



Technical memorandum for an application for subdivision consent under the Resource Management Act 1991 in respect of 42 Okura Road, Elsthorpe

To: Ryan O'Leary, Planning Manager, The Property Group

From: Lee Paterson, Senior Geotechnical Engineer, Stantec

1. Application details

Applicant's name: SR & BJ Williams Charitable Trust Board (**Applicant**)

Application number: RM230016

Activity type: Eleven lot fee simple rural subdivision (8 Rural Lifestyle Lots)

Site address: 42 Okura Road, Elsthorpe, legally described as Lot 2 DP 481291 (RT 674477) (**Property**)

2. Introduction

Qualifications and relevant experience

- 2.1. My name is Lee Paterson, and I am a Senior Geotechnical Engineer at Stantec.
- 2.2. I have a Bachelor of Science (Civil Engineering) with Geology from the University of Geology.
- 2.3. I am a natural hazards advisor for several local authorities around the country including the Dunedin City Council and the Central Hawke's Bay District Council.
- 2.4. I have been providing natural hazards advice nationally since 2009.

3. Overview and scope of technical memorandum

- 3.1. The Applicant has applied for a resource consent to subdivide the Property into:
 - a. 8 Rural Lifestyle Lots plus two balance lots;
 - b. two balance allotments (Lots 11 and 12); and

- c. a separate lot (Lot 13) to be amalgamated with the adjoining property at 38 Okura Road (legally described as Lot 1 DP 25627).
- 3.2. This technical memorandum assesses the geotechnical effects of the Application to assist the preparation of the Central Hawke’s Bay District Council’s **(Council)** reporting planner’s report under s 42A of the RMA and will cover the following matters:
- a. Peer review of the applicant’s assessment of geotechnical hazards associated with slope stability; and
 - b. Peer review of appropriate specific engineering advice from the applicants engineer
- 3.3. In preparing this technical memorandum, I have reviewed the following documents relevant to the Application:
- a. Applicant’s resource consent application (**Application**), and in particular:
 - i. RDCL geotechnical assessment report “10 Lot Subdivision, Mangakuri beach” ref 19385C-03 dated 7 August 2023
 - ii. RDCL Response Geotechnical Report Review Version 03 & 04. Ref No. R19385B-04 dated 7 August 2023
 - iii. RDCL geotechnical assessment report “LOT 1 & 2, Mangakuri beach subdivision” ref 19385C-05 dated 6 October 2023
 - b. Stantec also has met with the applicant’s agent (RDCL) in an audio-visual meeting and discussed the concerns that we had with the original reporting, and detailed the requirements to be met in future amendments.

