Earthworks Assessment – Wellington City Council

26 April 2022 Service Request No: 505203

Site Address: **292 Main Rd, Tawa**

Introduction:

My name is John Davies. I am the Earthworks Engineer in the Council's City Consenting and Compliance Unit. I am an engineering geologist and a Member of Engineering New Zealand. I have a BSc in Geology and a Masters in Mining Engineering Science majoring in geomechanics. I have been in my current role with the Council for over 6 years, following 12 years working in the mining industry.

As Earthworks Engineer my main role is to assess individual resource consent applications and provide verbal and written advice to the resource consent planner on earthworks issues. I recommend requests for further information from the applicant, and conditions to be used in the resource consent.

I confirm that I am familiar with the Code of Conduct for expert witnesses contained in section 7 of the 2014 Environment Court Practice Note and agree to abide by the principles set out therein.

The proposal is for a development of 24 residential units at 292 Main Rd Tawa which includes a moderate amount of the earthworks, near the Porirua Stream. An area of the earthworks is also within the Tawa Flood Hazard Area of Council's District Plan.

Legislative Requirements (i.e., District Plan / Standards / RMA):

The following sections of Council's District Plan has been considered as part of the earthworks assessment.

Chapter 30 Earthworks Rules

District Plan 30.1.1 Earthworks in the:
(i) Residential Area (except the Urban Coastal Edge shown on Map 62 and Map 63;
(ii) Centres and Business Areas (except the Churton Park Concept Area as shown in Appendix 1 to this chapter);

(iii) Institutional Precincts;

(iv) Rural Area (excluding the Ridgelines and Hilltops Overlay); and

(v) Open Space A and C Areas;

are Permitted Activities provided that they comply with the following conditions:

30.1.1.1(a)	
(i) The cut height or fill depth does not exceed 1.5m measured vertically;	1.6m
(ii) The cut or fill is not on an existing slope angle exceeding 34 degrees;	Complies
(iii) The cut height or fill depth does not exceed the distance from the nearest site	
boundary, building or structure (above or below ground) measured on a horizontal	
plane;	Complies
(iv) The area to be cut or filled does not exceed 250m^2	697m^2
30.1.1.2	
The cut or fill is no closer than the following (measured on a horizontal plane) to a river (including streams), a wetland or the coastal marine area:	
• Rural Area 20m	
• Centres and Business Areas adjoining the Porirua Stream 10m	
• All other areas 5m	Complies
30.1.1.3	
The cut or fill is not in a Hazard (Flooding) Area;	Non-complying
30.1.1.4	
There is no visible evidence of settled dust beyond the boundaries of the site.	Can Comply

30.1.1.5	
(i) The cut or fill is no closer than 12m to the closest visible edge of the foundation of a high voltage transmission line support structure;	Complies
(ii) earthworks do not reduce the clearance distance from conductor to ground to less than 10m within 12m of the centreline of an electricity transmission line (as shown on the Planning Maps).	Complies

Discretion

The above triggers rule 30.2.1 that limits the Council's discretion to the following:

- The earthworks stability
- The erosion, dust and sediment control
- Impacts on visual amenity
- The flooding hazard risks
- The earthworks and structures closer than 5m from a stream
- The transport of material that exceed 200m^3.

Assessment:

Stability of Earthworks

A geotechnical assessment has been supplied as part of the application. the geotechnical assessment was supplied by Engeo Ltd (dated 30 March 2021, reference 18501.000.001_01). The assessment is at high level but does identify the key geotechnical aspects for the proposed extension. These include, retaining of the cuts, liquefaction considerations, fault hazards and flood hazards risks. The report notes that additional temporary support may be required to ensure stability of Council's footpath. Overall, the report is considered supportive of the development provided further geotechnical investigations and design work is undertaken as part of the final detail design.

It is noted that because proposed earthworks are not within the 5m standoff from the Porirua Stream limiting the discretion of any potential effects of earthworks or associated structures on the character amenity of the stream (refer to Policy 29.2.1.6). In terms of stability, the final detailed design is expected to include piled foundations that will concentrate loads below the potential surcharge plane for the Porirua Stream's banks, therefore maintaining stability of the earthworks. If this is not the case, then as part of the detailed design, an engineering assessment of the potential bank stability and resulting surcharge loads will be required. It will be necessary to ensure an acceptable level if risk is achieved, to ensure the stability of the streambank and earthworks.

