

Earthworks Assessment on Resource Consent Application

14 July 2022

Service Request No: 471670

Site Address: **26 Donald St**

Introduction:

1. 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 geomechnaics. I have been in my current role with the Council for over 6 years, following 12 years working in the mining industry.
2. As an 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.
3. 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.
4. The proposal is for a development of a new retirement village at 26 Donald St with associated earthworks.

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

106 Consent authority may refuse subdivision consent in certain circumstances

(1) A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that—

(a) there is a significant risk from natural hazards;...

RMA 1991	Applicable
Section 106 – Right of Refusal Subdivision Consent	No

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(b)	Exceeds
(i) The cut height or fill depth does not exceed 2.5m measured vertically; and	Cut up to 4m Fill up to 4.5m
(ii) The cut or fill is retained by a building or structure authorised by a building consent (which must be obtained prior to any earthworks commencing); and	Complies
(iii) The area to be cut and/or filled does not exceed 250m ²	~25,000m 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:	
<ul style="list-style-type: none"> • Rural Area 20m 	
<ul style="list-style-type: none"> • Centres and Business Areas adjoining the Porirua Stream 10m 	
<ul style="list-style-type: none"> • All other areas 5m 	Complies
30.1.1.3	
The cut or fill is not in a Hazard (Flooding) Area;	Complies
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

Assessment:

Geotechnical Assessment

5. A geotechnical assessment has been supplied as part of the application. The geotechnical report was developed by Tonkin and Taylor Ltd (dated August 2020, reference 30309.v4). Further information was also supplied in the form of a geotechnical letter by Tonkin and Taylor Ltd (dated 13 Nov 2020) to satisfy geotechnical questions raised by Council's peer reviewer ENGEO Ltd. ENGEO Ltd (letter dated 1 Dec 2020, Ref: 17766.000.000_02) confirmed that they are comfortable with the geotechnical approach by Tonkin and Taylor Ltd at this stage of the geotechnical assessments process.
6. The reports by Tonkin and Taylor identified that the site contains a mixture of sedimentary units between 5 and 29m thick, overlying weathered greywacke basement rock. The risk of instability is considered to be focused around the larger cuts during the construction phase and the potential for settlement issues associated with the weaker sedimentary units.
7. The initial geotechnical report by Tonkin and Taylor (dated August 2020) analysed the geotechnical matters with respect to the resource consent process as shown in figure 1 below:

Planning matters considered	Geotechnical assessment findings
<ul style="list-style-type: none"> • Natural hazards that may affect the Proposed Village and adjacent land, being earthquake shaking and associated ground liquefaction/lateral spreading and land instability/subsidence • The potential for earthworks, including excavation and retention associated with the Proposed Village, to affect the stability and/or cause ground deformation of land • The potential for works to affect the groundwater regime at adjacent sites and cause ground deformation or 	<ul style="list-style-type: none"> • Specific design consideration is not required for Seismic return periods of less than 100 years. Post-shaking settlement and some reduction in ground bearing capacity, lateral support and stiffness may occur somewhere between a 100 to 500 return period event. The Proposed Village development is not assessed to exacerbate seismic hazard effects at adjacent sites. • The proposed excavations will be assessed and supported with suitably designed and constructed retaining walls. No adverse land stability impacts are expected on or around the Site. • The potential cumulative settlement due to fill and/or structural loads, excavations and groundwater drawdown are expected to result in less than 10 mm of settlement at any boundary of the Site and negligible settlement at the location of any neighbouring structure. The Proposed Village is to not expected to have any adverse ground deformation and settlement effects on adjacent properties.

Figure 1 – Tonkin and Taylor Summary of key planning matters and findings with respect to earthworks.

8. Ultimately the development is supported by both the Tonkin and Taylor assessments and the ENGEO Ltd review. No significant geotechnical issues were identified that are considered to require more in-depth investigations at this stage.
9. The position of the larger cuts may require temporary retaining particularly around existing buildings and the public roads along the north-eastern boundary. As such a Construction Management Plan detailing the staging and stability controls of the earthworks is to be developed and submitted to council prior to earthworks commencing on site.
10. Monitoring of the earthworks is to be undertaken by a Chartered Professional Engineer. This will allow for assessment of the cuts stability and, if required, remediation measures to be implemented in a timely manner.
11. The geotechnical reports also considered risks associated with potential settlement effects due to watertable drawdown, reduced lateral confinement and loading by fill or structures. Of which the risk of settlement beyond the site boundaries was considered to be low.
12. Therefore, provided typical industry controls are undertaken which are in line with the conditions of consent below and the recommendations from both geotechnical reports are adhered to; the application is supported from an earthworks stability viewpoint.

