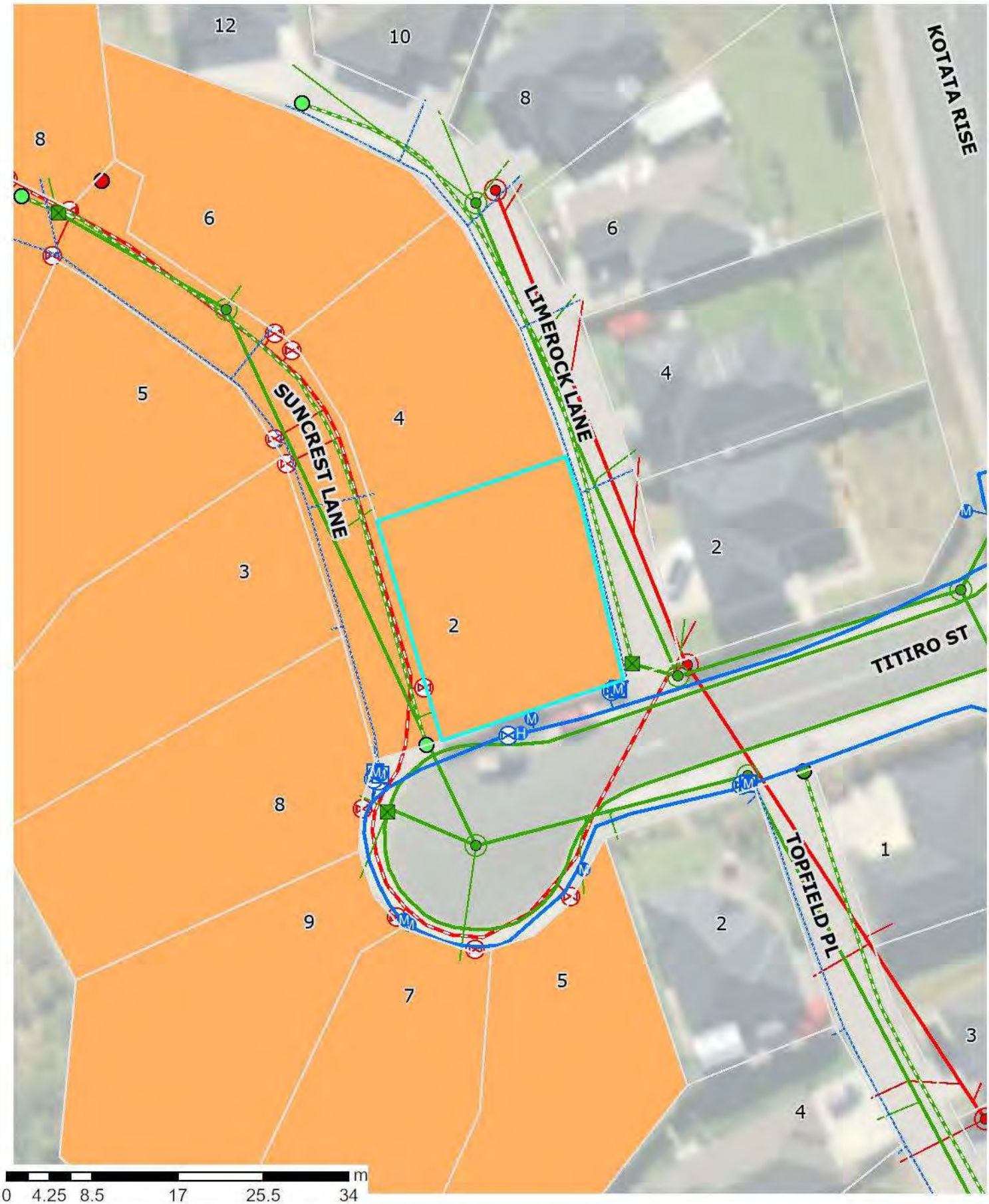
Council has a legal obligation to ensure that information such as this is available to anyone requesting a Land Information Memorandum (LIM) for your property it being information held by Council identifying special features or characteristics of your property.

Council recommends you check with your insurer in the interests of full disclosure, otherwise you do not need to take further action in relation to this letter. If you have any questions relating to this letter please contact Nadia de la Guerre, Development Engineering Team Leader, Whangarei District Council on 09 4304200 or email nadia.delaguerre@wdc.govt.nz or myself, alison.thompson@wdc.govt.nz

Yours faithfully,

Alison Thompson
**Infrastructure Development Manager**

# Water, Wastewater and Stormwater




This information is generalized and shows the approximate location of the known pipeline services.
For digging, the As-Built engineering drawings must be used to accurately locate the services.
See WDC Customer Services.

28 July 2026
Scale 1:500

# Water, Wastewater and Stormwater – Map Legend

Whangarei District Council

## Water

Water Point

Actuator
- WDC
- Private

Backflow Device
- WDC
- Private

Bore
- WDC
- Private

End Structure
- WDC
- Private

Fitting Node
- WDC
- Private

Hydrant
- WDC
- Private

Meter
- WDC

Meter Manifold
- WDC
- Private

Pump
- WDC
- Private

Valve
- WDC
- RED
- Private

Water Line

Abandoned Pipe

Raw Water Main
- WDC
- Private

Trunk Main
- WDC
- Private

Other Main
- WDC
- Private

Process Pipework
- WDC
- Private

Reticulation
- WDC
- Private

Service Line
- WDC
- Private

Water Area

Chamber
- WDC
- Private

Reservoir
- WDC
- Private

## Stormwater

Stormwater Point

End Structure
- WDC
- Private

Fitting Node
- WDC
- Private

GPT
- WDC
- Private

Manhole
- WDC
- Private

Pump
- WDC
- Private

Stormwater Inlet
- WDC
- Private

Valve
- WDC
- Private

Stormwater Line

Abandoned Pipe

Culvert
- WDC
- Private

Drainage
- WDC
- Private

Main
- WDC
- Private

Service Line
- WDC
- Private

Surface Drain
- WDC
- Private

Stormwater Area

Basin
- WDC
- Private

Chamber
- WDC
- Private

## Wastewater

Wastewater Point

Backflow Device
- WDC
- Private

End Structure
- WDC
- Private

Fitting Node
- WDC
- Private

Manhole
- WDC
- Private

Meter
- WDC
- Private

Motor Control Centre
- WDC
- Private

Pump
- WDC
- Private

Valve
- WDC
- Private

Wastewater Line

Abandoned Pipe

Main
- Rising Main (Pressure)
- Sewer Gravity Main
- Private
- Other

Process Pipework
- WDC
- Private

Service Line
- WDC
- Private

Wastewater Area

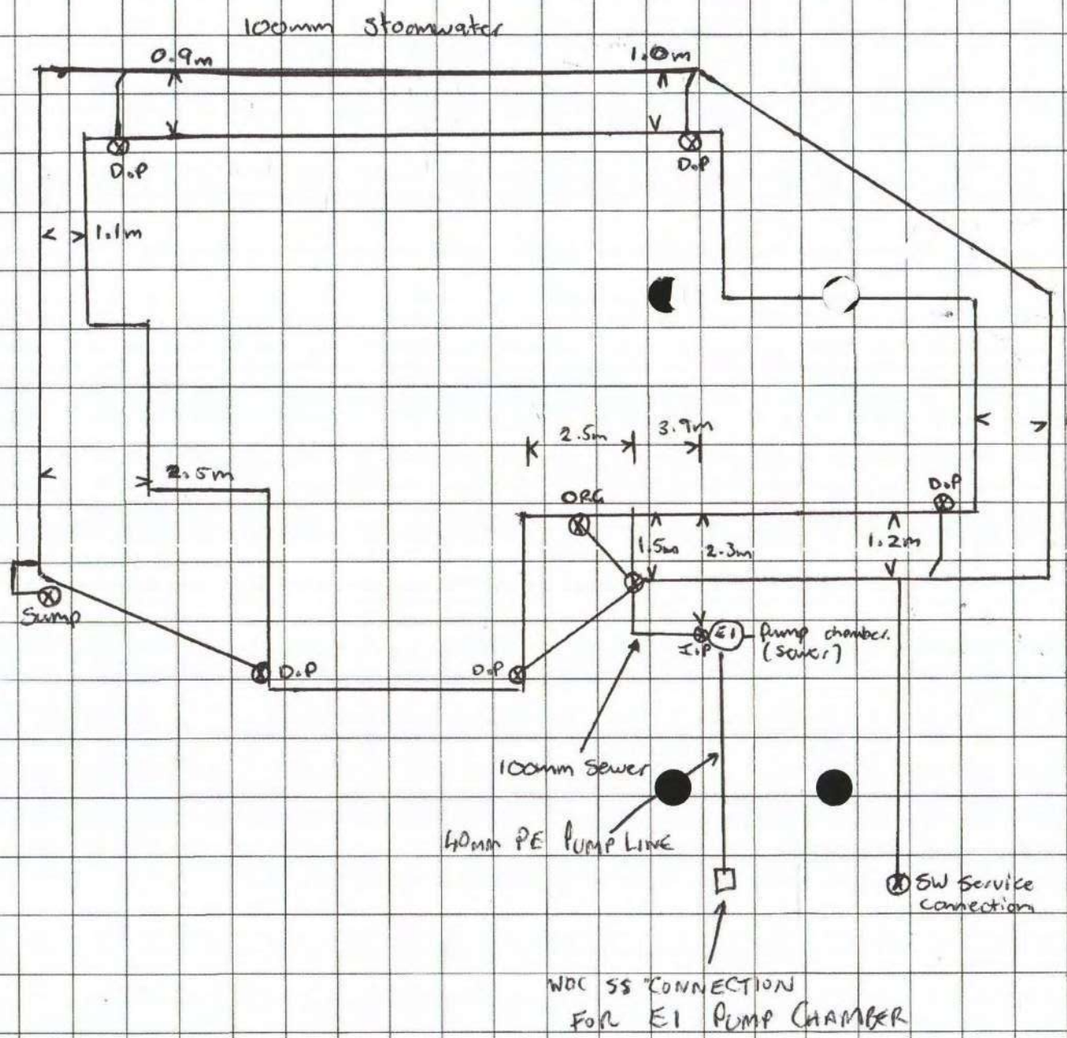
Chamber
- WDC
- Private

Pressure Sewer System
- Public
- Private

Whangarei District Council

## PART C As-built services plan

(to be completed in all cases. If details are already noted on separate drawings then provide copies in duplicate as appropriate and attach to this sheet. Ensure that drawing numbers, etc, is noted below)






Scale NTS in _____

Site address 2 Suncrest lane, Whangarei, 0110

**Whangarei District Council**
**Private Bag 9023, Te Mai**
**Whangarei 0143**
**Ph:0-9-430 4200**
**Email: mailroom@wdc.govt.nz**

