9(2)(a)

**From:** Hugh Cowan 9(2)(a)
**Sent:** Tuesday, 14 September 2010 10:55 p.m.
**To:** 9(2)(a)
**Cc:** Hugh Cowan; 9(2)(a) @ccc.govt.nz
**Subject:** Re: Card to use

Thanks 9(2)(a)
The concept is great so although the content of the sample you attached is a bit dated now, we should have a chat to see if it could be adapted to meet new or emergent needs. I am hoping to meet recovery office folk tomorrow (via 9(2)(a) ) so perhaps I will meet you and 9(2)(a) too.

regards
Hugh Cowan

On Tue, Sep 14, 2010 at 7:41 PM, 9(2)(a) @msd.govt.nz> wrote:
Hi Hugh

It was highlighted at the 1pm meeting this afternoon that the Earthquake Commission is looking for a card to hand out to people you visit, who are in need of added assistance. Attached is a copy of an existing resource we have at MSD. Can you let me know if this suits your needs. It is the size of a business card and unfolds to contain the additional information.

If this is what your after I could have copies to you on Thursday.

Regards

9(2)(a)

9(2)(a)

**From:** Hugh Cowan
**Sent:** Tuesday, 14 September 2010 12:37 p.m.
**To:** 9(2)(a)
**Subject:** FWD: CCC Updated structure diagrams
**Attachments:** CCC Updated structure diagrams

9(2)(a)

**From:** 9(2)(a)
**Sent:** Tuesday, 14 September 2010 12:06 p.m.
**To:** Hugh Cowan; 9(2)(a) @dia.govt.nz
**Subject:** CCC Updated structure diagrams
**Attachments:** Local & Regional Recovery Office Structure September 2010 (A4 version).DOC; CCC Recovery Office Support Management Structure September 2010.DOC

Hi Hugh and 9(2)(a)

Please find attached the current CCC recovery structure diagram. Please note this will change, its a starting point.

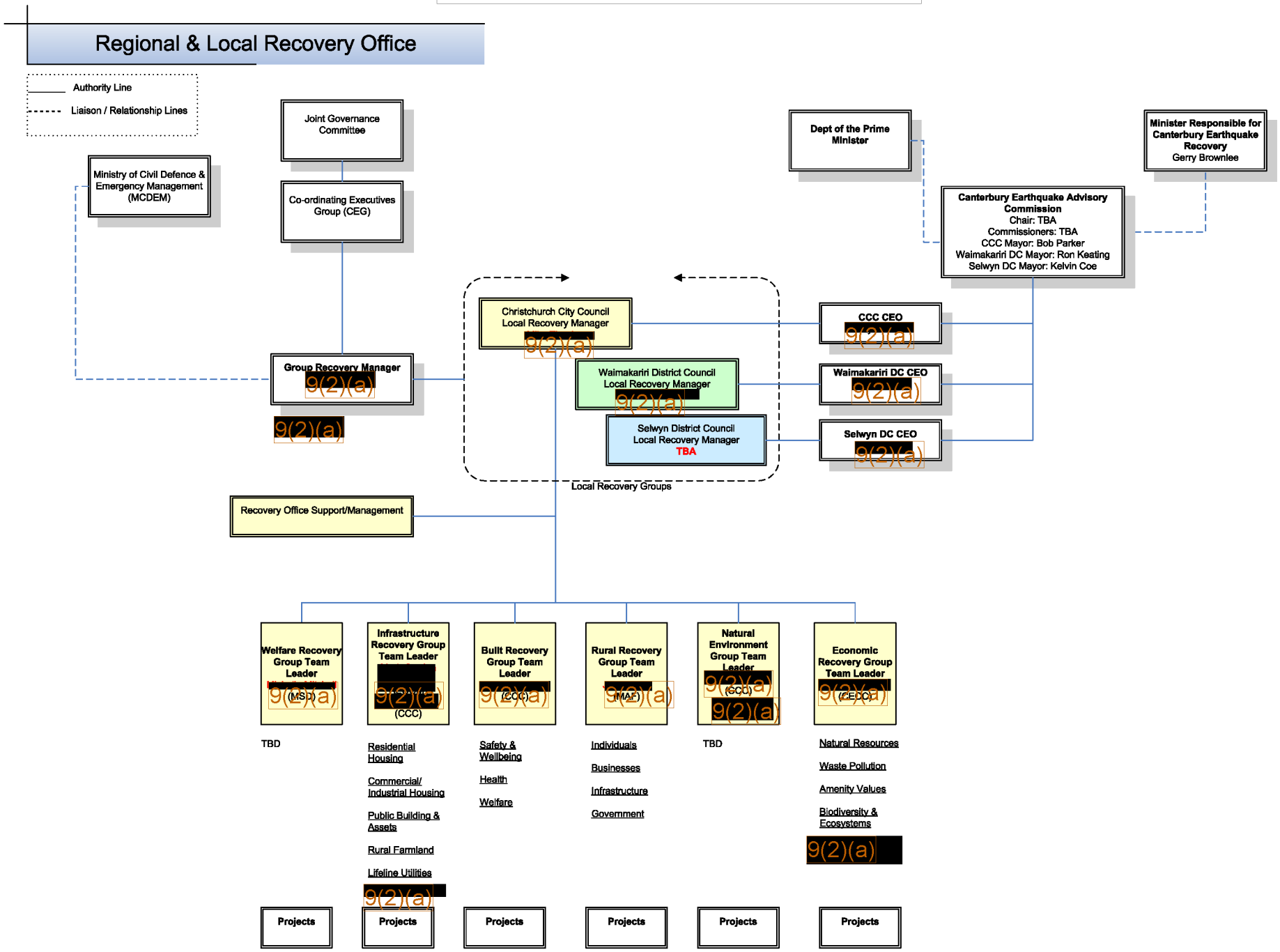
Kind regards

9(2)(a)

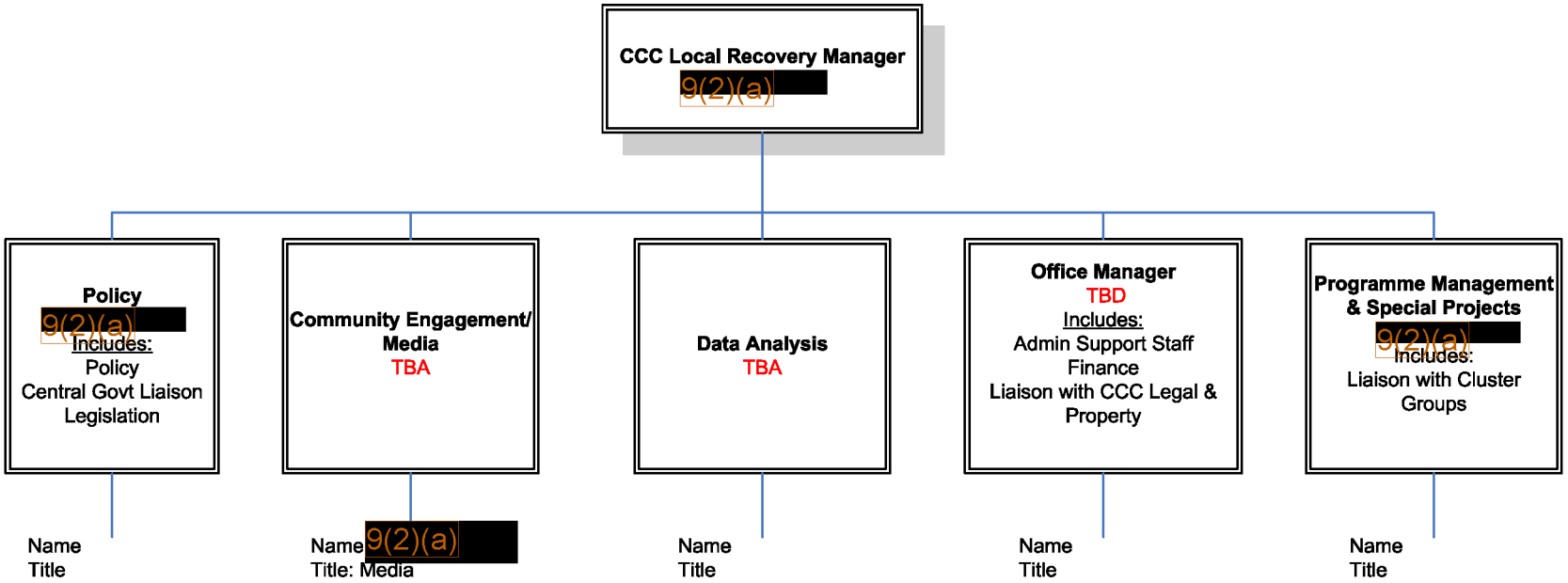
------ Forwarded Message
From: 9(2)(a) @ccc.govt.nz>
Date: Mon, 13 Sep 2010 19:35:05 +1200
To: 9(2)(a)
Subject: Updated structure diagrams

<<Local & Regional Recovery Office Structure September 2010 (A4 version).DOC>> <<CCC Recovery Office Support Management Structure September 2010.DOC>>

# Regional & Local Recovery Office



# CCC Recovery Office Support/Management Structure



9(2)(a)

**From:** Hugh Cowan
**Sent:** Tuesday, 14 September 2010 2:25 p.m.
**To:** Ian Simpson; 9(2)(a)
**Subject:** FWD: CCC Updated structure diagrams
**Attachments:** CCC Updated structure diagrams

Hi, the current local thinking about recovery arrangements. Where we fit among others is an open question that we should address before others do. Will try to write or call later, but key message is we need stronger media/comms presence here to channel intel and align efforts through recovery office. Regards, hugh

9(2)(a)

**From:** 9(2)(a)
**Sent:** Tuesday, 14 September 2010 12:06 p.m.
**To:** Hugh Cowan; 9(2)(a) @dia.govt.nz
**Subject:** CCC Updated structure diagrams
**Attachments:** Local & Regional Recovery Office Structure September 2010 (A4 version).DOC; CCC Recovery Office Support Management Structure September 2010.DOC

Hi Hugh and Simon

Please find attached the current CCC recovery structure diagram. Please note this will change, its a starting point.

Kind regards

9(2)(a)

------ Forwarded Message
From: 9(2)(a) @ccc.govt.nz>
Date: Mon, 13 Sep 2010 19:35:05 +1200
To: 9(2)(a)
Subject: Updated structure diagrams

<<Local & Regional Recovery Office Structure September 2010 (A4 version).DOC>> <<CCC Recovery Office Support Management Structure September 2010.DOC>>

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Wednesday, 15 September 2010 10:58 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** FWD: Information about strong-motion records of the 5 September 20 10 Darfield, Christchurch, New Zealand earthquake - please delete if you are not interested

**Attachments:** Information about strong-motion records of the 5 September 2010 Darfield, Christchurch, New Zealand earthquake - please delete if you are not interested

**Marija Bakulich**

**From:** 9(2)(a) @gns.cri.nz>
**Sent:** Wednesday, 15 September 2010 10:45 p.m.
**To:** 9(2)(a)
**Cc:** Group - Natural Hazards
**Subject:** Information about strong-motion records of the 5 September 2010 Darfield, Christchurch, New Zealand earthquake - please delete if you are not interested

Dear Colleagues and friends,

Here are the links to the files about the Darfield earthquake in Christchurch in New Zealand, on 5 September 2010. Please check the file sizes before you decide to download any of the files.

These files are:

PossiblePermanentDisp_plot.pdf – 1MB

This file contains the displacement plot I derived from the acceleration records. I used the crudest method and I have no guarantee that these permanent displacement amplitudes are real.

GDLC is the closest record (a deep soil site within 1 km from the fault although the closest distance to a fault model is only 0.2km)

TPLC is from a school where I found little damage, a deep soil site at 2-3 km from the fault

ROLC is also a school (I heard that the school suffered very little damage), a deep soil site at a distance of 3km

HPSC is a pumping station site at a distance of 14km from the fault. 9(2)(a) told me that liquefaction occurred at this site

RHSC has an unknown site class at a distance of 3.1 km from the fault.

EQRecordHeaderWithin350kml.xls 1MB
This file has all the information I have at moment and site classes A, B, C, D, E are defined in the NZS1170.50. U means that site class is not available. I gave two sets of closest distance and please see my email to my colleague Caroline about the surface layer of gravels in the Canterbury plane.

RecordParamWithin50km.xls 0.4MB
This file contains the corner frequency for the high-pass filter I used. Most records are good for up to about 20s. Note that the near-source were processed manually and separately.

AccPlot.zip (17MB), VelPlot.zip (20MB) and DispPlots.zip (19MB)– Contains the plot files for accelerations without any process and they are in pdf format, batch processed velocity and displacement. Al records are within a distance of 350km. The velocity and displacement time histories were filtered with corner frequencies determined for each record.

RecordsV1A.zip (16MB)
This file contains the record I used and they are volume 1 file (not processed). You can download volume 2 file from www.geonet.org.nz but they were processed using a set of default filters. If you need to use these records for long-period structures, you need to process the Volume 1 file using appropriate filters. I will load the processed records in the next few days.

Spectra.zip (0.3MB) contains the response spectra. The header is
1st column - Period number,
2nd – column - Spectral period in second,
3rd – 5th - acceleration, velocity and displacement spectra for the first horizontal direction (see Volume 1 file in

RecordsV1A.zip), 6th - 8th columns are the acceleration, velocity and displacement spectra for the 2nd horizontal direction and 9th - 11th columns are the acceleration, velocity and displacement spectra for the vertical direction

Accelerograms_produced_by_timber.pdf (4MB)
This file contains the spikes when I dropped timber on the floor of the garage close to the recorder box for experiments. I would like to thank 9(2)(a) the president of Australian Society of Earthquake Engineering for his navigation on the Canterbury plane (you may miss a township if you blink too often in many parts of New Zealand) and the owner of the property for sharing their story and photos with me.
I will not be surprised if we later find that some of the spikes in the one or two records may be generated by falling debits.

Please not be surprised and please tolerate if you find any mistakes. This is an extremely informal information distribution. If you would like to use any information for your publication please let me know so that I can make sure the information is correct.

