

Your Ref:
Our Ref: 7.00857



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Dear Campbell

Te Tumu New Community Planning - Natural Hazard Risk Assessment

The purpose of this letter is to confirm the risk assessment work undertaken for the proposed new Te Tumu Urban Growth Area is suitable for inclusion in the Section 32 evaluation report to support a potential Plan Change for new community planning at Te Tumu. This letter states BOPRC position on whether this work gives effect to the natural hazard provisions of the Regional Policy Statement (RPS).

1 Introduction

I wish to acknowledge the work Tauranga City Council (TCC) has undertaken to give effect to the natural hazard provisions of the Regional Policy Statement in undertaking new community planning for Te Tumu.

This new community planning and potential Plan Change is in the transition period before BOPRC has completed the hazard susceptibility mapping and relevant risk assessment in accordance with the allocation of responsibility (Policy NH 13C of the RPS). We understand TCC has adopted a risk-based approach to natural hazards for the new community planning in accordance with RPS Policy NH 4B.

We support the partnership approach initiated by TCC from involving BOPRC in the scoping stage of the risk assessments through to the invitation to review draft technical reports. The following final version risk assessment reports were received by Bay of Plenty Regional Council – Toi Moana (BOPRC):

- *Tsunami – Tonkin + Taylor (2018) Te Tumu Natural Hazard Assessment, Tsunami*
- *Coastal Inundation – NIWA (2017) Coastal inundation mapping at Te Tumu, Bay of Plenty*
- *Coastal Erosion - Tonkin + Taylor (2018) Te Tumu Natural Hazard Assessment, Coastal Hazard*

- Liquefaction – *Tonkin + Taylor (2018) Te Tumu Natural Hazard Risk Assessment, Liquefaction*

We understand that both the hazard and risk assessments for intense rainfall and river flooding are ongoing. Therefore, these two hazards are not covered under this letter and we note you are working with the BOPRC Engineering Team to progress this work.

2 Risk Assessment

TCC undertook four risk assessments for a range of natural hazards, including an allowance for climate change to the year 2130. The risk assessments consider the potential consequences of the proposed development form and recommend mitigation options to achieve a low level of risk where required. The BOPRC position on each of the natural hazard risk assessments completed by TCC for the Te Tumu development site is outline below.

2.1 Tsunami

Tsunami inundation was modelled and mapped for a 0.2%, 0.1% and 0.04% annual exceedance probability event likelihoods (500, 1000 and 2500 year average return interval (ARI) respectively), including an allowance for sea level rise to 2130.

The modelling results map minimal inundation across this site for tsunami events at these likelihoods. Minor inundation occurs along the Wairakei Stream and in some isolated areas on the periphery of the site along the Kaituna River.

The risk assessment was undertaken for each of the nine landowner parcels based on consequences to buildings and health and safety. Eight of the landowner parcels (i.e. natural hazard zones) resulted in low risk. Landowner parcel F resulted in a medium risk based on a moderate consequence level for health and safety.

Medium risk is required to be reduced to low risk for a new development proposal in accordance with RPS Policy NH 3B. The report presents a range of options that can reduce the risk to low through mitigating the health and safety consequence. Considering the majority of the site is elevated above the modelled tsunami inundation levels, evacuation to safe ground is an accepted mitigation resulting in a low risk. Therefore, clear tsunami evacuation zones and routes should be a requirement of this development.

2.2 Coastal Inundation

Coastal inundation from storm surge and wave setup was modelled and mapped for a 2%, 1% and 0.2% annual exceedance probability event likelihoods (50, 100 and 500 year ARI respectively), including an allowance for sea level rise to 2130.

The assessment shows the development site is not subject to coastal inundation for events of these likelihoods. Therefore, the natural hazard risk from coastal inundation is considered to be low. However, the natural hazard upstream from the coast from the conjunctive risk from costal inundation (with the effects upon upstream water levels) and intense rainfall and river flooding is yet to be assessed. The impacts of coastal inundation upon upstream flood risks is an important consideration.

The site was stress tested against a higher sea level rise scenario, which resulted in some inundation along proposed roads and around proposed stormwater ponds. The inundation pathway is from the Kaituna River and no dune overtopping or inundation is expected from the open coast side. We concur with the assessment that the inundation modelling can be considered conservative in this area due to the simple bath tub methodology. More detailed

hydrodynamic modelling would most likely show no inundation over the development site for all scenarios.