# Rates LIM Report

**As at: Tuesday, 28 July, 2026**

| | |
|---|---|
| **Property Number** | 168932 |
| **Legal Description** | LOT 7 DP 525547 |
| **Assessment Number** | 0075200226 |
| **Address** | 2 Suncrest Lane (Pvt) Whangarei 0110 |
| **Record of Title(s)** | 849307 |
| **Land Value** | $260,000 |
| **Capital Value** | $585,000 |
| **Date of Valuation** | 01-July-2024 |
| **Effective Date (used for rating purposes)** | 01-July-2025 |
| **Meter Location** | 9M RH of LANE, 2.5M from KERB #2 |

**Rates Breakdown (up to 30 June 2027)**

| Rates Charge | Charge Total |
|---|---|
| General Residential | 801.32 |
| Regional Flood Infrastructure | 43.11 |
| Regional Economic Development | 9.15 |
| Regional Emergency & Hazard Management | 58.36 |
| Uniform Annual General Charge | 996.00 |
| Regional Land and Freshwater Management | 72.70 |
| Sewage Disposal - Residential | 991.00 |
| Regional Whangarei Transport Rate | 29.70 |
| Stormwater | 124.00 |
| Regional Pest Management | 110.40 |
| Regional Rescue Services | 11.09 |
| Regional Council Services | 214.35 |
| Regional Sporting Facilities | 7.94 |
| **Annual Charge Total** | **$3,469.12** |

## Opening Balance as at 01/07/2026 $0.00

| Rates Instalments | Total |
|---|---|
| 20/07/2026 Instalment | $868.12 |
| 20/10/2026 Instalment | $867.00 |
| 20/01/2027 Instalment | $867.00 |
| 20/04/2027 Instalment | $867.00 |
| **Rates Total** | **$3,469.12** |

## Balance to Clear $3,469.12

Whangarei District Council
Private Bag 9023, Whangarei 0148, New Zealand
P +64 9 430 4200 | 0800 WDC INFO | 0800 932 463 F +64 9 438 7632
E mailroom@wdc.govt.nz www.wdc.govt.nz

# Form 5

## Building Consent No: BC1901130

**Section 51, Building Act 2004**

**Issued: 23 October 2019**

**Project Information Memorandum No: PM1900231**

### The Building

| | |
|---|---|
| Street address of building: | 2 Suncrest Lane (Pvt)<br>Whangarei 0110 |
| Legal description of land where building is located: | LOT 7 DP 525547<br>LLP: 130245 |
| Building name: | N/A |
| Location of building within site/block number: | N/A |
| Level/unit number: | N/A |

### The Owner

J O M Stevenson
J P A Stevenson
28 Parry Road
RD 8
Whangarei 0178

| | |
|---|---|
| Phone number: | N/A |
| Mobile number: | 0210573539 |
| Facsimile number: | N/A |
| Email address: | jemmastevenson77@gmail.com |
| Website: | N/A |
| Street address/registered office: | 2 Suncrest Lane (Pvt)<br>Whangarei 0110 |

First point of contact for communications with Council/building consent authority

### Contact Person

Jennian Homes Northland 2009 Limited
PO Box 3144
Onerahi
Whangarei 0142

| | |
|---|---|
| Phone number: | 4595408 |
| Mobile number: | 0275114021 |
| Facsimile number: | N/A |
| Email address: | northland@jennian.co.nz |
| Website: | N/A |

### Building Work

The following building work is authorised by this consent:

**New Dwelling**

Whangarei District Council

This building consent is issued under section 51 of the Building Act 2004. This building consent does not relieve the owner of the building (or proposed building) of any duty or responsibility under any other Act relating to or affecting the building (or proposed building).

This building consent also does not permit the construction, alteration, demolition, or removal of the building (or proposed building) if that construction, alteration, demolition, or removal would be in breach of any other Act.

## This building consent is subject to the following conditions:

### Section 90 Building Act 2004

Section 90 Building Act 2004 Inspections by Building Consent Authorities applies. This building consent is subject to the condition that agents authorised by the building consent authority are entitled at all times during normal working hours or while work is being done to inspect land on which building work is being or is proposed to be carried out and building work that has been or is being carried out on or off the building site and any building.

Nominated Inspections are carried out to ensure that the building work is in accordance with the building consent. Completed Inspections will be classified as pass, or pass subject to remedial work or failed status.

1. See attached schedule of site requirements for inspections and documentation required.
2. To confirm compliance an Energy Works Certificate will be required (Electrical).

## Compliance Schedule

A compliance schedule is not required for the building.

## Attachments

The Project Information Memorandum for the building work covered by this building consent.

## Additional Information

1. The applicant must control dust nuisance created by any site or building works.
2. Toilet facilities must be provided within reasonable distance of the construction site. Ground discharge is no longer acceptable.
3. Lapsing of building consent. For the purposes of S52(b) of the Building Act 2004, the period after which this consent will lapse if the building work to which it relates does not commence will be 12 months from the date of issue.
4. Building advice that a maintenance schedule is recommended for the ongoing performance of the building elements to ensure they meet their serviceable life please consult with your designer to develop a specific maintenance programme or another helpful source of information is the BRANZ web site http://www.maintainingmyhome.org.nz/maintenance-guides/maintenance-schedule.

Tilly Selwyn
Support Assistant – Building Processing
On behalf of Whangarei District Council

23 October 2019
Date

Jennian HOMES
Your personality Our expertise

- 2 OCT 2019
WHANGAREI DISTRICT COUNCIL

R.O.W

66.0 | 340°57' 5.00 | 345°34' 17.91 | 70°28' 18.99

1.5m Bdy RESTRICTION

65.0

64.0

MB

5.951

2.000 FROM SLOPE

5.0m Dia. OUTDOOR LIVING COURT

4,967

2.0m Bdy RESTRICTION

CONCRETE PAD 2.00m² APPROX

TAP 2,128

70°28' 18.99

WATER CONNECTION

POWER CONNECTION

DAYLIGHTING POINT 'B'

250°08' 19.82

1.0m Bdy RESTRICTION

CAR 2 4.77 x 1.88m

PROPOSED NEW RESIDENCE
FFL: 63.600
CUT: 63.300

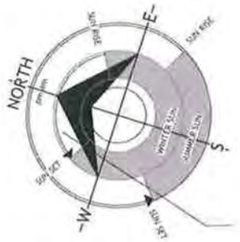
2,281

DAYLIGHTING POINT 'C'

TITIRO STREET

## LOT 7 DP 525547
## 470m²

| | |
|---|---|
| WIND ZONE | VERY HIGH |
| EARTHQUAKE ZONE | 1 |
| CORROSION ZONE | C |
| SNOW LOADING | N0 |
| BUILDING FOOTPRINT: | 126.21m² |
| SITE COVERAGE: | 26.85% (35% MAX) |
| IMPERMEABLE AREA: | 177.21m² |




REFER TO RS ENG LTD SUITABILITY REPORT No/ 15450

LEVELS IN TERM OF ONE TREE POINT (1964) DATUM

**EARTHWORK CALCULATIONS:**

CUT
V=125m³ (INCL. FOOTPRINT)
MAX. HEIGHT= 0.4m

FILL
V=30m³ (INCL. FOOTPRINT)
MAX. HEIGHT= 0.2m

PATIO AND PAVING TO FRONT DOOR TO COMPLY WITH NZBC D1 2.1 SLIP RESISTANCE TABLE 2.
- MAXIMUM STEP HEIGHT TO ALL COMMON / MAIN PRIVATE STAIRWAYS TO BE 190mm. (INCLUDES ALL EXTERNAL DOOR WAYS)

PROPOSED DRIVEWAY (INDICATIVE ONLY) 49.00m² APPROX

CAR 1 4.77 x 1.88m

ECOFLOW SEPTIC PUMP STATION

63.0

7,150

TAP

7,437

2,334

1.5m Bdy RESTRICTION

2,334

9,722

DAYLIGHTING POINT 'A'

342°29' 22.74

SANITARY SEWER CONNECTION

STORMWATER CONNECTION

7,061

9,438

63.0

SUNCREST LANE

BC1901130
APPROVED
22/10/2019
WHANGAREI DISTRICT COUNCIL BCA

Client: JEMMA & JOSEPH STEVENSON
LOT 7 DP 525547
2 SUNCREST LANE, KOTATA HEIGHTS, WHANGAREI

Drawing: SITE PLAN
SCALE 1:100 @ A3

Revision: WD-B WORKING DRAWINGS

elevation key

Date: 25 SEP 19
Job #: JNL 19011
Drawn: S.B.
Checked: S.B.
Amended: S.B.

Sheet: 2/17.

