



**BEFORE**

Independent Commissioners appointed by Tasman District Council

**IN THE MATTER**

of the Resource Management Act 1991

**AND**

**IN THE MATTER**

of an application by CJ Industries Ltd for land use consent RM200488 for gravel extraction and associated site rehabilitation and amenity planting and for land use consent RM200489 to establish and use vehicle access on an unformed legal road and erect associated signage

**EVIDENCE OF DAVID JOHN AVERILL ON BEHALF OF CJ INDUSTRIES LTD  
("GEOTECHNICAL")**

**15 July 2022**

**1. INTRODUCTION**

1.1 My full name is David John Averill. I am a Senior Geotechnical Engineer at Tonkin + Taylor Ltd (T+T).

1.2 The applicant has applied for resource consents authorising the extraction of gravel, stockpiling of topsoil, and reinstatement of quarried land, with associated amenity planting, signage and access formation at 134 Peach Island Road, Motueka:

(a) RM200488 land use consent for gravel extraction and associated site rehabilitation and amenity planting and

(b) RM200489 land use consent to establish and use vehicle access on an unformed legal road and erect associated signage

1.3 My evidence addresses the geotechnical assessment of the activities for which consent is sought.

## **Qualifications and Experience**

- 1.4 I have been employed as a Geotechnical Engineer at T+T since 2011. I have a Bachelor of Engineering (Civil) with honours. I am a Chartered Professional Engineer (CPEng) and Engineering NZ Chartered Member (CMEngNZ) specialising in Geotechnical Engineering.
- 1.5 My technical skills and experience directly relevant to my assessment include geotechnical slope stability and seepage modelling for stopbank structures.
- 1.6 I have been to site (9/03/2022) and inspected the site, including proposed transportation routes and stockpile areas. I observed exposures of the existing stopbank fill during my site walkover (local to the access track over the stopbank). The fill exposed matched the soil type assumed in the geotechnical modelling undertaken, as summarised in **T+T's report** (Ref: 1015514.0000, dated 16 December 2022, titled "Peach Island Gravel Extraction").

## **Purpose and Scope of Evidence**

- 1.7 The purpose of my evidence is to assess the effects of the proposal on the geotechnical slope stability of the existing stopbank, and to provide recommendations to avoid, remedy or mitigate adverse geotechnical effects on the existing stopbank.

## **Code of Conduct**

- 1.8 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014 and I agree to comply with it. My evidence is within my area of expertise, however where I make statements on issues that are not in my area of expertise, I will state whose evidence I have relied upon. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

## **2. EXECUTIVE SUMMARY**

- 2.1 The applicant is proposing to undertake gravel extraction on the floodplain of the Motueka River. The proposed works involve excavation of gravel from extraction (borrow) areas that are located a minimum of 20 m horizontal distance from the toe of the stopbank. The maximum depth of excavation is 5 m, the maximum width of

excavation is 20m and the maximum excavation length is 80m. Excavation areas will be progressively backfilled with clean fill to ensure that the maximum plan area of the excavation pits open at any given time does not exceed these dimensions.

- 2.2 The applicant engaged T+T to assess the impact of the proposed activity on the adjacent Peach Island stopbanks. Geotechnical stability was checked by T+T using the industry accepted software package, SLOPE/W.
- 2.3 The results of the SLOPE/W analysis showed that the proposed gravel extraction works are not expected to affect the stability/function of the existing stopbank surrounding Peach Island.

### **3. EVIDENCE**

#### **Existing environment**

- 3.1 The proposed gravel extraction site is located on the Motueka River floodplain area, adjacent to Peach Island, Motueka. Published geology of the area describes the underlying ground as Holocene river deposits, which consists of well sorted gravels forming modern flood plains and young fan gravels. These gravel deposits are overlain by more recent flood deposits consisting primarily of fine sand and silt.
- 3.2 The stopbank extends around the full perimeter of Peach island. It was constructed between 1951 and 1956 by the Nelson Catchment Board. The general specifics of the stopbank profile consists of the following:
  - (a) Crest width: 2.5 m to 3.0 m.
  - (b) Depth of stopbank fill 1.5 m to 2.0m.
  - (c) Side slopes: varies considerably, generally between 1V:3H and 1V:1H.
- 3.3 The stopbanks were constructed from local overbank silt/sand material and are primarily covered in grass and sedges.