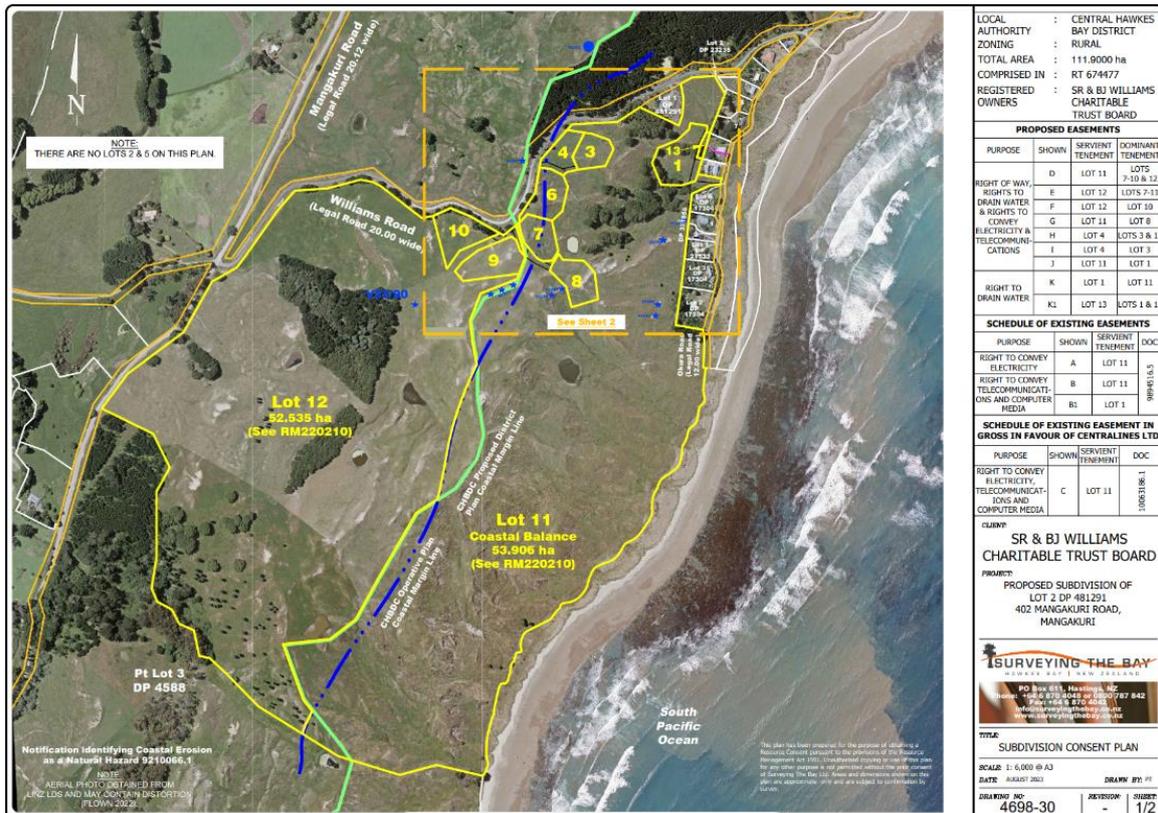
4. Executive summary

- 4.1. The identification and assessment of risk to each proposed lot is robust and the slope stability assessments in the updated report demonstrates that each slope in the vicinity of the building platforms meets best practice requirements for stability.
- 4.2. Many submitters note significant stability issues on their own properties. No specific hazard / risk assessment has been undertaken on the adjacent properties within the applicant’s assessment. There is always a potential that the existing risk for natural hazards on these properties may not be “low”. We cannot verify from the assessment undertaken what risk these properties have from natural hazards.
- 4.3. I am satisfied that the applicant’s agents have confirmed as part of their assessment that the proposed work will not have a detrimental effect on adjacent properties, exacerbating or creating additional risk to adjacent land.

5. Overview of Application

- 5.1. The Application describes the subdivision proposal in detail. However, by way of summary, involves an 11-lot subdivision of land comprising of eight rural lifestyle allotments (Lots 1, 3, 4, 6 to 10), two balance allotments (Lots 11 and 12) and a separate lot (Lot 13) to be amalgamated with the adjoining property at 38 Okura Road (legally described as Lot 1 DP 25627). It is to be

completed over four stages. An excerpt of the proposed scheme plan is included in **Figure 1** below.



- 5.2. The Application is for subdivision consent only, and no land use consent has been applied for in relation to development of the proposed lots (e.g. for potential non-compliance of development with the Operative Central Hawke’s Bay District Plan’s Rural Zone’s permitted activity rules, such as minimum setbacks of residential dwellings from internal boundaries).
- 5.3. I understand that the subdivision proposal requires consent as a discretionary activity pursuant to rule 9.9.4 of the Operative Plan as it is unable to comply with all relevant subdivision performance standards in standards 9.10(1)(a)-(i) of the Operative Plan.

6. Summary of proposal (relevant to Land and Building Platform Stability)

- 6.1. The application adopts the recommendations stated below from the RDCL Geotechnical Report (Appendix E) and will complete all earthworks associated with the construction of vehicle access and building platform and complete all stormwater infrastructure prior to seeking certification under section 224 of the RMA. Any enduring requirements of the adopted conditions, including being in accordance with the recommendations contained within the Geotechnical Report for foundation design, an outcome secured by a consent notice. The conditions proposed by the applicant are repeated for completeness. These would be secured by consent notice.

Conditions Proposed by the applicant:

- Lots 3 to 11 building platforms should be lowered (excavated) to form a level building platform and to reduce the risk of further land instability.
- Lot 1 should not be subjected to excavation at the toe of the slope due to risk of land stability.
- Lot 1 may be subjected to fill with geotechnical consideration.