Please note that your email address has not been revealed to the other recipients.

Now is the time for me to catch up some sleep!

Best regards,

9(2)(a)

Email to 9(2)(a) about fault inversion model
9(2)(a)
I have just talked t9(2)(a)nd he thinks that the thickness of gravels may vary between 1 and 2 km and 9(2)(a) thought that even the layer underneath the gravels may not have enough 'rigidity'. This means that the surface layer in an inversion model needs to be excluded as there is no stored strain energy to be released during this earthquake. As the slip appears to be large at the surface layer, without excluding the surface layer will lead to either under-estimated slip or the area of the asperity. I am also curious to know if this may affect the fault dimensions (the fault with a reasonable amount of slip. The rupture of the surface layers where no strain energy is stored may consume part of the released energy(??).

I know nothing about fault inversion and ignore me if I am completely wrong. Just wonder if this is easy to be implemented in your inversion model and please let me know if you do find large changes in the fault parameters if this layer can be excluded.

I copied this email to others so that they can tell me off if I am wrong. I am an engineer and can only understand simple stuff.

Regards,
9(2)(a)

ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/PossiblePermanentDisp_plot.pdf
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/EQRecordHeaderWithin350kml.xls
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/RecordParamWithin50km.xls
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/AccPlot.zip
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/DispPlots.zip
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/VelPlots.zip
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/Spectra.zip
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/Accelerograms_produced_by_timber.pdf
ftp://ftp.gns.cri.nz/pub/jzhao/ChristchurchEQK2010/RecordsV1A.zip

9(2)(a)

**From:** Hugh Cowan
**Sent:** Wednesday, 15 September 2010 1:06 p.m.
**To:** 9(2)(a)
**Subject:** FWD: FW: Request for Research Paper 3621
**Attachments:** FW: Request for Research Paper 3621

9(2)(a) grateful if yot could assist with this request from library collection. Thanks Hugh

9(2)(a)

**From:** 9(2)(a)
**Sent:** Wednesday, 15 September 2010 11:07 a.m.
**To:** Hugh Cowan; 9(2)(a)
**Subject:** FW: Request for Research Paper 3621

**From:** 9(2)(a)
**Sent:** Wednesday, 15 September 2010 8:56 a.m.
**To:** Insurance
**Cc:** 9(2)(a)
**Subject:** Request for Research Paper 3621

Good morning,

9(2)(a) has requested the above research paper to be sent by email or post.

Email address: 9(2)(a)

Postal address: 9(2)(a)

Research Paper 3621 - Co-seismic subsidence in the Lower Hutt Valley resulting from rupture of the Wellington fault.

Thanks and regards,
9(2)(a)

9(2)(a)

**From:** Hugh Cowan
**Sent:** Wednesday, 15 September 2010 9:02 a.m.
**To:** 9(2)(a)
**Subject:** FWD: Recovery meetings
**Attachments:** Recovery meetings

9(2)(a)

**From:** 9(2)(a)@ccc.govt.nz>
**Sent:** Wednesday, 15 September 2010 8:53 a.m.
**To:** Hugh Cowan
**Cc:** 9(2)(a)
**Subject:** Recovery meetings
**Attachments:** Ward by Ward Meetings for September.DOC

Hi Hugh

Thanks for the conversation. Attached is the schedule.

I hope you are able to find some way of being represented at theses meetings. The first three on Thursday and Friday are the key meetings for us these are the highly impacted areas and its really imperative that we get some representation form EQC so that we can those key important messages out

Regards

9(2)(a)

9(2)(a) <<Ward by Ward Meetings for September.DOC>> 9(2)(a)
DDI: 9(2)(a)
Fax:
Mobile: 9(2)(a)
Email: 9(2)(a)@ccc.govt.nz
Web:

Christchurch City Council
6h Floor, 53 Hereford Street, Christchurch 8013 PO Box 73016, Christchurch, 8154

Please consider the environment before printing this email

# Public Meetings – Held by Ward

**Wednesday – 15 September**

Burwood Pegasus - Horseshoe Lake Residents Assoc.
Shirley Cricket Club - 7.30pm
9(2)(a) to Chair

NOT FOR CCC PROMOTION – organised by residents association and attended by CCC

**Thursday – 16 September**

Hagley Ferrymead - Avonside Girls, Avonside Drive - 5.30pm

Burwood Pegasus - Burwood Primary School, New Brighton Road - 7.30pm
9(2)(a) to Chair

**Friday – 17 September**

Shirley Papanui - Papanui RSA, 55 Bellvue Avenue - 7.00pm
9(2)(a) to Chair

**Saturday – 18 September**

Riccarton Wigram - Oaklands School Hall, Cunningham Place - 4.30pm
9(2)(a) to Chair

**Tuesday - 21 September**

Spreydon Heathcote Cashmere Club, Hunter Terrace 7.30pm
9(2)(a) to Chair

**Wednesday – 22 September**

Fendalton Waimairi - Boardroom, Fendalton Service Centre - 7.30pm
9(2)(a) to Chair

**Not yet contacted/confirmed**

9(2)(a) - Lyttelton Mt Herbert - Possibly Monday 20 September
- Akaroa Wairewa - Possibly Thursday 23 September

9(2)(a)

**From:** Hugh Cowan
**Sent:** Thursday, 16 September 2010 3:32 p.m.
**To:** Ian Simpson
**Subject:** RE: FW: Structural engineering advice CONFUSION - Now Confirmed bu t Disturbing

Have talked with 9(2)(a) and briefed 9(2)(a) Also have connected 9(2)(a) with council counterpart to get better alignment of messages. Day at a time. . . See you shortly :)

--- original message ---
From: "Ian Simpson" <isimpson@eqc.govt.nz>
Subject: FW: Structural engineering advice CONFUSION - Now Confirmed but Disturbing
Date: 16th September 2010
Time: 2:06:10 pm

Hugh,

This will be an issue at the meeting this afternoon. Not sure if 9(2)(a) has spoken to you about this – he said he was going to find you. A message that we have inspected 944 of the most seriously damaged properties may help. Also, just to remind all concerned (including 9(2)(a) ) that the council does the initial safety inspections.

Cheers,

Ian.

From: 9(2)(a)
Sent: Thursday, 16 September 2010 1:26 p.m.
To: Ian Simpson
Cc: hcowan@eqc.co.nz; 9(2)(a)
Subject: FW: Structural engineering advice CONFUSION - Now Confirmed but Disturbing

Hi Ian

As discussed briefly please find below several emails in particular an email from a 9(2)(a)

Can you please advise how EQC will respond in this instance. I understand either you or Hugh will be attending this afternoons meeting in the Art Gallery. I am sure there will be questions raised at that meeting in regard this matter, hence the heads up to be prepared to answer those questions please.

Kind regards

9(2)(a)

9(2)(a) [redacted]

------ Forwarded Message
From: 9(2)(a) [redacted]@ccc.govt.nz>
Date: Thu, 16 Sep 2010 12:17:10 +1200
To: 9(2)(a) [redacted]
Subject: FW: Structural engineering advice CONFUSION - Now Confirmed but Disturbing

9(2)(a) [redacted]

are you able to assist with this. the advice of EQC seems to be contrary to the type of signals sent by the government early in the piece

it will ,come up with council this afternoon at their briefing so it would be good for EQC to be informed and possibly be able to clarify before 3.30pn

thanks

9(2)(a) [redacted]

9(2)(a) [redacted]
Strategy and Planning Group
9(2)(a) [redacted]
Email: 9(2)(a) [redacted]@ccc.govt.nz <mailto 9(2)(a) [redacted]@ccc.govt.nz> <mailto: 9(2)(a) [redacted]@ccc.govt.nz>
Web: www.ccc.govt.nz <http://www.ccc.govt.nz/> <http://www.ccc.govt.nz/>

Christchurch City Council
6h Floor, 53 Hereford Street, Christchurch 8013 PO Box 73016, Christchurch, 8154

Please consider the environment before printing this email

---

From: 9(2)(a) [redacted]
Sent: Thursday, 16 September 2010 9:59 am
To: 9(2)(a) [redacted]
Cc: 9(2)(a) [redacted]
Subject: FW: Structural engineering advice CONFUSION - Now Confirmed but Disturbing

9(2)(a) [redacted]

Seems to be an issue for recovery.

---

From: [redacted]
Sent: Thursday, 16 September 2010 9:53 am
To: [redacted]
Subject: FW: Structural engineering advice CONFUSION - Now Confirmed but Disturbing

Another one I'm not too sure what to do with.

[redacted]
Web www.ccc.govt.nz <http://www.ccc.govt.nz/> <http://www.ccc.govt.nz/>

Christchurch City Council
53 Hereford Street, P O Box 237 Christchurch 8140

---

From: [redacted]
Sent: Thursday, 16 September 2010 7:48 am
To: info@eqc.govt.nz
Cc: [redacted]
Subject: RE: Structural engineering advice CONFUSION - Now Confirmed but Disturbing

Gentleman,

EQC now advise ( The Press today) that they cannot guarantee any payment for advice such as engineers reports done without a prior EQC inspection of the property and approval.

I believe this position is further adding to the distress of the many homeowners such as those who have contacted us seeking advice regarding their damaged homes, unsure whether they are safe to occupy.

Where was EQC on Monday 6th September when my office received over 100 calls for assistance before midday? Should I have stayed at my desk, referred them to EQC, and waited weeks for the EQC process to kick in? I tried to phone EQC on that Monday, but after many minutes on hold, decided the greater priority was to get out there and give the advice I am trained to give.

If at all possible, would you try to get EQC to change this advice to homeowners. Homeowners I have seen are often unsure whether a crack is minor or major, and need proper advice as soon as possible.

Please forgive me for being blunt about this. After 12 days of little sleep, and seeing firsthand the situation of many homeowners, my tolerance for bureaucracy stifling commonsense is running a little short.

Regards,

[redacted]

Managing Director

9(2)(a) [redacted]

---

From: 9(2)(a) [redacted]
Sent: Wednesday, 15 September 2010 9:20 a.m.
To: 'info@eqc.govt.nz'
Cc: '9(2)(a) [redacted]@ccc.govt.nz'
Subject: Structural engineering advice CONFUSION

Good morning.

I am managing director of a consulting structural engineering firm in Christchurch. We have been dealing with hundreds of requests by residents and businesses over the last 10 days to visit premises, primarily to determine their safety, in addition to helping CCC and Selwyn Council with their emergency response.

I was concerned to read advice reported in The Press this morning that EQC will first assess properties, then organise an engineer if considered necessary, and that homeowners should not organise one themselves. My concerns are:

1. Many of these properties have not yet been visited by EQC, and homeowners have been anxious to know whether or not their homes are safe. We have advised them on this.
2. In the past 10 days since the earthquake, we have not had one single call from EQC asking us to inspect a property, yet we are one of the largest structural engineering practices in the city. Does this mean EQC have not inspected any properties themselves? Or do you not know about our team of structural engineers?

In the meantime, we are putting such inspections on hold, and advising those contacting us to contact EQC. We are very concerned however at the delays this may result in, especially for those who are distressed regarding the condition of their homes.

Would you please urgently advise your position, so that we can advise those many people contacting us.

Regards,

9(2)(a) [redacted]

**********

9(2)(a)

**From:** Hugh Cowan
**Sent:** Thursday, 16 September 2010 12:53 p.m.
**To:** 9(2)(a)
**Subject:** FWD: Draft TOR for Damaged House Advisory Group
**Attachments:** Draft TOR for Damaged House Advisory Group

9(2)(a)

**From:** David Brundson
**Sent:** Wednesday, 15 September 2010 10:04 p.m.
**To:** Hugh Cowan
**Subject:** Draft TOR for Damaged House Advisory Group
**Attachments:** Draft TOR for Damaged House Advisory Group 20100915.doc

Hi Hugh

I hope your public meeting at Kaiapoi went OK.

After further quick discussions with 9(2)(a) during the research meeting, I've drafted the attached as a raw starter for ten.

9(2)(g)(i)

If you think this might be broadly on track, please make suggestions for improvement by email or phone call, and then I or you can send it round 9(2)(a) and 9(2)(a)

I'm up until around 10.30 if you'd like to call, or up by 6.00. I've already got breakfast here in my fridge, but I'm happy to have a breakfast coffee with you before I report into CCC at 7.30 for one last day. I can of course break out at any stage once I get a few things going, as this is priority.

9(2)(g)(i)

Cheers
Dave

# Advisory Group to Government and the Insurance Sector On Damaged Canterbury Houses in Areas of Significant Liquefaction

## Draft Terms of Reference

15 September 2010

### Objective of the Advisory Group

- To provide pragmatic and focused advice initially to Government Ministers and then to the insurance sector and their advisers on decision-making criteria and repair techniques for the reinstatement of damaged Canterbury Houses in areas of significant liquefaction and ground damage following the 4 September 2010 Darfield Earthquake.

### Principal Outputs of the Advisory Group

1. The establishment of clear and practical criteria to guide decisions on whether or not damaged houses in areas of significant liquefaction can realistically be repaired
2. The identification of appropriate repair techniques for damaged houses that are considered repairable

### Associated (Secondary) Outputs of the Advisory Group

3. Advice on time frames for decision-making regarding reinstatement, and the inputs required by other sectors and agencies
4. Advice on time frames for the commencement of repairs
5. The identification of factors that may contribute towards broader decisions as to whether areas/ streets should be reinstated as residential areas
6. Identification of forms of house construction that have performed well in areas of significant ground damage

### Structure and Composition of the Advisory Group

- The Core Group is to comprise approximately six people drawn from relevant technical and industry sectors, including engineering, geotechnical, residential remedial practitioners, insurance, regulatory and risk
- The Core Group is to have access to and the ability to task other practitioners, researchers and agency representatives whose inputs would be of value to them

### Proposed Time Frames and Arrangements

- *To be developed*

9(2)(a)

**From:** Hugh Cowan <9(2)(a)
**Sent:** Wednesday, 15 September 2010 12:22 a.m.
**To:** Ian Simpson
**Subject:** reinsurance note
**Attachments:** Words for reinsurance briefing.doc

Ian,

Running out of puff but hope you find a sentence or two that you can use for the reinsurance note. regards, Hugh

Words for reinsurance briefing – please snip and paste as required.