Jennian HOMES

Your personality Our expertise

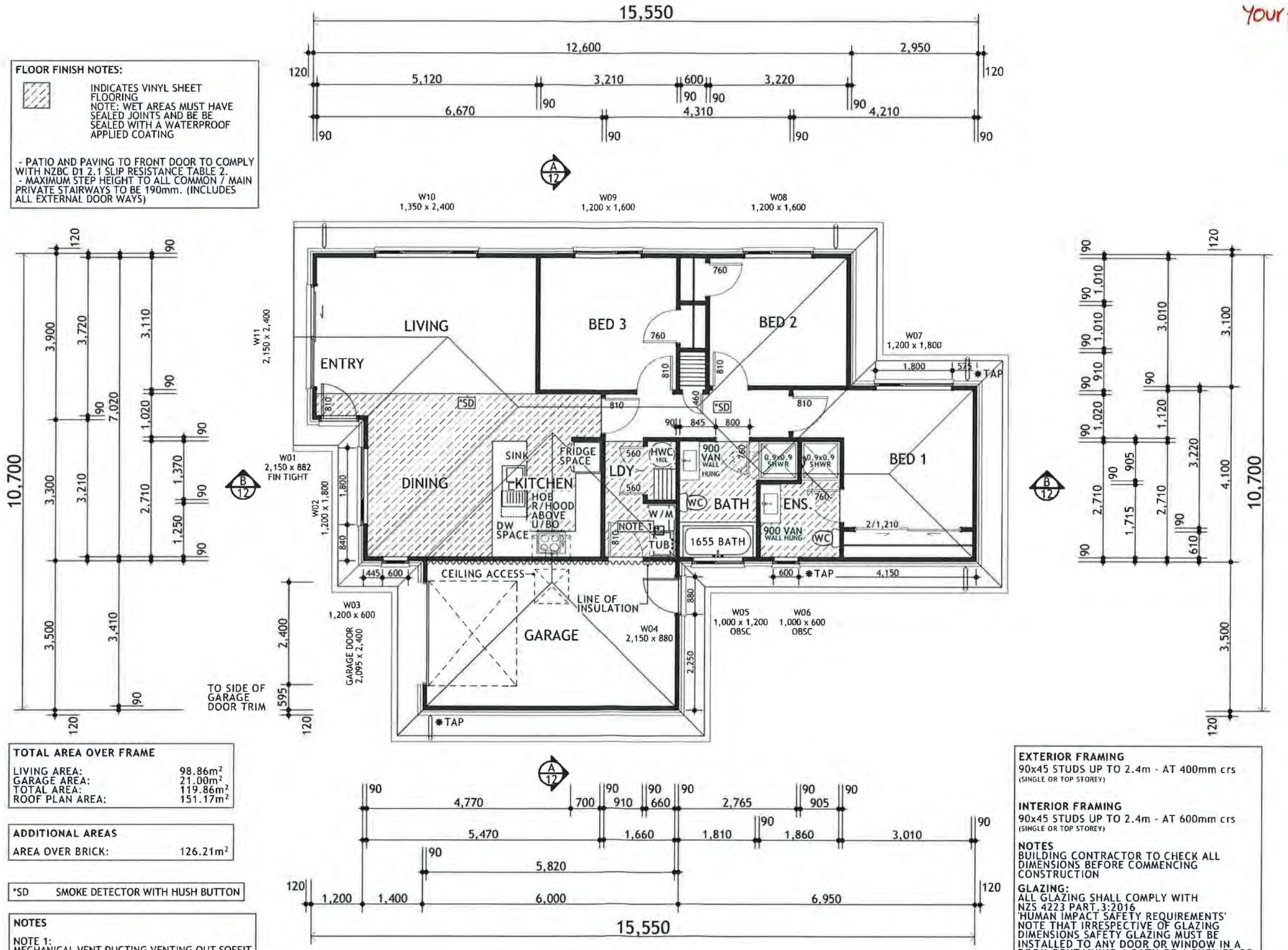
- 2 OCT 2019

WHANGAREI DISTRICT COUNCIL

**FLOOR FINISH NOTES:**

INDICATES VINYL SHEET FLOORING
NOTE: WET AREAS MUST HAVE SEALED JOINTS AND BE BE SEALED WITH A WATERPROOF APPLIED COATING

- PATIO AND PAVING TO FRONT DOOR TO COMPLY WITH NZBC D1 2.1 SLIP RESISTANCE TABLE 2.
- MAXIMUM STEP HEIGHT TO ALL COMMON / MAIN PRIVATE STAIRWAYS TO BE 190mm. (INCLUDES ALL EXTERNAL DOOR WAYS)




| TOTAL AREA OVER FRAME | |
|---|---|
| LIVING AREA: | 98.86m² |
| GARAGE AREA: | 21.00m² |
| TOTAL AREA: | 119.86m² |
| ROOF PLAN AREA: | 151.17m² |

| ADDITIONAL AREAS | |
|---|---|
| AREA OVER BRICK: | 126.21m² |

*SD SMOKE DETECTOR WITH HUSH BUTTON

**NOTES**

NOTE 1:
MECHANICAL VENT DUCTING VENTING OUT SOFFIT

**EXTERIOR FRAMING**
90x45 STUDS UP TO 2.4m - AT 400mm crs
(SINGLE OR TOP STOREY)

**INTERIOR FRAMING**
90x45 STUDS UP TO 2.4m - AT 600mm crs
(SINGLE OR TOP STOREY)

**NOTES**
BUILDING CONTRACTOR TO CHECK ALL DIMENSIONS BEFORE COMMENCING CONSTRUCTION

**GLAZING:**
ALL GLAZING SHALL COMPLY WITH NZS 4223 PART 3:2016 'HUMAN IMPACT SAFETY REQUIREMENTS' NOTE THAT IRRESPECTIVE OF GLAZING DIMENSIONS SAFETY GLAZING MUST BE INSTALLED TO ANY DOOR OR WINDOW IN A ROOM CONTAINING A BATH OR A SHOWER OR A SPA
AND TO ALL SHOWER DOORS AND SCREENS

DOUBLE GLAZING TO ALL EXTERIOR JOINERY, EXCLUDING GARAGE SPACE

OFFSET JOINERY IS DIMENSIONED OTHERWISE CONSIDERED CENTRED IN WALL SPACE

Client: JEMMA & JOSEPH STEVENSON
LOT 7 DP 525547
2 SUNCREST LANE, KOTATA HEIGHTS, WHANGAREI

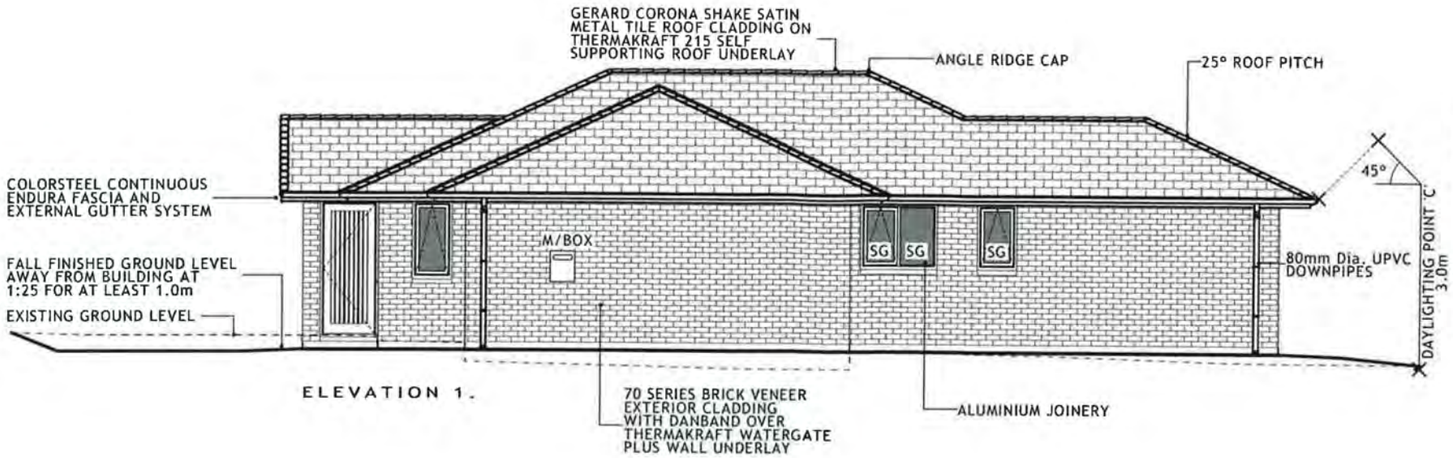
Drawing: FLOOR PLAN
SCALE 1:100 @ A3
STANDARD PLAN: EDWARD 3 (ALTERED)
Revision: WD-B WORKING DRAWINGS

elevation key

Date: 25 SEP 19
Job #: JNL 19011
Drawn: S.B.
Checked: S.B.
Amended: S.B.

Sheet: 4/17.

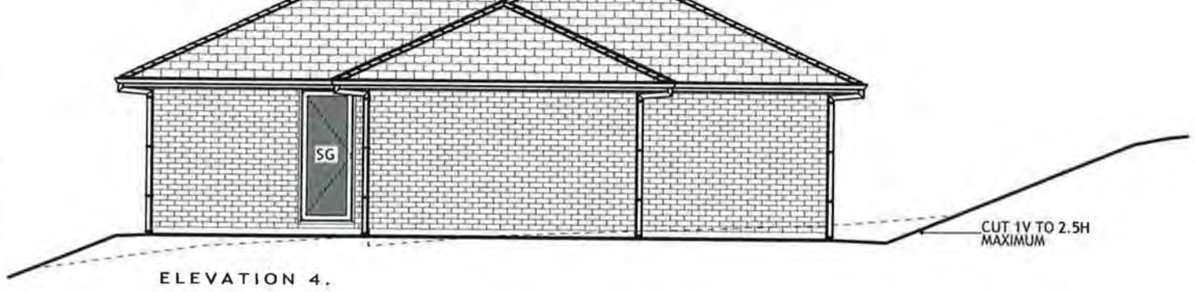
BC1901130
APPROVED
22/10/2019
WHANGAREI DISTRICT COUNCIL BCA



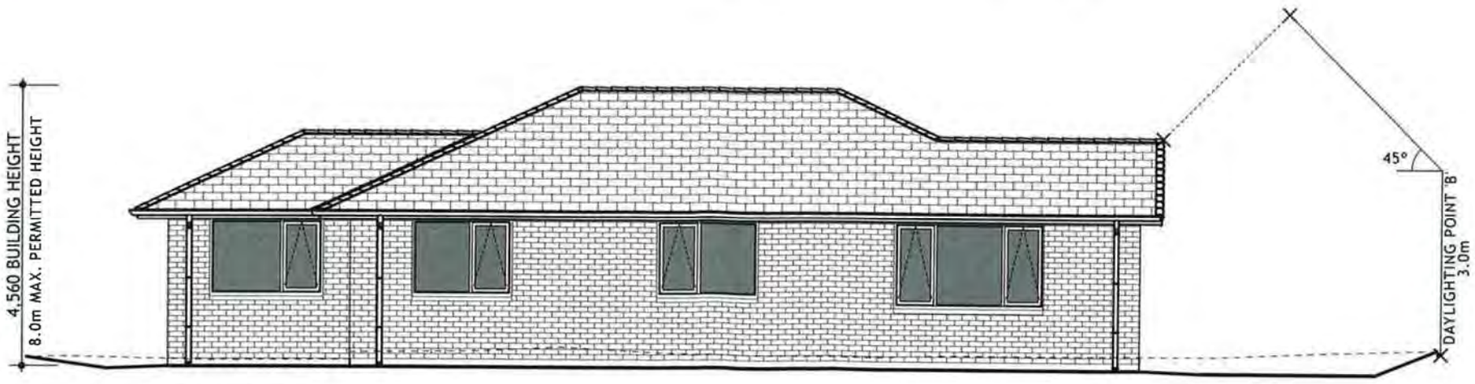

ELEVATION 1.

| BUILDING ENVELOPE RISK MATRIX | | |
|---|---|---|
| ALL ELEVATIONS | | |
| **Risk Factor** | **Risk Severity** | **Risk Score** |
| **Wind zone (per NZS 3604)** | Very high risk | 2 |
| **Number of storeys** | Low risk | 0 |
| **Roof/wall intersection design** | Low risk | 0 |
| **Eaves width** | Medium risk | 1 |
| **Envelope complexity** | Medium risk | 1 |
| **Deck design** | Low risk | 0 |
| **Total Risk Score:** | | **4** |


ELEVATION 2.




ELEVATION 4.