Erosion, Dust and Sediment Controls

13. Typically, the controls required to minimise the risk posed by erosion, sediment and dust loss from the site are documented in an Earthworks and Sediment Control Plan (ESCP).
14. The area of earthworks exceeds 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. As such an ESCP is considered to be required with an initial draft developed by Woods (reference 042-RCT_401_Co-180, Dated 14 august 2020). The controls within the ESCP are general acceptable but further detail is expected to be added once the earthworks contractor has been appointed. Key to this further

detail is staging of the earthworks to minimise the potential for erosion and sediment loss from the site.

15. As such a final ESCP is required as part of the recommended conditions below.

Visual Amenity

16. The proposed area of earthworks and cut and fill heights exceed the of earthworks threshold. Therefore, an assessment on the visual impact is triggered.

Transport Management Plan (TMP)

17. The volume of excess earthworks material exceeds the threshold. Therefore, advice from a transport engineer is expected to be required.

Conclusion:

18. The proposal is supported from an earthworks point of view, as it is expected that standard industry methodologies will be implemented to minimise any potential earthworks effects.
19. The following conditions/advice notes are suggested to ensure that standard earthwork methodologies are implemented:

Submitter Queries

20. The following table documents the earthworks concerns raised by submitters and responses to these concerns.

Name/Address	Earthwork Comments	Response
Barbara Carruthers/ 14 Scapa Terrace	Increased shade on our property, impact on our privacy, traffic/parking problems, construction noise/ dust and traffic issues.	Dust from earthworks must be controlled as part of the recommended conditions, refer to condition (15) below.
John McArdle / 15 Scapa Terrace, Karori	Aspects of the application that you support or oppose: ... <ul style="list-style-type: none"> • impact on nearby residents from 	Dust from earthworks must be controlled as part of the recommended conditions, refer to condition (15) below.

	<p>construction noise, dust and traffic during the lengthy construction period.</p>	
<p>Jude Wallace / 13 Scapa Terrace</p>	<p><u>Construction</u></p> <p>As someone who lives close to the proposed development, I am worried about the level of dirt, dust and noise that will be generated from what will be years of construction activity. This situation will be compounded by what is a very windy site and I seek assurances that Ryman Healthcare will make good on their original offer to frequently wash the exterior of affected houses.</p> <p>...</p> <p>As a resident close by, I am worried about the impacts of ground movement from major excavation work at the site. As with the dirt and dust impacts, I would like Ryman Healthcare to confirm adjacent properties will have their homes and sections assessed before and after construction to check whether there has been any movement because of construction work.</p>	<p>The risk of dirt and dust being lost from the site is considered to be adequately addressed through development of earthwork controls that are required as part of the ESCP conditions.</p> <p>The requirement to wash any dust from the exterior of the houses is outside of the scope of this assessment. But a condition could be developed around this requirement if agreed on by the applicant.</p> <p>This is outside of the scope for an earthworks assessment. Specific comment should be sought from experts around vibration conditions.</p>
<p>Jennifer Mattlin / 36 Cooper St</p>	<p>Aspects of the application that you support or oppose: I oppose the proposed Ryman development for the following reasons:</p> <p>...</p> <p>Construction impacts – dust, noise, ground movement.</p>	<p>The risk of dirt and dust being lost from the site is considered to be adequately addressed through development of earthwork controls that are required as part of the ESCP conditions.</p> <p>The risk of instability is to be controlled through engineering monitoring and controls required to be development of</p>

		<p>Construction Management Plan required as part of the conditions below.</p> <p>This risk impact from noise and vibration is outside of the scope for an earthworks assessment. Specific comment should be sought from experts around vibration conditions.</p>
<p>Bonita Gestro / 6 Scapa Tce</p>	<p>...</p> <ul style="list-style-type: none"> • I am also concerned by the effects of ground movement from excavation and piling on my property and request that Ryman honour their original offer to neighbours impacted by the development to have their homes assessed pre and post construction and to rectify any movement or shaking impacts on homes from the construction activities 	<p>Stability of the excavations is to be maintained via typical construction controls such as batters, engineering monitoring and temporary support (as required). These controls are required as part of the conditions of consent below.</p> <p>Piling is excluded from consideration as earthworks but any vibration affects should be commented on by the advising expert with conditions developed.</p>
<p>Joost & Kerri van Amelsfort / 12 Scapa Tce</p>	<p>...</p> <p>5 Construction</p> <p>5.1 We submit the scale and duration of the construction phases for the proposed village will:</p> <p>5.1.1 materially adversely impact neighbouring residents' use and enjoyment of their properties;</p> <p>5.1.2 create risks of protracted exposure to noise, dust and other pollutants; and 5.1.3 be particularly impactful for neighbours on the northern and southern boundaries of the site, given the prevailing wind direction is predominantly north / northwesterly (affecting the southern end of the site) and south / south-westerly</p>	<p>The risk of dirt and dust being lost from the site is to be minimised by controls required by the ESCP as part of the conditions of consent. Both are required to be controlled in line with recommended conditions (14) and (15) below.</p>

	<p>I can see no controls or mitigation in place to address ground movement to the Scapa Terrace residents. Excavation will occur on our boundary for stormwater replacement pipes and a few metres away for building construction. Should Ryman not be able to proceed until they have an understanding of soil types and potential impacts to existing buildings?</p> <p>- I would expect some form of INDEPNENT baseline assessment and periodic review (say quarterly) for ground movement. Page 5 - I would expect to see controls and mitigations in place to protect the function of existing stormwater and wastewater infrastructure during construction given the significant impact it could have upstream and downstream of the construction zone. - I would expect to see controls and mitigations in place for heavy rain events during construction.</p>	<p>Geotechnical reports have been undertaken as part of the application by Tonkin and Taylor Ltd (dated August 2020, reference 30309.v4). These have been reviewed by Engeo Ltd as part of the RC process. Reference to these reports is included the recommended conditions of consent. More detailed design is often undertaken as part of the BC process.</p> <p>Stability of the excavations is to be maintained via typical construction controls such as batters, engineering monitoring and temporary support (as required). These controls are required as part of the conditions of consent below.</p> <p>The ESCP will be developed with specific controls designed to limit erosion and sediment loss from the site. An ESCP has been developed as part of the application, additional controls and further review of the ESCP is required as part of the conditions of consent.</p>
Clinton Moran / 16 Scapa Terrace	<p>...</p> <ul style="list-style-type: none"> • I am also concerned by the effects of ground movement from excavation and piling on my property (foundations, plaster ceilings etc.). <p>...</p>	<p>Stability of the excavations is to be maintained via typical construction controls such as batters, engineering monitoring and temporary support (as required). These controls are required as part of the conditions of consent below.</p> <p>Piling is excluded from consideration as earthworks but any vibration affects should be commented on by</p>

		the advising expert with conditions developed.
B Dunstan 11 Scapa Tec	Dust during construction	Dust from earthworks must be controlled as part of the recommended conditions, refer to condition (15) below.
Responsible Development Karori Inc 49 Campbell Street	... 14. Construction effects a) Dust – due to the windiness of the site, it will be very difficult to contain dust generated by the construction activities. It is requested by RDK that Ryman take all practicable measures to minimize dust from the site and to honour their original offer to neighbours to have their houses washed periodically (at least 3 monthly) during the construction phase. b) Ground movement – the scale of excavation and piling during constructions risks ground movement that has the potential to cause seismic damage to neighbouring homes. It is requested by RDK that Ryman honour their original offer to neighbours to have their homes assessed pre, during and post construction and to rectify any movement or shaking impacts on homes from the construction activities.	Earthwork conditions have been developed to minimise the risk of these issues. Development of conditions in line with the submitter's comments would need to be agreed with the applicant.
Mark Moore / 17 Paddington Grove	Construction Physical effects • I am concerned by dust generated from construction, particularly given the windiness of the site and request that Ryman honour their original offer to neighbours impacted by the development to have their houses washed periodically during the construction phase. ...	Dust from earthworks must be controlled as part of the recommended conditions, refer to condition (15) below.

	<ul style="list-style-type: none"> • We are also concerned by the effects of ground movement from excavation and piling on my property and request that Ryman honour their original offer to neighbours impacted by the development to have their homes assessed pre and post construction and to rectify any movement or shaking impacts on homes from the construction activities 	<p>Stability of the excavations is to be maintained via typical construction controls such as batters, engineering monitoring and temporary support (as required). These controls are required as part of the conditions of consent below.</p> <p>Piling is excluded from consideration as earthworks but any vibration affects should be commented on by the advising expert with conditions developed.</p>
Bernadette & Tristram Ingham 22 Scapa Terrace,	<p>Construction Physical effects</p> <ul style="list-style-type: none"> • I am concerned by dust generated from construction, particularly given the windiness of the site and request that Ryman honour their original offer to neighbours impacted by the development to have their houses washed periodically during the construction phase. <p>...</p> <ul style="list-style-type: none"> • We are also concerned by the effects of ground movement from excavation and piling on my property and request that Ryman honour their original offer to neighbours impacted by the development to have their homes assessed pre and post construction and to rectify any movement or shaking impacts on homes from the construction activities 	<p>Dust from earthworks must be controlled as part of the recommended conditions, refer to condition (15) below.</p> <p>Stability of the excavations is to be maintained via typical construction controls such as batters, engineering monitoring and temporary support (as required). These controls are required as part of the conditions of consent below.</p> <p>Piling is excluded from consideration as earthworks but any vibration affects should be commented on by the advising expert with conditions developed.</p>
Margot King / 15 Scapa Terrace	(e) Disruption during construction must be minimised for neighbours and environment. A plan be agreed with concerned parties.	Earthwork conditions have been developed to minimise the risk of these issues.
Bruce and Miranda Major	<p>Construction Physical effects</p> <ul style="list-style-type: none"> • We are concerned by dust 	Dust from earthworks must be controlled as part of the

37 Donald St	<p>generated from construction, particularly given the windiness of the site and request that Ryman honour their original offer to neighbours impacted by the development to have their houses washed periodically during the construction phase.</p> <p>...</p> <ul style="list-style-type: none"> • We are also concerned by the effects of ground movement from excavation and piling on my property and request that Ryman honour their original offer to neighbours impacted by the development to have their homes assessed pre and post construction and to rectify any movement or shaking impacts on homes from the construction activities 	<p>recommended conditions, refer to condition (15) below.</p> <p>Stability of the excavations is to be maintained via typical construction controls such as batters, engineering monitoring and temporary support (as required). These controls are required as part of the conditions of consent below.</p> <p>Piling is excluded from consideration as earthworks but any vibration affects should be commented on by the advising expert with conditions developed.</p>
<p>David Winston King and Anna Reese McKinnon-King 24 Scapa Terrace,</p>	<p>Dust (section 5.3.1) 84. Ryman submits that the effects of dust on the environment will be less than minor as a result of the applications of relevant standards and mitigation.</p> <p>Geotechnical effects (section 5.6 of the AEE) 100. Ryman submits that the geotechnical effects will have 'no noticeable' effects on the environment and adjacent properties. 14 101. The expert report does not consider applying or apply a s3(f) test. 102. Consequently, the potential adverse geotechnical effects are possibly greater than minor. Further, expert advice needs to be provided by Ryman on this matter.</p>	<p>ESCP and dust conditions have been recommended below and adherence to robust dust management strategies are required as part of this plan.</p> <p>Recommend: Comment should be sought from the geotechnical advisor for clarity around the advice statement.</p>

Recommended Conditions

Chartered Professional Engineer

- 1) A Chartered Professional Engineer (CPEng) must be engaged by the consent holder for the detailed design and construction phases of the project.
- 2) The name and the contact details of the CPEng must be provided to the Council's Compliance Monitoring Officer by the Consent Holder, at the time the person is appointed.
- 3) The CPEng will monitor the construction of the temporary and permanent earthworks, retaining structures and drainage. The CPEng will advise on the best methods to ensure:
 - the stability of the site and surrounding land
 - the construction of cut faces, fill batters, staging, shoring, and benching as required for stability of the earthworks,
 - the design and construction of the temporary and permanent earthworks, retaining structures and drainage, are consistent with geotechnical reports undertaken by Tonkin and Taylor Ltd (dated August 2020, reference 30309.v4).

The Consent Holder must follow all the advice of the CPEng in a timely manner.