The new development is considered to adequately address the long-term earthwork stability risks through redevelopment of the site with specific engineered retaining walls. Certification of the stability of the walls is required as part of the conditions of consent. In order to minimise the risk of instability during the construction, and ensure only suitable material is reused, it is recommended that monitoring is undertaken by a chartered engineer, and that certification is provided for the fill material.

The combination of the controls required by the recommended conditions is considered to reduce the geotechnical risk to an acceptable level, for both the construction phase and the final earthworks design.

Erosion, Dust and Sediment Controls

Typically, the controls required to minimise the risk posed by erosion, sediment and dust loss from the site are documented in an Erosion and Sediment Control Plan (ESCP).

The area of earthworks will exceed the threshold under rule 30.1.1.1, which is a general indication that there may be adverse effects from the earthworks activity during construction. An ESCP is considered to be required and is included as part of the consent conditions below. The ESCP will need to be provided in advance of any earthworks commencing on site.

It is understood that the intention is to reuse suitable material from the excavation cuts as fill on the site, and as such stockpiling of this material on site is assumed to be required. Any stockpiling should be located outside of the flood hazard zone and secondary overland flow pathways and utilise appropriate sediment and erosion controls. To further decrease the risk posed by potential flood events it is suggested that any earthworks be stabilised as soon as practicable. Consideration for the flood hazard risk in relation to erosion and sediment loss has been included in the ESCP condition below.

Typically, the ESCP is developed in conjunction with the consultants and earthwork contactors, and as such are typically provided after consents are granted, but at least 10 working days prior to earthworks starting.

In summary, the risk of erosion, sediment and dust loss is considered to be adequately addressed with development of typical industry controls required by the ESCP conditions below.

Visual Amenity

The proposed area of earthworks will exceed the threshold of the rule. Therefore, an assessment on the visual impact is triggered. Noting that much of the earthworks is to be obscured by the final development and as a result will be temporary in nature. For the remaining areas it is understood that the application is to be reviewed by landscape architect, with conditions of the consent developed accordingly. No visual impact assessment is included within this report.

Flood Hazard

The site is located with the Tawa Flood Hazard Area and as such assessment of possible flooding risks has been undertaken. It is to be review by Wellington Water Ltd. Additional controls in relation to flooding have been recommended above in relation erosion, sediment and dust conditions.

Submissions

The following are comments that submitters have raised around potential earthworks effects and reposes to these concerns:

Name	No	Submitter Comment	Council's Response
Christian Minga	17	Laying/digging foundation of a 4-story building will destroy the earthworks of the whole site and neighbourhood. ... That piece of land is not suitable to hold such building, especially its right next to a creek. That building will eventually collapse it wouldn't have a good stable land.	The recommended earthwork conditions are considered to address this risk with monitoring of the earthworks by a Chartered Engineer in combination with a robust erosion and sediment controls required as part of the ESCP. A detailed design process will be required to address this potential issue as part of the building consent process.
Hazel Ancheta	20	Construction will compromise the stability of land. Diggers, heavy machines creates vibrations that will affect earthworks and potentially damage neighbourhood's houses.	The earthworks are considered to pose a low risk of instability given the shallow nature of the excavation. And monitoring by a Chartered Engineer, as required in the conditions, will further minimise this risk. Typically, vibration issues arise with high impact rock breaking or driven piles are used in weak ground. It is expected that any foundation construction or earthworks will utilise low impact methods. That said, a vibration condition has been recommended as it is unclear what methodology will be used.

