Dear Minister,

30 March 2016

Re: Oppose the proposed closure of Redclffs School

The Redcliffs School site is safe. An immense amount of work has been done to know this for a fact. If the reason for closure is due to a "possible interruption of education" please show us how Redcliffs School would be more at risk than any other school in New Zealand. One must consider the many different events that can impact a schools opening hours, flooding, tsunami, volcanic eruptions, snow fall, power outages, cyclones, etc..... Keeping in mind the nature of the country that we live in, it would be hard to image great differences in a "possible interruption of education."

Our community and, especially our children, have been through so much. We are just starting to move into our repaired and rebuilt houses, and having the hope of our school returning to Redcliffs was one of the reasons why we stayed and waited. The thought of the school returning to Redcliffs has kept our community alive and strong. Frankly, it is truly appalling the way you, the National Party, have treated us.

Please Hekia, you cannot close Redcliffs School. Our community, and the wider community need it, we want it, we embrace it, and our children dream of it.... Haven't they been through enough already? If anything, is it not possible to put the school in another location within the Redcliffs area.

Finally and clearly, I oppose the proposed closure of Redcliffs School.

9(2)(a)

Redcliffs

From: 9(2)(a)
Sent: Tuesday, 12 January 2016 9:57 a.m.
To: Coralanne Child
Cc: board@redcliffs.school.nz; h.parata@ministers.govt.nz; g.brownlee@ministers.govt.nz; p.bennett@ministers.govt.nz
Subject: Road Safety Error in Redcliffs School Closure Interim Decision

To: Coralanne Child, Education

Cc: School Board and Ministers of: Education, Transport, State Services

Dear Coralanne,

I have two children at Redcliff School. You answered my email about the road at Shag Rock Reserve (Peacocks Gallop) in 2011. My on going investigation has led me to **two** mistakes in: Redcliffs+-+interim+decision+signed.pdf at shapingeducation.govt.nz. I refer to paragraphs by their numbers.

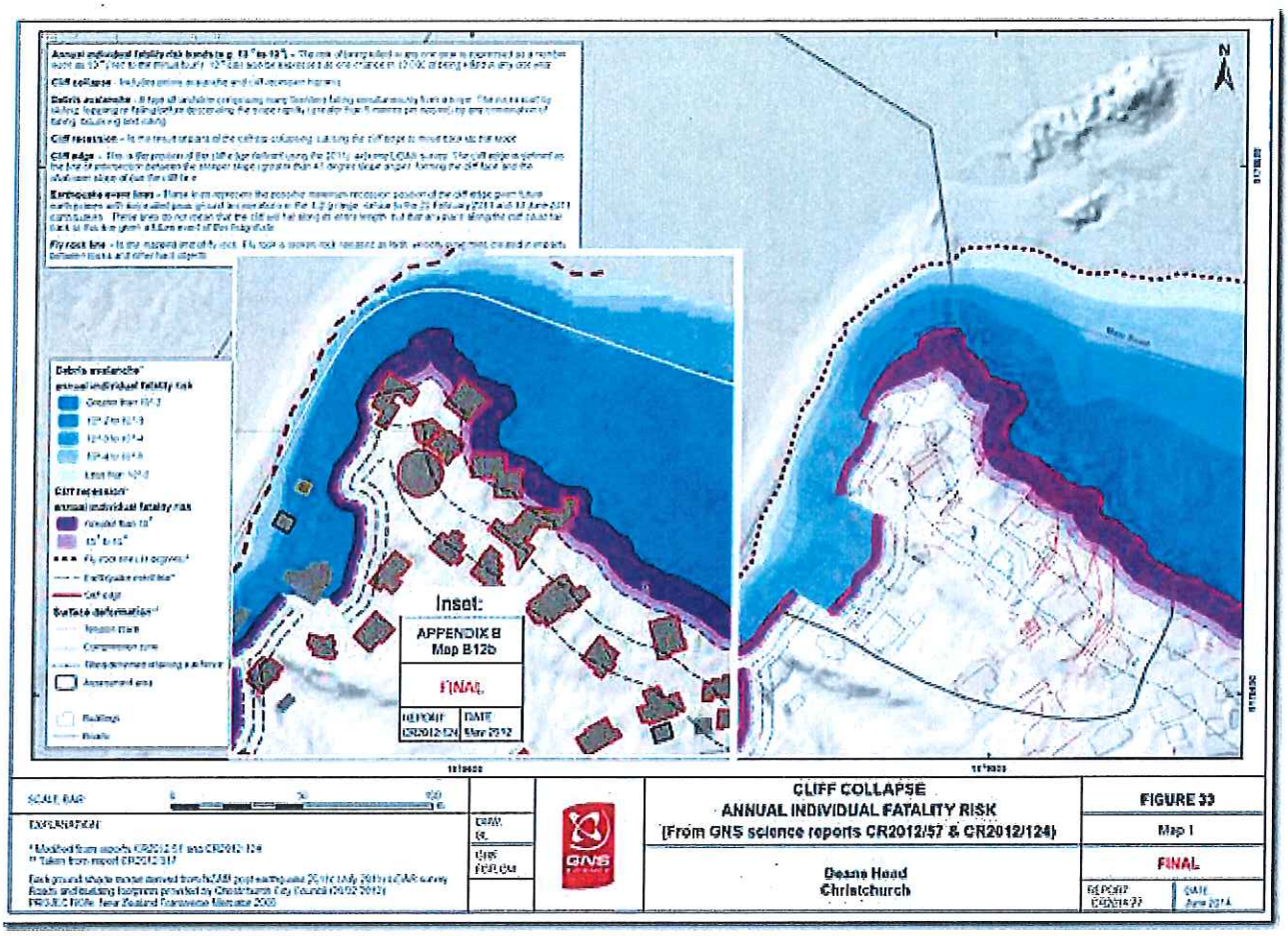
For the first error, refer to paragraphs 33 and 34: The name Dr Chris Massey is NOT among the attendees listed in the minutes "Appendix-3-Minutes-of-meeting-of-technical-experts.pdf". (at: http://shapingeducation.govt.nz/read-more-2/recent-announcements)