Construction Management Plan (CMP)

- 4) A Construction Management Plan (CMP) must be developed by the Consent Holder, with input from both the CPEng and submitted to the Council's Compliance Monitoring Officer for certification, at least 10 working days prior to any work commencing on site.

The CMP must be consistent with the finding and recommendations of the geotechnical assessment by Tonkin and Taylor Ltd (dated August 2020, reference 30309.v4) and will include, but is not limited to, the following:

- Measures to ensure earthworks and retaining structures are constructed incrementally to maintain stability of all the slopes
- The maximum height increment of earthworks before the structural support to that earthwork is put in place.
- Other measures to ensure earthworks and retaining structures remain stable, including measures to limit the exposure of unretained earthworks at any one time
- Details of the staging of work
- Roles and responsibilities of key site personnel
- A contact (mobile) telephone number(s) for the on-site manager, where contact can be made 24 hours a day / 7 days a week
- A communication and complaints procedure for adjoining property owners/occupiers and the public.

The CMP must be peer reviewed by the CPEng prior to being submitted to Council, to ensure that the methodology is in accordance with the geotechnical assessment, by Tonkin and Taylor Ltd (dated August 2020, reference 30309.v4) and current engineering best practice. The review must be provided to the Council's Compliance Monitoring Officer when the final CMP is filed for certification.

- 5) No work may commence on site until the CMP is certified. The earthworks and retaining work must be carried out in accordance with the certified CMP.
- 6) Any amendments to the CMP (once work starts) must be approved by:
 - The CPEng, andCertified by the Council's Compliance Monitoring Officer.

Earthworks and Sediment Management Plan (ESCP)

- 7) The Earthworks and Sediment Management Plan (ESCP) submitted with the application has been supported in principle. The ESCP was by Woods (reference 042-RCT_401_Co-180, Dated 14 august 2020). It is expected that this will form the basis of the final ESCP, which must be submitted to the Council's Monitoring Officer for certification, at least 10 working days prior to any work commencing on site.

The following additional measures must be implemented:

- An illustrated plan that records the key features of the ESCP
- Measures to limit the area of earthworks exposed to the weather at any one time (sources of dust and sediment)
- Measures to ensure temporary excavations remain stable. Slips or failures can significantly increase dust and sediment
- Stabilisation of the site entrance(s) to minimise the tracking of earth by vehicles onto the adjoining roads
- 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
- Details of how, throughout construction, all stormwater from roofs, paved and impermeable surfaces will be collected and piped to prevent it discharging onto earthworks areas where it can pick up sediment and not discharged on to sloping ground
- The type and location of silt fences to control water-borne sediment
- Methods for protecting stormwater sumps from the infiltration of water-borne sediment

- Measures to ensure that the discharge of dust created by earthworks, construction and transport activities are suitably controlled to minimise dust hazard or nuisance
- Covering 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)
- The methods for managing and monitoring the ESCP controls
- Nomination of a site person responsible for the implementation and administration of the ESCP.

The ESCP must be peer reviewed by the CPEng prior to being submitted to Council, to ensure that the methodology is in accordance with engineering best practice. The review must be provided to the Council's Compliance Monitoring Officer when the final ESCP is filed for certification.

- 8) 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.
- 9) Any amendments to the ESCP once work starts must be approved by the following:
 - The CPEng, and
Certified by the Council's Compliance Monitoring Officer.
- 10) 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.

Producer Statements

- 11) A construction review statement must be supplied by a suitably experienced Chartered Professional Engineer (CPEng) to the Council's Compliance Monitoring Officer within one month of the earthworks being completed. The document should:
- Provide details of any changes that were necessary to address geotechnical or engineering problems encountered during the earthworks;
 - A certification upon completion of land development and subdivision, Schedule 2A of NZS4404:2010
- 12) 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

- 13) All exposed areas of earthworks, unless otherwise built on, 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.

General Earthworks Conditions

- 14) All sediment laden run-off must be managed and contained within the site. Any sediment that is deposited onto neighbouring properties or the public road must be cleaned up immediately (with the landowner's permission on land that isn't

public road). The deposited sediment must not be swept or washed into street channels or stormwater inlets or dumped on the side of the road.

Note:

As a minimum, 100mm of clarity is required to allow run-off to be discharged offsite. If clarity is less than 100mm then the run-off is considered to be sediment laden and must be contained and/or treated on site.

- 15) 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.

Author:

John Davies

Earthworks Engineer