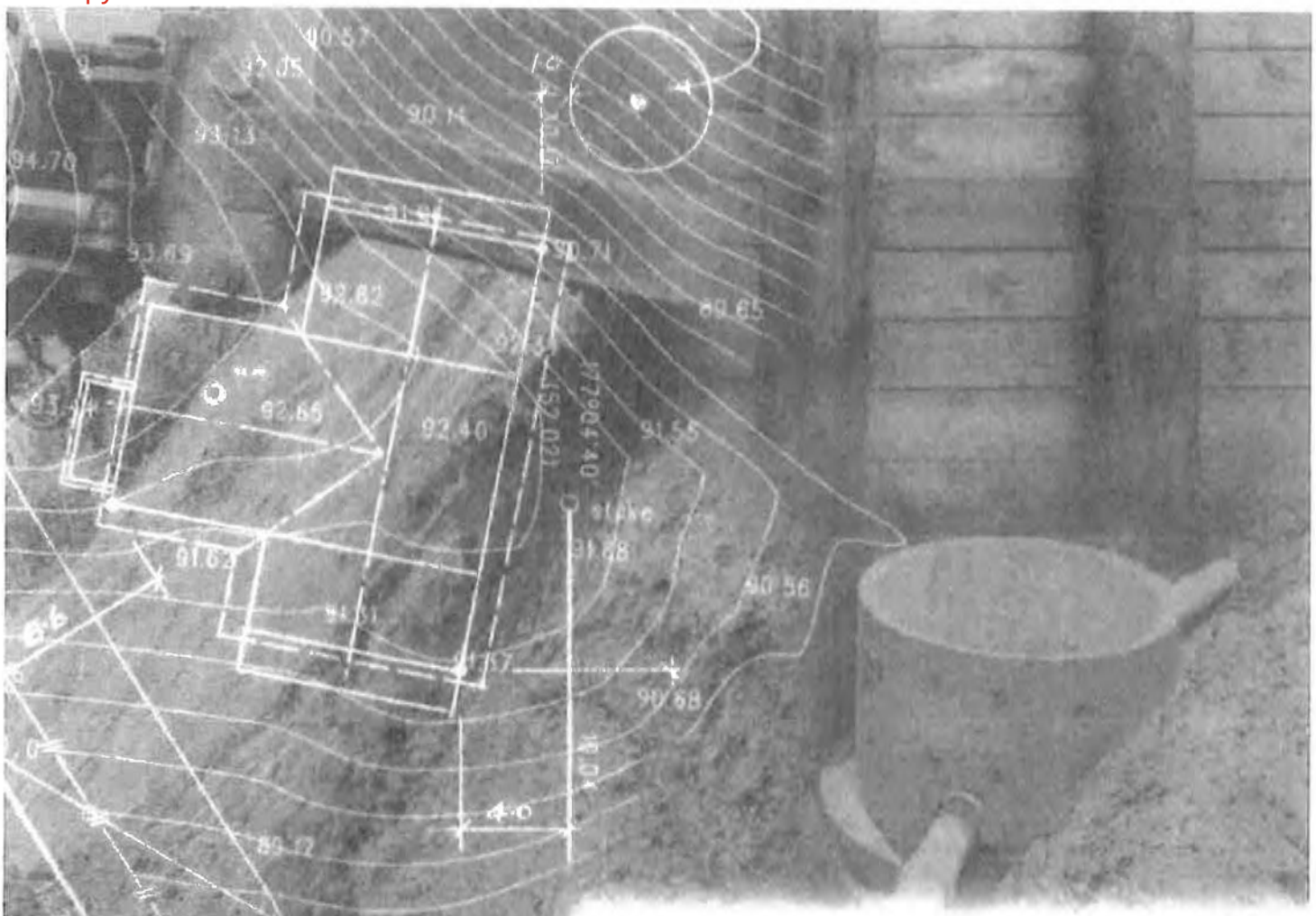

ELEVATION 3.



| Client: | Drawing: | Date: 25 SEP 19 | Sheet: |
|---|---|---|---|
| JEMMA & JOSEPH STEVENSON<br>LOT 7 DP 525547<br>2 SUNCREST LANE, KOTATA HEIGHTS, WHANGAREI | ELEVATIONS<br>SCALE 1:100 @ A3 | Job #: JNL 19011<br>Drawn: S.B.<br>Checked: S.B.<br>Amended: S.B. | 5 / 17. |
| | Revision: WD-B WORKING DRAWINGS | elevation key: 1 2 3 4 | |



Jennian HOMES
Your personality Our expertise



# STAGE 2 SUBDIVISION
# SUITABILITY REPORT
## High Street,
## Morningside

Richardson·Stevens
CONSULTING ENGINEERS

Richardson·Stevens
CONSULTING ENGINEERS

# STAGE 2 SUBDIVIISON SUITABILITY REPORT

## High Street, Morningside

| | |
|---|---|
| **Report prepared for:** | Kotata Developments Ltd |
| **Report prepared by:** | Matthew Jacobson |
| **Report reviewed by:** | Max Haag |
| **Report reference:** | 7793 |
| **Date:** | 23 June 2017 |

| Version | Date | Comments |
|---|---|---|
| 0 | 23 June 2017 | Issue for Resource Consent |
| | | |
| | | |

2 Seaview Rd, Whangarei 0110, Ph 09 438 3273, Fax 09 438 5734, email engineers@richardsonstevens.co.nz

# Contents



**Appendices**

Richardson·Stevens
CONSULTING ENGINEERS

File: 7793
23 June 2017

# STAGE 2 SUBDIVISION SUITABILITY REPORT

## High Street, Morningside

---

### 1.0 Introduction

Richardson Stevens Consultants (1996) Ltd has been engaged by Kotata Developments Ltd to investigate their properties (Lot 15-17, subdivision of Part Lot 3 DP 100672) for a residential subdivision. The purpose of the report is to assess the suitability of the property for the proposed residential development in support of a resource consent application to the Whangarei District Council (WDC).

The proposed boundary layout for the subdivision of 34 residential lots is shown on the Reyburn and Bryant scheme plan in Appendix A.

### 2.0 Site Description

This property is located on the western side of a ridge which falls to the south from "Morningside mountain". The property was subject to extensive earthworks between 2007 and 2012 to create level building areas. Most of the property is near level over several platforms on its eastern side which slopes moderately, falling away towards the west. The level platforms are mostly bear earth with steeper slopes being covered in rank kikuyu.

### 3.0 Previous Engineering Report

Richardson Stevens Consultants (1996) Ltd has previously reported on the geotechnical suitability of this property. This report is entitled *'Geotechnical Assessment for Proposed Subdivision, High Street, Morningside'* dated *14 July 2016*.

2 Seaview Rd, Whangarei 0110, Ph 09 438 3273, Fax 09 438 5734, email engineers@richardsonstevens.co.nz

## 4.0 Field Investigations

This property was subject to investigations as part of the 2016 engineering report. Further investigations have been undertaken across this property since the investigations of the 2016 report. These investigations consisted of a walkover inspection, a machine borehole (MBH 9), seven testpits by Richardson Stevens Consultants (1996) Ltd and five testpits by Kotata Developments Ltd.

### 4.1 Walkover Inspection

The walkover inspection did not observe any signs of concern across the majority of the property in regard to the proposed development, however a significant slope failure has occurred on the edge of the level platform and moderate western slopes. This slope failure appears to be approximately 30m wide and 80m long with a head scarp of 5-7m high.

### 4.2 Subsurface Investigations

Subsurface investigations in total consisted of 12 testpits and a machine borehole. The tespits extended to a maximum depth of 5.0m below ground level. The tespits generally encountered varying depths of fills overlying residual soils and weathered rock, which is summarised in Table 1 below.

**Table 1: Subsurface Investigation Summary**

| Test | Depth of Fill (m) | Depth to Weathered Allochthon (m) | Comments |
|---|---|---|---|
| TP 1 | 0.4 | 3.0 | |
| TP 2 | 0.0 | 2.0 | |
| TP 3 | 0.0 | 1.8 | |
| TP 4 | 1.0 | 0.6 | 0.1m Topsoil Between |
| TP 5 | 0.0 | 0.0 | Weathered Rock on Surface |
| TP 6 | 0.0 | 0.5 | |
| TP 7 | 0.0 | 2.0 | |
| WP TP 1 | 2.0 | 2.0 | |
| WP TP 2 | 3.5 | 3.5 | |
| WP TP 3 | 2.2 | 4.2 | |
| WP TP 4 | 0.0 | 2.2 | 0.4m weak layer above Weathered Rock |
| WP TP 5 | 1.5 | 3.5 | |

The machine borehole was augured to a depth of 12.5m below ground level. The bore encountered 9.0m of earthfills overlying 1.5m of residual soil, then weathered rock. In-situ

samples were taken at 2m intervals throughout the borehole to determine Air Void percentage. Air Voids varied, but did not exceed 2.7%.

## 5.0 Suitability Assessment

To determine the suitability of the land for the proposed residential subdivision, we have undertaken assessments, as follows:

### 5.1 Geotechnical

The geotechnical suitability of the property has previously been investigated and analysed with remedial recommendations for an industrial/commercial subdivision (report referenced in Section 3.0). The relevant recommendations of this report are as follows:

- Lots 1-16 – A soldier pile wall should be constructed at the base of the fill batter to achieve an adequate FoS with any construction or hard stand setback 10m from the crest of the fill batter.

- Lots 17-26 – Counterfort drainage is installed on the slopes to draw groundwater levels down to 3.5m below ground level over a length of 35m. A 5m setback from the crest of the slopes for construction utilizing shallow foundations.

- Lots 27-34 – Generally suitable, provided foundations are specifically designed to account for shallow soil creep.

Additional investigations, as discussed in Section 4.0 above have been undertaken due to the increased density associated with the proposed residential development. Given these investigations, further analysis and review has been undertaken, which is presented as follows.

#### 5.1.1 Lots 1-16

These lots lie over an area which has previously been subject to extensive earthworks, with cuts and fills up to 1m and 8m respectively. A deep seated slope failure has occurred through the toe of the fills. Based on the investigations previously undertaken and detailed within this report, additional slope stability analysis has been carried out, using Slide V5.0.

To ensure long term stability of the building site, achieve a suitable FoS against slope instability and remediate the existing slope failure we make the following recommendations:

- A soldier pile wall, specifically designed by a Chartered Professional Engineer is installed at the base of the fill batter as shown on the drawing in Appendix C.
- The building site on Lots 11 is either setback a minimum of 5m from its western boundary or protected by a soldier pile wall specifically designed by a Chartered Professional Engineer to account for retained depth of 2.0m.
- The building site on Lots 12 is either setback a minimum of 14m from its western boundary or protected by a soldier pile wall specifically designed by a Chartered Professional Engineer to account for retained depth of 4.0m
- As a minimum, foundations should be designed to account for moderately expansive soil.
- Any foundations within 5m of slopes >14° shall be specifically designed to account for up to 1.0m of shallow soil creep.
- Any buildings should be setback from steep batter slopes as required by Table 2 in our previous report, which is attached in Appendix D.