The M7.1 earthquake of 4 september ruptured an east-west trending, right-lateral strike-slip fault beneath the Canterbury Plains with its epicentre about 30km west of Christchurch. Early analysis of the event, which was well recorded by the GeoNet monitoring network indicate a complex rupture involving possibly two sub-events. Media reports have highlighted the fact that the causative fault was previously unknown and had not ruptured for at least 16,000 years (the minimum age of the Canterbury surface ruptured by the fault) but the event falls within the background seismicity for the NZ Seismic Hazard Model in this area and the recorded ground motion, although subject to further analysis, appear comparable to expected levels of shaking for soft soils in a 1/500-750 year event.

The Darfield earthquake is clearly the strongest to affect Christchurch in 100 years or more, but its impacts describe a tale of two cities. Damage to housing and commercial buildings situated on consolidated alluvial gravels (much of western Christchurch) or the nearby hills of Banks Peninsula typically suffered only slight, non-structural damage, except for masonry chimneys. Old unreinforced masonry buildings where not previously strengthened fared poorly as expected and a number suffered either partial collapse or have been evacuated pending a decision on retrofit or demolition. Most of the old buildings strengthened under a long-term programme of "heritage protection" performed well.

In northeastern areas of Christchurch, where the soils are soft and the water table high, liquefaction and lateral spreading has impacted residential housing. Again the spatial pattern of damage is quite variable with the worst impacts observed adjacent to rivers, as expected, while some other areas (e.g. southeast Christchurch) did not liquefy at all. Assessments by geotechnical and structural engineers are underway to determine the spatial pattern of damage, its severity and the percentage of such properties at which land and building damage may be repaired and by what means.

More and detailed information is being collected daily and a comprehensive operating picture will soon be available for analysis.

9(2)(a)

**From:** Hugh Cowan
**Sent:** Thursday, 16 September 2010 12:50 p.m.
**To:** Ian Simpson
**Subject:** RE: EQC presence in Selwyn District

Ian, we should be close to a deal at Lincoln Uni by this afternoon. Will follow up if not sorted. Hugh

--- original message ---
From: "Ian Simpson" <isimpson@eqc.govt.nz>
Subject: RE: EQC presence in Selwyn District
Date: 16th September 2010
Time: 9:35:03 am

Hugh,

This came after a very friendly chat between myself and 9(2)(a) last night – so I'm not sure what else is driving the tone of this note. Would you mind leading this (as well!!). As you know I am happy to be involved in the on-going discussion.

Cheers,

Ian.

From: 9(2)(a) @selwyn.govt.nz]
Sent: Thursday, 16 September 2010 9:31 a.m.
To: 9(2)(a)
Cc: Ian Simpson; Hugh Cowan
Subject: EQC presence in Selwyn District

ISSUED ON BEHALF OF 9(2)(a)

Good Morning 9(2)(a)

Ian Simpson rang me yesterday and I stressed the urgent need for EQC to establish a presence in Selwyn District and indicated to him that an option for accommodation of EQC personnel had been arranged last Friday following the meeting with you at Rolleston.

I can provide more information on this matter if you require it.

We have also met with 9(2)(a) from Tauranga ( who has had extensive experience in emergency response and recovery situations) and his advice is that EQC need to establish a presence here in Selwyn as soon as possible.

The following is list of Selwyn's needs:

- An office in the District staffed by EQC personnel
- Attendance by an EQC officer at a meeting of building professional next Tuesday evening(21 September)
- Attendance by an EQC officer at more general community meetings which will be organised in the next day or so.
- An accessible liaison contact person for building related issues

9(2)(a) believe that the time is well overdue for some effective engagement between EQC, the Council and its ratepayers and residents and I look forward to an early positive response to the matters listed above.

I realise that we are all dealing with a very significant event however I would have expected that EQC would have been proactive in its dealings with the Council.

Regards

9(2)(a)

Selwyn District Council

Email: 9(2)(a) @selwyn.govt.nz

Mobile: 9(2)(a)

DDI: 9(2)(a)

Selwyn District Council
2 Norman Kirk Drive, Rolleston 7614

PO Box 90, Rolleston 7643
Christchurch

Free Calling Area Phone: 03 347 2800
Fax: 03 347 2799 Darfield Free Calling Area Phone: 03 318 8338
Fax: 03 347 2799

www.selwyn.govt.nz & www.selwyndistrict.co.nz

9(2)(a)

**From:** Hugh Cowan
**Sent:** Thursday, 16 September 2010 7:45 a.m.
**To:** 9(2)(a)
**Subject:** RE: FW: Hipótesis o Teoría sobre placa tectónica antártica

Thanks 9(2)(a) will read with interest. Am buried in the recovery effort presently in Christchurch. Cheers, Hugh

--- original message ---
From: 9(2)(a) @mfat.govt.nz>
Subject: FW: Hipótesis o Teoría sobre placa tectónica antártica
Date: 16th September 2010
Time: 6:29:42 am

[UNCLASSIFIED]

Hi Hugh

The attached material arrived, unsolicited, at the Embassy today. We wouldn't usually do anything with something like this, but since we have you as a Spanish speaker and expert in seismic matters I thought we would pass it along on the off-chance that it may contribute something to your work. If it doesn't, please feel free to put it in the "trash".

Cheers

9(2)(a)

---

From: 9(2)(a)
Sent: Wednesday, 15 September 2010 12:32 p.m.
To: 9(2)(a)
Subject: FW: Hipótesis o Teoría sobre placa tectónica antártica

[UNCLASSIFIED]

What shall we do with this? I refuse to translate it!

---

From: Embajada de Nueva Zelandia [mailto:embajada@nzembassy.cl]
Sent: Wednesday, 15 September 2010 12:25 p.m.
To: 9(2)(a)
Subject: FW: Hipótesis o Teoría sobre placa tectónica antártica

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From: 9(2)(a)
Sent: Wednesday, 15 September 2010 12:07 p.m.
To: embajada@nzembassy.cl
Subject: Hipótesis o Teoría sobre placa tectónica antártica

Excelentísima Embajadora de Nueva Zelandia

Adjunto le envío un archivo sobre mi Hipótesis o Teoría sobre la placa litográfica antártica, enviada al Embajador don Jorge Berguño, del Ministerio de RREE de Chile, y Presidente del Instituto Antártico de Chile,INACH ; que explica el origen de la gran actividad tectónica , terremotos, maremotos, errupciones volcánicas, seguidilla que lleva a la fecha más de 45 terremotos despues del terremoto de Chile el 27 de Febrero 2010, en los cuatros puntos cardinales del planeta Tierra, en ambos hemisferios, evento inédito en los últimos mil años.

El reciente terremoto en su país me motiva ha enviar este archivo a los científicos y sismológos, para que conozcan y estudien mi hipótesis o teoría, por ser
ambos países, Chile y Nueva Zelandia, los que están más cerca de la placa litográfica antártica. Por ello mucho agradecería hiciera llegar a su Gobierno,
y organismos pertinentes, éste documento.

Le adjunto además cuatro archivos sobre un Proyecto denominado " Activa Grilla Global Geofísica " o " Active Global Geophysical Grid ", AG3, con privilegios de propiedad intelectual hasta el 6 de Abril del año 2014, pues desearíamos invitar a su Gobierno a ser partícipe de este hermoso Proyecto AG3.

Un afectuoso saludo

9(2)(a) [redacted]
Presidente, Proyecto AG3
Año del Bicentenario de nuestra Independencia

P.S. Ruego confirmar recepción satisfactoria de estos archivos

9(2)(a)

**From:** Hugh Cowan
**Sent:** Saturday, 18 September 2010 11:34 p.m.
**To:** 9(2)(a)
**Subject:** RE: Earthquake Energy Project

I agree entirely re duration. Happy to facilitate work. I would like to involve 9(2)(a) to discuss scope and alignment with other things. Talk soon, but you are right about there being other immediate priorities. Regards Hugh

--- original message ---
From: 9(2)(a) 9(2)(a)
Subject: Earthquake Energy Project
Date: 18th September 2010
Time: 11:22:56 pm

Hello Hugh

I am more convinced than ever that this project will help to explain a lot of things from the recent earthquake. There will be other priorities for now, but this is a simple project and could shed a lot of light to correlate ground motion records and building performance.

Duration needs to be considered. PGA is a very poor indicator.

All for now.

9(2)(a) Office: 9(2)(a) Mobile: 9(2)(a) Email 9(2)(a)

From: 9(2)(a)
Sent: Tuesday, 11 May 2010 3:46 p.m.
To 9(2)(a)
Subject: RE: Earthquake Energy Project

Hi 9(2)(a)

This did slip by but I wasn't waiting bated breath for it anyway.

The pilot study as outlined is relatively limited in scope and I'd be willing to it on spec, on the basis that I'd develop a macro to generate the step series of models. This macro would likely have other uses for our company down the line. This assumes there is not urgency, I could do it sometime before the end of this month.

If you thought Hugh was willing to pay for it, a fee of 9(2)(i) would cover my time.

Regards,

9(2)(a)

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From: 9(2)(a)
Sent: Monday, 26 April 2010 3:54 p.m.
To: 9(2)(a)
Subject: RE: Earthquake Energy Project

Hi 9(2)(a)

I am sure I have responded to your October email before! At least I hope so.

I have been working on Hugh Cowan to get some money to advance this project. I think I can get him to agree to a small pilot study to show how it works. Please would you give me a price for doing the following analyses, a bit of communication time with me and presentation of results (just a simple table):

1. Assume 5% damping

2. Assume elastic – perfectly plastic

3. For each step:

a. Calculate El-Pl energy absorbed after the full record – per your energy calc.

b. Calculate El-Pl energy for the test cycle – (As done at UoC with progressive excursions of increasing overall structural ductility demand – see attached. I calculate the Elasto-plastic energy as 78 times Fy times dy.)

c. Compute the value of a. / c. as a ratio – the calculation of a ratio is critical as it non-dimensionalises the results relates it to the demands of the test regime.

The main point is not the value of the ratio itself (what does it mean?) but in the comparison of ratios from one earthquake source to another – maybe we should do two or three earthquake records, even in the pilot scheme).

4. Assume strength of resonator is as per NZS 1900 Ch8 1965 for Zone A ordinary buildings

5. Use the same earthquake record for all runs / steps

6. Compute the above ratios for resonators matching the Ch 8 design spectrum from T=0 to T= 3 seconds, in steps of 0.1 seconds

7. Produce a table that shows the ratio for each period.

The idea is that the shape of this diagram, and the size of the ratio, will give some indication of the damage potential to buildings of a particular natural period.

I know there are many issues that could be debated, but if I can get a graph of the table in 7 in front of Hugh, I think I will be able to persuade him to fund a wider study.

Thanks for your help. I look forward to hearing from you in due course. (Hugh is going to Chile with the NZSEE team so there is no rush!)

Of course, please feel free to make suggestions.

Kind regards.

9(2)(a)
Bus: 9(2)(a) Mob: 9(2)(a) Email: 9(2)(a)

From: 9(2)(a)
Sent: Monday, 19 October 2009 4:56 p.m.
To: 9(2)(a)
Subject: RE: Earthquake Energy Project

9(2)(a)

It does seem to have potential, although as with all research it would be a matter of working through the theory to see how it worked in practice. I'd certainly be interested in doing the time history part, I see it as relatively straight forward to set up.

I ran 3 examples through the El Centro time history to illustrate the output we'd get from our software. These are for 5% damped resonators, 0.5 and 1.0 seconds, with the 0.5 second resonator also undamped.

There are a few issues that would have to be considered - e.g. what damping to use, if any, and also whether an elastic-perfectly plastic material model is appropriate. As you can see from the examples, a model with zero strain hardening is susceptible to a permanent set.

Anyway, I see it as an interesting avenue to pursue provided it were funded - I don't see any benefits to our company so we'd need external funding, maybe EQC as you noted.

Regards,

9(2)(a)

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From: 9(2)(a)
Sent: Monday, 19 October 2009 12:15 p.m.
To: 9(2)(a)
Subject: Earthquake Energy Project

9(2)(a)

I could not locate a soft copy so here are two pages describing what I had in mind. I will be interested in your comments. I think the idea has considerable potential in communicating in very broad terms the differences between earthquakes. ( I first wrote this in 1999!)

I have a different idea than the one stated for normalising the energy calculation – which is the key to ease of communication. I now propose to compare the energy absorbed in the time-history analysis with the calculated energy absorbed in the full cycle of loading done in the University of Canterbury laboratory on beam-column joints etc. Ie increasing excursions into greater and greater ductility. This is on the basis that if the ratio of energy from the THA is more than the lab calc, even a well detailed resonator would have trouble.

I probably need to explain more, but this should give you the idea.

Regards

9(2)(a)
Bus: 9(2)(a)
Mob: 9(2)(a)
Email: 9(2)(a)

9(2)(a) [redacted]

**From:** Hugh Cowan 9(2)(a) [redacted]
**Sent:** Saturday, 18 September 2010 9:37 p.m.
**To:** Ian Simpson
**Subject:** Fwd: WFCP meeting in Bucharest
**Attachments:** HOTEL REGISTRATION FORM (2).doc; WFCP Program for participants.doc

Hi Ian,

The following was sent to 9(2)(a) [redacted] and me. Perhaps 9(2)(a) [redacted] has already shared this with you but just in case.....I have not responded. Perhaps we can attend next year - as part of our strategy for managing perceptions and (over)pricing of perils....

H.

---------- Forwarded message ----------
From: 9(2)(a) [redacted]
Date: Fri, Sep 17, 2010 at 11:46 PM
Subject: WFCP meeting in Bucharest
To: "hacowan@eqc.govt.nz" <hacowan@eqc.govt.nz>
Cc: 9(2)(a) [redacted] @eqc.govt.nz>

Dear 9(2)(a) [redacted]

I kindly ask you to confirm participation of one or EQC representatives to the World Forum for Catastrophe Programmes. I strongly need your confirmation till Monday, September 20. On Tuesday the hotel is closing the reservation period.