Sue Keats	29	There have been multiple landslips on the Main Road over the years (I can remember a huge one that went onto this property back in the 1970's). With the stream on one side and an unstable bank on the other this is a really questionable location for such a large structure.	This risk is considered outside of the scope of the assessment under the Earthworks rules of the District Plan. It may be relevant to any subsequent application to subdivide the land - as a requirement of section 106 of the Resource Management Act 1991.
Rocelle Obaldo	31	Construction will compromise the stability of land. Diggers, heavy machines creates vibrations that will affect earthworks and potentially damage neighbourhood's houses.	Please refer to response to submitter 20.
Rhodora Zurbito	32	Construction will compromise the stability of land. Diggers, heavy machines creates vibrations that will affect earthworks and potentially damage neighbourhood's houses.	Please refer to response to submitter 20.
Graham Savell	37	Earthworks close to Porirua Stream. It seems that maybe 697 cubic metres is involved. I don't know what the limits are but this is a massive amount so close to what has been a problem stream for many residents who live closeby to the Porirua Stream and further down.	The proposal is for an area of 697 square metres, rather than 697 cubic metres. Wellington Water is providing advice on the flood hazard issue. The development of erosion, sediment dust controls required to satisfy the ESCP conditions are considered adequate to mitigate these potential effects.
		The extent of the earthwork is non-compliant having a disturbed area of 697m² rather than 250m². What additional provisions are being applied to protect the stream and its ecosystems during the construction of this building? It has been indicated that the construction of the building is likely to take 18 months, what	This is correct it does breach the District Plan rules and as such earthwork conditions are recommended. The development of erosion, sediment dust controls required to satisfy the ESCP conditions are considered adequate to mitigate these potential effects. Earthworks are not planned within the stream buffer zone and most of the excavated material is expected

		additional measures are being taken to ensure that there are no impediments to the stream's water flow and on the residents in the nearby properties.	to stay on site and as such truck movements are expected to be low with respect to earthworks.
Kerryn Palmer & Richard Martin	52 54	The building of which, necessitates invasive earthworks on a small site that is next to the flood-prone Porirua stream. The most recent heavy rain which saw half of the bank dissolve into the stream further up from proposed site. a. Proximity to the Stream • The District Plan requires that buildings be erected no closer than 10 metres from the Porirua Stream. • The application puts the building at 8.1 metres from the stream, and the proposed deck structures are between 2.46m and 5.0 m from the stream. These distances are non-compliant. • the stability of the site streambank with a building of this size, or erosion of the streambanks of neighbouring properties if the site streambank is altered. … iv. Earthworks • The extent of earthworks required is highly non-compliant, having a proposed disturbed area of 697m² rather than the permitted 250m²	The proposed conditions for earthworks stability and the development of erosion, sediment dust controls required to satisfy the ESCP conditions are considered adequate to mitigate these potential effects. The 5m standoff from waterbodies (character and amenity of the stream). contained within the earthwork rules, has not been breached. The piling work for decking structures are a permitted activity under the District Plan rules. Engineering around foundation design and the bearing capacity of the ground is to be undertaken as part of the detailed design with a specific condition requiring this report before works commence. As such, potential adverse effects are considered to be mitigated. Stability issues have been addressed in the overall earthworks assessment and recommended conditions. The area of the earthworks is typical of a multi-unit housing development.
Sue Abraham	62	Environment … In the March 20 and June 21 9am diagrams, there is a lot of	 The effect of shading on soil moisture is considered to be

		additional shade on the bank to the west of the Main Road. This has the potential of not giving the bank a good option to dry out adequately. Earlier this year there was a slip just south of this area which closed the Main Road for some time. This was likely the result of the bank being waterlogged. Has the potential for slips opposite the 292 Main Road site (and on other areas of the bank that would be subject to additional shading from this proposal) been assessed? …	outside of the scope of the earthworks assessment. That said, the effect to the risk of instability as result of shading from the development on the western bank is considered to be low.
		Porirua Stream – This proposed building is very close to the stream and will involve a significant amount of earth moving and foundation work. As is seen when walking through Tawa along the Porirua stream, there are a number of places where the riverbank has eroded into the stream. Building such a significant dwelling so close to the stream will put pressure on the already unstable land and potentially impact the ecosystem of the area. There does not appear to be anything documented as yet in terms of what will be done to mitigate pollution of the stream or erosion both by the site and further downstream. Will having so many people on one site and the decks so close to the stream increase the potential for rubbish to end up in the stream – both causing pollution and potentially blocking water flow and causing flooding. There could be runoff into the stream both during construction and afterwards as ongoing maintenance happens. <u>Flooding</u> Based on the WCC flood zone map it appears that proximately	Engineering around foundation design and the bearing capacity of the ground is to be undertaken as part of the detailed design with a specific condition requiring this report before works commence. As such these issues are considered to be adequately addressed. Noting that the 5m standoff from waterbodies (character and amenity of the stream) contained within the earthwork rules has not been breached. The piling work for decking structures are a permitted activity under the District Plan rules. The proposed conditions and development of erosion, sediment dust controls required to satisfy the ESCP conditions are considered adequate control the potential for runoff entering the Porirua Stream. Input form Wellington Water is understood to have addressed the