- *Where land falls below the building platform:*
 - *Building setback of 5 m is recommended inside the break in slope (slope crest) for all building platforms formed on cut where ground slopes away exceeding 20 degrees; and/or*
- *Where land rises above the building platform:*
 - *Building setback of 5m from the toe of slope is recommended where ground rises above the building platform (Lots 1).*
- *Building Platforms should be formed entirely within Natural ground (Cut). Engineered Fill should be designated for minor structures and landscaping only unless modified and certified acceptable.*
 - *All materials excavated from this site in preparation for being used as engineered fill should be tested to confirm the presence of expansive clay soils in accordance with NZS3604:2011.*
 - *Expansive clay soils can only be reused if modified.*
- *All cut slopes should be formed at 1V:1.5H and fills at 1V:2H.*
- *Subsoil drains should be installed where seepage occurs relative to the building footprint or fill placement and in particular on the eastern side of the building platform and where appropriate for road access where seepage is observed.*
- *Cut-off drains to be installed above building platforms and road cuts.*
- *Due to the expansive nature of soils, strict control on planting is required. We recommend all cut and fill slopes and stormwater and effluent discharge areas to be planted with small shrubs and shallow rooting plants.*
- *Large tree species may not be planted within a horizontal distance equivalent to the mature tree height of any pertinent structure (house, road, stormwater, drainage).*
- *Stormwater Pond to be assessed and designed by competent engineers considering embankment suitability and slope stability”.*

6.2. No building platforms are identified for Lots 11 and 12. The application states that these lots have the ability to be developed in accordance with the permitted activity provisions of the ODP and PDP. However, the applicant has proposed consent notices¹ for these lots stating that no dwelling shall be established unless any application for building consent is accompanied by:

- *a geotechnical report from a suitably qualified engineer verifying the appropriateness of the proposed building platform and associated access way for a residential dwelling; and*
- *an archaeological report from a suitably qualified archaeologist verifying that the proposed building platform and associated access will not modify or destroy any known archaeological sites”.*

7. Site locality and description of the environment (relevant to Land Stability)

7.1. The development proposes to undertake significant residential activity on the site. It is clear from aerial imagery and available topography that the site has globally suffered from previous signs of movement.

7.2. There are significant signs of previous landslide movement and erosion on the southeastern faces of the hill to the south of the existing village. These movements are anticipated to be

¹ Applicant's AEE pg 17

event-driven, and RDCL suggests that the instabilities in the locality of the proposed dwelling Lots has a low risk of movement in the life of the development (100 years). There are several stock ponds present on the hillside. The northwestern aspect appears to be generally less affected by previous instabilities.

8. Outline of Peer Review process

- 8.1. The applicant was aware of the obvious signs of historical movement and erosion present both locally and on adjacent property. They appointed RDCL as geotechnical specialist to undertake testing and provide an assessment on the suitability of the site for development and the factors of safety against potential movement under serviceable and ultimate loading conditions.
- 8.2. Review of the documentation originally provided was undertaken by two members of Stantec staff to ensure that a consensus opinion was achieved. I was the supervising senior engineer associated with this process. The other engineer was Mr Gueirero referred to in the Council's Notification Decision.
- 8.3. This process highlighted a number of requests back to our RDCL for clarification and additional modeling. RDCL provided a revised risk assessment, additional modelled load cases, and designation of appropriate minimum setbacks from potential extents of future ground movement in a major seismic event.
- 8.4. Proposed development areas where factors of safety did not meet current minimum industry standards for ultimate seismic stability factor of safety of 1.1 in a ULS load case were modelled by RDCL. RDCL then proposed reductions in ground level for some proposed Lots, and the general requirement to control overland stormwater flows through appropriate cutoff drainage in order to mitigate risk and achieve minimum required factors of safety in those locations.
- 8.5. Whilst RDCL recognised the initial risk assessment was not "low" for most of the site, their detailed site-specific assessment indicated that, with appropriate engineering mitigation, all of the proposed building platforms and accessways were suitably stable and met minimum factors of safety for industry standards.
- 8.6. Following cyclone Gabrielle, Stantec noted that there was the potential for significant additional erosion on site, and that the original information provided with the application should be updated to reflect the current ground. This work was carried out with additional capture by drone photogrammetry and the land stability assessment was updated accordingly. RDCL confirmed that there was no significant movement as a result of the Cyclone Gabrielle event.
- 8.7. Stantec met with the applicant and RDCL to discuss elements of the final report that still required clarification, and this report was again amended / revised with all identified issues addressed.
- 8.8. I note that Stantec has carried out a peer review and has therefore not carried out any parallel calculations to confirm any of the modeled factors of safety provided by RDCL. However we have confirmed that the procedures undertaken by RDCL are in accordance with recommended industry best practice.