As I already informed you, thanks to 9(2)(a) [redacted] the World Forum for Cat Programs will take place in Bucharest between October 11-15. First day, October 12 the meeting will take place together with the International Catastrophe Risk Forum (ICAR) (www.icarforum.ro/2010/ ).

I am looking forward to meeting an EQC representative here.

Best regards,

9(2)(a) [redacted]

Romanian Catastrophe Insurance System (PAID)

30 Puskin street, district no. 1, Bucharest, Romania

email: 9(2)(a) [redacted] @paidromania.ro

9(2)(a)

**From:** Hugh Cowan
**Sent:** Saturday, 18 September 2010 8:53 p.m.
**To:** 9(2)(a)
**Cc:** 9(2)(a)
**Subject:** RE: FW: Christchurch earthquake

9(2)(a) you have my support re NELC funds. Regards Hugh

--- original message ---
From: 9(2)(a)
Subject: FW: Christchurch earthquake
Date: 18th September 2010
Time: 8:28:23 pm

Guys

Just a heads-up on a forthcoming study mission from the US Technical Council for Lifeline Earthquake Engineering. This guy 9(2)(a) has headed up a number of such investigations, including following the Wenchuan earthquake last year. I am sure our own analysis of this event will benefit from their experience.

Hugh and 9(2)(a) are you happy if we apply some of the NELC and Platform budget in support of their visit, in addition to connecting in other researchers as much as we can?

9(2)(a) can you let me know the extent to which you can personally support 9(2)(a) and his team (I'm mindful that this is a busy time at the University for you).

Thanks
9(2)(a)

-----Original Message-----
From: 9(2)(a)
Sent: Saturday, 18 September 2010 20:19
To: 9(2)(a)
Subject: RE: Christchurch earthquake

9(2)(a)

Good to hear from you, and of your interest in this event. We have benefitted from having the EERI team here over the past week, and trust you will be linking up with them upon their return next week.

Your overall assessment of the principal lifeline impacts is essentially right. It is wastewater rather than water supply which is now the lingering problem in the areas of Christchurch City and surrounding districts where the liquefaction effects were the greatest. Christchurch City today stated that it will be a further 4 weeks before they will know the extent of the wastewater sewers that they will have to re-lay.

I will be happy to assist you with the planning of your visit, and as much as I can, during your visit. As it happens, this week on the 22nd and 23rd we have our annual two day National Lifelines Forum. While I will be able to inform some of the key providers at the Forum of your visit, due to my commitments in delivering the Forum I probably won't be able to make any formal requests until next weekend.

It would be helpful both for our understanding of the scope of your mission and for making connections with Lifeline agencies if you could outline in a brief letter aspects such as:

- about TCLEE, and the work you have done following other major earthquakes, and forms of output;
- the lifeline sectors that you are seeking to study
- the personnel and their specific interests
- the timeframes for your visit

In parallel with this, I will alert key individuals of your intended mission, and with 9(2)(a) and others, we will use the time at this week's Forum to consider the key elements of and contacts for your visit.

Kind regards
9(2)(a)

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9(2)(a) [redacted]

-----Original Message-----
From: 9(2)(a) [redacted]
Sent: Saturday, 18 September 2010 07:57
To: 9(2)(a) [redacted]
Subject: Christchurch earthquake
Importance: High

9(2)(a) [redacted]
I was asked to lead a TCLEE team to come to Christchurch to perform data collection on lifelines. I am positive that both of you can help the team by introducing contacts in lifelines for us to set up meetings or visit their facilities.

We all understand that (from the news) there was no damage to most lifelines, and their operations were not impacted. However, the water system was the one that had some set backs. As you know we like to document what went well and what doesn't. Our target duration is about a week, around early October.

Please let me know from your perspective what we should do and how we should approach this investigation.
Cheers,
9(2)(a)

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Saturday, 18 September 2010 10:49 a.m.
**To:** 9(2)(a) [redacted]
**Cc:**

**Subject:** RE: Earthquake information and interpretation - A map with links is needed.

Thanks 9(2)(a) may not be possible at such short notice, but if this summary could be assembled by Monday morning I would appreciate receiving a copy (with whatever caveats may apply) to inform a meeting that EQC will have with Govt officials and Cabinet on Monday afternoon. Many thanks to all those who have been developing our scientific understanding of this event so far. Regards, Hugh

--- original message ---
From: 9(2)(a) [redacted]
Subject: Earthquake information and interpretation - A map with links is needed.
Date: 18th September 2010
Time: 10:27:48 am

Hi 9(2)(a) and all

Good comments, of course.

Please would someone (9(2)(a) [redacted]) put together a map showing where the instrument stations are, a record of accelerations at each site (could be a link on the map), and a response spectrum for horizontal movement plotted in the conventional way with the 1170 values for all soil types for comparison (could also be a link on the map).

This will give some "factual" information for all to see, and clearly show how complex and variable the situation is. It will also help all of us who are trying to interpret building / infrastructure / liquefaction behaviour in different parts of Christchurch.

It would also be great to flash in front of MPs as a simple visual reminder of the complexity that confronts the interpretation of the meaning of this earthquake.

However, we still need to distil things down to simple statements for those for whom this is enough. Better that than nothing.

Regards to all

9(2)(a) Office: 9(2)(a) Mobile: 9(2)(a) Email: 9(2)(a)

From 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 2:15 p.m.
To: 9(2)(a)
9(2)(a)
9(2)(a) Hugh Cowan; 9(2)(a)
9(2)(a)
Subject: Christchurch spectra versus NZS1170 - The current code does not tell us if an "old" building should be damged or not.

Hi Guys,
We must not jump to a conclution for any thing at this moment. Every earthquake surprised many seismologists and engineers and this one certainly does too. Jump to a premature conclusions will hinder out lateral thinking. I may be too negative and a bit grumpy because I haven't had much sleep since the earthquake. Please do not feel being offended.

We also need to compare the design spectra from old codes and the NZS1170.50 (as sent out by GNS and 9(2)(a)) is essentially irrelavent to the structures in most parts of the Canterbury as many house and structures were designed long before the current code. The current code does not tell us if an "old" building should be damged or not. We will have a lot explanations to do after the dust down and after we complete the information collection phase.

I suspect that some records may have been influnced by the dancing of heavy stuff around the instrument or the response of the concrete blocks (where instrument was bolted down) on soggy soil in farm land. It would be absolutely necessary for us to visit strong-motion recording stations and record all the possible damage for both contents as well as any structural damage. I visited quite a few stations but it is important to talk to the people from these stations as most was cleaned up and people did not respond to phone messages. Would any structural engineers and an experienced builder like to joint me for the trip some time next week (if I get approval from my boss who has supported me for many years?

When I was in Canterbury, I even could not get a post-graduate to come with me even though 9(2)(a) tried to help me to find one. The damges at strong-motion stations will give us a very clear picture on the performance of NZ residential houses around the immediate area.

Cheers,
9(2)(a)

9(2)(a) @canterbury.ac.nz>

17/09/2010 13:41

To

9(2)(a) [redacted]

9(2)(a) Hugh Cowan <HACowan@eqc.govt.nz>, 9(2)(a) [redacted]

9(2)(a) [redacted]

cc

Subject

RE: Christchurch spectra versus NZS1170

Thanks 9(2)(a) for admitting this. I tried my best to convince you guys on this in yesterday's meeting; but could not. For Christchurch the 10% in 50 yrs hazard factor is 0.22, which is in CRUDE terms an indication of design level PGA. We have recorded PGAs in either side of this value in different parts of Christchurch. Based on the response spectra of some records; it is clear that the response demand was much less than (about half) the design level demand for short period structures; slightly less than design level for medium period structures and equal to (or even higher than) the design demand for long period structures. Once we admit this, a lot of things will start making sense. We will find the questions a lot easier to answer:

1. Why little damage in low rise and residential buildings?

Because the demand for these buildings was much less than the design level.

2. Why so much damage in the areas of soft soil?

Because the soft soil has a longer period for which the demand may be equal to (I suspect even greater than in some very soft soils) the design level demand.

3. How have our tall buildings fared in this close-to-design-level event?

I have noticed/observed non trivial damages (including plastic hinges) in tall RC frame buildings (periods likely to be in the range of 1sec) and we have to admit that most of our tall buildings have performed as well as we expected them to perform in a design level event. One thing we must note is: our design code allows some damage and inelastic response in a design level event; but it does NOT mean they MUST damage significantly in a design level event. It will be interesting to see how many flexible buildings (say taller than 8 storeys) people have noticed/observed not to have incurred any significant damage; personally I have NONE. So far, I have gained access to three buildings falling in these categories and the damage categories I would assign to these buildings is moderate (very close to severe) and minor (very close to moderate), and minor. With several factors built in the design process (to increase the demand or reduce the capacity) it is not a surprise that the tall buildings have seen off this event by having minor-moderate damage. Isn't this what we expect from our structures?

4. Are we likely to have a bigger earthquake?

Certainly YES, but based on my several conversations with seismologists a bigger earthquake in the Alpine fault does not result in similar level of PGA in Christchurch (using the available attenuation relationship) but the duration of shaking is likely to be longer. Again, the shaking is likely to be dominated by low frequency (i.e. longer duration) as the high frequency components may be filtered out or restrained while travelling for a long distance. Hence, a bigger earthquake in the Alpine fault may not necessarily be more damaging to the low period buildings (which dominates our building stock).

5. Are we likely to have more damaging (note this does not necessarily mean bigger) earthquakes?

Possible (not necessarily probable), but mainly for low rise and residential buildings which have periods less than 0.25 sec; but the same cannot be said about the soft soils and flexible high rise structures. To have a shaking to induce a design level demand from high frequency (low period) structures, the source should be at a closer distance and some forward directivity effect may help. Maybe another rupture of an unknown fault in the Canterbury plains at a closer distance?

I know not everybody will buy into these, but to me these are plausible conclusions based on my limited knowledge, experience, and observation. I am always open to learn more, so please do respond if you have more plausible explanations for the different levels of damage for different types of structures/soils we have observed so far.

Cheers
9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering
University of Canterbury
Private Bag 4800
Christchurch 8020, New Zealand
9(2)(a)
<http://www.civil.canterbury.ac.nz/staff9(2)(a).asp> http://www.civil.canterbury.ac.nz/staff9(2)(a)

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From: 9(2)(a)@gns.cri.nz]
Sent: Friday, 17 September 2010 10:07 a.m.
To: 9(2)(a)
Cc: 9(2)(a) Hugh Cowan;
Subject: Re: Christchurch spectra versus NZS1170

Hi 9(2)(a)

Thanks for these plots - they are very important in my mind. It suggests the event has been much closer to the 10% in 50 yr event than is currently being discussed around town. That has major implications into the thinking behind build-back, tolerable impact, and guidelines, including the heritage buildings.
I will circulate this to others because there is a current perception that the building stock only experienced about 30-60% of the 500 year demand. I would be interested in the records on firm ground class also - to try to reconcile the lack of damage on firm soil sites in the west of the city.

Regards,9(2)(a)

----9(2)(a) /GNS wrote: -----
To9(2)(a) /GNS@GNS
From:9(2)(a) /GNS
Date: 16/09/2010 18:23
cc: 9(2)(a) GNS@GNS, 9(2)(a) /GNS@GNS, 9(2)(a) /GNS@GNS
Subject: Christchurch spectra versus NZS1170

9(2)(a) and others

I attach a spreadsheet showing plots of spectra in Christchurch City (and Kaiapoi) compared to NZS1170 Class D Deep or Soft Soil Z=0.22 R=1 (i.e. 500-yr return period). Sites closer to the source than Riccarton High School are not included. The spectra are as recalculated with record-specific filter bands by 9(2)(a) so may vary slightly from those on the Geonet website. For the periods plotted (up to 4.5s, as covered by NZS1170), I expect any differences to be minor.

The first plot includes both horizontal components, the second the larger of the two horizontal components at each period, and the third the larger component for four sites near the central city. Some sites likely to have been affected by liquefaction are excluded.

NZS1170 spectra are for the stronger component.

All plots show the geometric mean ("median") of all the sites included in each plot.

The spectra standing out well above the others at short period are for Heathcote Valley School. Its spectra are the weakest at periods beyond 1s. It may well be sited on a wedge of colluvium, as iut is at the base of the Port Hills, near to the entrance to Lyttelton tunnel. The historic hotel that was demolished was only about 200-300 metres down the road.

The median of the four central city spectra are close to NZS1170 R-=1 values from about 0.25s to 1s, and stronger than NZS1170 for periods of about 1.5s and stronger, considerably so for periods above about 2s.

Regards

9(2)(a)

9(2)(a)

**From:** Hugh Cowan
**Sent:** Friday, 17 September 2010 10:50 p.m.
**To:** Ian Simpson
**Subject:** FWD: FW: Canterbury Earthquake Update
**Attachments:** FW: Canterbury Earthquake Update

As discussed earlier. Cheers Hugh

9(2)(a)

**From:** 9(2)(a) @canterbury.ac.nz>
**Sent:** Friday, 17 September 2010 4:31 p.m.
**To:** Hugh Cowan
**Subject:** FW: Canterbury Earthquake Update

**Importance:** High

Hugh

This has gone out nationally!!

Was this discussed with EQC before issued?

*"Frustration is turning to anger and despair. "*

I suspect not

Let me know if there is anything I can do

9(2)(a)

------ Forwarded Message
**From:** IPENZ Special Bulletin 9(2)(a)
**Reply-To:** <office@ipenz.org.nz>
**Date:** Fri, 17 Sep 2010 14:44:39 +1200 (NZST)
**To:** 9(2)(a) @cae.canterbury.ac.nz>
**Subject:** Canterbury Earthquake Update

Dear 9(2)(a)

Canterbury Earthquake

Welcome to this special bulletin for IPENZ Members. In this bulletin we have set out a summary of what has happened to date, what we see happening now and into the future, and conclude with a message from the Canterbury Branch Chair. We can celebrate no loss of life, and that the engineering response has been praised by politicians and community leaders.

