

# GEOTECHNICAL SERVICES PROPOSAL



**Date:** 12 March 2021

**Project:** 751 & 787 Kaipara Coast Highway, Kaukapakapa

**Client:** Riverview Properties C/- The Planning Collective

**Initial Contact Person:** Burnette O'Connor (The Planning Collective)

**Proposal No:** AKL2021-0052AA Rev. 1

## 1.0 Introduction

Thank you for the opportunity to provide a proposal for geotechnical services for this project.

It is understood that you require a geotechnical appraisal for a proposed Private Plan Change Request for a section of land located at 751 and 787 Kaipara Coast Highway, Kaukapakapa. The Plan Change will seek to rezone land presently zoned as Countryside Living to Residential-Rural and Coastal Settlement. In parallel with the proposed plan change, application for subdivision consent will also be sought and hence this updated proposal covers geotechnical investigation and associated assessment as required.

CMW has previously been engaged to provide geotechnical services on the adjacent block of land located to the north of the subject sites.

After our phone discussions, we understand you require preliminary geotechnical appraisal (Stage 1 works), including comment on onsite wastewater disposal suitability, to support the Plan Change application.

Stage 2 works will follow that include a full geotechnical investigation and associated reporting to support Resource Consent application.

## 2.0 Scope of Work – Services to be provided

### Stage 1- Preliminary Geotechnical Appraisal

- Geotechnical desktop study of readily available geological and geotechnical data sources.
- Site walkover by a Senior Engineering Geologist.
- Brief letter report outlining the key geotechnical risks to the developments, based on the findings from the desktop study and walkover.

### Stage 2 – Geotechnical Investigation and Assessment

- Relevant H&S preparation and administration;
- On-site service location and site walkover;
- Undertake 10 no. hand auger boreholes to depths of up to 5m with regular shear vane tests completed during borehole advancement to assess the near surface profile, Scala penetrometer test of max. 1m depth will also be carried out at the base of each hand auger borehole should an early refusal be met;
- Laboratory testing comprising three (3 no.) shrink swell index tests;
- Prepare borehole logs (as per NZGS Field Description of Soil and Rock);
- Develop a representative geological model including site plan and geological section;
- Ground characterisation, hazard identification and foundation recommendations;
- Prepare a geotechnical investigation report (for Resource Consent application) outlining the ground conditions encountered, an assessment of relevant geohazards and any recommendations for future development and further work required.

## 3.0 Anticipated Programme

Stage 1 - We understand that you require our appraisal by 17 April 2021, however if we receive signed acceptance before 17 March we should be in a position to deliver our letter by 9 April to allow time for the civil engineer to read the letter and adjust their scheme plans if required.

Stage 2 - We would be in a position to complete the investigation fieldworks within 3 working weeks and a further 3 weeks for reporting following the completion of fieldworks and to allow for receipt of laboratory test results. We also noted a target date for Resource Consent application being in late May which would be achievable.

## 4.0 Exclusions to Scope

For clarity, the following items are specifically excluded from our scope of work:

- The design of any structures;

- Environmental assessment of the soils, including assessment of contaminants such as pesticides as required by NES 2012 for new land uses such as subdivision. We can arrange these services if required.
- Attendance at meetings.
- Any additional work or rework required due to changes in the supplied development proposals used for preparation of this proposal.
- Any additional work or rework required due to Council requirements after the submission of our report.

## 5.0 Additional Information / Prerequisites for Scope

- We will require open access to the property for our fieldwork and the restraint of any aggressive stock or pets.

## 6.0 Conditions of Engagement

Our work will be completed in accordance with the ACENZ Short Form Model Conditions of Engagement 2019 (copy attached). Clause 12 of the conditions is amended to:

*“The maximum aggregate amount payable, whether in contract, tort or otherwise, in relation to claims, damages, liabilities, losses or expenses, shall be five times the fee (exclusive of GST and disbursements) with a maximum limit of \$NZ500,000.”*

CMW payment terms are 20 days from date of invoice.

The rates presented below are valid for acceptance for 30 days from the date of this proposal.

Progress claims may be made on a monthly basis for projects of significant duration.

CMW will be uploading factual data from this investigation onto the New Zealand Geotechnical Database unless we hear from you to specifically advise otherwise.