### 5.1.2 Lots 17-34

These lots lie over an area which has previously been subject to extensive earthworks, with cuts and fills up to 10m and 1m respectively. The investigations undertaken, as detailed within this report encountered conditions consistent with parameters used in our previous analysis. On this basis, the recommendations previously outlined are applicable. To ensure long term stability of the building sites, the following recommendations have been made:

- Countertfort drainage is installed below Lots 17-23 to draw groundwater levels down to 3.5m below ground level over 35m.
- As a minimum, foundations should be designed to account for moderately expansive soil.
- Any foundations within 5m of slopes >14° shall be specifically designed to account for up to 1.0m of shallow soil creep.
- Any buildings should be setback from steep batter slopes as required by Table 2 in our previous report, which is attached in Appendix D.

## 5.2 Sanitary Sewer Reticulation

It is proposed to construct a reticulated sanitary sewer system as part of the proposed subdivision. It is proposed to provide gravity connections for Lots 1-6 and 19-34 and low-pressure sewer connections for Lots 7-18. The design and final layout of these systems should be completed at the engineering plan stage to best suit the final scheme layout and conform to the WDC EES and Low Pressure Sewer Policy. See the following table detailing expected design volumes.

**Table 2: Sanitary Sewer Design Flows**

| Parameter | Flow ($m^3$/day) |
|---|---|
| Average Dry Weathered Flow | 27.2 |
| Dry Weathered Peak Flow | 54.4 |
| Peak Wet Weather Flow | 108.8 |

## 5.3 Reticulated Water Supply

The WDC water reticulation is available, adjacent to the property at High Street and Kotata Rise. This reticulation is supplied by a booster pump which is located at the intersection of High Street and Morningside Road, which will provide adequate flow and pressure. It is suggested that the reticulation into the subdivision be extended, to supply all the proposed lots. Fire hydrants will also be installed at regular intervals as per the WDC EES. See the following table detailing expected design volumes.

**Table 3: Water Supply Design Flows**

| Parameter | Flow ($m^3$) |
|---|---|
| Daily Flow | 40.8 |
| Peak Daily Flow | 81.6 |
| Peak Hourly Flow | 8.5 |

## 5.4 Stormwater Reticulation

It is proposed to construct stormwater reticulation to service the new allotments. Runoff from the existing property naturally drains towards the west, away from Kotata Rise. Connections will be provided to the majority of the area (approximately 75% or 26 lots of the 34), connecting to the existing reticulation of Kotata Rise. The existing stormwater network has been designed to account for 20% increase for climate change and discharges directly to the low lying area discharging to the marine environment.

The remaining lots will be provided connections to a new reticulation, which will discharge towards the west, on the steeper slopes. As the proposed stormwater reticulation will divert a significant voume of water away from the west catchment, post development flows are likely to be 50% of pre development flows, therefore attenuation will not be required. To ensure such an outfall does not activate slope instability or erosion we recommend that a comprehensive dispersal structure is designed at the engineering plan stage.

## 5.5 Access

The proposed new road and right-of-ways shall gain access off the new road, Kotata Rise. Kotata Rise intersects High Street at a recently constructed intersection and adjoins the terminated end of Southend Ave.

### 5.5.1 Intersection

The new intersection with Kotata Drive will need to be designed in accordance with the WDC EES, and has adequate sight distances.

### 5.5.2 Carriageways

The proposed new roads and right-of ways shall be designed and constructed as per the WDC EES. The layout proposed is shown on the scheme plan, attached in Appendix A.

## 6.0 Conclusion

It is the conclusion of Richardson Stevens Consultants (1996) Ltd that the property is generally suitable for residential development, provided the recommendations and limitations of this report are complied with.

Richardson Stevens Consultants (1996) Ltd also concludes that, in terms of Section 106 of the Resource Management Act 1991 and subject to the recommendations of this report that:

(a) the land in respect of which a consent is sought, or any structure on the land, is not or is not likely to be subject to material damage by subsidence, slippage or inundation from any source; and

(b) any subsequent use that is likely to be made of the land is not likely to accelerate, worsen, or result in material damage to the land, other land, or structure by subsidence, slippage or inundation from any source: and,

(c) sufficient provision can be made for legal and physical access to each allotment to be created by the subdivision.

## 7.0 Limitations

This report has been prepared solely for the benefit of our client and the Whangarei District Council. The purpose is to determine the engineering suitability of the proposed development, in relation to the material covered by the report. This report does not address matters relating to the National Environmental Standard for Contaminated Sites, and if applicable separate advice should be sought on this matter from a suitably qualified person.

The reliance by other parties on the information or opinions contained therein shall, without our prior review and agreement in writing, do so at their own risk.

Recommendations and opinions in this report are based on data obtained as previously detailed. The nature and continuity of subsoil conditions away from the test locations are inferred and it should be appreciated that actual conditions could vary from those assumed.

Prepared by:

Matthew Jacobson
Engineering Technician

Approved by:

Max Haag
Chartered Professional Engineer

**Richardson Stevens Consultants (1996) Ltd**

| Soil Type | Batter Height | Maximum Batter Slope | Top of Batter Setback | Bottom of Batter Setback |
|---|---|---|---|---|
| Compacted Fill | 4m -7m | 25° | 5m | 2m |
| Compacted Fill | 3m-4m | 27° | 4m | 1m |
| Compacted Fill | Up to 3m | 27° | 3m | 1m |
| Residual Soil | 4m-7m | 23° | 5m | 2m |
| Residual Soil | Up to 4m | 27° | 5m | 2m |

Short Batter Slope Requirements

HIGH STREET
LEGAL, SEALED, IRREGULAR WIDTH

LOT 37
1.2100 Ha
BALANCE LOT

Lot 1
DP 96485

LOT 11 720m²
LOT 10 590m²
LOT 6 (895m²) 465m²
LOT 5 555m²
LOT 4 765m²
LOT 3 595m²
LOT 9 535m²
LOT 12 (1290m²) 780m²
LOT 13 1000m²
LOT 8 480m²
LOT 2 510m²
LOT 1 520m²
LOT 14 830m²
LOT 7 470m²
LOT 36 1030m² ROAD TO VEST IN WDC
LOT 15 670m²
LOT 26 410m²
LOT 19 400m²
LOT 16 730m²
LOT 17 550m²
LOT 18 590m²
LOT 25 410m²
LOT 24 405m²
LOT 20 530m²
LOT 21 445m²
LOT 23 660m²
LOT 22 (980m²) 630m²
LOT 27 515m²
LOT 34 545m²
LOT 28 590m²
LOT 33 535m²
LOT 29 (1215m²) 765m²
LOT 32 530m²
LOT 30 640m²
LOT 31 (655m²) 595m²

25 0 25
METRES - 1:1250

N

CAUTION:

1. THIS DRAWING SHOULD NOT BE AMENDED MANUALLY.
2. AREAS & DIMENSIONS ARE APPROXIMATE ONLY AND ARE SUBJECT TO FINAL SURVEY.
3. THE VENDOR & PURCHASER MUST CONTACT THE SURVEYOR IF SALE & PURCHASE AGREEMENTS ARE ENTERED INTO USING THIS PLAN.
4. SERVICES MUST NOT BE POSITIONED USING THIS PLAN.
5. DO NOT SCALE OFF DRAWINGS.
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7. DESIGNED BY REYBURN & BRYANT - WHANGAREI - NEW ZEALAND

RECEIVED - CUSTOMER SERVICES
- 2 OCT 2019
WHANGAREI DISTRICT COUNCIL

PROPOSED EASEMENT SCHEDULE

| PURPOSE | SHOWN | SERV.TENE. | DOM.TENE. |
|---|---|---|---|
| RIGHT OF WAY & SERVICES | (A) | LOT 6 HEREON | LOTS 1 - 5 HEREON |
| | (B) | LOT 13 HEREON | LOTS 8-11 & 14-15 HEREON |
| | (C) | LOT 23 HEREON | LOTS 21-22 & 24-26 HEREON |
| | (D) | LOT 30 HEREON | LOTS 29-30 & 32-35 HEREON |

TOTAL AREA: 3.4000Ha
COMPRISED IN:
LOTS 15 - 17 SD1000085.02
THIS SITE IS ZONED ' BUSINESS 2 ' AND THE BUILDING SETBACKS ARE THUS: 2.5m FROM ROAD BOUNDARIES, 3m FROM LIVING, OPEN SPACE AND BUSINESS 3 ENVIRONMENTS.

| REV | DATE | DESCRIPTION |
|---|---|---|
| | | |
| | | |
| B | 30.08.17 | AMENDMENTS |
| A | 12.05.17 | FIRST ISSUE |


reyburn & bryant
Ph: 09 438 3563
7 Selwyn Ave, Whangarei
PO Box 191, Whangarei 0140
www.reyburnandbryant.co.nz


CLIENT
KOTATA DEVELOPMENTS LTD
HIGH STREET, MORNINGSIDE
WHANGAREI

TITLE
PROPOSED SUBDIVISION
OF LOTS 15 - 17
SD1000085.02

| DATE | SCALE | |
|---|---|---|
| JUNE 2017 | 1:1250 @A3 | |
| NO. S 14556 | SHEET 1/1 | Rev. B |

BC 9014
APPROVED
2/10/2019
WHANGAREI DISTRICT COUNCIL BCA

Date Plotted: 30-Jun-17 File Path: P:\14000 - 14999\14556 - Pipiwai Investments - Kotata\Drawings\Scheme Plan\S14556 - Kotata Dev LTD - Rev B.dwg

LOCAL AUTHORITY: WHANGAREI DISTRICT COUNCIL


NOTES:
-1m Contour Intervals

Richardson·Stevens
CONSULTING ENGINEERS

2 Seaview Road Whangarei 0110
T: 09 438 3273 F: 09 438 5734
engineers@richardsonstevens.co.nz

Title
**Stage 2**
**Site Investigations**

Client
**Kotata Developments Ltd**

Location
**High Street**

| Date | Rev | Notes |
|---|---|---|
| 30/06/17 | | |

| File | Scale | Rev |
|---|---|---|
| 7793 | 1:1000 | A |
| Drawn by: MJ | Original: A3 | Sheet: 1/1 |

Whangarei District Council
Private Bag 9023, Whangarei 0148, New Zealand
P +64 9 430 4200 | 0800 WDC INFO | 0800 932 463 F +64 9 438 7632
E mailroom@wdc.govt.nz www.wdc.govt.nz

DEC

# *Form 7*

# *Code Compliance Certificate BC1901130*

**Section 95, Building Act 2004**

**Issued: 03 March 2020**

## The Building

| | |
|---|---|
| Street address of building: | 2 Suncrest Lane (Pvt)<br>Whangarei 0110 |
| Legal description of land where building is located: | LOT 7 DP 525547<br>LLP: 130245 |
| Building name: | N/A |
| Location of building within site/block number: | N/A |
| Level unit number: | N/A |
| Current, lawfully established use: | Detached Dwelling |
| Year first constructed: | 2019 |

## The Owner

J O M Stevenson
J P A Stevenson
28 Parry Road
RD 8
Whangarei 0178

| | |
|---|---|
| Phone number: | N/A |
| Mobile number: | 0210573539 |
| Facsimile number: | N/A |
| Email address: | jemmastevenson77@gmail.com |
| Website | N/A |
| Street address/registered office: | 2 Suncrest Lane (Pvt)<br>Whangarei 0110 |

First point of contact for communications with the building consent authority:

## Contact Person

Jennian Homes Northland 2009 Limited
PO Box 3144
Onerahi
Whangarei 0142

| | |
|---|---|
| Phone number: | 4595408 |
| Mobile number: | 021979480 |
| Facsimile number: | 4595409 |
| Email address: | rachel.herbert@jennian.co.nz |
| Website: | N/A |

Whangarei District Council

**Building Work** **New Dwelling**

Building Consent Number: BC1901130

Issued by: Whangarei District Council

## Code Compliance

The building consent authority named below is satisfied, on reasonable grounds, that -

(a) The building work complies with the building consent.