2.3 Coastal Erosion

Coastal erosion was modelled and mapped for a 50% and 5% exceedance probability (EP) likelihoods (likely and very unlikely respectively), including an allowance for sea level rise to 2130. For example the 50% EP coastal erosion hazard zone has a 50% chance of being exceeded by the year 2130. BOPRC acknowledges the probabilities outlined in the RPS for coastal erosion do not easily align to common approaches. This is because erosion is a long term process that cannot be assigned an annual exceedance period. Therefore, mapping coastal erosion zones at two exceedance likelihood scenarios for a set timeframe of 2130 is considered to be in accordance with the RPS (i.e. likely and very unlikely likelihood scenarios).

The assessment shows the development site is not subject to coastal erosion for either of the two likelihoods by the 2130 timeframe. Therefore, the natural hazard risk from coastal erosion is considered to be low.

The site was stress tested against a higher sea level rise scenario, which resulted in some erosion along the coastal edge of landowner parcel G and F. We acknowledge that this scenario is very unlikely and it only covers a relatively small portion of the development site (1.06 hectare). However, long term erosion adjacent to rivers is very uncertain and areas of landowner parcel F could be subject to erosion over the 2130 timeframe. Therefore, we expect a site specific assessment to be undertaken at the time this parcel is developed to ensure a low risk is achieved.

2.4 Liquefaction and lateral spreading

2.4.1 Liquefaction

Liquefaction was modelled and mapped for a 0.2%, 0.1% and 0.033% annual exceedance probability event likelihoods (500, 1000 and 3030 year ARI respectively), including an allowance for sea level rise to 2130.

The assessment shows the majority of the development site is susceptible to liquefaction (i.e. minor to moderate land damage) for earthquake events of these likelihoods. Landowner parcels D, F and G are unlikely to experience liquefaction induced land damage (none to minor land damage).

The assessment analyses the liquefaction risk and evaluates levels of foundation design as possible mitigation options (i.e. slab on grade, TC2, TC3). The assessment results show the risk is low for the majority of foundation options. TC2 and TC3 foundation types result in low liquefaction risk for all landowner parcel blocks. Therefore, the natural hazard risk from liquefaction can be considered to be low if this mitigation measure is actioned.

We note the low risk outcome is limited to one and two level buildings only. Buildings greater than two levels will require a new assessment.

2.4.2 Lateral spreading

If left untreated, land up to approximately 150 m from the free-faces across the site is considered vulnerable to lateral spreading. If lateral spreading mitigation measures are not adopted, buildings and infrastructure constructed on this land are expected to have compromised functionality.

The Tonkin + Taylor report presents four options to mitigate the risk of lateral spreading, showing a low level of risk can be achieved. We concur with the T+T recommendation of not building within 150 m of a free face without the adoption of a mitigation option.

2.4.3 Lifelines and utilities

BOPRC concurs with the T+T conclusion that lifelines and utilities should be appropriately designed to mitigate the consequences of liquefaction and lateral spreading that are anticipated for the local ground conditions. Where practical, in areas where moderate-to-severe liquefaction damage is possible or within lateral spreading set back areas the construction of critical lifelines and utilities should be avoided. These recommendations should be considered further in the next stage of structure planning.

Lifelines and utilities are not considered to be impacted by the other three hazards based on the limited extent of site coverage.

3 Summary

BOPRC confirms the appropriate natural hazards were considered for Te Tumu under Policy NH 7A and the risk assessment methodology is in accordance with Appendix L of the RPS and Policy NH 4B.

TCC undertook four risk assessments for a range of natural hazards, including an allowance for climate change to the year 2130. The risk assessments consider the potential consequences of the proposed development form and recommend mitigation options to achieve a low level of risk where required.

BOPRC confirms the natural hazard risk is low at Te Tumu for coastal inundation, coastal erosion, liquefaction and tsunami hazards, based on the recommendations made in the technical reports. T+T recommend mitigation options are adopted to reduce the risk from lateral spreading to buildings within 150 m of free – faces across the site. BOPRC concurs with the T+T conclusion that lifelines and utilities should be appropriately designed to mitigate the consequences of liquefaction and lateral spreading that are anticipated for the local ground conditions. The risk to lifelines and utilities is considered to be low for the other three hazards.

We understand that both the hazard and risk assessments for intense rainfall and river flooding are ongoing. Therefore, these two hazards are not covered under this letter and we note you are working with the BOPRC Engineering Team to progress this work.

We welcome the opportunity to review the associated sections of the Section 32 to support the proposed amendment to the Tauranga City Plan.

Yours faithfully



David Phizacklea
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for General Manager Strategy & Science