*Figure 1: Photograph of stopbank taken during site walkover on 9/3/22*

### **The proposal**

- 3.4 The Applicant proposes to undertake gravel extraction on the property in three stages, within an area of approximately 73,500m<sup>2</sup>, and over a period of 15 years. No processing or crushing of gravel will occur on site.
- 3.5 The proposed works involve excavation of gravel from extraction (borrow) areas that are located a minimum of 20 m horizontal distance from the toe of the stopbank to the top of temporary cut batter. The maximum depth of excavation will be determined by groundwater but will not be more than 5 m, the maximum width of excavation is 20 m and the maximum excavation length is 80 m. Excavation areas will be progressively backfilled with clean fill to ensure that the maximum plan area of the excavation pits open at any given time does not exceed these dimensions.
- 3.6 Some proposed extraction areas are adjacent to property boundaries.
- 3.7 As part of gravel extraction works, trucks and trailer units will traverse across the existing stopbank for transportation of extracted gravel and clean fill material.

### **Potential effects on the environment**

- 3.8 T+T was engaged by CJ Industries Ltd to provide advice on the implications of gravel extraction at Peach Island, Motueka. As a part of these works, I assessed the geotechnical

risk to the Peach Island stopbanks (**T+T's report** Ref: 1015514.0000, dated 16 December 2022, titled "Peach Island Gravel Extraction"). My conclusions in this report advise that "The proposed gravel extraction works are not expected to affect the stability/function of the existing stopbank surrounding Peach Island".

- 3.9 I have relied upon my geotechnical risk/slope stability assessment, as summarised in the **T+T report** as part of my assessment.
- 3.10 As part of that report I did not consider stability effects with respect to adjacent properties. The applicant proposes to excavate gravel pits with a batter to adjacent property boundaries. CJ Industries Ltd have advised that excavations will be open for a short duration (less than 6 months) prior to being backfilled. I have assessed the short term slope stability against requirements as specified in industry accepted guidelines, such as slope factor of safety recommendations stipulated in the NZTA Bridge Manual (Section 6.4.1b) for normal and elevated groundwater conditions, determination of appropriate design seismic return period events for the temporary nature of works in accordance with NZS1170.0 Table 3.3 and determination of industry accepted seismic Ultimate Limit State (i.e. point of slope failure limits the design) accelerations based on NZGS Module 1 (29 Nov. 21). Based on the above slope stability assessment, I have determined that the following maximum (i.e. steepest) slope angles are permitted such that short term excavations are unlikely to initiate slope instability that could encroach into neighbouring property:
- (a) Lower Gravels to be battered at 1H:1.3V max (dense to very dense gravels, green in Figure 1 & Figure 2 below)
  - (b) Upper mantle to be battered at 1H:1.7V max (loose to medium dense clays/silts, yellow in Figure 1 & Figure 2 below)

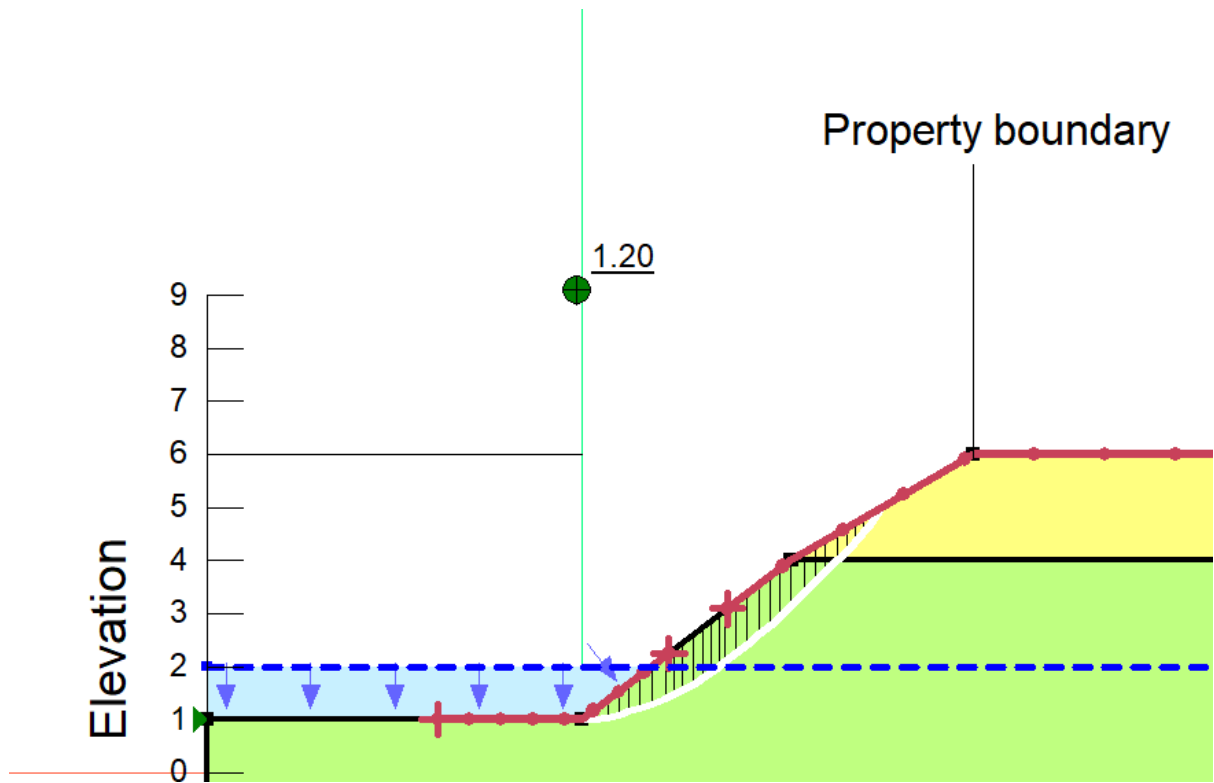


Figure 2: Slope stability analysis output for short term design case (elevated groundwater conditions)