		half the site is a flood zone and/or the current flow of the stream. Are the proposed floor levels high enough to mitigate flood risk and if not/if they need to go higher how will this further impact the building height and building recession non-compliance. In the documents relating to this application, it mentions "Standards for buildings in Tawa Hazard (flooding area) – building floor level, location within site, effects on erosion and flood hazard risks and stream maintenance." There doesn't appear to be much said about what will be done to mitigate erosion, flood hazard risk and how the stream will be maintained on an ongoing basis. ...	floor height to ensure that the development above the potential flood levels. It is expected that the ESCP controls when combined with the limited time frame for the earthworks adequately control the risk erosion from posed by flooding. Once development of the site is complete and areas of earthworks stabilised the ongoing risk of erosion is not considered to the be increased.
		The ENGO Flood Assessment Report notes "all potential development on the site should be founded at or above the top of bank elevation". It is not clear if this is currently the case and how will it be ensured that any development on the site is only above the current top of bank elevation if excavation is undertaken during the building process? ...	It is understood that limited excavation is to occur on the site. The earthworks required are mainly to elevate the building platform, and the cuts are concentrated on the western side of the development.
		Size of building. Does a building on this site really need to be that big – and non-complying on so many areas? Does it really meet the need for good quality high density housing? It does not comply with site coverage, building height, building recession, earthworks or open spaces. This seems to be a large amount of non-compliance when it is likely something could be designed that complied with most of these areas. The	Wellington Water is providing advice on the flood hazard issue.

		rules are there to assist with quality of life for those in the proposed dwelling and those surrounding it. The earthworks are significant and while there will be earthworks for any construction, this seems to significantly alter the site and could therefore cause problems for surrounding properties, run-off etc and also the stream.	
Ross and Delcye Chesney	63	Proximity to Stream Proximity to the unstable western slopes on the west side of the proposed building. .... With the 292 Main Rd being a streamside property, there is concern about the effect of the extensive and large and length construction process in an active flood plain. Erosion mitigation is not properly addressed. ... The issues of run-off, entry of sediment and debris, and the protection of the Porirua Stream from Erosion are not dealt with satisfactorily in the proposal where the selective use of information has the effect of reducing consideration of the impact of the building on the stream. ... 2) Proximity to the unstable slopes on the West side of the proposed building Main Road Tawa between Victory Crescent and McLellan Street remained closed to	Stability of the western slope is considered outside of the earthworks assessment under the Earthworks rules of the District Plan. It may be relevant to any subsequent application to subdivide the land - as a requirement of section 106 of the Resource Management Act 1991. Controls required as part of the ESCP and further geotechnical development of the detailed design are required by the proposed conditions to assess the earthworks risks with respect to the stream proximity. It is expected that the ESCP controls when combined with the limited time frame for the earthworks will adequately control the risk erosion from posed by flooding. See comment at top above

		through traffic for more than a week in Feb 2022 because of the larger slip that came down after heavy rain and there are continuing concerns about the stability of this hillside bordering the Main Road, with concrete barriers and cones remaining in place.	
Vicky Gibbs	65	This area is already prone to flooding. The artists "impressions" didn't show a stream, just a bank. The building itself is too close to the stream (as per District Plan guidelines). I'm concerned that the proposed earthworks would have a negative impact on the banks of the stream, and therefore negatively impact the neighbours' properties and put them at risk of flooding /subsidence. ... The proposed building is also very close to the opposing bank, so I would imagine the lower ones (particularly) would be quite dark. This bank has also had a number of landslides in the last few years. The earthworks would be a concern in case they unsettle the land and cause another slip.	Wellington Water is providing advice on the flood hazard issue. Engineering around foundation design and the bearing capacity of the ground is to be undertaken as part of the detailed design with a specific condition requiring this report before works commence. As such these issues are considered to be adequately addressed.
Robert McClean Principal Advisor Treaty and Strategic Relationships	70	12. With regards to the proposal, there is a minimal buffer between the development and the stream. The proposed building is planned to be constructed right up against Te Kenepuru. 13.There is a need for a greater indigenous buffer area between the development and the stream.	Discretion is limited with respect to earthworks as the 5m standoff from streams (character and amenity of the stream) within the earthwork rules has not been breached. This may be addressed as part of the landscape review.