Response Phase

As expected, the engineering response plans of the major utilities kicked in and electricity, water, wastewater and other services were progressively brought back on-line. No doubt many of our Members were heavily involved.

The building stock is a different issue as it has a plethora of different owners, and there can be no plan like there is for utilities. Rather, we rely on the emergency management system of central and local government calling up engineers from the private sector to assist.

IPENZ was first contacted at 8.03am on Saturday 4 September by a text message from the Department of Building and Housing (DBH) who were at that time asking for a Christchurch co-ordinator for earthquake response. At 8.40am 9(2)(a) Director – Engineering and 9(2)(a) Acting Chief Executive conferred leading to communication, firstly with the Ministry of Civil Defence and Emergency Management (MCDEM) and then with 9(2)(a) FIPENZ (a Christchurch-based Member of the governing Board) who agreed to be our eyes and ears on the ground. 9(2)(a) FIPENZ from Hokitika rang around 10.00am to offer assistance.

By 11.00am, further contact with MCDEM ensured that a first detail of Urban Search and Rescue (USAR) engineers was being arranged and we were advised that MCDEM were willing to work with senior structural engineers to establish a presence on the ground. 9(2)(a) FIPENZ co-ordinated responses on his arrival.

Phone calls were fielded throughout the day and throughout the next day making arrangements for engineers to start carrying out building assessments from Monday morning. 9(2)(a) took five West Coast engineers to Christchurch. A further nine engineers arrived on the 8.40am flight from Wellington on Monday morning, making a total of 15 on the ground doing initial assessments.

The Earthquake Emergency Engineering Team, located in the Christchurch Art Gallery, quickly established the need for further resources and came to IPENZ National Office for this support. An email directed at South Island engineers initially, followed by a further "call to arms" to all IPENZ Members, resulted in 368 engineers offering their services and the outcome of that was 87 engineers who reported to the Control Centre, signed a Memorandum of Understanding empowering them to assist Territorial Authorities in a State of Emergency and subsequently being deployed in the field, until the State of Emergency was lifted at noon on Thursday 16 September. Many worked long hours over many days.

During this period, 9(2)(a) graciously provided accommodation to a number of engineers who ended up staying with him for the whole period and provided support on many fronts; perhaps the most outlandish of which was to respond to a request at 9.15pm from 9(2)(a) to receive an email with a spreadsheet of volunteering engineers, open it, format it, print it and deliver it to the Emergency Centre, who had no such capability at that stage (only personal email, no printers, no phones – other than personal mobiles).

During the emergency phase, at the request of the Christchurch City Council, IPENZ National Office staff established an 0800 number (0800 CHCH HELP), for the people of Christchurch to use to log requests for assistance. Up to 100 calls per day were being received and thankfully now that we have transitioned to recovery, that flood has slowed. After dealing as best as we can with the social element, we are endeavouring to explain the options open, and where we can, to mobilise engineers.

Recovery Phase

The recovery phase will endure for many months, and the emergency powers are no longer in force. Engineers' activities will now attract liability to them, and there is an expectation that there will be commercial contractual arrangements in place. The government has relaxed some provisions of the Building Act by order in Council under the Emergency Act, primarily to allow certain types of building work (including some aspects of demolition) to proceed without building consents (which can be found at www.ipenz.org.nz/ipenz/downloads/img-916145155.pdf <http://www.ipenz.org.nz/ipenz/downloads/img-916145155.pdf> ).

The response has three main components:

- Commercial buildings, predominantly in the CBD. The Council will evaluate buildings which were classified as red or yellow in the response phase, and may issue notices to fix for dangerous or unsanitary buildings. For buildings on the earthquake-prone building register, the work programme must take into account the new requirement for performance to 67 per cent of current loading code. For heritage buildings, the requirement for permission to demolish continues. The overall work programme will be one of evaluation, and then either demolition or development of a recovery work programme. The documentation requirements for consenting seems likely to be relaxed by the Building Consent Authority.
- Buildings (largely residential) which have been compromised through ground movement destabilising foundation systems (primarily through soil liquefaction).
- Homes with structural damage, primarily masonry/brickwork collapse, eg chimneys.

Larger consulting firms with structural and geotechnical capability are already deployed in the first of these areas. IPENZ has therefore focused its activities primarily to support homeowners. Those engineers with expertise, and who operate in a commercial model most suited to this work are often sole practitioners or small firms who concentrate in this market sector.

On Monday, 13 September, we launched our second appeal to engineers prepared to take on work (this was a different appeal to that a week earlier in which we sought volunteers for the response phase). A total of 153 responded (over and above those 368 who had already offered to provide support in a volunteer capacity), and that list continues to grow.

The question of habitability is one for the relevant local body; that of compensation for repairs is for the insurers and the Earthquake Commission (EQC). Homeowners do not understand this subtlety. EQC is adamant that it cannot underwrite any repairs unless it has completed its own assessment. It is trying to prioritise its assessments, but the backlog is days (or weeks). However, the homeowner can undertake "emergency repairs" or "temporary repairs" and then seek compensation. The issue up to today was that there was no adequate definition of what emergency or temporary repairs means. EQC have just advised us that in order to clarify matters they have removed temporary repairs and defined emergency repairs as those relating to any damage which results in a compromise of security, safety, sanitation or weather tightness.

What this means is that those homeowners with issues either have to seek higher prioritisation from EQC to get their assessment done, or take the chance of privately engaging assistance (on the basis that if the work qualifies as emergency or temporary repairs they can seek reimbursement from EQC). In effect, for those who cannot afford to take the risk of no reimbursement, they are delayed in seeking professional assistance. Hence the anxiety continues to rise, and the social impacts have become increasingly important. Frustration is turning to anger and despair.

As of today, we have received several hundred calls and where possible in the circumstances have connected those callers to engineers.. Many callers want reassurance that they are not in danger and sometime we can refer them to a builder. Where a case seems urgent, we are telling EQC. These actions will continue.

Learnings for the Future

Engineers must learn all we can from the Canterbury earthquake. Important areas will be:

- Structural engineering – how did buildings perform, and what can we learn?

- Land use – do we have appropriate standards and procedures to ensure appropriate zoning of land, and subsequent caveats on construction?
- Did the profession perform as well as it could during the response and recovery phases – if not, what could be improved?

We might consider some task forces involving all parties to consider these or other questions (just as we assembled a pan-party taskforce after the Tamahere cold store fire). It will be important that whatever we do it is linked to government work, and that we avoid duplication of investigative pieces of work. However, there is a week or two to reflect on such matters – we need to continue to support the recovery effort for now.

A Note of Appreciation

As Chief Executive, it has been gratifying to see the efforts made by so many in the profession, and from amongst the IPENZ staff. My impression is that the actions of engineers have been much more widely appreciated. On behalf of the IPENZ governing Board, can I thank all those who have undertaken actions outside the norm. That there are hundreds of Members and would therefore be impossible to name them all is rather strangely gratifying in itself.

Dr Andrew Cleland
Chief Executive

Message to All IPENZ Members from the Canterbury Branch

On behalf of IPENZ and the community, we extend our sincere thanks to all Members from Canterbury and around the country who rallied to assess damage from the earthquake and restore essential services. Special mention must go to the USAR teams, who played a vital role under the Civil Defence emergency.

Now that voluntary work is being replaced by commercial activities, your continued work is vital to get the region back on its feet, protect our heritage and rebuild safe and well-engineered structures and infrastructure.

We are working with IPENZ National Office to ensure that lessons learnt in all aspects of the Canterbury earthquake and its wake can be gathered for the maximum benefit of regions throughout the country. Input from those involved in any way is appreciated.

9(2)(a) [redacted]

This email message was intended for 9(2)(a) [redacted] and was sent to 9(2)(a) [redacted]

------ End of Forwarded Message

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Friday, 17 September 2010 5:34 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** FWD: land cover
**Attachments:** land cover

9(2)(a)

**From:** Office Temp #01
**Sent:** Friday, 17 September 2010 5:09 p.m.
**To:** Hugh Cowan
**Subject:** land cover

# EQC's land cover – key points

- EQC provides some land cover for property owners who have fire insurance
- Because of a great variety of situations it is not easy to provide a simple explanation of the cover
- EQC is required to consider each case on its merits
- Land is covered where there is a residence lawfully on that land
- Vacant sections are not covered
- The following property is insured as residential land
  - Land directly under the residential buildings such as house, garage and shed
  - Land within 8 metres of those buildings
  - The main accessway to the building from the boundary of the land (maximum of 60 metres)
  - Bridges or culverts within the land described above
  - Retaining walls and their support systems needed for support or protection of the buildings or any areas of the land described above (within 60 metres of a residential building)
- A claimants land is not covered unless it is within the same land holding as the residential building e.g. if a neighbour's land is 5 metres from a residential building of the claimant then cover stops at that boundary
- The maximum amount of cover is the market value at the time of damage of the smallest of the following three:
  - Whatever area is the minimum area allowed for a residential section in the relevant local government area
  - An area of 4000 metres squared
  - The area of land that has actually suffered loss or damage
- The maximum amount of excess payable is $5000
- The maximum amount of cover is calculated exclusive of GST
- Cover is for the indemnity value of bridges, culverts or retaining walls conditional on the above.
- EQC is not required to pay the maximum amount of cover irrespective of how much or how little damage for if the land can be reinstated for less then that will be the amount paid

- If the cost of reinstatement exceeds the EQC limit EQC simply pays the maximum amount of cover available
- If the land cannot effectively be repaired or reinstated so that it can again support a residential building it will usually be considered a total loss and in that case EQC would pay the maximum cover
- Claimants must pay an excess and this is the greater of the following two amounts
  - $500 multiplied by the number of dwellings in the residential building on the land
  - 10% of the amount EQC pays
- The cover is for what has been described above and excludes various items of property including trees, plants, lawns, crops, paving, and artificial surfaces generally
- To the extent that damage consists of debris EQC is only required to remove the debris
- Where EQC replaces or reinstates it does not have to do so exactly or completely but only as circumstances permit and in a reasonably sufficient manner
- Instead of paying the amount of damage EQC, at its option, can relocate the building concerned on the same site or where the site is unsuitable to a different site

End

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Friday, 17 September 2010 11:59 a.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: Land cover

Ok, will call again soon.

--- original message ---
From: 9(2)(a) [redacted]@treasury.govt.nz>
Subject: RE: Land cover
Date: 17th September 2010
Time: 11:47:19 am

I still need answers to these questions.

---

[redacted] The Treasury

Tel: 9(2)(a) [redacted] | 9(2)(a) [redacted]@treasury.govt.nz

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From: Ian Simpson [mailto:isimpson@eqc.govt.nz]
Sent: Monday, 13 September 2010 5:12 p.m.
To: Hugh Cowan
Cc: 9(2)(a) [redacted]
Subject: FW: Land cover

Hugh,

Would you be able to call 9(2)(a) tomorrow (number below). He needs to get some answers to Min of Fin on the land issues, and you are just the man for the job.

Ta,

Ian.

From: 9(2)(a) @treasury.govt.nz]
Sent: Monday, 13 September 2010 4:02 p.m.
To: 9(2)(a)
Cc: ^9(2)(a) ; Ian Simpson
Subject: RE: Land cover

I haven't got answers yet. Thanks for the info, that is very interesting. It sounds like that minimum allowable area provision is going to cause a few headaches.

---

9(2)(a) | The Treasury

Tel: 9(2)(a) @treasury.govt.nz



From: 9(2)(a) @EQC.govt.nz]
Sent: Monday, 13 September 2010 3:53 p.m.
To: 9(2)(a)
Cc: ^9(2)(a) Ian Simpson
Subject: Land cover

9(2)(a)

Have you got answers on this yet or do I still need to respond?

Here is a document we have put together along with information about the Canterbury situation (which is a bit confusing).

Regards

9(2)(a)

From: 9(2)(a) @treasury.govt.nz]
Sent: Monday, 13 September 2010 12:13 p.m.
To: Ian Simpson; 9(2)(a)
Subject: Land cover

A request from the MoF's office:

* MoF would like further information on the issues with land cover that were mentioned in the report I did last week - what are the actual issues in Canterbury, how are they playing out?

* Minimum land issue (the link to the district plan) - what's the process for resolution? What about different district rules? Is there room for some flex?

* What about where EQC rules mean people get less than what is required for remediation? Links to point 1

On the last point, since private insurance doesn't cover land, I assume anyone in this situation just takes an equity loss. Either they have to pay for further remediation themselves, or EQC gives them a cash settlement at the maximum possible and they have to walk away from the land and rebuild elsewhere.

I have been trying to deal with as many questions as possible myself, but I'll need your input on these ones.

---

9(2)(a) The Treasury

9(2)(a) @treasury.govt.nz

9(2)(a)

**From:** Hugh Cowan
**Sent:** Friday, 17 September 2010 10:39 a.m.
**To:** 9(2)(a)@dpmc.govt.nz
**Subject:** FWD: Re: Christchurch spectra versus NZS1170
**Attachments:** Re: Christchurch spectra versus NZS1170

9(2)(a) for your info. Best to describe event as close to 500 year design quake. The important point remains, the event was already in the national hazard model and therefore informing the loadings standard. 9(2)(a) should attend Monday meeting also. Pls confirm you have got this. Thanks. Hugh

9(2)(a)

**From:** 9(2)(a) @gns.cri.nz>
**Sent:** Friday, 17 September 2010 10:07 a.m.
**To:** 9(2)(a)
**Cc:** 9(2)(a) Hugh Cowan; 9(2)(a)
**Subject:** Re: Christchurch spectra versus NZS1170
**Attachments:** ChristchurchSpectra.xls

Hi 9(2)(a)

Thanks for these plots - they are very important in my mind. It suggests the event has been much closer to the 10% in 50 yr event than is currently being discussed around town. That has major implications into the thinking behind build-back, tolerable impact, and guidelines, including the heritage buildings.
I will circulate this to others because there is a current perception that the building stock only experienced about 30-60% of the 500 year demand. I would be interested in the records on firm ground class also - to try to reconcile the lack of damage on firm soil sites in the west of the city.