03 March 2020

Enka Stephenson
Support Assistant – Building Processing
On behalf of Whangarei District Council

Date

WT032803.

Private Bag 9023 | Whangarei 0148 | New Zealand
T: 09 430 4200 | 0800 WDC INFO | 0800 932 463 | F: 09 438 7632
W: www.wdc.govt.nz | E: mailroom@wdc.govt.nz

WHANGAREI DISTRICT COUNCIL

# Fast Track - Public Utility Service Application 20mm Water Meter Only

PU 191345

## General Guidance

- All fields must be completed or N/A as appropriate
- The applicant must be the owner of the land, or the lease holder, or a person who has agreed to unconditionally purchase or lease the land
- If a Backflow Preventer is required with the water meter (see application requirements), please complete a 'standard' public utility works application.

## Owner / Applicant

Full Name: Joseph & Jemma Stevenson

Postal address: 28 Parry Road Mangapai Post code: 0178

Phone: 021 057 3539 Mobile:

Email: jemmastevenson77@gmail.com

## Agent

Name: Jennian Homes Northland

Postal address: PO box 3144 Onerahi Post code: 0174

Phone: 4595403 Mobile:

Email:

## Site Address

Street/Road Number: 2 Street/Road Name: Suncrest Lane

Town or Area: Kotata Heights Lot: 7 DP: S25547

**Office Use Only**

Property ID: 168932

LLP number: 130932 Date: 30/9/19

Related Consents: BC 190 1130

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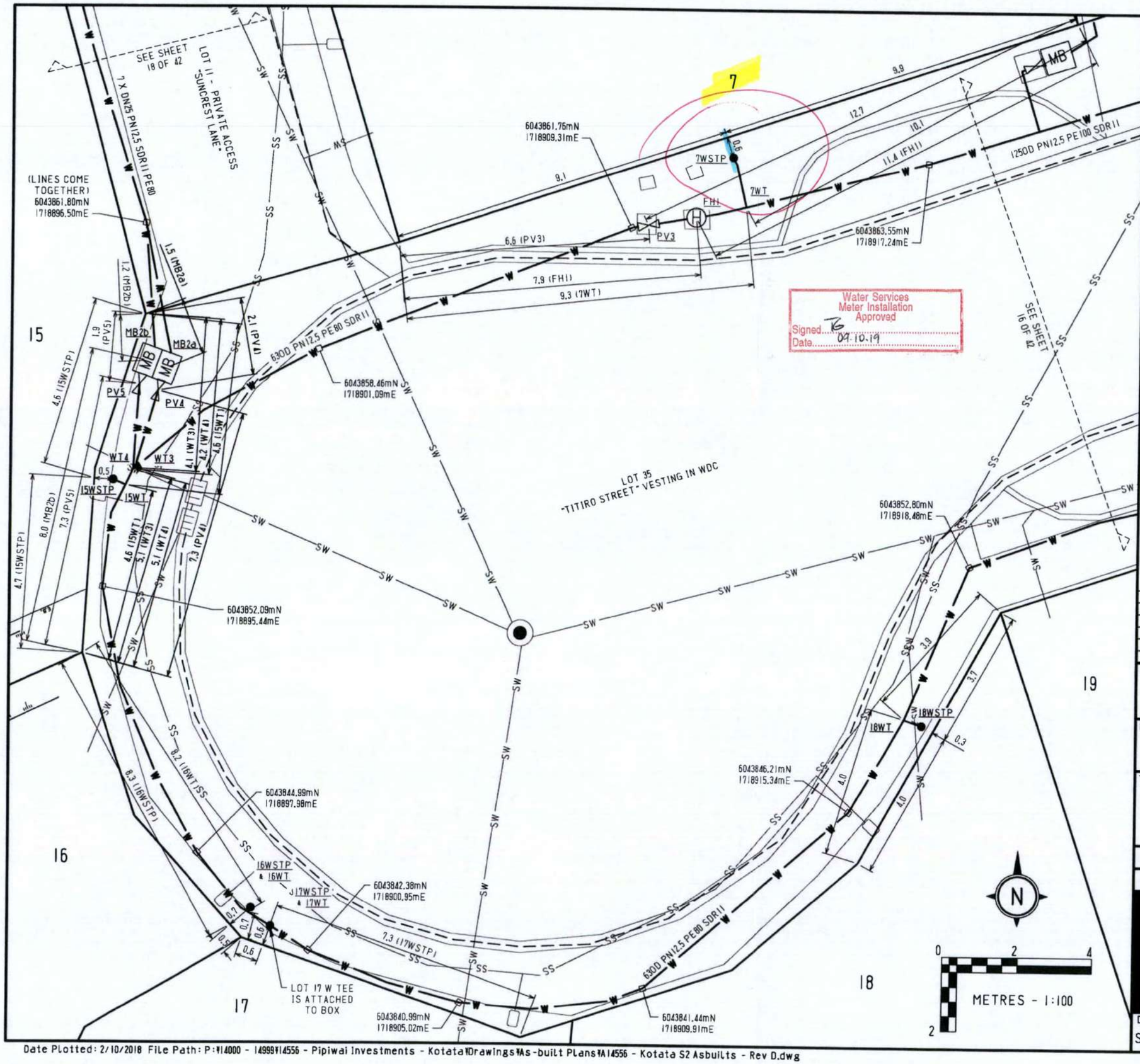
30 SEP 2019
WHANGAREI DISTRICT COUNCIL

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- COORDINATES IN TERMS OF : NZ TRANSVERSE MERCATOR 2000
- LEVELS IN TERMS OF : ONE TREE POINT (1964) DATUM

1. ALL SW SERVICE CONNECTIONS ARE 100mm ϕ uPVC SN6.
2. ALL LINES CONNECTING MANHOLES AND CESSPITS ARE 300mm ϕ RCRRJ PIPE UNLESS OTHERWISE SHOWN
3. ALL SS SERVICE CONNECTIONS ARE 100mm ϕ uPVC SN6.
4. ALL LINES CONNECTING MANHOLES AND LAMPHOLES ARE 150mm ϕ UPVC PIPE UNLESS OTHERWISE SHOWN
5. ALL SINGLE WATER SERVICE CONNECTIONS ARE DN25 PN12.5 SDR11 PE80.
6. PE PIPES DIA ARE OD, ALL OTHER PIPE TYPES ARE ID MEASUREMENTS.
7. ALL NEW WATER SERVICE CONNECTIONS TO NEW MAINS ARE AS SHOWN ON THE PLAN.
8. WATER CONNECTION TO LIVE MAIN COMPLETED BY WATCO PLUMBING LTD.

RECEIVED - CUSTOMER SERVICES
30 SEP 2019
WHANGAREI DISTRICT COUNCIL

AS-BUILT RECEIVED
Signed:
Date: 4/10/18

WHANGAREI DISTRICT COUNCIL
Infrastructure & Services Group
ASSET DATA TEAM APPROVED
Signed: Dated: 5-10-18

| REV | DATE | AMENDMENTS |
|---|---|---|
| D | 02.10.18 | AMENDMENTS FOR WDC - SB |
| C | 06.09.18 | AMENDMENTS FOR BDX REVIEWER - SB |
| B | 03.09.18 | FIRST ISSUE OF FULL SET - SB |
| A | 13.08.18 | DRAFT ISSUE, ASSET SHEETS TO BE COMPLETED - SB |

REF. DATA:

CLIENT
KOTATA DEVELOPMENTS
KOTATA RISE, WHANGAREI

DESCRIPTION
LOTS 1 TO 37 LT 525547 BEING A SUBDIVISION OF LOT 15 DP 513969

TITLE
# ASBUILT PLAN
## WATER LAYOUT : TITIRO ROAD

SCALE : 1:100 @A3

COUNCIL REFERENCE : SD1700159 & P54135

reyburn & bryant
Ph: 09 438 3563
7 Selwyn Ave, Whangarei
PO Box 191, Whangarei 0140
www.reyburnandbryant.co.nz

| DRAWING REF. | | SHEET | REV |
|---|---|---|---|
| STAGE : 2 | A14556 | 17 OF 42 | D |

Date Plotted: 2/10/2018 File Path: P:\14000 - 14999\14556 - Pipiwai Investments - Kotata\Drawings\As-built Plans\A14556 - Kotata S2 Asbuilts - Rev D.dwg

Jennian HOMES
Your personality Our expertise

RECEIVED - CUSTOMER SERVICES
30 SEP 2019
WHANGAREI DISTRICT COUNCIL

Water Services Meter Installation Approved
Signed B
Date 09.10.19

R.O.W

66.0

340°57' 5.00

345°34' 17.91

70°28' 18.99

MB

1.5m Bdy RESTRICTION

65.0

64.0

5,951

2.000 FROM SLOPE

5.0m Dia. OUTDOOR LIVING COURT

4,967

2.0m Bdy RESTRICTION

CONCRETE PAD 2.00m² APPROX

TAP 2,128

70°28' 18.99

WATER CONNECTION

POWER CONNECTION

DAYLIGHTING POINT 'B'

250°08' 19.82

1.0m Bdy RESTRICTION

PROPOSED NEW RESIDENCE
FFL: 63.600
CUT: 63.300

CAR 2
4.77 x 1.88m

2,281

DAYLIGHTING POINT 'C'

PROPOSED DRIVEWAY (INDICATIVE ONLY) 49.00m² APPROX

CAR 1
4.77 x 1.88m

ECOFLOW SEPTIC PUMP STATION

63.0

7,150

TAP

7,437

2,334

1.5m Bdy RESTRICTION

2,334

9,722

DAYLIGHTING POINT 'A'