John and Jannah Dennison	71	a) Flooding One of our most central concerns is the proximity of the new building to the Porirua Stream. We are concerned that the sheer size of the proposed build, the scale of the earthworks necessary, and the probable mitigating measures needed to safeguard the site's streambanks from erosion and flooding will be very detrimental to the health of the stream, and have serious potential to negatively impact our own streambank and that of neighbouring properties. The District Plan requires that buildings be erected no closer than 10 metres from the Porirua Stream. And even with this in mind, we imagine that when this rule was made, the planners certainly weren't expecting a building of this magnitude to be so near the stream. The building application has the building at 8.1 metres from the stream, but the proposed deck structures come as close as 2.46 m to the stream, and range between 2.46 m and 5.01 m of the stream. This seems very unwise, given the propensity of the stream to flood…	Wellington Water is providing advice on the flood hazard issue. Discretion is limited with respect to earthworks as the 5m standoff from streams (character and amenity of the stream) within the earthwork rules has not been breached. This may be addressed as part of the landscape review. It is noted that piling for deck structures is a permitted activity under the District Plan rules.
Cont'd John and Jannah Dennison	71	b) Erosion Aside from questions of flooding, even more central for us is the possibility of stream bank erosion, including the kind of invasive mitigating measures that might be necessary to prevent this, and the effect of these mitigating measures on the stream and the banks of our property and other neighbouring properties. The Porirua Stream can be wild when in flood. The streambank of 292 Main Rd involves no significant meander, but in	Engineering of the foundation design and the bearing capacity of the ground is to be undertaken as part of the detailed design with specific conditions requiring this geotechnical report recommended below. The report is to include measures to ensure stability of the bank is not comprised. Noting that the 5m standoff from waterbodies contained within the earthwork rules has not been breached. The piling work for decking structures is a permitted

		flood the flow surges laterally and eddies strongly against both banks as the river shoots past the more restricted section under McLellan St bridge. We have attached several photos of properties within several hundred metres upstream and downstream of 292 Main Rd which have experienced damage just in the last few months. You can see the serious bank erosion and collapse: in each case, several metres of bank have been lost, and retaining walls have collapsed into the stream. All of the streambanks are clearly vulnerable to erosion and change to different degrees: We were therefore very surprised to see from the ENGEO report that they did not in fact have plans showing the exact location of the proposed building, and that they were not aware of the batter angle of the slope or the material that comprises the slope. It has been stated that further geo-engineering investigations will determine the likelihood of scour at the base of the slope due the Porirua Stream. Our comments above about the way this section of the stream surges laterally and eddies when in flood suggest issues are likely to arise. In the absence of any conclusions here we have the following questions: • What effect would such a large building, and the accompanying earthworks, have on the ground and streambank stability in the long term? • Will a retaining wall be needed across the stream bank?	activity under the District Plan rules. Wellington Water is providing advice on the flood hazard issue. This is to address in the final detailed design for foundations and building stability required by the proposed conditions of resource consent. This is considered as part of the stabilisation controls and final detailed design subject to the proposed conditions of resource consent. There is a retaining wall at the crest of the bank that is proposed as part of the ring foundation of the building.

		• Will the existing streambank vegetation - which helps to stabilise the stream bank, and enhances the green outlook – be removed for any retaining wall?	Landscaping along the stream bank is proposed and is to be assessed by Council's landscape advisor.
		• Would you need to drill into the base of the stream? If so, this would be very invasive to the stream, the wildlife, and the vegetation. …	This has not been proposed.
		• Could you guarantee that the presence of any large retaining wall in the stream directly opposite our bank would not harm the stability or plantings of our own stream bank? It very important to us and to our neighbours that we do not run the risk of any erosion to our streambank – you can see from the photographs of other properties nearby the devastation that this would cause. …	No retaining wall is proposed in the stream area.
		Another consideration with regards the proposed building and traffic is the proneness of the east-facing bluff above Main Road to slips. 292 Main Rd is sited opposite a section of this bluff. There was a huge slip just a few weeks ago which led to the closure of Main Road for many days: All traffic was diverted down McLellan St, creating even more traffic congestion than usual. Slips are not unusual here, and any such events will add to the pressure on Main Rd and McLellan Street traffic, particularly during a long building phase of 292 Main Rd. This is just another reason not to add large numbers of extra parked cars to the surrounding streets, and also not to plan a building	Stability of the western slope is considered outside of the earthworks assessment under the Earthworks rules of the District Plan. It may be relevant to any subsequent application to subdivide the land - as a requirement of section 106 of the Resource Management Act 1991.