Regards, 9(2)(a)

-----9(2)(a) /GNS wrote: -----

To: 9(2)(a) /GNS@GNS
From: 9(2)(a) /GNS
Date: 16/09/2010 18:23
cc: 9(2)(a) /GNS@GNS 9(2)(a) /GNS@GNS, 9(2)(a) /GNS@GNS
Subject: Christchurch spectra versus NZS1170

9(2)(a) and others

I attach a spreadsheet showing plots of spectra in Christchurch City (and Kaiapoi) compared to NZS1170 Class D Deep or Soft Soil Z=0.22 R=1 (i.e. 500-yr return period). Sites closer to the source than Riccarton High School are not included. The spectra are as recalculated with record-specific filter bands by 9(2)(a) so may vary slightly from those on the Geonet website. For the periods plotted (up to 4.5s, as covered by NZS1170), I expect any differences to be minor.

The first plot includes both horizontal components, the second the larger of the two horizontal components at each period, and the third the larger component for four sites near the central city. Some sites likely to have been affected by liquefaction are excluded.

NZS1170 spectra are for the stronger component.

All plots show the geometric mean ("median") of all the sites included in each plot.

The spectra standing out well above the others at short period are for Heathcote Valley School. Its spectra are the weakest at periods beyond 1s. It may well be sited on a wedge of colluvium, as iut is at the base of the Port Hills, near to the entrance to Lyttelton tunnel. The historic hotel that was demolished was only about 200-300 metres down the road.

The median of the four central city spectra are close to NZS1170 R-=1 values from about 0.25s to 1s, and stronger than NZS1170 for periods of about 1.5s and stronger, considerably so for periods above

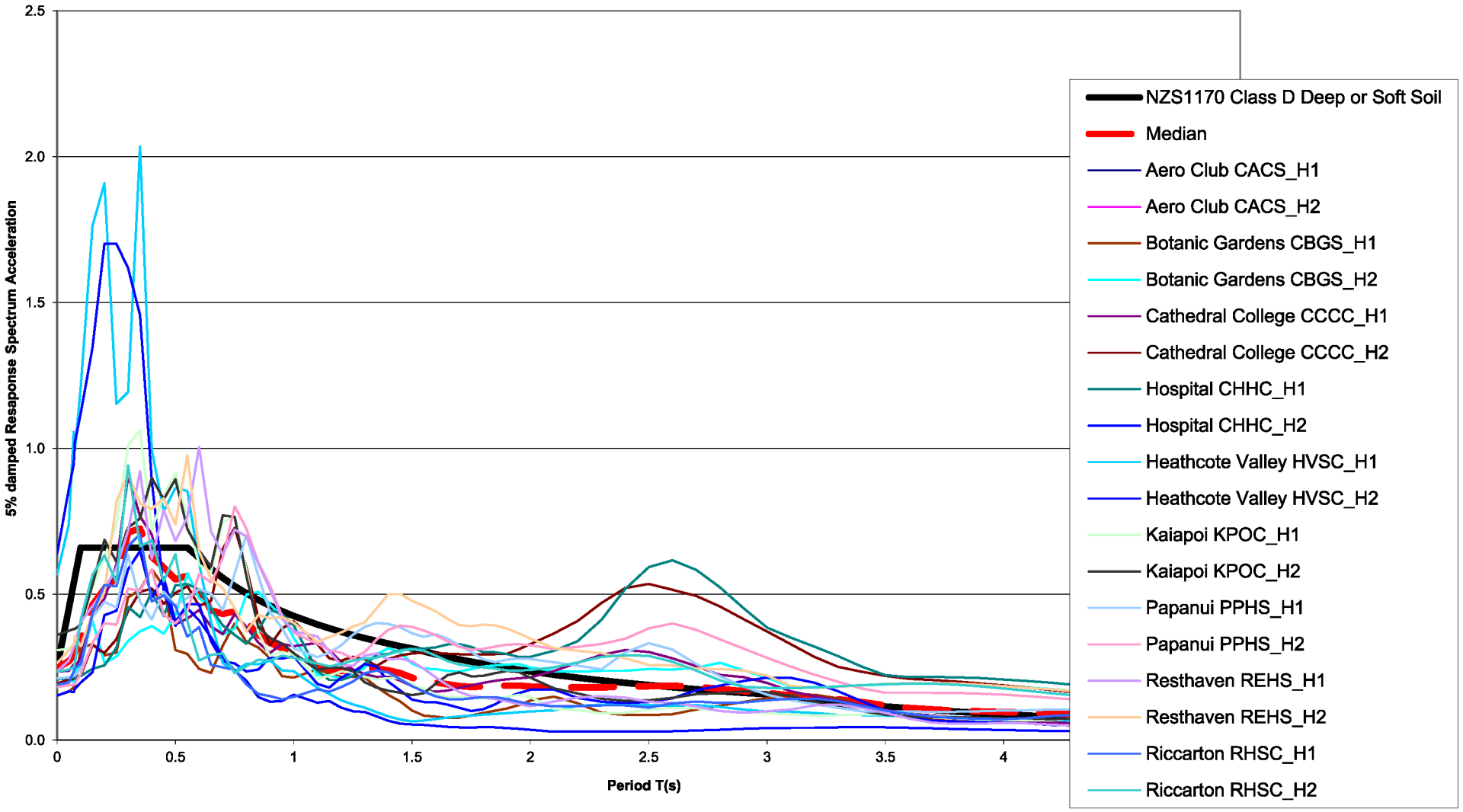
about 2s.



Regards

9(2)(a) [redacted]

# CHRISTCHURCH SPECTRA vs NZS1170 500-Yr Deep Or Soft Soil



9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Friday, 17 September 2010 8:10 a.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: COWAN and RENE PAPER

Hi 9(2)(a) yes I do remember you well. I am caught up in the recovery effort (management) so I am away from my desk but this note is to say I will respond properly early next week. Regards Hugh

--- original message ---
From: 9(2)(a) [redacted]
Subject: COWAN and RENE PAPER
Date: 16th September 2010
Time: 4:18:51 pm

Hi Hugh,

You probably do not remember me but we meet 11 years ago here in Christchurch when I was invited by 9(2)(a) 9(2)(a) [redacted] to spend my sabatical leave in CU. I know you must be very busy now but 9(2)(a) [redacted] told me that there is a paper that you wrote with Rene? which could help me to understand what is the structure of the canterbury basin and maybe give me some ideas about the shallow soil deposits in Christchurch. Could you pass me the title of the paper and the Journal where it was published? 9(2)(a) [redacted] from CMU wants to model the 7.1 Canterbury Earthquake in the HERCULES software and compare the results with some records and observations. Do you know if there is a digital model of the Canterbury basin structure?

Thanks very much for your help.

Cheers,

9(2)(a) [redacted]

UNIVERSIDAD EAFIT

CRA. 49 #7 SUR-50

9(2)(a) [redacted]

MEDELLÍN

COLOMBIA

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Friday, 17 September 2010 8:06 a.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: press ad

Ok, good idea. :)

--- original message ---
From: 9(2)(a) [redacted]@EQC.govt.nz>
Subject: RE: press ad
Date: 17th September 2010
Time: 7:28:14 am

Do you want the ccc to see the ad?

From: Hugh Cowan [mailto 9(2)(a) [redacted]
Sent: Friday, September 17, 2010 12:40 AM
To: 9(2)(a) [redacted]
Subject: press ad

h9(2)(a) [redacted]

The press advert reads well. I request only one minor amendment to the para that deals with "Can I get emergency repairs done?". As follows:

"Yes, If you need to get emergency repairs e.g. to temporarily secure or waterproof your property, remove a badly damaged chimney, or fix broken services such as sewer, water or power connections, please take a photograph if you can.....etc..."

thanks a lot!

Hugh

**Marija Bakulich**

**From:** Hugh Cowan
**Sent:** Friday, 17 September 2010 12:11 a.m.
**To:** 9(2)(a)
**Subject:** RE: Earthquake counselling

Hi 9(2)(a) another long day, including meetings with top three in Cabinet then my cameo at a public meeting in Burwood near New Brighton. Tough questions from distressed folk. Went tolerably well. Going back Sat. Will let yot know if window opens. Hugh

--- original message ---
From: "9(2)(a)
Subject: Earthquake counselling
Date: 16th September 2010
Time: 7:24:13 pm

hi Hugh....you must be busy...hope you enjoyed the Burnside meeting tonight

Earthquale counselling.jpg

9(2)(a)

**From:** Hugh Cowan
**Sent:** Sunday, 19 September 2010 8:28 p.m.
**To:** Ian Simpson
**Subject:** FWD: Some Further Thoughts
**Attachments:** Some Further Thoughts

Ian, thought I would share this note from Dave Brunsdon with you now, since it requires no greater explanation from me before we have the chance to discuss. Newcastle, Australia was a 1989 moderate quake that killed a number and cost a lot. Dave was a key advisor to the Aussies in the aftermath. See you tomorrow. Hugh

9(2)(a) [redacted]

**From:** David Brundson
**Sent:** Sunday, 19 September 2010 8:12 p.m.
**To:** Hugh Cowan
**Subject:** Some Further Thoughts

Hugh

Hope you had something of a break today! Just a few thoughts below for you to read (tomorrow) as I mull over the points you mentioned yesterday afternoon when you briefed me, and also seeing the reported figures of 2,700 homes uninhabitable.

These thoughts are somewhat random, as I consider the 'next steps' connection with the relevant professions that you raised, so ignore them if they're not relevant or don't add. I have found my report to the Insurance Council of Australia prepared 18 months after the Newcastle earthquake. But it only has marginal relevance to this event, as liquefaction wasn't an issue there, but reactive clays were.

What is that figure of 'uninhabitables' based on, as in who has made that decision - Council or EQC?

9(2)(g)(i) [redacted]

One aspect might be an independent panel of engineers to give owners a second opinion, maybe for free or agreed rate (as in, independent from EQC).

I would be interested to know the nature of the technical (engineering) resource that EQC currently has at its disposal. For example, how many Chartered Prof Engs are there?

Brownlee has been reported as saying (Stuff website) that those claims between $10k and $100k are 'clear and easy', whereas >$100k would require full geotech assessment. I would say be very wary of those between $50k and $100k - if there's one relevant lesson from Newcastle, it is they are the 'boomerangs' that could come back and bite later (ie. often treated as superficial damage and the underlying causes (foundations) not given enough attention).

Anyway, good luck tomorrow, and let me know if and where I can help.

Kind regards
Dave

--
Dave Brunsdon - Director
db@kestrel.co.nz - M 9(2)(a) [redacted]
Wellington Office - P 04 499 4433 - F 04 499 4445
Kestrel Group - Risk, Continuity and Emergency Management - www.kestrel.co.nz

9(2)(a)

**From:** Hugh Cowan
**Sent:** Sunday, 19 September 2010 7:23 p.m.
**To:** 9(2)(a)
**Subject:** FWD: Keep in touch: local obseravtions
**Attachments:** Keep in touch: local obseravtions

As discussed 9(2)(a) Hugh

9(2)(a)

**From:** 9(2)(a)
**Sent:** Sunday, 19 September 2010 12:20 p.m.
**To:** Hugh Cowan
**Subject:** Keep in touch: local obseravtions

Hugh

I am staying in the Academy Motel, Creyke Road, oppo CU School of Engineering and NZi3. Meet with 9(2)(a) and others Mon am. I expect to return to WGN Tue, I have been asked to a meeting at Parliament Tue evening. All this as NZSEE.

I am working today on an 'Information Clearing House plan' - to enable access to information for Recovery decision makers to use for a defensible recovery plan for Canterbury/CHC. The objective of the plan is to facilitate access to the Gb of shareable information (seismic hazard, soils, buildings and infrastructure, vulnerabilities, remote sensed RadarSat, GeoEye, High res air photos, LIDAR, etc) and manage the process of access to data that is 'Public', 'Restricted', or 'Confidential'.

Are you in CHC? Regardless, can we catch up?

You may be interested in the independent, experienced, observations below.

9(2)(a)

Over breakfast in the motel restaurant I found that 9(2)(a) the cook/waitress grew up in Murchison, her fathers farm ws where the top storey of the 9(2)(a) house finished up, on top of the Mataki landslide. You will know the photo, we have it on the wall of our Wellington MCDEM office. I found that 9(2)(a) has many relevant observations, particularly with the experience of being in Murchison for the Inangahua earthquake and having been told many stories by her grandmother of the Murchison earthquake. The Lockwood house that 9(2)(a) built twenty years ago on Lower Styx Road has no significant problem (Lockwood has rung from Rotorua to say that they are coming to Canterbury to 'service' (tighten) all Lockwoods affected by the earthquake - great!). They lost two crystal glasses.

9(2)(a) noted that:

- their section was 'natural' uneven ground;
- the house is on 'very long' piles because of the of the soils;
- during the building the shallow top soil was disturbed and they found their section was underlain by sand;
- some years after construction they bought in truck load(s) of top soil that was spread around, particularly in the lower areas (and not under the house).

For the Sat 4 Sep eq 9(2)(a) noted:

- liquefaction occurred under their house where there was no imported topsoil (sand boils) and on the section only where the topsoil was the thinnest (sand boils and 'strips' (lateral spread fissures?);
- the Lockwood moved on the piles but all is 'ok';
- other houses in their neighbourhood are badly affected - all on conc slabs, mostly 'new mansions';
- houses in their neighbourhood on piles appear okay - such as old 9(2)(a) across the road who is in a c.1935 piled weatherboard/corr iron roof house;

- newer subdivisions/houses aren't good, done on the cheap, except for the Pegasus subdivision which was good work;
- After the earthquake there was A LOT of water around on the ground, like a flood after heavy rain;
- driving to work, waiting until it was light enough to see so that she didn't drive into cracks or holes (her experience of the Inangahua eq?), she was surprised to see 'drums' standing up c.1 m high along the road, she had to "drive around them like dodgems", she then recognised them as manholes, when she came home hours later they were half as high, today they are only just above the road (c.300) high, except for a couple that were leaning and "couldn't fit back down their holes".
- a neighbour, a few houses away, lives in a piled house; he's a house mover, he has jacked up his house and moved it to the back of his section where it is 'better'.