For the second error, refer to paragraph 106. Reference 3 at the bottom of the page leads to CR2014/77 by Dr Chris Massey et al. where p. 102 yields Figure 37. The range of values in paragraph 106 matches the values assigned to the colours on this figure; 10^{-9} ...10^{-12}. But these values are **NOT** Annual Individual Fatality Risk (AIFR) as paragraph 106 claims. The text relating to Figure 37, CR2014/77, explains how the road is broken into one metre by one metre cells and how the risk for each cell calculated. A traveller moving along the road then accumulates the risks from each cell when passing through it. From this accumulation, a risk per journey is calculated. These results are presented in Figures 35, 36, 38, 39 and 40 as

Fatality Risk per 100 Million Journeys, along with risks due to the chosen mode of travel itself.

To arrive at an AIFR figure, it is necessary to multiply the risk per journey by the number of journeys per year. The case referred to in paragraph 106 "Adopting an annual event frequency of 0.05 events per year (based on a return period of 20 years)" is presented in Figure 36 (of CR2014/77) at 3 fatalities per 100 million journeys for one lane and 4 fatalities per 100 million journeys for the other. Thus a return trip has a risk of 7 fatalities per 100 million journeys. A primary school year has 192 days. Multiplying 7 fatalities per 100 million journeys by 192 days gives 1344 fatalities per 100 million years. This can be expressed as 1.344×10^{-5} AIFR. **This is more than a *factor of ten* WORSE than the AIFR for Redcliffs School without the bund.** But it gets worse.

Risk data in papers of C. I. Massey et al. is often presented for varying parameters of cliff collapse and earthquake return period. A pictorial example of the resulting variability in AIFR is shown below this paragraph. The map at right (Figure 33 Map 1 of CR2014/77) assumes an earthquake return period of over 600 years while the one at left in the inset (Map B12b of CR2012/124 Appendix B) uses an earthquake period of sixty years. The difference in AIFR is clear. If the parameters applied in CR2012/124 had been applied in CR2014/77, the calculated risks to road users would have been much higher than those shown in Figures 35, 36, 38, 39 and 40.



Appendix A of CR2014/77, in section A1.2, states that Taig and Massey devised the methodology used for road-user risk assessment. Such a mathematical/statistical treatment must be a far cry from geology meaning that a "geotech expert" may not be fully conversant with it. Therefore in correcting the aforementioned paragraph 106, I would strongly recommend that you contact either of these two people. In the mean time a simple comparison can illustrate the safety of the school against the danger of the road.

See the two AIFR maps from CR2012/57 in Redcliffs&ShagRockCloseupCR2012-57.jpg attached. Title boxes and annotations have been rearranged in order to allow both maps to fit neatly onto a single page. The AIFR maps are otherwise unaltered and both are at exactly the same scale. This layout allows quick comparison of the two areas. It clearly shows that while AIFR over the whole of the revised school

grounds is less than 10^{-6} (one in a million), AIFR on much of the road is higher than 10^{-2} (one in a hundred). Acceptable levels of safety for road-users stem only from the limited time spent in the dangerous area and within a context of relatively high background risk faced by them while at the wheel. But taking children away from a safe school and making them travel under a dangerous cliff to another school is different matter. However, we are told that the minister's justification for closing the school is not based on safety but disruption. But in fact, closing Redcliffs School can't prevent disruption to education.