## 7.0 Costs

Our proposed fees, exclusive of GST, to complete the scope of work outlined in Section 2.0 above are presented below:

| Item Description – CMW Fees (Stage 1 – Preliminary Geotechnical Appraisal) |                   |
|----------------------------------------------------------------------------|-------------------|
| Stage 1 - Desktop study, site walkover and geotechnical appraisal letter   | \$2,800.00        |
| <i>Stage 1 Sub-total (excluding GST)</i>                                   | <i>\$2,800.00</i> |

| Item Description – CMW Fees (Stage 2 – Geotechnical Investigation and Assessment)            |                   |
|----------------------------------------------------------------------------------------------|-------------------|
| Project management and H&S documents                                                         | \$800.00          |
| Field investigations, including hand auger boreholes and field tests                         | \$2,800.00        |
| Preparation of borehole logs, site plan and typical geological section                       | \$1,500.00        |
| Preparation of a geotechnical investigation report to support a Resource Consent application | \$2,500.00        |
| <i>Stage 2 Sub-total (excluding GST)</i>                                                     | <i>\$7,600.00</i> |

| Item Description – Sub-Contractor Fees |                   |
|----------------------------------------|-------------------|
| Underground service location           | \$400.00          |
| Laboratory testing                     | \$1,100.00        |
| <i>Sub-total (excluding GST)</i>       | <i>\$1,500.00</i> |

|                              |                    |
|------------------------------|--------------------|
| <b>Total (excluding GST)</b> | <b>\$11,900.00</b> |
|------------------------------|--------------------|

## 8.0 Authorisations

**For CMW Geosciences (NZ) Limited Partnership,  
PO Box 300206, Albany, Auckland 0752:**

*Prepared by:*



Jack Mynett-Johnson

**Project Engineering Geologist**

[jackmj@cmwgeo.com](mailto:jackmj@cmwgeo.com)

*Approved by:*



Richard Knowles

**Principal Geotechnical Engineer, CPEng**

[richardk@cmwgeo.com](mailto:richardk@cmwgeo.com)



**For the Client:**

Client Entity (company / trust / individual(s)): \_\_\_\_\_

Postal Address: \_\_\_\_\_

**Details of person authorising the work:**

Name: \_\_\_\_\_ Position: \_\_\_\_\_

Landline: \_\_\_\_\_ Mobile: \_\_\_\_\_

Email Address: \_\_\_\_\_

*I confirm that I am authorised to approve this proposal and instruct CMW to proceed with the works as described:*

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Purchase Order Number if applicable:** \_\_\_\_\_**Additional details of accounts person (to copy invoices to) if needed:**

Name: \_\_\_\_\_ Position: \_\_\_\_\_

Landline: \_\_\_\_\_ Mobile: \_\_\_\_\_

Email Address: \_\_\_\_\_

9 April 2021

Document Ref: AKL2021-0052AB Rev. 0

Riverview Properties Limited  
PO Box 540,  
Silverdale, 0944

Attention: Paul Boocock

Dear Paul

**RE: PRELIMINARY GEOTECHNICAL APPRAISAL  
751 & 787 KAIPARA COAST HIGHWAY, KAUKAPAKAPA**

## **1 INTRODUCTION**

CMW Geosciences (CMW) has been engaged by Riverview Properties Limited to undertake a preliminary geotechnical appraisal of 751 & 787 Kaipara Coast Highway, Kaukapakapa. This work has been carried out in accordance with our proposal referenced AKL2021-0052AA Rev. 1 dated 12 March 2021. No invasive site investigations have been carried out as part of this preliminary appraisal, which will be undertaken in the next phase.

We understand that this report will be used as part of a plan change application with Auckland Council. The plan change will seek to rezone land presently zoned as Countryside Living to Residential-Rural and Coastal Settlement.

## **2 RELATED REPORTS**

CMW have previously been engaged to provide geotechnical services on the adjacent block of land located to the north of the subject sites. The CMW reports from this project referenced are as follows:

- Geotechnical Investigation Report for the Proposed Residential Subdivision at 751 & 787 Kaipara Coast Highway, Kaukapakapa referenced AKL2016\_0462AB Rev. 1 dated 1 September 2016;
- Response to Section 92 Request from Auckland Council for 787 Kaipara Coast Highway referenced AKL2016\_0462AC Rev. 0 dated 15 November 2016;
- Further Response to Section 92 Request from Auckland Council for 787 Kaipara Coast Highway referenced AKL2016\_0462AD Rev. 0 dated 16 January 2017;
- Comment of Effluent Disposal at 787 Kaipara Coast Highway referenced AKL2016\_0462AE Rev. 1 dated 17 November 2017;
- Geotechnical Completion Report for 751 & 787 Kaipara Coast Highway referenced AKL2016\_0462 Rev. 0 dated 25 May 2018.