Her husband 9(2)(a) and daughter had taken photos, she will get them emailed to me, as well as the house mover's contact details, and Lockwood's.

9(2)(a) also knows 9(2)(a) and 9(2)(a) and family of the Mangles Valley well. You may remember that is where 9(2)(a) and 9(2)(a) spent many summers in the 9(2)(a) cottage while 9(2)(a) mapped the area. I did field work based there too, through 1973 - 1981, I liked the area so much that 9(2)(a) and I had some days of our honeymoon in the 9(2)(a) cottage. 9(2)(a) and I had many Murchison/Buller experiences to share.

I conclude that it's a small world; some learn from past experiences (like 9(2)(a) and Lockwood), and some don't.

9(2)(a) 8 Sep 2010

9(2)(a)

**From:** Hugh Cowan
**Sent:** Sunday, 19 September 2010 12:58 p.m.
**To:** 9(2)(a)
**Subject:** FWD: A further query I've just remembered
**Attachments:** A further query I've just remembered

9(2)(a)

**From:** 9(2)(a) @ccc.govt.nz>
**Sent:** Sunday, 19 September 2010 12:16 p.m.
**To:** Hugh Cowan; 9(2)(a)
**Subject:** A further query I've just remembered

Did I understand it correctly that for residential properties it might be or would be the insurer who accesses the Building Recovery Office for consents etc rather than the resident themselves?

Please can you clarify?

Thanks

9(2)(a)

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Sunday, 19 September 2010 12:57 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** FWD: Joined up communications - CCC, EQC and Insurance Council
**Attachments:** Joined up communications - CCC, EQC and Insurance Council

Hi 9(2)(a) as discussed. Cheers Hugh

9(2)(a)

**From:** 9(2)(a) @ccc.govt.nz>
**Sent:** Sunday, 19 September 2010 12:14 p.m.
**To:** Hugh Cowan; 9(2)(a)
**Cc:** 9(2)(a)
**Subject:** Joined up communications - CCC, EQC and Insurance Council
**Attachments:** flowchart.doc; FAQs for EQC, insurance council and CCC for call centre staff_website_comms_marketing.doc

Hello Hugh, 9(2)(a)

Hugh, 9(2)(a) and I met on Saturday morning to try to develop a clear flow chart process that explains the process for home owners to make claims and carry out necessary repairs where appropriate as the messages between the three organisations weren't that coherent.

Attached is a copy of the flow chart we developed. It is in a fairly rudimentary form at the moment and will need some tarting up before we use it in the newspapers. We didn't have any Business Support people around this weekend so have done our best with the flow chart but it needs tidying up in places!

Also attached are a number of FAQs we worked on. These can be used with call centre staff, staff in the Building Recovery Office and also as a basis for information in the media.

Hugh and 9(2)(a) please can you check the flow chart and FAQ's. Are you happy with these? Any changes required?

Hugh - I identified a couple of further FAQs (at the bottom that need an answer from EQC). Please can you have a look at these.

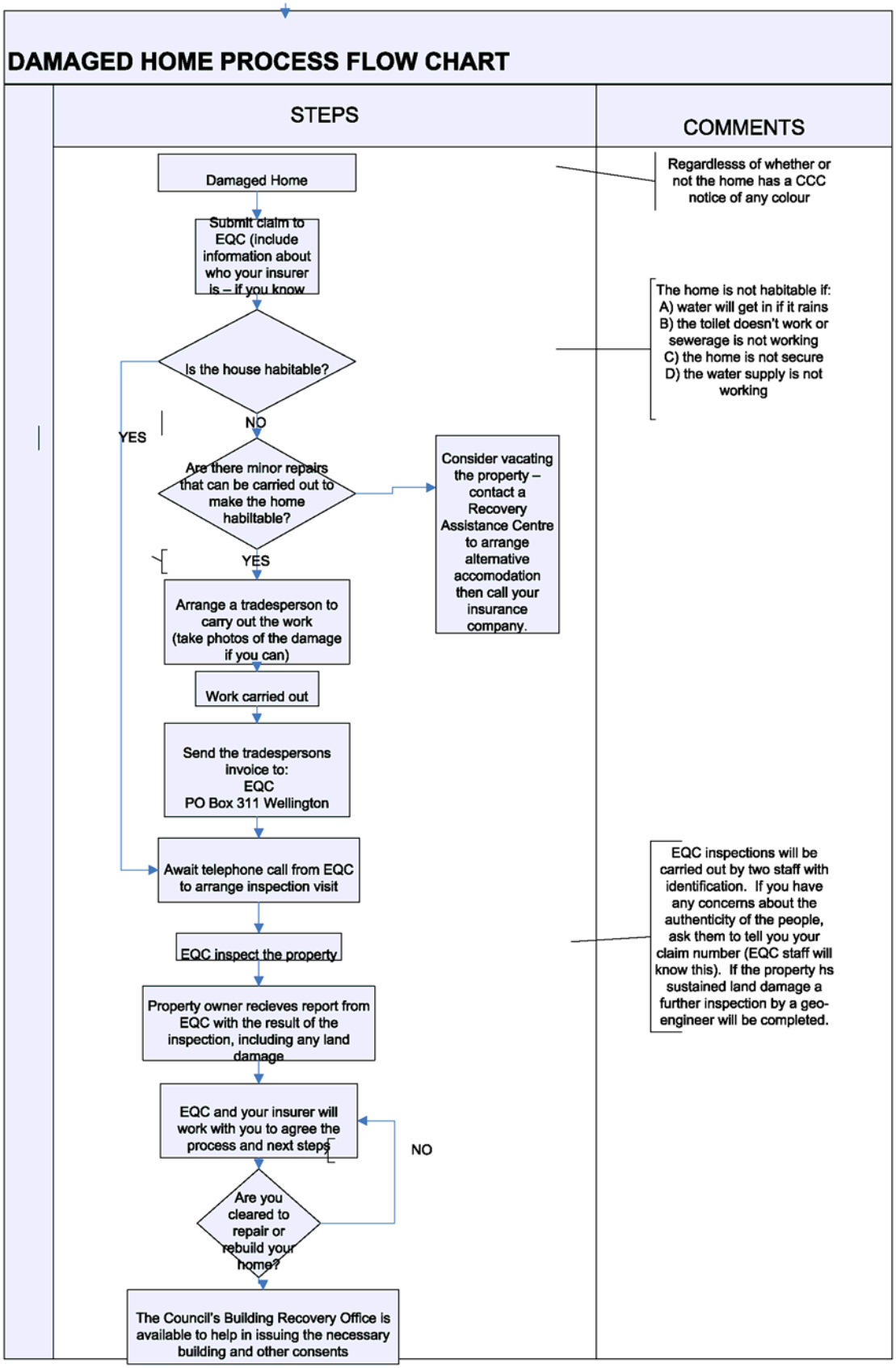
9(2)(a) Hugh, 9(2)(a) and I talked about putting some of this information out to the public via the newspaper(s) on a shared cost basis. The cost sharing is yet to be confirmed by EQC and ICNZ but Hugh and 9(2)(a) will follow that up. Can you commence a process with 9(2)(a) or whoever to work through transforming this information in to a form more suitable for newspaper publication and have a look at prices for advertising. I think we need something big - maybe a whole page.

Thanks

9(2)(a)

<<flowchart.doc>> <<FAQs for EQC, insurance council and CCC for call centre staff_website_comms_marketing.doc>>

# DAMAGED HOME PROCESS FLOW CHART



**FAQs for EQC, Insurance Council and CCC** 18 Saturday 2010

**Q: Do I need to lodge a claim with my insurer as well as EQC?**

**A:** If you own a residential property, you need to lodge a claim with EQC. When you lodge your claim you'll need to give EQC your insurer's details (if you have them) and EQC will notify your insurance company.. You should also contact your insurance company to take care of issues not covered by EQC e.g. temporary accommodation cover.

If your land has been damaged, include this in your claim to EQC.

Owners of commercial buildings need to lodge a claim with their Insurance Company. If your commercial building has a residential component, e.g. a flat above a dairy, you should also lodge a claim with the EQC for the residential component.

N.B. EQC does not cover commercial buildings.

**Q: I don't have insurance on my property. Can I still lodge a claim with the EQC?**

**A:** If you don't have insurance on your residential property, then it is not covered by EQC. However if you would like to provide EQC with your name, address and other contact details they will be passed on to the Government.

**Q: Can I arrange repairs for my residential property to be done before the EQC has assessed the damage?**

**A:** Yes. If you need to get emergency repairs carried out to secure your property, make the property weather proof or fix damaged services such as water, wastewater and electricity. Please take a photograph if you can of the damage or damaged items. Arrange to have the work done (you need to authorise this yourself) and obtain an invoice for the work.

For other types of repairs please wait for EQC to assess your property before making repairs.

What about payment for emergency repairs?
When you have an invoice for those emergency repairs then please forward this along with your claim number if you know it, the name you lodged the claim under, the damage address, an explanation of the repairs, and any photos you may have taken, to EQC at PO Box 311 Wellington. EQC will contact you and make payment to your contractor as soon as possible.

What about other repairs or professional advice?
Other than for emergency repairs, you should wait until EQC has inspected your property. EQC cannot guarantee any payment for work you get done or advice you obtain such as engineers' reports done without an EQC inspection and our approval.)

**Q: When can I expect to have my residential property assessed by the EQC?**

**A:** The most urgent cases are being assessed now. An assessor will be in touch with you as soon as possible.

[**Note for call centre staff**: If the caller has an uninhabitable house and/or is evidently very distressed, EQC has a process to prioritise these properties. However you will have to use your judgment as to which cases to refer to this system. If all or many cases get referred to this system will be over run.

For these 'special' cases please e-mail the contact details of the person to claims_coordinator@eqc.clear.net.nz ]

**Once I have lodged my claim what should I receive from EQC?**
Once you have lodged a claim with EQC you will receive a letter acknowledging your claim, information about the cover under the Earthquake Commission Act and an outline of the claim process. At this stage, because of the large number of claims lodged, it may take a few days for this information to be sent. The most urgent cases are being assessed now. An assessor will be in touch with you as soon as possible. If you have not received the information from EQC after 7 days please contact EQC on 0800 326 243

**Comment** 9(2)(a) Does this imply that if the assessor doesn't contact you in 7 days something is wrong and you should call EQC?

**Q: Should I phone the Council to arrange a building or engineering inspection of my residential property?**

**A:** No. Council staff are now only inspecting public buildings and those properties that are in immediate danger, with the purpose of protecting life and property.

**Comment** 9(2)(a) – is this the right message from a CCC building inspection point of view?

EQC or your insurance company will assess your property and discuss with you what should happen next.

Whether or not your property has a Council placard of any colour, the process is essentially the same. Lodge a claim with EQC which will then arrange an inspection of your property.

**Q: Should I phone the Council to arrange a building or engineering inspection of my commercial property?**

A. No. Contact your insurance company. The insurance company will arrange an inspection and employ building professionals if required. The insurance company will also work with the Council to arrange the necessary building consent permissions.

**Q: My chimney has been damaged - can I repair or remove it myself? Residential Property**

**Comment [AB3]:** Is the message different for commercial property? i.e. contact the insurance company rather than EQC?

**A. Repairing or replacing a chimney or flue** Given the risk that inadequately repaired chimneys can pose, skilled and professional building practitioners should be used

Damage to a chimney can constitute a danger to health and safety and be considered a necessary emergency repair.
If you need to get emergency repairs carried out prior to EQC's assessment to secure your property, make the property weather proof or fix damaged services such as water and electricity. Please take a photograph if you can of the damage or damaged items. Arrange to have the work done (you need to authorise this yourself) and obtain an invoice for the work.

Refer to answers above about method of payment.

**Q: Do I need building consent to repair the damage to my property?**

A: You may need building consent for some repairs - information is available on CCC's earthquake information web pages. Or you can make an appointment to talk to someone at CCC's Building Recovery Office.

You should discuss the need for building consent with EQC and your insurance company. They will help establish whether a building consent is required.

[For EQC call centre staff, the customer should call CCC 03 941 8999 and ask for the Building Recovery Office.EQC :IS THIS CURRENT/CORRECT?]

9(2)(a) *EQC not aware that EQC call centre staff are being told to answer this question let alone in that way.. Should we add the above to our own FAQs?* 9(2)(a) *CAN YOU CHECK WITH* 9(2)(a) *IF THIS IS CORRECT?AND THEN COULD YOU EMAIL* 9(2)(a) *ON* Temp001@eqc.govt.nz *with Attn Barrie Cook in the subject line. In the meantime the Q and A in black type can go up)*

**Comment** 9(2)(a) Not sure if the loop has been closed with 9(2)(a) on this one.

**Q: I own a commercial building which has been damaged - can I go ahead and organise repairs?**

**A:** No, please get in touch with CCC's Building Recovery Office before you go ahead with any repairs.

9(2)(a) what are key messages about green, yellow and red placards we need to be giving out now? Do we need to link these up with messages about emergency repairs via EQC/insurance company?

**Q. How long have I got to make my claim to EQC?**

A. **Hugh** - Is the answer one month or three? Newspaper material from EQC said one month. Public meeting answer was three months.

**Q. Does EQC cover damage to driveways, fences etc?**

A. **Hugh** – please can you supply an answer.

**Q. Does EQC cover damage to services (e.g. water and sewerage) on private property?**

A. **Hugh** – please can you supply an answer

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Sunday, 19 September 2010 12:49 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** FWD: RE: Earthquake information and interpretation - Draft FAQs
**Attachments:** RE: Earthquake information and interpretation - Draft FAQs

Hi 9(2)(a) not sure if yot get these or no. This note and following one from 9(2)(a) highlight the need for us to differentiate between multiple parallel channels of data, information and advice. Clearly we will be served best if those at the core can negotiate sensible division of effort. Let's start tomorrow with a chat among ourselves.

9(2)(a)

**From:** 9(2)(a)
**Sent:** Sunday, 19 September 2010 12:09 p.m.
**To:** 9(2)(a)
**Cc:** 9(2)(a) Hugh Cowan; 9(2)(a) 9(2)(a)

**Subject:** RE: Earthquake information and interpretation - Draft FAQs
**Attachments:** Canterbury Earthquake Briefing FAQs.docx

Hi 9(2)(a) and all

Many thanks for the information, particularly the strong motion data. It underlines the variability and the difficulty in drawing early conclusions.