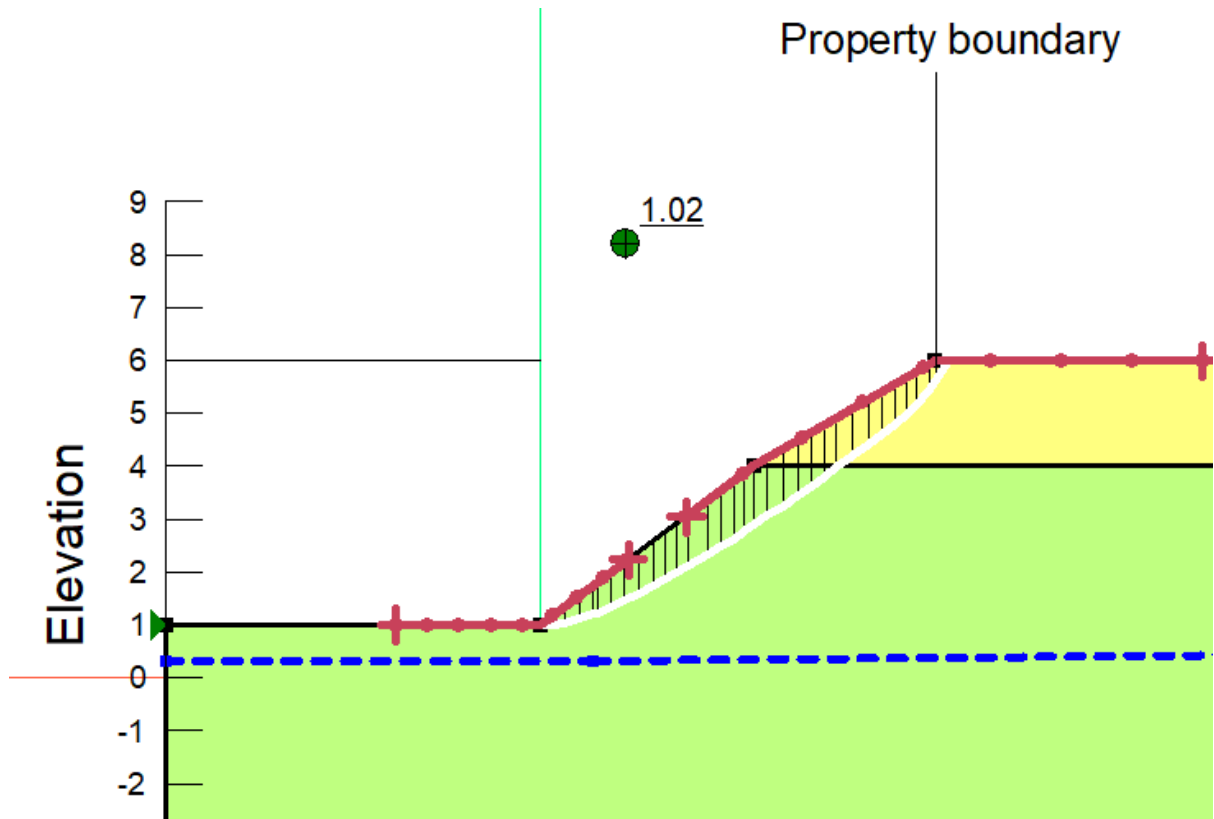


Figure 3: Slope stability analysis output for short term design case (Ultimate Limit State seismic)

- 3.11 The excavation areas should be inspected by the Geo-professional during construction such that they can verify that the ground conditions are as per the assumed ground model above, as recommended in Section 6.4 of the NZTA Bridge Manual.
- 3.12 The applicant may be able to steepen up the maximum slope angles specified above where adjacent to the property boundary if the adjacent landowner agrees to a proposal such that the applicant is to repair/reinstate any damaged land caused by shallow surficial landslips during the gravel extraction pit works.
- 3.13 Discharge of stormwater down the slope face is likely to cause surficial erosion and ravelling/shallow landslip damage. I would recommend that CJ's put in place stormwater control measures during construction such that they divert concentrated surface water away from the temporary cut slopes, in particular where these slopes are adjacent to private property.
- 3.14 Vehicles (trucks and trailer units) traversing across the existing stopbank is expected to cause settlement of the stopbank local to the vehicle crossing location. I recommend that this is addressed by CJ's allowing for the following measures to be put in place:
- (a) Pre-works condition survey of the crossing point.
  - (b) Placement of sacrificial metal course layer (200mm minimum thickness) across the full extent of where vehicles will cross the stopbank. This sacrificial metal course layer is to be maintained throughout construction works.
  - (c) Removal of sacrificial layer upon completion of works.
  - (d) Condition survey upon completion of works.
- 3.15 CJ's have confirmed that they will volunteer this as condition.