		project on such a large scale here. d) Earthworks and loading The earthworks required are hugely non-compliant, having a proposed disturbed area of 697m2 rather than the permitted 250m2. We are very concerned about the effect that this might have on the stream and its banks, particularly in terms of the loading of the ground and associated mitigation. It is not clear that proper geotechnical work has been done to establish 10 whether this site can actually support the proposed building. Furthermore, the vertical alteration maximum depth is also outside the limit.	The development controls required as part of the proposed condition for a ESCP is considered to adequately address the risk of erosion. Engineering around foundation design and the bearing capacity of the ground is to be undertaken as part of the detailed design with specific conditions requiring this geotechnical report in the conditions recommended below. They include measures to ensure stability of the bank is not comprised.
Janet Webster	74	Shading of the steep hill slopes on the opposite side of Main Road to this building is significant on the shading analysis, particularly for March and June. Soils on shaded slopes tend to be wetter than on sunny aspects, and shading is likely to exacerbate the already well documented instability of these steep slopes. One major slip less than 100m further south along Main Road (image below) resulted from a high rainfall event on 15 February 2022, and smaller slips are frequent. With the impact of global warming, extreme rainfall events are likely to become more frequent. 3. Earthworks do not comply with the district plan. The proposed 697m2 exceeds the permitted 250m2 by 178.8%. The excavation depth also (1.6m) exceeds the permitted 1.5m. This could also have an adverse effect on the stability of the site.	Stability of the western slope is considered outside of the earthworks assessment under the Earthworks rules of the District Plan. It may be relevant to any subsequent application to subdivide the land - as a requirement of section 106 of the Resource Management Act 1991. That said, the effect to the risk of instability as result of shading from the development on the western bank is considered to be low. With risk due ongoing and increased frequency of heavy rain considered to be a more significant driver for increasing the risk of instability. The control of earthworks, required by the proposed conditions, are considered to adequately address the risk posed by this area of earthworks.

		4. Proximity to the Porirua Stream. At 8.1m, the building does not comply with the District Plan, being closer than the 10m minimum distance. Decks are even closer at 2.46-5.0m. ... The siting of non-complying earthworks so close to the stream is of particular concern. The Porirua stream banks are soft silt loam which is very unstable. Between the McLellan St bridge and the Linden Ave bridge (a distance of about 300m), there are at least 4 sites where the stream bank has collapsed recently due to erosion in high stream flows within 200m downstream of the proposed building site. Site investigations in the application do not appear to have addressed the impact of earthworks, wastewater and storm water on erosion, sedimentation and pollution of the stream, or produced plans to indicate how these effects could be mitigated.	Wellington Water is providing advice on the flood hazard issue. The proposed conditions for erosion and sediment controls during the construction of the earthworks are designed to ensure typical industry controls and processes are followed will be adequately to address the concerns raised around earthworks.
Grant Scherf	75	... 8) Earthworks and Construction Effects The proposed extent of earthworks required is highly non-compliant, having a proposed disturbed area of 697m2 rather than the permitted 250m2. This surely calls into question the suitability of this site for a development of this size. The proposal has stated the construction of the proposed development will take 12-18 months. In all reality this will in fact be 24 months with the associated construction noise, dust, construction vehicles, tradesman vehicles all contributing to a poor living environment for immediate	The earthworks are non-complaint and as such have been assessed in accordance with the district plan discretion. Most of the excavated material is expected to stay on site and as such truck movements are expected to be low with respect to earthworks.