Nevertheless, I have attempted to summarise the situation in the attached draft FAQs. I think these are an improvement on where we were last Thursday
- but then I wrote them!

It is still important in my view to try and describe our best interpretations in simple terms. I plan to use this or something like it to hand out to MPs at the briefing on Tuesday night.

I am happy to receive suggestions for improvement to the document from any of you but particularly 9(2)(a) 9(2)(a)

All for now.

Regards and many thanks.

9(2)(a)
Office: 9(2)(a) Mobile:
9(2)(a)

-----Original Message-----
From: 9(2)(a) @canterbury.ac.nz]
Sent: Saturday, 18 September 2010 12:56 p.m.
To: 9(2)(a)
9(2)(a)

HACowan@eqc.govt.nz 9(2)(a)
Subject: RE: Earthquake information and interpretation - A map with links is needed.

Hi 9(2)(a)

I am attaching a few documents, which provide information on:
where (and how far from the fault) the stations are what are the PGA, PGV and PGD recorded at these different stations how do response spectra of some records compare with design spectra

The spreadsheet is based on the data shared by 9(2)(a) on NZSEE clearinghouse site. 9(2)(a) pdf file plots the PGA values at different sites on a map but as you can notice some values are different from those in the spreadsheet. 9(2)(a) might have made some preliminary corrections for some obvious errors.

Regards
9(2)(a)

9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Christchurch, New Zealand
http://www.civil.canterbury.ac.nz/staff/9(2)(a)

---

From: 9(2)(a)
Sent: Sat 18/09/2010 10:28 a.m.
To: 9(2)(a)
Cc: 9(2)(a) 'Hugh Cowan'; 9(2)(a)
HACowan@eqc.govt.nz 9(2)(a)
Subject: Earthquake information and interpretation - A map with links is needed.

Hi 9(2)(a) and all

Good comments, of course.

Please would someone 9(2)(a) put together a map showing where the instrument stations are, a record of accelerations at each site (could be a link on the map), and a response spectrum for horizontal movement plotted in the conventional way with the 1170 values for all soil types for comparison (could also be a link on the map).

This will give some "factual" information for all to see, and clearly show how complex and variable the situation is. It will also help all of us who are trying to interpret building / infrastructure / liquefaction behaviour in different parts of Christchurch.

It would also be great to flash in front of MPs as a simple visual reminder of the complexity that confronts the interpretation of the meaning of this earthquake.

However, we still need to distil things down to simple statements for those for whom this is enough. Better that than nothing.

Regards to all

[redacted]
9(2)(a)
Mobile:

From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 2:15 p.m.
To: 9(2)(a)
Cc: [redacted]
9(2)(a) Hugh Cowan; 9(2)(a)
9(2)(a) 9(2)(a)
9(2)(a)
Subject: Christchurch spectra versus NZS1170 - The current code does not tell us if an "old" building should be damged or not.

Hi Guys,
We must not jump to a conclution for any thing at this moment. Every earthquake surprised many seismologists and engineers and this one certainly does too. Jump to a premature conclusions will hinder out lateral thinking. I may be too negative and a bit grumpy because I haven't had much sleep since the earthquake. Please do not feel being offended.

We also need to compare the design spectra from old codes and the NZS1170.50 (as sent out by GNS and 9(2)(a)) is essentially irrelavent to the structures in most parts of the Canterbury as many house and structures were designed long before the current code. The current code does not tell us if an "old" building should be damged or not. We will have a lot explanations to do after the dust down and after we complete the information collection phase.

I suspect that some records may have been influnced by the dancing of heavy stuff around the instrument or the response of the concrete blocks (where instrument was bolted down) on soggy soil in farm land. It would be absolutely necessary for us to visit strong-motion recording stations and record all the possible damage for both contents as well as any structural damage. I visited quite a few stations but it is important to talk to the people from these stations as most was cleaned up and people did not respond to phone messages. Would any structural engineers and an experienced builder like to joint me for the trip some time next week (if I get approval from my boss who has supported me for many years?

When I was in Canterbury, I even could not get a post-graduate to come with me even though Greg tried to help me to find one. The damges at strong-motion stations will give us a very clear picture on the performance of NZ residential houses around the immediate area.

Cheers,
9(2)(a)

9(2)(a) @canterbury.ac.nz>

17/09/2010 13:41

To

9(2)(a)

9(2)(a) Hugh Cowan <HACowan@eqc.govt.nz> 9(2)(a)

<9(2)(a)

cc

Subject

RE: Christchurch spectra versus NZS1170

Thanks 9(2)(a) for admitting this. I tried my best to convince you guys on this in yesterday's meeting; but could not. For Christchurch the 10% in 50 yrs hazard factor is 0.22, which is in CRUDE terms an indication of design level PGA. We have recorded PGAs in either side of this value in different parts of Christchurch. Based on the response spectra of some records; it is clear that the response demand was much less than (about half) the design level demand for short period structures; slightly less than design level for medium period structures and equal to (or even higher than) the design demand for long period structures. Once we admit this, a lot of things will start making sense. We will find the questions a lot easier to answer:

1. Why little damage in low rise and residential buildings?
Because the demand for these buildings was much less than the design level.
2. Why so much damage in the areas of soft soil?
Because the soft soil has a longer period for which the demand may be equal to (I suspect even greater than in some very soft soils) the design level demand.
3. How have our tall buildings fared in this close-to-design-level event?
I have noticed/observed non trivial damages (including plastic hinges) in tall RC frame buildings (periods likely to be in the range of 1sec) and we have to admit that most of our tall buildings have performed as well as we expected them to perform in a design level event. One thing we must note is:
our design code allows some damage and inelastic response in a design level event; but it does NOT mean they MUST damage significantly in a design level event. It will be interesting to see how many flexible buildings (say taller than 8 storeys) people have noticed/observed not to have incurred any significant damage; personally I have NONE. So far, I have gained access to three buildings falling in these categories and the damage categories I would assign to these buildings is moderate (very close to severe) and minor (very close to moderate), and minor. With several

factors built in the design process (to increase the demand or reduce the capacity) it is not a surprise that the tall buildings have seen off this event by having minor-moderate damage. Isn't this what we expect from our structures?

4. Are we likely to have a bigger earthquake?

Certainly YES, but based on my several conversations with seismologists a bigger earthquake in the Alpine fault does not result in similar level of PGA in Christchurch (using the available attenuation relationship) but the duration of shaking is likely to be longer. Again, the shaking is likely to be dominated by low frequency (i.e. longer duration) as the high frequency components may be filtered out or restrained while travelling for a long distance. Hence, a bigger earthquake in the Alpine fault may not necessarily be more damaging to the low period buildings (which dominates our building stock).

5. Are we likely to have more damaging (note this does not necessarily mean bigger) earthquakes?

Possible (not necessarily probable), but mainly for low rise and residential buildings which have periods less than 0.25 sec; but the same cannot be said about the soft soils and flexible high rise structures. To have a shaking to induce a design level demand from high frequency (low period) structures, the source should be at a closer distance and some forward directivity effect may help. Maybe another rupture of an unknown fault in the Canterbury plains at a closer distance?

I know not everybody will buy into these, but to me these are plausible conclusions based on my limited knowledge, experience, and observation. I am always open to learn more, so please do respond if you have more plausible explanations for the different levels of damage for different types of structures/soils we have observed so far.

Cheers
9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Private Bag 4800 Christchurch 8020, New Zealand
Ph: 9(2)(a)
Fax
http://www.civil.canterbury.ac.nz/staff/9(2)(a)
<http://www.civil.canterbury.ac.nz/staff/9(2)(a)

---

From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 10:07 a.m.
To: 9(2)(a)
9(2)(a)
9(2)(a) Hugh Cowan; 9(2)(a)
Subject: Re: Christchurch spectra versus NZS1170

Hi 9(2)(a)

Thanks for these plots - they are very important in my mind. It suggests the event has been much closer to the 10% in 50 yr event than is currently being discussed around town. That has major implications into the thinking behind

build-back, tolerable impact, and guidelines, including the heritage buildings.
I will circulate this to others because there is a current perception that the building stock only experienced about 30-60% of the 500 year demand. I would be interested in the records on firm ground class also - to try to reconcile the lack of damage on firm soil sites in the west of the city.

Regards, 9(2)(a)

-----9(2)(a) /GNS wrote: -----
To: 9(2)(a) /GNS@GNS
From: 9(2)(a) /GNS
Date: 16/09/2010 18:23
cc: 9(2)(a)
Subject: Christchurch spectra versus NZS1170

9(2)(a) and others

I attach a spreadsheet showing plots of spectra in Christchurch City (and Kaiapoi) compared to NZS1170 Class D Deep or Soft Soil Z=0.22 R=1 (i.e. 500-yr return period). Sites closer to the source than Riccarton High School are not included. The spectra are as recalculated with record-specific filter bands by 9(2)(a) so may vary slightly from those on the Geonet website. For the periods plotted (up to 4.5s, as covered by NZS1170), I expect any differences to be minor.

The first plot includes both horizontal components, the second the larger of the two horizontal components at each period, and the third the larger component for four sites near the central city. Some sites likely to have been affected by liquefaction are excluded.

NZS1170 spectra are for the stronger component.

All plots show the geometric mean ("median") of all the sites included in each plot.

The spectra standing out well above the others at short period are for Heathcote Valley School. Its spectra are the weakest at periods beyond 1s. It may well be sited on a wedge of colluvium, as iut is at the base of the Port Hills, near to the entrance to Lyttelton tunnel. The historic hotel that was demolished was only about 200-300 metres down the road.

The median of the four central city spectra are close to NZS1170 R-=1 values from about 0.25s to 1s, and stronger than NZS1170 for periods of about 1.5s and stronger, considerably so for periods above about 2s.

Regards

9(2)(a)

# Technical briefing on Canterbury Earthquake – NZSEE and CAENZ

The NZSEE and CAENZ have recognised the need for the best possible information to be available on technical aspects and implications of the Canterbury Earthquake. The following questions and answers summarise the views of experts who are involved in examining the impact of the earthquake and gathering data to better understand its implications.

Special effort has been made to describe a very complex situation in simple terms. Those wanting more detail should visit websites such as GNS, New Zealand Society for Earthquake Engineering and Christchurch City Council or contact

1. **Intensity of ground shaking**

   Q. How does the intensity of ground shaking in the 4 September earthquake compare with that used in the design of new buildings and infrastructure?

   A. *Building performance and damage caused suggests that this was a moderate earthquake with much less impact than expected from a "design" earthquake. However, liquefaction damage suggests that the ground shaking was nearer a design earthquake. Measurements of ground shaking from more than 70 instruments show peak accelerations similar to those expected in a design earthquake. This is borne out by the felt intensity reported by people to GNS.*

   *It will take some time to get a more detailed appreciation of the situation, but experts believe that greater damage would have resulted if the strong shaking had lasted for longer.*

2. **Future earthquake affecting Christchurch and Canterbury**

   Q. Does this earthquake mean that there will not be similar shaking in Christchurch for hundreds of years?

   A. *Unfortunately, no. Earthquake events on other faults can produce shaking as great, or greater, than that experienced on 4 September. There is no significant change in the probability of future shaking in Christchurch, for example by the Alpine Fault, as a result of the earthquake.*

3. **Design Standards for earthquake**

   Q. Will earthquake design standards for buildings and infrastructure in Christchurch / Canterbury need to be changed as a result of the earthquake?

   A. *No, it is most unlikely. There is no reason evident so far to suggest they should be increased or decreased. The performance of buildings and infrastructure was generally as expected by experts. The earthquake is a reminder that good engineering design and good quality construction is important.*

4. **Soil liquefaction / lateral spreading**

   Q. Liquefaction and lateral spreading occurred in a number of areas. Did geotechnical expert expect this?

   A. *Yes. Many parts of Christchurch and surrounding areas are known to be susceptible to liquefaction of underlying soils. Because ground shaking varies with location and soil properties also vary greatly, it is difficult to predict exactly where liquefaction will occur. Lateral spreading, which is associated with liquefaction, tends to occur near streams and waterways as the soil mass moves towards them.*

*Q.* Is it possible to reduce the amount of soil liquefaction / lateral spreading that occurs in an earthquake?

*A. Yes, engineering measures such as ground densification, gravel columns, and retaining measures can significantly reduce the effects. They do cost money, but, as the experience at the Pegasus development shows, they can be effective.*

*Q.* Is it possible to reduce the damage to buildings caused by liquefaction and lateral spreading?

*A. Yes. Robust foundations, tying of floor slab to buildings, using piled foundations, replacement or densification of the liquefiable layers are well accepted measures. The choice of method will depend on cost-effectiveness. The recent earthquake shows that it is well worth investigating for liquefaction potential at a building site and taking steps to reduce the damage it can cause.*

Q. Does the extensive damage in some areas due to liquefaction / lateral spreading in the Darfield earthquake mean that there should be restrictions on development in other areas of Canterbury?

A. *The potential for liquefaction exists for large areas of Christchurch and surrounding areas. Blanket restrictions would be hard to justify. It is clear from the recent earthquake that careful investigation is required to assess the suitability of sites for development. Equally important is the need to take steps in the design and construction of sub-divisions and individual buildings, to reduce the chances of liquefaction and lateral spreading.*

*Q.* If my house is damaged by liquefaction, what should I do?
*A. You should seek advice from an expert geotechnical engineer and an expert structural engineer. In many cases it will be possible to make repairs to the building and services. In other cases it may be necessary to demolish and rebuild all or part of the building.*

Q. Does this mean that liquefaction damage could occur in a future earthquake, even in the same place?
*A. Yes it is possible in another strong earthquake. When making repairs or replacing the building, every opportunity should be taken to reduce the effects of liquefaction and lateral spreading. Many areas of Christchurch and Canterbury are susceptible to liquefaction and a future earthquake could cause liquefaction in different locations.*

**5. Building Performance:**

Q. