

To: Minister for Canterbury Earthquake Recovery



IN CONFIDENCE

Initial Considerations Following Receipt of Geotechnical Reports in the Port Hills

Date	10 May 2012	Priority	Medium
Report No	M/12/0373	File Reference	

Action Sought

	Deadline
Hon Gerry Brownlee <i>Minister for Canterbury Earthquake Recovery</i>	Note the information provided in this briefing

Contact for Telephone Discussion (if required)

Name	Position	Telephone	1st Contact
Diane Turner	General Manager, Strategy, Planning and Policy		
John WA Scott	Senior Advisor, Policy	Withheld under section 9(2)(a)	
Withheld under section 9(2)(g)(i)			

Minister's office comments

<input type="checkbox"/> Noted <input type="checkbox"/> Seen <input type="checkbox"/> Approved <input type="checkbox"/> Needs change <input type="checkbox"/> Withdrawn <input type="checkbox"/> Not seen by Minister <input type="checkbox"/> Overtaken by events <input type="checkbox"/> Referred to
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Comments

Released by the Minister for Canterbury Earthquake Recovery

Initial Considerations Following Receipt of Geotechnical Reports on the Port Hills

Purpose

- 1 This report provides you with an update on results from geotechnical studies on the Port Hills, and possible implications for rezoning decisions and the installation of rockfall protection systems.

Executive Summary

- 2 CCC and CERA have received four reports from GNS and Geovert, which provide critical information that is needed to progress decision making in the White Zone. These reports suggest that rockfall fences will be a cost-effective solution to hazard management in some areas of the Port Hills, and that a retreat zone may be the best approach for dealing with the majority of significant cliff collapse and debris inundation areas.
- 3 While other essential information is still pending, it is expected that by 30 June it will be possible to make rezoning decisions and to provide property owners in rockfall and cliff collapse areas with certainty regarding their future.
- 4 Further consideration is being given to options relating to properties affected by landslips, which is the subject of separate research and management processes.
- 5 As a foundation for these decisions, officials in CCC and CERA are working through a number of issues that may require government decisions or direction to proceed. This includes the criteria for a cost-benefit analysis to determine where rockfall protection systems should be installed; agreement on a potential cost-sharing arrangement between central government and CCC; possible precedent risks of central government leadership and assistance with natural hazard management/mitigation; and other criteria that Ministers could use in decision making.
- 6 In the short term, and on the basis of received reports, officials have identified approximately 375 White Zone properties that could be zoned green.

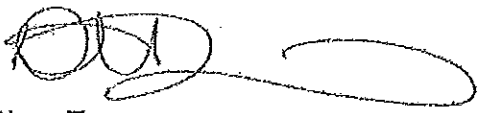
Recommendations

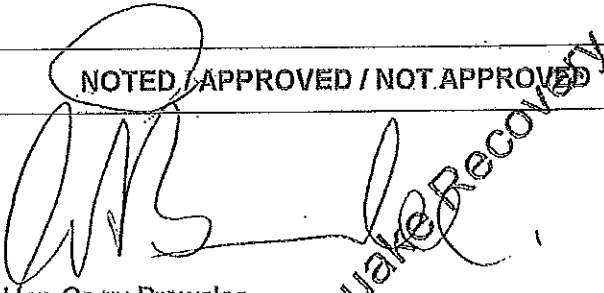
7 It is recommended that you:

- 1 Note officials will report back to you with a potential green zoning decision on 10 May ?
- 2 Forward this briefing note to the Minister of Finance, the Associate Minister of Finance (Hon Steven Joyce) and the Minister of Housing for their information.

YES/NO

YES/NO


Diane Turner
General Manager – Strategy, Planning
and Policy

NOTED / APPROVED / NOT APPROVED
 Hon Gerry Brownlee Minister for Canterbury Earthquake Recovery
Date: 11/05/2012

Attachments:

Annex A: Executive summaries of GNS and Geovert Reports

Annex B: Guide to Risk Levels

Annex C: Comparison of GNS Data and Section 124 Building Act Notices

Background

- 8 On 1 July 2011, the Port Hills was zoned white whilst assessments were undertaken, including reports on life safety risks associated with rock fall and cliff collapse by the Institute of Geological and Nuclear Sciences (GNS) for CCC, a "ground truthing" of this GNS model by the Port Hills Geotechnical Group (PHGG), and a 3D rockfall study by Geovert for CERA.
- 9 On 5 September 2011, 9,700 properties were zoned from white to green, leaving 3,700 properties in the Port Hills White Zone.
- 10 On 19 December 2011, a further 1,600 properties were zoned from white to green, leaving 2,100 residential properties in the Port Hills White Zone.
- 11 Since your 22 March meeting with officials from CERA, CCC, DBH, EQC and Tonkin & Taylor, CERA has been working with CCC to develop advice on zoning decisions and the suitability of rockfall protection systems. Discussions on funding and long-term ownership/maintenance will take place after this initial advice has been formulated.
- 12 A number of geotechnical reports have recently been finalised (or are close to being finalised). This briefing note discusses these geotechnical reports and their implications.