GWE Consulting Engineers were engaged to provide a field investigation and assessment of on-site wastewater disposal, the findings and recommendations are outlined in the report referenced 751 & 787 Kaipara Coast Highway, Kaukapakapa - On-site Wastewater Disposal Field Investigation and Assessment Report dated 28 February 2019. This report includes an assessment of a portion of the subject site.

### **3 SITE DESCRIPTION**

The site consists of three parcels of land, legally described as Lots 1, 2 and 36 DP 523159 with a total land area of approximately 5.6 hectares.

The site is roughly rectangular in shape and is bound by Kaipara Coast Highway to the south and residential properties on all other sides. Lot 2 is separated from the other two lots by MacLennan Farm Lane, which was constructed as part of the residential development to the north of the site, which CMW was involved in the construction inspection and associated certification.

751 Kaipara Coast Highway (Lot 36) contains two existing dwellings, numerous sheds and carports and a swimming pool. The majority of the site is residential lawns and gardens. The western third of the site is covered in a mixture of exotic bush growth and pines. The site is generally flat/ slightly graded at 1(v):10(h), with evidence of minor landscaping earthworks.

787 Kaipara Coast Highway (Lots 1 & 2) contain one residential property each. The remainder of the land is used for low intensity cattle and sheep grazing. Both sites are generally flat with gentle gradients of 1(v):20(h) in the western end next to Lot 36. A noise bund, consisting mainly of topsoil and organic soils, was constructed along the southern and western boundary of 787 Kaipara Coast Highway during the formation of the residential development to the north.

## 4 DESKTOP STUDY

### 4.1 Site History and Geomorphology

Historical aerial photography viewed on the Auckland GIS viewer<sup>1</sup> and from the Retrolens<sup>2</sup> website indicates the site was in pasture in 1940, with the main dwelling on 751 Kaipara Coast Highway (Lot 36) and two farm sheds on 787 being the only structures.



Figure 1: 1940 aerial photo with approximate subject site boundaries outlined in red. Source: Retrolens

The site topography appears consistent with the current landform. The western shed appears to be located at the head of a wide gully feature with indications of soil creep or pugging.

The land does not appear to have changed significantly by 1966, with a number of structures added to the site. A small wetland area can be observed on the lower elevated portions of 751 Kaipara Coast Highway,

<sup>1</sup> <https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>

<sup>2</sup> <https://retrolens.co.nz/Map/>

and the western shed on 787 Kaipara Coast Highway is located next to a steeply incised erosional feature with possible tomos.



**Figure 2: 1966 aerial photo showing erosional features next to shed. Source: Retrolens**

In the 1979 photo, the wetland in north-west corner of 751 Kaipara Coast Highway has been converted into a farm pond with a small pump station. This farm pond is still observable in 1999 photo but has been replaced with pine trees in the 2003 photo. The existing house was renovated and the majority of the landscaping work was completed on 751 Kaipara Coast Highway between 1999 and 2003. A large amount of landscaping work was carried out on 787 to form the farm yard and sheds.

The sites changed very little between 1940 and late 2017, when earthworks to form the neighbouring residential development began. While the bulk of the works was centred around the neighbouring site, minor earthworks involving up to a metre of cut and fill were undertaken on Lot 1 of 787 Kaipara Coast Highway. This was generally to ease contours across the site and provide a level building platform for future developments. The bulk of the structures on 787 Kaipara Coast Highway were demolished. The noise bund around the southern and western boundary of 787 was constructed at this time. No works were undertaken on 751 Kaipara Coast Highway during this period.

A review of the Auckland Council GIS shows a series of overland flow paths and a flood plains across the site.



Figure 3: Map showing Overland Flow Plaths (Dark Blue lines and Dotted Light Blue lines) and Flood Plains (Light Blue area and hatched area) with subject site outlined in red. Source: Auckland GIS

## 4.2 Regional Geology

Published geological maps<sup>3</sup> depict the regional geology of the area as Holocene river deposits of the Tauranga Group on the lower portion of the site, and older Middle to Late Pleistocene alluvial deposits of the Tauranga Group on the higher elevated portion of the site, as illustrated in **Figure 4** below. Both of these geologies are shown to be underlain by East Coast Bays Formation rock of the Waitemata Group.

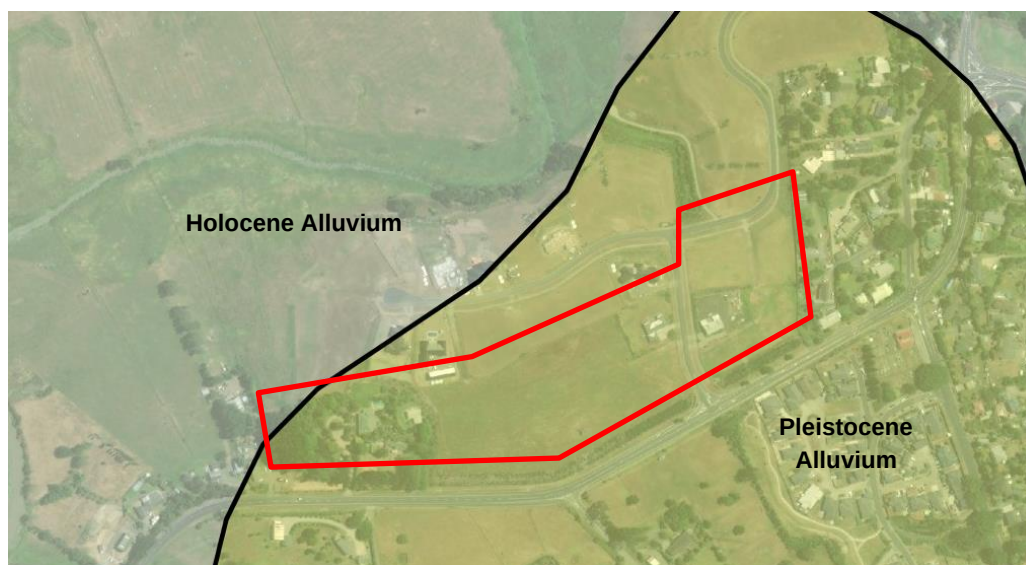


Figure 4: Geological Map with subject site outlined in red. Source: GNS Web Viewer

The Holocene (14,000 years old to current day) river deposits are described as a mixture of loosely consolidated sand, silt mud and clay with localised gravel and peat beds. Organic inclusions and thick layers of soft soils are expected within this geology.

Similarly, the older Middle to Late Pleistocene (14,000 years to 128,000 years old) alluvial deposits are described as a mixture of pumiceous sand, silt, mud and clay with interbedded gravel and peat beds.

<sup>3</sup> Edbrooke, S.W. (compiler) 2001, Geology of the Auckland Area, 1:250,000, Geological Map 3, GNS Science

Differentiating the two materials can be difficult, however, due to the relative age differences of these deposits, the older materials are generally more consolidated and with higher strengths.

The East Coast Bays Formation is of Miocene age (16.4Mya to 23.8Mya) and consists of alternating siltstone and sandstone flysch deposits with some volcanoclastic inclusions, formed in a submarine fan within the Waitemata Basin. Residual soils in this geology typically weather to a mixture of predominantly clays and silts with interbedded deposits of sands.

Based on the known history of the site, areas of existing fills are expected.

No signs of historical instability were observed in the available aerial photographic record.

### **4.3 Exiting Geotechnical Information**

As part of the previous geotechnical investigation for the residential development to the north of the site, CMW carried out two hand auger boreholes within the subject site namely HA01-16 and HA12-16. A sample was taken from HA01-16 to assist with site expansive soils classification.

HA01-16 encountered stiff to hard alluvial soils to the target depth of 5.0m. HA12-16 encountered very stiff to hard alluvial clays to the base of the borehole at 4.0m. The borehole was terminated before the target depth due to the hand auger being unable to penetrate further. The material directly above the termination depth was a hard, white silt layer so the termination of the borehole may not signify rock. Within borehole HA12-16, a very thin bank of firm (vane shear strength of 48kPa) was encountered at 2.8m below ground level (m bgl). Groundwater was encountered at 3.4m bgl and 2.8m bgl respectively during the investigation undertaken in winter months.

From site observations during the earthworks of the northern development, these hand augers are expected to be representative of the subject site subsoil.

Laboratory testing on the sample taken from HA1-16 resulted in a liquid limit of 86 and a linear shrinkage of 22 which was categorised as being between AS2870 Class M and Class H2, with the recommendation that additional testing was carried out as part of the Geotechnical Investigation Report.

The ground conditions encountered by GWE were consisted with our previous investigation data.

## **5 PRELIMINARY GROUND MODEL**

From the information gathered in the desktop study, it is likely that Middle to Late Pleistocene alluvial soils of the Tauranga Group are present across the majority of the site, consisting of stiff to hard clays and silts. However, the presence of softer and potentially organic soils is expected in the north west corner of the site where elevations are lowest. Uncertified filling is expected within the old farm pond. Other areas of filling cannot be ruled out considering the historical land use of the subject site.