		residents for an extended period. 9) Geotechnical, Flooding and Natural Hazards Effects. The Porirua Stream is subject to high to extreme water levels during significant rainfalls and the proposed changes to the bank structure need to take these into consideration. Also, the downstream impact has not been considered along with the impact this proposal would have on the current flood plain of the surrounding area.	Engineering around foundation design and the bearing capacity of the ground will be undertaken as part of the detailed design with specific conditions requiring the geotechnical report recommended below. The conditions will include measures to ensure stability of the bank is not comprised. Wellington Water is providing advice on the flood hazard issue.
Bruce & Sandie Gallagher	78	… Also concerned about the proximity of the proposed building to the bank/stream and the effect a building of this size will have on the stability of the bank and/or erosion of the stream banks of neighbouring properties if the stream bank on the site is altered!	Engineering around foundation design and the bearing capacity of the ground will be undertaken as part of the detailed design with specific conditions requiring the geotechnical report recommended below. The conditions will include measures to ensure stability of the bank is not comprised.
Richard Herbert	82	I am concerned however, that the Porirua Stream traverses through part of 292 Main Road. In the recent past there have been server erosion of the stream bank of the stream at some other nearby properties. This is a risk to the 4 story building proposed for this site and the long-term stability of the building in flooding events with the normal level of the stream some 3m meters below the adjacent road level.	Engineering around foundation design and the bearing capacity of the ground will be undertaken as part of the detailed design with specific conditions requiring the geotechnical report recommended below. The conditions will include measures to ensure stability of the bank is not comprised.

Applicants Suggested Conditions

The applicant's suggested conditions have been reviewed and the following conditions have been specially developed as part of this assessment. They are recommended to control the risks, and mitigate the effects, associated with the proposed earthworks.

Conclusion:

The proposal is supported because it satisfactorily addresses the earthworks provisions of the District Plan, and it is expected that standard industry methodologies will be implemented to minimise any potential earthworks effects.

The following conditions/advice notes are suggested to ensure that standard earthwork methodologies are implemented:

Recommended Conditions

Geotechnical Assessment Report

1) A geotechnical assessment report of the site and proposed development must be submitted to the Council's Compliance Monitoring Officer for certification, at least 20 working days prior to any work commencing on site. The geotechnical assessment report should be undertaken by an experienced 'Geotechnical Professional' and as a minimum should contain, but not be limited to, the following:

    i. A review of all available geotechnical reports for the site including the geotechnical report by Engeo Ltd (dated 30 March 2021, reference 18501.000.001_01).
    ii. A summary of the ground conditions with a proposed geological model.
    iii. An assessment of the geotechnical analysis of the Porirua Stream Bank and the development, that ensures no increased risk of instability.
    iv. A geotechnical analysis of the design concept and resulting recommendations that will mitigate any potential adverse effects.

    The purpose of the geotechnical assessment is to ensure that appropriate geotechnical risk have been identified in relation to potential effects on the stream and to ensure the geotechnical soundness and resilience of the earthworks and stream bank.

A 'Geotechnical Professional' is defined as a Chartered Professional Engineer (CPEng) with specialist geotechnical skills and experience in the design, construction and monitoring of excavations in similar ground conditions as the proposed development.

Chartered Professional Engineer:

2) A suitably experienced and qualified Chartered Professional Engineer (CPEng) must be engaged by the consent holder for the monitoring earthworks, detailed design and construction phase of the project.

The CPEng must advise on:

v. The methods to ensure the stability of the site and surrounding land
vi. The construction of cut faces, fill batters, staging, shoring, and benching as required for stability of the earthworks,
vii. The earthworks methodology to ensure consistency with the geotechnical report by Engeo Ltd (dated 30 March 2021, reference 18501.000.001_01).

The consent holder must follow all the advice of the CPEng in a timely manner. If necessary, the Council's Compliance Monitoring Officer may require information regarding the engineer's monitoring and/or specific assessments to address any potential or actual instability issues in relation to earthworks.

Erosion and Sediment Control Plan (ESCP)

3) An Erosion and Sediment Control Plan (ESCP) must be developed by the Consent Holder and submitted to the Council's Compliance Monitoring Officer for certification, at least 10 working days prior to any work commencing on site.