Geotechnical Reports Being Finalised

- 13 The following reports have been provided to CCC and CERA (Executive Summaries available in Annex A):
 - *Final GNS pilot study for assessing life-safety risk from rockfall*: this report analyses rockfall risks for the Port Hills residential pilot study areas, which were most affected in 2011, and estimates the annual individual fatality risk in these areas from rockfall, assuming increased seismicity and presence in the home 24 hours a day, 7 days a week;
 - *Final GNS pilot study for assessing life-safety risk from cliff collapse*: this report analyses cliff collapse and debris inundation risks for the Port Hills residential pilot study areas, which were most affected in 2011, and estimates the annual individual fatality risks in these areas from cliff collapse and debris inundation, assuming increased seismicity and presence in the home 24 hours a day, 7 days a week;
 - *Final GNS study on the principles and criteria for the assessment of risk from slope instability*: this report analyses issues for consideration in establishing a life risk-based approach to the management of slope instability hazards in the Port Hills, and contains a review of international best practise on life risk;
 - *Port Hills Geotechnical Group (PHGG) ground truthing study (for areas covered in GNS' rockfall pilot studies)*: PHGG conducted field peer reviews of GNS' risk maps for Port Hills residential areas, and provided commentary back to GNS through CCC on any variations to these maps due to local topographical features; and
 - *Geovert 3D studies on rockfall*: these reports analyse the potential trajectories, bounce heights and energy levels of boulders in the Port Hills. This preliminary work allows designers to quickly determine the viability and possible location of rockfall protection systems. It also provides estimates of capital costs and design concepts (such as height and strength), and fills in present gaps in information due to GNS's prioritization of pilot studies areas.

- 14 These reports provide critical information that is needed to progress decision making in the White Zone. Although further information in several areas is still required, these reports are critical inputs for the following:
- Based on these reports, CCC is reviewing current s124 Building Act notices. CCC officials report that approximately 10 s124 notices may be removed, and approximately 48 new notices could be added. If this were to occur, it would bring the number of s124 notices issued to approximately 570 buildings. There has been no timeframe provided for this decision, due to a delay in receipt of geotechnical advice;
 - Identifying the potential location and capital/installation cost of rockfall protection systems, (most likely rockfall fences due to the sloping terrain);
 - Identifying where rockfall protection would be effective and meet cost-benefit criteria; and
 - Identifying cliff collapse areas where on-going habitation is unsafe.
- 15 These reports do not provide all information required for decisions by 30 June. In particular:¹
- The GNS pilot rockfall and cliff collapse studies (and associated PHGG ground truthing study) cover pilot study areas in the Port Hills White Zone, these pilot areas include residential areas at highest risk from cliff collapse and rockfall, and account for approximately 35% of the current Port Hills White Zone. PHGG is working to deliver reports for these remaining White Zone areas by end-May;
 - Further peer review on some aspects of the Geovert reports may be undertaken, in particular around the reports' estimated capital costs for rockfall protection systems and design concepts. In parallel, CCC and CERA are designing a comprehensive cost-benefit model, which will include estimates of other expenses such as maintenance and repair; and
 - The Geovert reports provides estimated timelines for rockfall protection system installation based on one team working sequentially on each task. More information is required to establish actual procurement and efficient installation timelines.
- 16 The majority of landslips in the Port Hills have already been zoned green, however four major landslips are located in the remaining White Zone. PHGG and GNS' work has not been focused on landslips as this issue has been managed separately by EQC, with Tonkin and Taylor providing them with engineering advice.
- 17 There are potentially 60-100 properties impacted by long-term landslip issues, for which data is still being collected. Separate advice on this issue will be provided to you.

Preliminary Implications of the Reports

Rockfall

- 18 The Geovert results imply that rockfall protection systems are likely to be feasible and cost-effective in many high risk rockfall areas in the Port Hills. This statement is based on initial analysis only and must be viewed with some caution, particularly as it is based on Geovert's estimate of capital expenses, which do not take into account ongoing maintenance or repair

¹ CERA is also discussing whether it is possible to gain some data from EQC that would augment our geotechnical understanding on cliff collapse issues. These discussions are proceeding well.

costs. We understand that fences are likely to be preferable to earthen bunds due to the topography of ideal placement locations (usually sloping hillsides).