Refer to Redcliffs&ShagRockCloseupOverlayAnnotated.jpg attached. This shows an image of the cliff behind Redcliffs School together with an image of the Cliff at Shag Rock Reserve. Both are from Google Satellite. Both are at the same scale as can be verified by the 20m scale bars. (The images in both attachments align with each other too.) A slice from the school has been pasted onto the road at Shag Rock Reserve and vice versa. The proposed bund and some of the school buildings have been overlaid over the school. The same overlay has been placed at Shag Rock Reserve at exactly the same distance from the cliff top as at the school. This comparison makes it abundantly clear that: if rocks ever reach the proposed bund, the road will be inundated by a rock fall. This would of course mean that disruption at the school would occur in unison with road closure. The Redcliffs Pupils that had been displaced to Sumner School would then have their education disrupted anyway. Then, perhaps tragically, because the the road to Sumner is so strategically important, it might be re-opened in an even more dangerous state than now. In this context, closing Redcliffs School today could place its future pupils in significant danger.

Conclusion: I have brought to your attention two errors in "Redcliffs+-+interim+decision+signed.pdf" and followed this up with a calculation that indicates that Redcliffs School children, if displaced to Sumner, would face a significantly higher danger on the road than at Redcliffs School. Danger on the road is then compared to safety at the school. A second comparison shows that any event which might disrupt the cliff behind Redcliff School

will also disrupt the road to the alternate school at Sumner. I.E., the closure of Redcliffs School cannot prevent disruption to education. The FAQ in the PS below contain more information.

Yours faithfully,

q (2) (a)

q (2)(a)

ChCh 8081

q (2) (a)

PS

FAQ

Where can CR2012/57etc be found?

CR2012/57

http://resources.ccc.govt.nz/files/Homeliving/civildefence/chchearthquake/gns_ph_pilotlifesafetycliffcollapse12687374web.pdf

CR2012/124

http://resources.ccc.govt.nz/files/Homeliving/civildefence/chchearthquake/gns_ph_lifesafetycliffcollapse12684515web-s.pdf

CR2014/77

http://resources.ccc.govt.nz/files/Homeliving/civildefence/chchearthquake/porthills/CR2014-77DeansHeadFINAL.pdf

The title of CR2012/57 uses the word "pilot". Does this mean that the comparison above uses preliminary data? NO. Visual inspection of the AIFR maps in CR2012/57 show that the AIFR contours are identical to those on the AIFR maps in CR2012/124. And CR2012/124 is current. (In fact, a map from it is used in the 2014 MWH report to the ministry.) Because CR2012/124 splits an area of interest between two maps, I have used the AIFR maps from CR2012/57. There is no other reason.

Are the two cliffs really equivalent? Referring to CD2012/57:

Table 6 lists the school cliff at 70m high and the Shag Rock Reserve cliff at 80m high.

Fig. 22 indicates that compared to the school cliff, the Shag Rock cliff ejected more than double the amount of rock in the quakes.

Table 23 suggests that in future large earthquakes they will eject similar volumes. (re first note under table)

So yes, the cliffs are equivalent. If anything the one at Shag Rock Reserve is the more dangerous.

Don't the containers make the road safe?

Perhaps they will act as trampolines to fly-rock. Due to the internal ballast they should stop boulders. But if the rock avalanche reaches them, they may well topple over because a container, no matter how much ballast, can fall at only 1g (9.8m/s/s). If the vertical ground acceleration is more

than 1g, (we had over 2g in Feb 2011 but not since) then the the ground will accelerate away from the container leaving a gap into which the rock avalanche will flow under its gathered (downward and outward) momentum. After a few oscillations, enough debris will build up under the avalanche side, that the container will topple over. (In the good old days a form 7 physics student would have followed this.)

So the containers may make the road more safe or less safe depending on what happens.

Why is Shag Rock Reserve called Peacocks Gallop? In the mid 1800s, John Jenkins Peacock was scared of rock fall there and so always galloped his horse through the danger area to minimise his risk.

Was there ever significant rock fall at Shag Rock Reserve before our earthquakes? Yes, including in 1907. See CR2014/77 pdf pages 194-197.