Erosion and Sedimentation Controls

viii. An illustrated plan that records the key features of the ESCP (including the approved earthworks plan)
ix. A description of the approaches to be used to prevent erosion, and minimise problems with dust and water-borne sediment including staging of stabilisation of earthworks to decrease the risk erosion from flooding or stormwater

x. Measures to limit the area of earthworks exposed to the weather at any one time (sources of dust and sediment)

xi. Stabilisation of the site entrance(s) to minimise the tracking of earth by vehicles onto the adjoining roads

xii. Detail of the use of diversion bunds/cut-off drains, as required, to minimise stormwater entering the site and discharging onto earthworks areas where it can pick up sediment and not discharged on to sloping ground

xiii. The type and location of silt fences to control water-borne sediment

xiv. Methods for protecting stormwater sumps from the infiltration of water-borne sediment

xv. Stabilisation of soil or other material that is stockpiled on the site or transported to, or from, the site, to prevent dust nuisance or erosion by rain and stormwater (creating water-borne sediment)

Dust Suppression

xvi. Ensuring that measures such as sprinklers are in place and ready for use at the start of the day when dry weather is expected

xvii. Ceasing all dust generating activities if site dust is observed blowing beyond the site boundary

Management of Controls

xviii. The methods for managing and monitoring the ESCP controls

xix. Nomination of a site person responsible for the implementation and administration of the ESCP.

4) No work may commence on site until the ESCP is certified by the Council's Compliance Monitoring Officer. The earthworks and associated work must be carried out in accordance with the certified ESCP.

5) The erosion, dust and sediment control measures put in place must not be removed until the site is remediated to the satisfaction of the Council's Compliance Monitoring Officer. 'Remediated' means the ground surface of the areas of earthworks have been stabilised (no longer producing dust or water-

borne sediment), and any problems with erosion, dust or sediment that occur during the work have been remedied.

Note:
If necessary, the Council's Compliance Monitoring Officer may require changes to the implementation of the ESCP, to address any problem that occurs during the work or before the ground surface is stabilised.

6) A copy of the certified ESCP must be held on site throughout the duration of the earthworks and must be made available on request.

Certification of Earthworks

7) A Construction Review Statement prepared by a suitably experienced Chartered Professional Engineer (CPEng) must be supplied to the Council's Compliance Monitoring Officer within one month of the earthworks being completed. The Construction Review Statement should:

ii. State the earthworks have been completed in accordance with the earthworks scheme plans, approved under the resource consent
iii. Include statement of Professional opinion for the suitability of earth fill for residential development, as per Appendix A NZS4431:1989.

Producer Statements

8) A copy of the producer statement 'PS4 – Construction Review' and its accompanying documents for structures/buildings required for the stabilisation of earthworks, and prepared for the associated building consent process, must be provided to the Council's Compliance Monitoring Officer within one month of the structures/buildings being completed.

Grassing of Earthworks

9) All exposed areas of earthworks, unless otherwise built on and/or stabilised, are to be grassed or re-vegetated within 1 month of completing each stage of the earthworks, to a level of establishment satisfactory to Council's Compliance Monitoring Officer.

The Council's Compliance Monitoring Officer may agree to a longer period than 1 month, if appropriate, and will approve it in writing.

10) If construction works at the site cease for a period of greater than 2 months, the exposed areas of earthworks must then be stabilised to reach a level of establishment satisfactory to the Council's Compliance Monitoring Officer.

General Earthworks Conditions

11) Run-off must be controlled to prevent muddy water flowing, or earth slipping, onto neighbouring properties or the legal road. Sediment, earth, or debris must not fall or collect on land beyond the site or enter the Council's stormwater system. Any material that falls on land beyond the site during work or transport must be cleaned up immediately (with the landowner's permission on land that isn't public road). The material must not be swept or washed into street channels or stormwater inlets, or dumped on the side of the road.

Note: As a minimum, 100 mm clarity is required to allow water to be discharged offsite. If clarity is less than 100mm then the water is considered to be muddy and must be captured and treated on site.

12) Dust created by earthworks, transport and construction activities must be controlled to minimise nuisance and hazard. The controls must be implemented for the duration of the site works and continue until the site stops producing dust.

Vibration

13) The consent holder must ensure construction and any earthworks activities must be controlled to ensure any vibration does not exceed the vibration limits set out in German Standard 'DIN 4150-3:1999 'Structural Vibration – Part 3: Effects of vibration on structures. Where a specific construction activity cannot comply with the limits set out in DIN 4150-3:1999 'Structural Vibration – Part 3: Effects of vibration on structures' the consent holder must provide the CMO an assessment of physical and managerial vibration control methods that must be adopted. The assessment shall be in line with section 16 of the Act (BPO)

Author:
John Davies
Earthworks Engineer
Wellington City Council

Peer Reviewer:
Jonathan Anderson
Team Leader, Earthworks and Subdivision Compliance
Wellington City Council