9. Technical assessment of effects

- 9.1. RDCL undertook an initial risk assessment of the property geohazards and correctly identified that the potential risk associated with land movement was high generally and moderate in

some places, triggering the requirement for site-specific risk assessment and modelling to quantify actual factors of safety against movement.

- 9.2. A comprehensive geotechnical investigation has been undertaken on the site to allow stability analysis to be undertaken.
- 9.3. Material properties, such as density, internal cohesion, friction and undrained shear strengths have been clearly discussed and recommended within the assessment provided, and we see no reason to question the geotechnical parameters used in the design.
- 9.4. Whilst the material strengths adopted in the design are conservative and defensible, we do note that the factors of safety resulting from these adopted parameters are not significantly greater than the minimum requirements for best practice, being 1.1 seismic (ULS), 1.2 Saturated elevated ground water model, and 1.5 Static Drained. Were lower material strength parameters adopted, this might result in insufficient factors of safety in the models used.
- 9.5. The slope stability modelling undertaken did identify a potential for factors of safety below the minimum required best practice, however these factors of safety did not directly impact any proposed building platforms and were limited to areas on adjacent ground. Minimum setbacks of 5m from these areas were proposed by RDCL, with insufficient specificity to properly set these out, and Stantec queried the suitability of these in light of the EQC coverage for land damage within 8 meters of buildings. As a result RDCL revised the minimum setbacks appropriately, with a clear requirement on the 5m distance set back from the 20 degree slope break-over.
- 9.6. The geotechnical stability modelling included static (drained) conditions under normal anticipated groundwater levels, static (drained) conditions under elevated groundwater levels that might result from prolonged rainfall, and significant seismic analysis undertaken during normal groundwater levels. We agree with this choice of modelled loading conditions is appropriate for assessing stability risk.
- 9.7. RDCL's position is that whilst movement has previously occurred in some locations on the application site, there is a low likelihood of occurring within the life of the development, and the factors of safety against instability make the likelihood of significant deflections low.
- 9.8. Subsequent to the revisions to the geotechnical assessment reported by RDCL, and amendments made to the proposal since it was first lodged in response to these revisions, we are satisfied that a thorough and robust engineering assessment has been undertaken.
- 9.9. We see no reason not to accept the conclusions from RDCL in this respect. We would anticipate, however, that Building Control will require a site specific engineering certificate in the form of a Producer Statement Design (PS2) explicitly confirming that the ground is suitably stable to support the development globally, and that the proposed developments will not create or exacerbate instability on this or adjacent property.

10. Statutory considerations

Operative Plan

- 10.1. There are clear requirements for subdivision of land not to be undertaken on ground classified as moderate or high risk, without a site-specific geotechnical assessment being undertaken to confirm that the ground is either low risk in its current condition or can be made low risk for residential activity through mitigations.

10.2. RDCL's assessment has demonstrated the stability of the site through significant geotechnical modelling and assessment, and also recorded that there was insignificant land movement recorded after a super design rain event (Gabrielle). As a result Stantec sought confirmation that instability is unlikely to occur in the design life, and RDCL confirmed that this is their position.

Submissions relevant to relevant to Land Stability

10.3. Almost all of the submissions opposing the subdivision raise concerns about land stability. These are set out and considered below.

10.4. Submitters note that there are readily apparent signs of prior movement on the property.

10.5. I agree that the landform has definitely been subject to prior movement. This impacted the level of scrutiny that we placed on the RDCL geotechnical assessment and slope stability modelling.

10.6. Modelling confirms that the areas proposed for residential activity are either suitably stable, or can be made such through excavations.

10.7. Submitters note that there is difficulty in insuring existing properties as a result of land instability and raised concerns about the future liability of land movement affecting their property.