With reference to paragraph 7 in the introduction of "Redcliffs+-+interim+decision+signed.pdf":

(Shown here for convenience)

> 7 The Ministry commissioned a review of the AECOM report and the Board's commentary on it by three geotechnical experts who are familiar with the site. The experts raised concerns about the conclusions drawn by the Board, and varyingly described parts of the submission as '*cherry picking*' or '*not letting the truth get in the way of a good story*'.

Is the above comparison cherry picking? NO. Each comparison above is based on two bites from exactly the same cherry. The result would be the same no matter which cherry was picked. Therefore this in NOT cherry picking.

And, can the above comparison be accused of "not letting the truth get in the way of a good story"? NO. When applying the same reasoning to two similar things the truth is usually revealed. Besides, the closure of a school is not even a good story. It is in fact, a very, very sad story. Just ask any of the few hundred pupils.

Annual individual fatality risk bands (e.g. 10^{-3} to 10^{-4}) - The risk of being killed in any one year is expressed as a number such as 10^{-4} ("ten to the minus four"). 10^{-4} can also be approximately represented as one chance in 10,000 years.

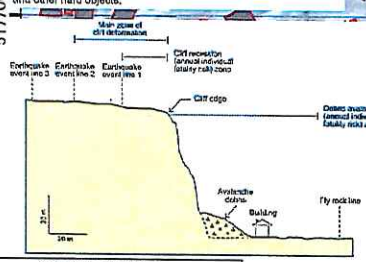
Debris avalanche - A type of landslide comprising many boulders falling simultaneously from a slope. The rocks start by sliding, toppling or falling before descending the slope rapidly (greater than 5 metres per second) by any combination of falling, bouncing and rolling.

Cliff edge – This is the position of the cliff edge defined using the 2011c airborne LiDAR survey. The cliff edge is defined as the line of intersection between the steeper slope (greater than 45 degree slope angle), forming the cliff face and the shallower slope above the cliff face.

Cliff recession – is the result of parts of the cliff top collapsing, causing the cliff edge to move back up the slope.

Earthquake event lines - These lines represent the possible maximum recession position of the cliff edge given future earthquakes with associated peak ground accelerations in the 2.0 g range, similar to the 22 February 2011 and 13 June 2011 earthquakes. These lines do not mean that the cliff will fail along its entire length, but that any place along the cliff could fall back to this line given a future event of this magnitude.

Fly rock line – is the mapped limit of fly rock. Fly rock is broken rock released as high-velocity projectiles created in impacts between rocks and other hard objects.



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Debris Avalanche (annual individual fatality risk)
- 10^{-1} to 10^{-2}
- 10^{-2} to 10^{-3}
- 10^{-3} to 10^{-4}
- 10^{-4} to 10^{-5}
- Less than 10^{-5}

Cliff edge (2011c (July 2011) LiDAR survey)

Cliff Recession (annual individual fatality risk)
- Greater than 10^{-3}
- 10^{-3} to 10^{-4}

Earthquake event line

Fly-rock line

Main zones of land instability (mechanism to be determined)

Buildings (20/02/2012)
- Dwelling
- Commercial-Industrial
- Accessory building
- Unknown

SCALE BAR: 0 50 100 m

EXPLANATION:

Background shade model derived from NZAM post earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.

Roads and building footprints and types provided by Christchurch City Council (20/02/2012).

DRW:	DWH, BL
CHK:	CM

CLIFF COLLAPSE ANNUAL INDIVIDUAL FATALITY RISK	APPENDIX D FINAL
Radcliffs Christchurch	PROJECTION: New Zealand Transverse Mercator 2000
REPORT: CR2012/57	DATE: Mar 2012