- 19 Deciding where mitigation measures could be placed, and what would be cost-effective, implies that a decision is made on what is deemed to be an acceptable risk. Where this is done in New Zealand, it is often made in the absence of quantitative data. See Annex B for an explanation of life risk measurements and implications based on international best practise.
- 20 There are no clear precedents on life risk in New Zealand to follow. However, based on GNS' life risk information and mapping, homes at potentially unacceptable risk are being identified. The cost effectiveness of potential mitigations measures will be analysed in terms of whether they would reduce risk to below these levels, and whether mitigation costs would in fact be less than the cost of purchasing an affected home.
- 21 In summary, if rockfall protection systems are used, a range of issues need to be considered:
 - An understanding of the private and public benefits of these systems;
 - An agreement on who pays for, owns and maintains these systems, and who will lead the implementation process;
 - Establish confidence in rockfall protection systems, noting these are not commonly used in residential areas, and there may be hesitation about the efficacy of such structures;
 - Decisions around the speed of implementation, noting that residents of buildings subject to s124 Building Act notices have been unable to live in their properties for over 14 months at this point in time, and there is increasing urgency for resolution;
 - A view on whether an offer of purchase will be made for private properties that have high levels of risk associated with them, but where protective fences are not installed;
 - Access to private land for scoping of rockfall protection system locations (warrants can be issued under section 33 of the CER Act);
 - Potential purchase of interests in private land (easements or full property purchase) for the installation of fences

Withheld under section 9(2)(h)

 - Regulatory requirements including building consents and compliance with CCC strategies, the Natural Resources Regional Plan and other documents (these could be fast tracked through the use of CER Act).
- 22 An early estimate for the procurement and installation of rockfall protection systems is approximately 9-18 months as a best case scenario.
- 23 In addition to agreements around funding for mitigation measures and the purchasing of interests in land, officials will be conducting work in the following areas:
 - Any precedent risks of central government leadership and assistance with natural hazard management/mitigation;
 - Criteria that Ministers could use if necessary in decisions around life safety risk (i.e. what level of risk is "socially acceptable"); and

- Cost-benefit analysis criteria to identify properties at heightened risk where long-term mitigation would not be cost effective in comparison to the purchase price.

Cliff Collapse

- 24 The GNS report on significant cliff collapse areas does not examine remediation options. However, geotechnical experts in CERA, CCC and PHGG concur that retreat will be the best option for some properties, as remediation would not be cost-effective, results would be uncertain, and it is unlikely that mitigation could be done safely due to the height of the cliffs.
- 25 The issues pertaining to cliff collapse include the extent to which houses are regarded as uninhabitable on a long-term basis, and the extent of any assistance package for affected land-owners (including who should fund any potential assistance package).

Aggregated Results

- 26 Based on the results from the GNS reports and PHGG ground truthing study, the following figures provide a summary of properties at heightened risk, and those where it is now assessed that there is negligible risk:

Current number of Port Hills White Zone properties	2,100
Properties identified by GNS with a life risk of 10^{-1} to 10^{-4} due to Cliff Collapse	77
Properties identified by GNS with a life risk of 10^{-1} to 10^{-4} due to Rockfall	412
Properties identified by GNS with a life risk of 10^{-4} to 10^{-5} due to Cliff Collapse	0
Properties identified by GNS with a life risk of 10^{-4} to 10^{-5} due to Rockfall	104
Properties that could be zoned green relatively quickly	Approximately 375 in early May More properties to be identified in May and June

- 27 The GNS reports available to date cover the residential areas at highest risk from cliff collapse and rockfall, and account for approximately 35% of the current Port Hills White Zone area. Information for the remaining White Zone area will be available to CERA towards the end of May. Based on the distribution of s 124 notices, it is likely that the number of properties with heightened risks levels (as represented in the above table) will increase.
- 28 Insurance implications for any policy decisions have not yet been considered. Due to the time since earthquake damage was caused, affected Port Hills homeowners are likely to be in a variety of insurance positions, with some settled and some yet to begin consideration of any settlement. No indications are currently available regarding insurer perspectives on providing future coverage in rockfall, cliff collapse or landslip areas.

Decision Making, Funding and Timing Implications

- 29 One issue for consideration relates to which party(ies) – either central government, the CCC, or a combination of both – make decisions on the Port Hills, which party(ies) fund and develop any associated mitigation works and/or purchasing of interests in land, and the timing implications of these issues.
- 30 The simplest way to ensure that all decisions are made in time to provide property owners with certainty by the end of June (as you have indicated) would be for government to make all of the major decisions.
- 31 An approach where government makes all major decisions would have drawbacks however. Firstly, decisions on natural hazard management in New Zealand are often made by local government, or EQC and insurers, as opposed to central government. Secondly, any decision with regard to acceptable life risk around natural hazard management will set a national precedent. In addition to this, if government were to make all decisions in the case of the Port Hills, then the rationale for central government to pay for a larger proportion of the costs would be stronger. However, this will have to be considered in more detail.
- 32 Further advice will be provided around these issues.

Consultation

- 33 Treasury and the Department of Prime Minister and Cabinet have provided input to this paper.

Financial implications

- 34 This paper has no direct financial implications.

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