10.8. I am sympathetic to local landowners difficulties regarding stability on their own property. However, RDCLs modelling indicates that the proposed activity is not anticipated to increase risk on adjacent land. As set out above, we consider that this conclusion was reached following a technically robust assessment.

10.9. Future proposed construction will have to be suitably designed to ensure that it meets Building Consent minimum requirements.

10.10. Coastal erosion is raised as a potential risk affecting the local community.

10.11. Whilst I recognise that this is a significant issue for those residents close to sea level, or within direct effect of potential future coastal erosion / retreat, this issue is unlikely to be exacerbated by or unlikely to affect the proposed development, which is set significantly above potential coastal inundation levels.

10.12. There are concerns from some submitters that concentrated stormwater runoff from up the hill may increase the likelihood of erosion or instability on the existing properties downslope.

10.13. There are already well understood overland flow paths, and the application suggests that stormwater retention be applied in order to mitigate the issue of increased runoff flows from hardstandings.

10.14. The existing hillside has a number of small stock ponds with potential adverse effects. The proposed stormwater retention ponds can be readily designed to be less permeable and better engineered than the ponds already present on site.

10.15. Some submitters are concerned that earthworks and construction processes may result in uncontrolled discharge of sediment off the site.

- 10.16. Sediment will need to be actively managed by any proposed developer. It is likely that the proposed stormwater controls could also do duty as sediment capture controls as well.
- 10.17. There is significant concern over the liability of either the Council, or the developer to cover any future damage affecting downslope properties.
- 10.18. Whether any liability was created in the future would depend on specific fact scenarios.
- 10.19. The Council would seek certification at Building Consent stage from any developers that their actions will not create or exacerbate these risks on the developer site or adjacent property.
- 10.20. The developer has suggested that the effects of the proposed residential activity will be readily mitigated, and could also offer some improvement in terms of present stormwater controls.

11. Recommendation and conditions

Adequacy of information

- 11.1. The above assessment is based on the information submitted as part of the Application and the subsequent engagement. I consider that the information submitted is sufficiently comprehensive to enable the consideration of the above matters on an informed basis. In particular:
- a. The level of information does provide a reasonable understanding of the nature and scope of the proposed activity as it relates to the Operative Plan, the Proposed Plan, and industry best practice.
 - b. The extent and scale of any adverse effects on the environment in terms of land stability are able to be assessed.
 - c. Whilst there are obvious indications of prior movement on the general topography for this entire region, the applicant's geotechnical experts are of the view that these will not be exacerbated on this or adjacent properties, and that the likelihood of future movement affecting the proposed residential activity will be appropriately low.

Conditions: Land Stability

- 11.2. The applicant's proposed conditions are stated above in section 6 Summary of Proposal, and are generally in accordance with the recommendations from the RDCL Geotechnical Report.
- 11.3. These conditions are unsurprising, and generally adequate. However, I consider that some of them are not specific enough to achieve the mitigation intended if.

Recommended Amendments to Conditions and plans

- 11.4. Plans should show "no build" zones to inform setbacks in survey set-out terms, rather than potentially ambiguous relationships to breakover slope angles.
- 11.5. Excavations are proposed to lower some sites to a level in order to achieve suitable factors of safety. This level should be explicitly defined in the conditions.

11.6. Although not explicitly required for ground stability in the modelling, there references to “large” or “small” plants. I recommend that the actual recommended species, or some more specific descriptor should be applied in a planting plan for review to ensure that these meet the expectations of this condition.

Conclusion

11.7. I remain sympathetic to the obvious signs of historic slips present on this property and reflected concerns regarding stability back to the applicant’s agent for additional detail in the initial risk assessment and several subsequent review processes.

11.8. RDCL has undertaken a significant revision of their geotechnical assessment in light of additional site inspections and drone survey post cyclone Gabrielle, as well as detailed numerical modeling associated with the stability of the proposed platforms and immediately adjacent ground. This modelling indicates that minimum best practice factors of safety are present for the proposed dwelling platforms.

11.9. Whilst the existing landform beyond the proposed residential activity is clearly affected by natural hazards associated with land stability, there is a firm assessment that the proposed development will not create or exacerbate instabilities on this or adjacent landforms in neighbouring properties. Notwithstanding that it is possible that existing residents may suffer the effects of future land movement whether the proposed development goes ahead or not.