The depth to bedrock is likely to be beyond the depth of any expected proposed earthworks.

## **6 PROJECT EVALUATION AND GEOTECHNICAL RISKS**

On the basis of our desktop study we consider the subject site is generally suitable for the proposed plan change from a geotechnical perspective, subject to the comments and recommendations below. Other residential developments in the area have been completed utilising standard construction processes and foundation solutions.

## 6.1 Soft Soils and Uncertified Fills

The presence of soft soils in the north west corner of the site and existing uncertified fills presents potentially the largest geotechnical risk to the site. Soft soils and uncertified fills are prone to load induced settlement which may cause damage to foundations, pavements and services. The soft soils may also have the potential for liquefaction. Any soft soils and existing uncertified fills are expected to be very isolated and are likely to be remediated via undercutting and replacement. Additional investigation as part of an application for Resource Consent would help locate areas of soft soil and uncertified fills.

## 6.2 Expansive Soils

Based on laboratory testing and experience working in the area we anticipate NZ Building Code B1/AS1 expansive site class for these soils likely to range from moderate (M) to high (H). Site specific laboratory testing should be undertaken. This can be addressed with standard foundation solutions, such as piles or stiffened rafts.

## 6.3 Slope Stability

Due to the gentle gradients across the site and the expectation that minimal earthworks will be required, slope stability is not considered a significant geotechnical risk to the development. Any steepened fill batters proposed can be addressed as part of a Geotechnical Investigation Report and are likely to be remediated via earthworks and drainage.

## 6.4 Groundwater

Groundwater levels are not expected to be high and it is unlikely to cause significant issues for civil works. If groundwater is encountered during service line installation, remediation options are expected to include localised sump points and trench shields.

## 6.5 Effluent Disposal

The residential development to the north was originally assessed as being TP58 (2004) soil category 7 (swelling clays), which equals GD06 soil category 6 (swelling clays), in the CMW Geotechnical Completion Report.

GWE were then engaged to provide a more in-depth assessment, which included soil hydraulic conductivity testing. GWE classified the soils within the northern residential development and a portion of the subject site as being TP58 soil categories 5/6 (sandy clays and non-swelling clays), which equals GD06 soil category 5 (sandy clay, light clay). Maximum hydraulic design irrigation rates based on the soil hydraulic conductivity testing ranged between 4mm/day and 17mm/day. Based on the soil categorisation and the soil hydraulic conductivity testing, GWE provided a recommended design irrigation rate of 3mm/day.

The topsoil on the subject site is likely to be GD06 soil categories 2/3 (loamy sand/fine loamy sand) and the subsoils are likely to be GD06 soil categories 5/6 (sandy clay/swelling clays). The recommendations provided in the GWE report for wastewater disposal and treatment are likely to be applicable to the subject site.

## 6.6 Liquefaction

The regional geology generally consists of soils with a notable clay content and high plasticity which are older than what case history data suggest as being susceptible to liquefaction. The soils are therefore not considered to be at risk of liquefaction in accordance with NZGS guidance<sup>4</sup>.

---

<sup>4</sup> Earthquake Geotechnical Engineering Practice, Module 3: Identification, assessment and mitigation of liquefaction hazards", (May 2016)

## 7 FUTURE WORK

A geotechnical investigation and assessment will be required to quantify the geotechnical hazards to any future developments and provide remediation options. This will comprise intrusive investigations, geotechnical design and reporting. Investigations should be planned to better define extent and depth of soft soil and uncertified fill deposits.

## 8 LIMITATIONS

This report has been prepared for use by our client Riverview Properties Limited and their consultants. Liability for its use is limited to these parties and to the scope of work for which it was prepared as it may not contain sufficient information for other parties or for other purposes.

It should be noted that previous factual data used as preliminary site appraisal and referenced in this report were obtained from discrete locations in the neighbouring properties using normal geotechnical investigation techniques. As such investigation methods by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the neighbouring investigations and which have not been taken into account in this report.

## 9 CLOSURE

We trust this report meets your requirements.

Should you require any further information or clarification regarding the information provided in this report, please do not hesitate to contact the undersigned.

### For and on behalf of CMW Geosciences

Prepared by:



Jack Mynett-Johnson

Project Engineering Geologist

Reviewed and authorised by



Gary Tang

Principal Engineering Geologist

Distribution: 1 electronic copy to client via email  
Original held at CMW Geosciences