342°29' 22.74

SANITARY SEWER CONNECTION

STORMWATER CONNECTION

7,061

9,438

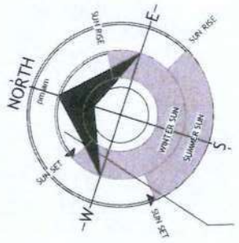
63.0

SUNCREST LANE

TITIRO STREET

## LOT 7 DP 525547
## 470m²

| | |
|---|---|
| WIND ZONE | VERY HIGH |
| EARTHQUAKE ZONE | 1 |
| CORROSION ZONE | C |
| SNOW LOADING | N0 |
| BUILDING FOOTPRINT: | 126.21m² |
| SITE COVERAGE: | 26.85% (35% MAX) |
| IMPERMEABLE AREA: | 177.21m² |




REFER TO RS ENG LTD SUITABILITY REPORT No/ 15450

LEVELS IN TERM OF ONE TREE POINT (1964) DATUM

**EARTHWORK CALCULATIONS:**

CUT
V=125m³ (INCL. FOOTPRINT)
MAX. HEIGHT= 0.4m

FILL
V=30m³ (INCL. FOOTPRINT)
MAX. HEIGHT= 0.2m

PATIO AND PAVING TO FRONT DOOR TO COMPLY WITH NZBC D1 2.1 SLIP RESISTANCE TABLE 2.
- MAXIMUM STEP HEIGHT TO ALL COMMON / MAIN PRIVATE STAIRWAYS TO BE 190mm. (INCLUDES ALL EXTERNAL DOOR WAYS)



Client: JEMMA & JOSEPH STEVENSON
LOT 7 DP 525547
2 SUNCREST LANE, KOTATA HEIGHTS, WHANGAREI

Drawing: SITE PLAN
SCALE 1:100 @ A3

Revision: WD-B WORKING DRAWINGS

elevation key 3 4 2 1

Date: 25 SEP 19
Job #: JNL 19011
Drawn: S.B.
Checked: S.B.
Amended: S.B.

Sheet: 2/17

Or ask for Infrastructure Projects and Support

WHANGAREI DISTRICT COUNCIL
Forum North, Private Bag 9023
Whangarei 0148, New Zealand
Telephone: +64 9 430 4200
Facsimile: +64 9 438 7632
Email: mailroom@wdc.govt.nz
Website: www.wdc.govt.nz

4 November 2019

Jemma Ola Margaret Stevenson
Joseph Phillips Andrew Stevenson
28 Parry Road
RD 8
Whangarei 0178

Dear Sir/Madam

## Utility Services Application No. PU191348

**2 Suncrest Lane (Pvt) Whangarei 0110**

The application at the above address has been approved as at **16/10/2019.**

**Condition:**
Council approved contractor to carry out the work.
Inspection to be installed as per Council EES Standards.

Please have this letter and the approved plans on site at time of inspection, as the inspector will require verification of Council's approval.

To arrange for an inspection please contact the Infrastructure Projects and Support Administration Team on (09) 470 3137. Requests for inspections requiring WDC presence are to be made a minimum of 24hrs ahead of time. The contractor may complete the connection and backfill if the Inspection was booked but not attended by the Inspector at the time requested.

It is the applicant's responsibility to ensure the final 'as-built' drawing is supplied within one month of inspection. The as-built will have to comply with the Council's current Environmental Engineering Standards.

Yours faithfully

Laynne Haretuku
**Infrastructure Support**

R.O.W

66.0

340°57' 5.00

345°34' 17.91

70°28' 18.99

1.5m Bdy RESTRICTION

65.0

64.0

5,951

2,000 FROM SLOPE

5.0m Dia. OUTDOOR LIVING COURT

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2.0m Bdy RESTRICTION

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POWER CONNECTION

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PROPOSED NEW RESIDENCE

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DAYLIGHTING POINT 'C'

PROPOSED DRIVEWAY (INDICATIVE ONLY) 49.00m² APPROX

ECOFLOW SEPTIC PUMP STATION

63.0

7,150

TAP

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1.5m Bdy RESTRICTION

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SANITARY SEWER CONNECTION

STORMWATER CONNECTION

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9,438

63.0

SUNCREST LANE

TITIRO STREET

## LOT 7 DP 525547
## 470m²

| | |
|---|---|
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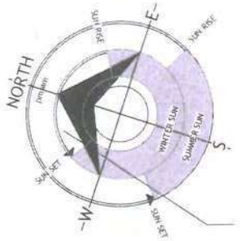
| EARTHQUAKE ZONE | 1 |
| CORROSION ZONE | C |
| SNOW LOADING | N0 |
| BUILDING FOOTPRINT: | 126.21m² |
| SITE COVERAGE: | 26.85% (35% MAX) |
| IMPERMEABLE AREA: | 177.21m² |




REFER TO RS ENG LTD SUITABILITY REPORT No/ 15450

LEVELS IN TERM OF ONE TREE POINT (1964) DATUM

**EARTHWORK CALCULATIONS:**

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V=125m³ (INCL. FOOTPRINT)
MAX. HEIGHT= 0.4m

FILL
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PATIO AND PAVING TO FRONT DOOR TO COMPLY WITH NZBC D1 2.1 SLIP RESISTANCE TABLE 2.
- MAXIMUM STEP HEIGHT TO ALL COMMON / MAIN PRIVATE STAIRWAYS TO BE 190mm. (INCLUDES ALL EXTERNAL DOOR WAYS)

ater / Stormwater Approved

Signature

Date 09/10/19



Jennian HOMES

Your personality Our expertise



Client: JEMMA & JOSEPH STEVENSON
LOT 7 DP 525547
2 SUNCREST LANE, KOTATA HEIGHTS, WHANGAREI

Drawing: SITE PLAN
SCALE 1:100 @ A3

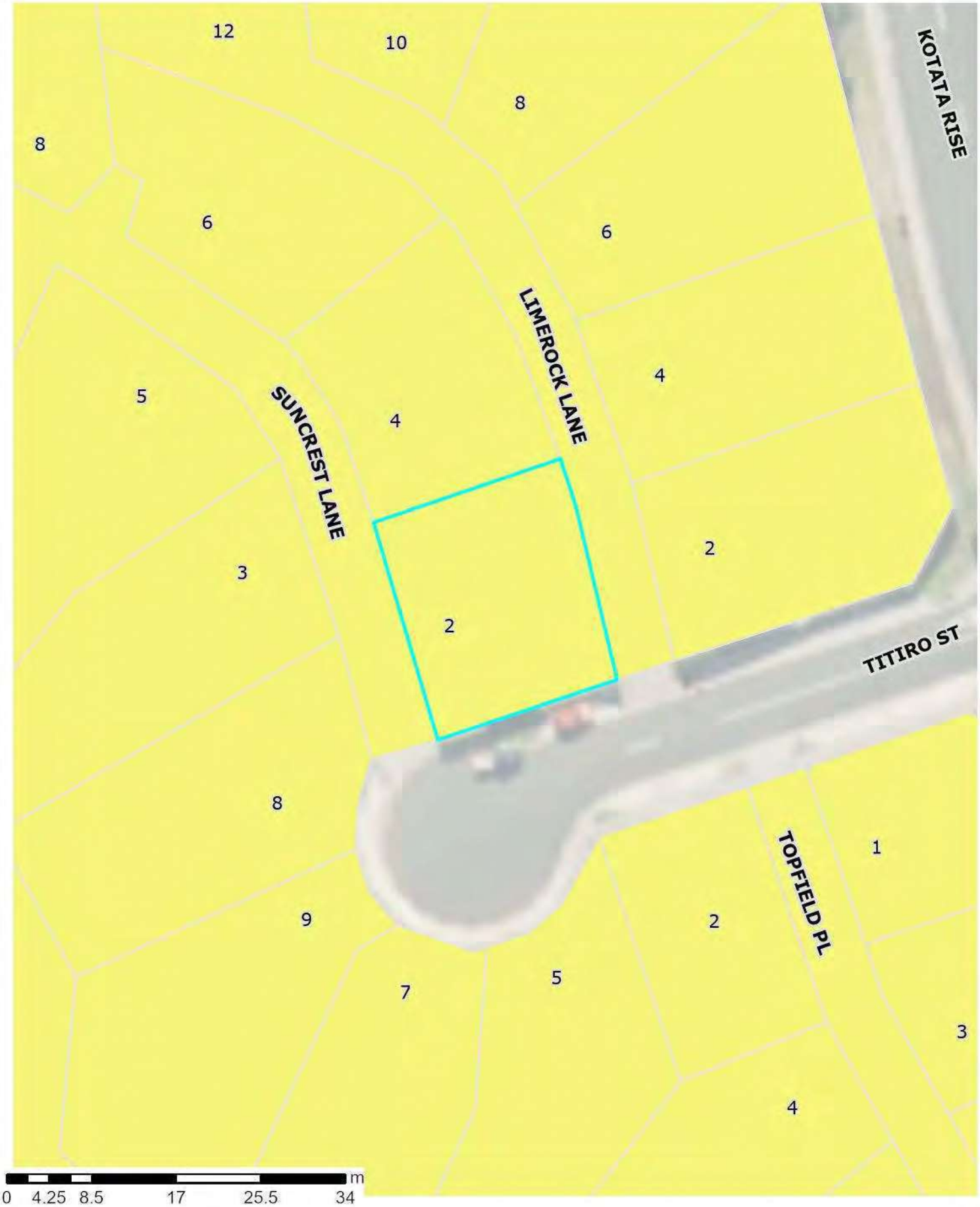
Revision: WD-B WORKING DRAWINGS

elevation key

Date: 25 SEP 19
Job #: JNL 19011
Drawn: S.B.
Checked: S.B.
Amended: S.B.

Sheet: 2/17

# Operative District Plan - Area Specific Matters




The information displayed is schematic only and serves as a guide. It has been compiled from Whangarei District Council records and is made available in good faith but its accuracy or completeness is not guaranteed.