### **Consistency with policy direction**

- 3.16 For stopbank and land stability issues, relevant provisions are found in TRMP Chapter 5 Site amenity effects Chapter 12 Land disturbance, and then primarily in Chapter 12 Natural hazards of the TRMP. The key directions for the purposes of assessing the actual and potential effects of the proposal are:

- (a) Policy 13.1.3.13: To regulate land disturbance so that slope instability and other erosion processes ... are not initiated or accelerated.
- (b) Policy 13.1.3.14: To avoid damage by land use activities to flood control structures or works for flood or erosion control.

3.17 With the measures recommended above, these policies will be achieved.

#### **Matters raised in submissions**

- 3.18 Multiple submitters have raised concerns about the proposed activity and the associated impact on the integrity of the stopbank, due to the proximity of the stopbank to the extraction (borrow) areas. As detailed in the **T+T report** I have analysed the closest proximity between the stopbank toe and extraction (borrow) pits and identified that the activity is not expected to affect the stability/function of the existing stopbank surrounding Peach Island.
- 3.19 In general, most submitters raised those generic queries but I have responded to any other specific comments in submissions below.
- 3.20 Michael D Harvey stated in his submission “I don’t have any issues with the stopbank stability analysis but will note that the Stage 2 and 3 projects are potentially at risk from seepage induced stopbank failure in a major but unspecified ARI flood.” I consider seepage induced failure of the stopbank to be unlikely based on my existing stopbank stability analysis and based on there being no historic evidence of such failures occurring during flooding events. It is more likely that the floodwater would overtop the stop bank.. The stability/function of the stopbank is unaffected by the extraction (borrow) pit excavation works.
- 3.21 Michael D Harvey stated in his submission “Stability analyses were not conducted with site specific soils data but were conducted with assumed values from the Motueka eastbank stopbank”. The data I used to develop the ground model for the Peach Island stability analysis is summarised in the **T+T Report** (Section 3.2.4) and was based on nearby test pit investigations undertaken by MWH in 2008 that were located adjacent to the Peach Island stopbank and validated against investigation works undertaken for the eastern Motueka stopbanks. I note that the investigation works undertaken for the eastern Motueka stopbanks have indicated that all of the stopbanks were constructed in a similar manner, and that the underlying ground conditions and soil strengths are



relatively uniform. I note that more recent investigations and construction works for the eastern Motueka stopbanks and observations during my site visit have also confirmed this assumption. Therefore I consider that my methodology of adopting soil data based on the nearby MWH investigation information and validating this information against information gathered during eastern stopbank investigations/construction works for similar soils is acceptable.

- 3.22 Graham Harold & Coralie Moore Le Frantz were concerned about settlement of the stopbank due to multiple truck movements over the stopbank access track. I consider this concern is valid for all Stages of works, where vehicles are proposed to cross over the stopbank works when trafficking between the extraction (borrow) area and stockpile area or when entering and existing the site. However, I believe the effects of settlement caused by such trafficking on the geotechnical integrity of the stopbank will be minor if a sacrificial gravel layer is placed as per my recommendation in paragraph 3.12.

#### **Matters raised in s 42A report**

- 3.23 The stopbank stability is addressed in Part 11 of the s 42A report. Mr Griffiths agrees with the T+T Report assessment that the extraction works are not expected to affect the stability/function of the existing stopbank, subject to extractions being setback a distance of 20 m from the toe of the stopbank. In relation to paragraph 11.7: I agree that it is prudent to mark out the location of the toe of the stopbank, such that there is no question regarding the interpretation of the 20m offset to gravel extraction sites.
- 3.24 Effects relating to trucks passing over the stopbank (paragraphs 11.5 and 11.8 of the s 42A report) are discussed in paragraphs 3.12 and 3.19 above.

#### **4. CONCLUSION**

- 4.1 The submissions and s 42A report did not provide any information that would affect the conclusions in the **T+T Report**. The findings in this report still stand and I believe that the stability/function of the stopbank will be unaffected by the extraction (borrow) pit excavation works and truck movements. I consider that effects on stability of adjacent land can be effectively managed, in accordance with appropriate batter slope angles.

Dave Averill

15 July 2022