5176500

N

Earthquake Event Line 1

Earthquake Event Line 2

Earthquake Event Line 3

Risk not evaluated

Main Rd

SCALE BAR: 0 50 100 m

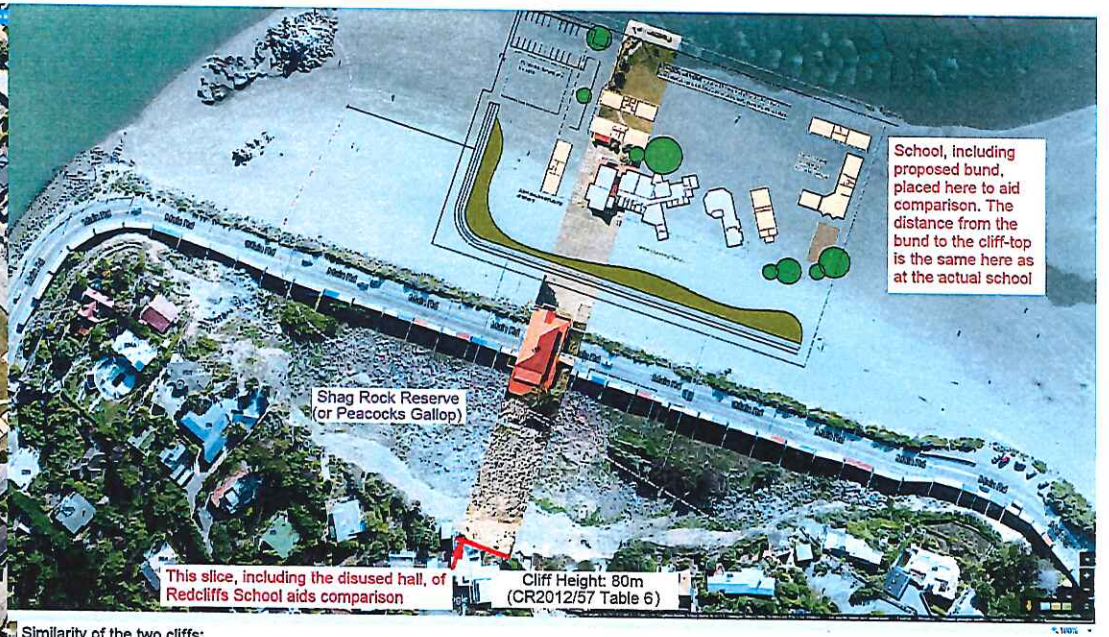
EXPLANATION:

Background shade model derived from NZAM post earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.

Roads and building footprints and types provided by Christchurch City Council (20/02/2012).

DRW:	DWH, BL
CHK:	CM

CLIFF COLLAPSE ANNUAL INDIVIDUAL FATALITY RISK	APPENDIX D FINAL
Shag Rock Reserve, Sumner Christchurch	PROJECTION: New Zealand Transverse Mercator 2000
REPORT: CR2012/57	DATE: Mar 2012



Similarity of the two cliffs:
Past: Compared to the Redcliffs cliff, the Shag Rock Reserve cliff ejected over twice as much rock during the earthquakes (CR2012/57 Fig. 22)
Future: Similar amounts of rock will be ejected in the future (CR2012/57 Table 23, including first note under the table)

CONCLUSION: If one cliff disrupts the school, the other cliff will disrupt the road.
If Redcliffs School is closed, pupils who get zoned to Sumner School will have their education disrupted by road closure.

Therefore the closure of Redcliffs School CANNOT prevent disruption to education

30 March 2016

RE: Submission to oppose the proposed closure of Redcliffs School

My name is 9(2)(a) and I have two children at Redcliffs School. I live at 9(2)(a) in Redcliffs. I have lived here for over 10 years.

I understand that the reason for the proposed closure is that possible future rock fall could require a reassessment and possible repair of the rock fall protection structures. The site may need to be closed during this period. This is considered to be potentially disruptive to students and staff.

We have been driving and busing our children to Van Asche in Sumner for the past 4 years. The disruption we have been experiencing for these 4 years was tolerable knowing that we would eventually be coming home to Redcliffs. Any possible future disruption could not possibly outweigh the disruption and grief you are now proposing to us, our children, and our community.

My children have been waiting for the time to come when they could walk, bike or scooter to school every day. We were all waiting for this. We could see the light at the end of a very long tunnel. It's only been just recently that we have all been slowly getting back on our feet. Our houses are finally being repaired or rebuilt, our grocery store is open, and until now, we thought our school was coming home. Again I say, the potential for further disruption to Redcliffs School cannot possibly hold any weight against the damage permanent closure would ultimately bring to our lives, and our community.

Much of the reason we have stayed in the area is related to the school, our friends and our families. We stayed because we believed in Redcliffs as a wonderful and vibrant community, and we stayed to support each other. Our Board of Trustees have spent a tremendous amount of time and resources to show, without a doubt, that the site can be made safe, both easily and cost effectively. We want to move back to Redcliffs to make our community whole again, right now and for future generations. Redcliffs School is the heart of our community. It just appears that the National Government does not care about any of these things.

I absolutely disagree with the proposal to close the school and want planning to start as soon as possible to build the mitigation, and relocate the school back on to its Main Road site. If National feels this site is so unsafe than find an alternative, don't destroy a community. I just find is astonishing how poorly you have treated us. Again, I disagree with the proposal to close the school.