28 July 2026
Scale 1:500

# Operative District Plan – Map Legend

Whangarei District Council

## District-Wide Matters

### Energy, Infrastructure and Transport

- National Grid Tower
- Northpower Tower CEL-Cat1
- National Grid Line
- Northpower Overhead Critical Line Cel-Cat1
- Northpower Critical Overhead Lines CEL
- Northpower Critical Underground Lines CEL
- Airport Runway
- Indicative Road
- National Road
- Regional Road
- Arterial Road
- Primary Collector Road
- Secondary Collector Road
- Low Volume Road
- Access Road
- Strategic Road Protection Area
- Strategic Railway Protection Line

### Hazards and Risks

- Coastal Hazard Area 1
- Coastal Hazard Area 2
- Flood Susceptible Areas
- Mining Hazard Area 1
- Mining Hazard Area 2
- Mining Hazard Area 3

### Historical and Cultural Values

- Notable Tree Overlay
- Heritage Item Overlay
- Sites of Significance to Maori
- Heritage Area Overlay
- Areas of Significance to Maori

### Natural Environment Values

- Esplanade Priority Area
- Coastal Marine Area (CMA) boundary
- Goat Control Areas
- Outstanding Natural Feature
- Outstanding Natural Landscape

### General District-Wide Matters

- Airport Noise Boundary
- Outer Control Boundary
- Helicopter Hovering Area
- Noise Control Boundary Overlay
- Rail noise alert area
- Rail vibration alert area
- QRA Quarrying Resource Area
- QRA Mining Area
- QRA Buffer Area
- QRA 500m Indicative Setback
- Coastal Environment Overlay
- Outstanding Natural Character Area
- High Natural Character Area

## Area Specific Matters

- Designation
- Precinct
- Development Area

### Residential Zones

- Large Lot Residential Zone
- Low Density Residential Zone
- General Residential Zone
- Medium Density Residential Zone

### Rural Zones

- Rural Production Zone
- Rural Lifestyle Zone
- Settlement Zone Residential Sub-Zone
- Settlement Zone Centre Sub-Zone
- Settlement Zone Industry Sub-Zone

### Commercial and Mixed Use Zones

- Local Centre Zone
- Neighbourhood Centre Zone
- Commercial Zone
- Mixed Use Zone
- Town Centre Zone
- City Centre Zone

### Industrial Zones

- Light Industrial Zone
- Heavy Industrial Zone

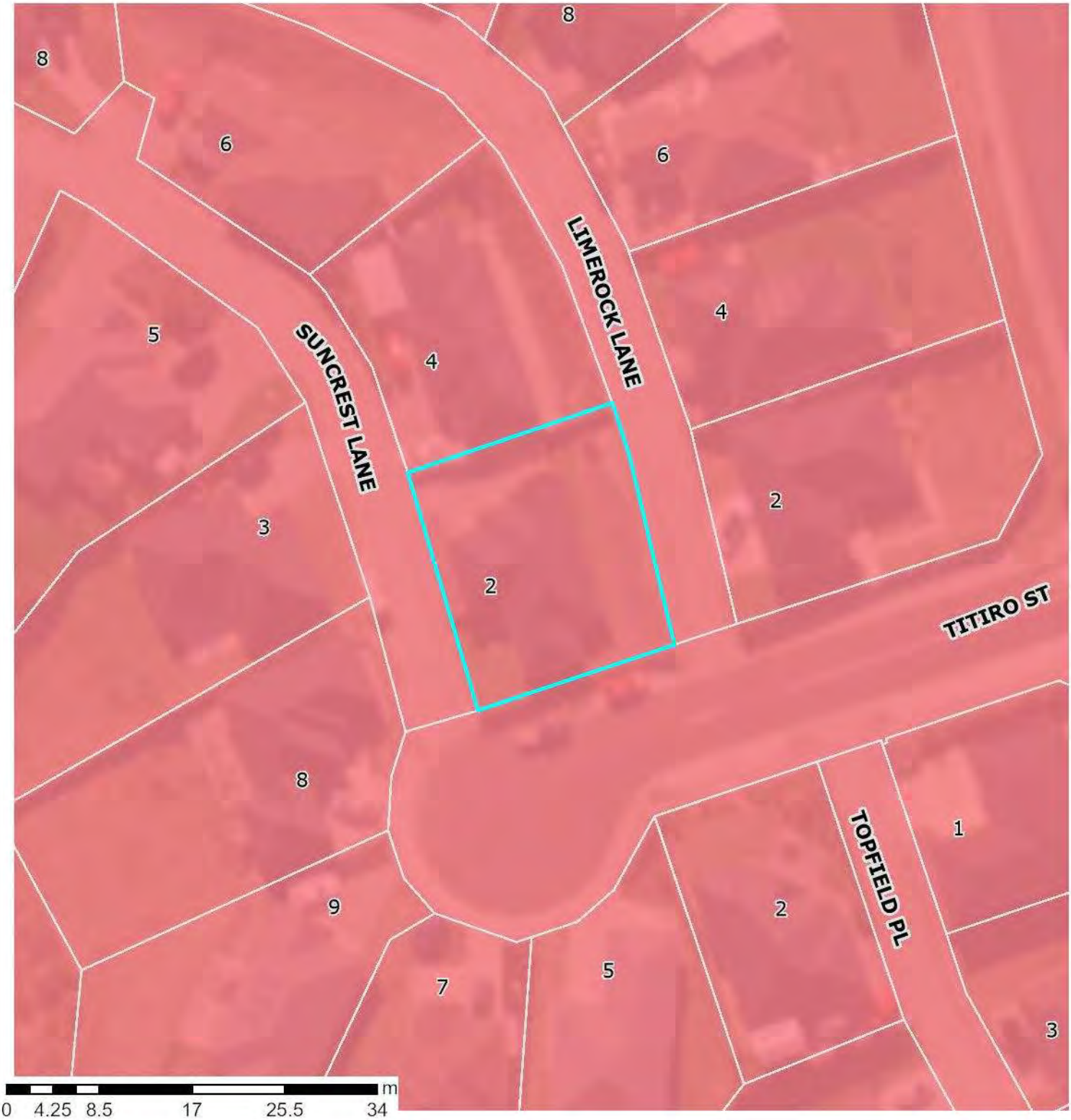
### Open Space and Recreation Zones

- Natural Open Space Zone
- Open Space Zone
- Sport and Active Recreation Zone

### Special Purpose Zones

- Airport Zone
- Future Urban Zone
- Fonterra Kauri Milk Processing SRIZ – Ancillary Irrigation Farms
- Hospital Zone
- Port Zone
- Ruakaka Equine Zone
- Shopping Centre Zone
- Strategic Rural Industries Zone
- Waterfront Zone

# District Plan Change 1 - Natural Hazards
# Land Instability




PC1 - Natural Hazards
Land Instability

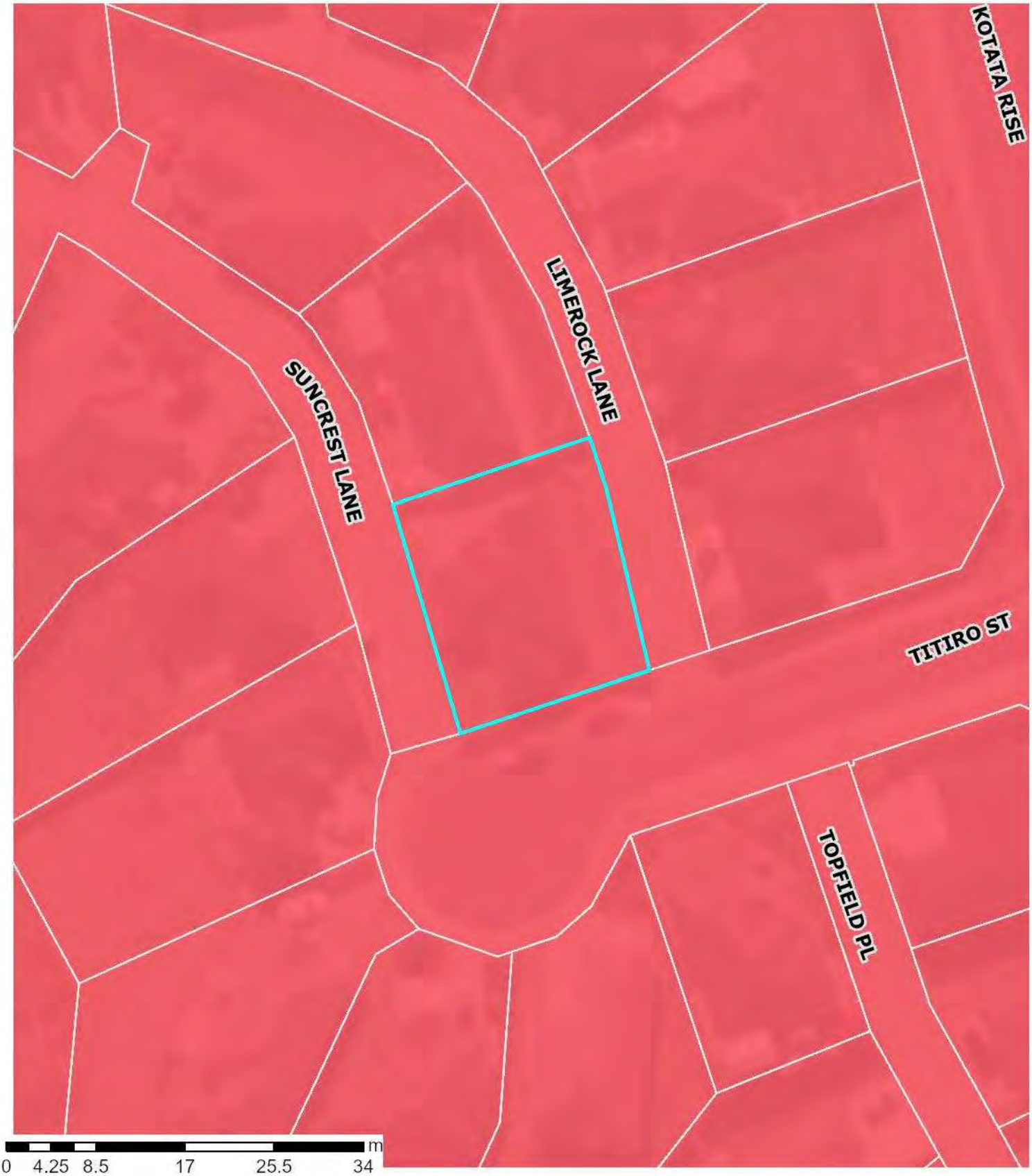
- High Susceptibility to Land Instability
- Moderate Susceptibility to Land Instability

28 July 2026
Scale 1:500

Information provided on this map forms part of Plan Change 1 – Natural Hazards.
To view the maps and see how the changes may affect the property please visit:
https://www.wdc.govt.nz/Services/Planning/District-Plan-changes/Current-plan-changes.

# Land Instability

Whangarei District Council




Landslide Susceptibility Zone

- High
- Moderate
- Low

28 July 2026

Scale 1:500

Whangārei District Council holds indicative information on land stability hazard for Whangārei. The Whangarei District Council may require site-specific investigations before granting future subdivision or building consent for the property, depending on the level of stability risk of the area the property is in. Tonkin + Taylor Ltd Landslide Susceptibility assessment report: https://www.wdc.govt.nz/files/assets/public/v/2/documents/council/reports/hazard-reports/land-stability/landslide-susceptibility-technical-report.pdf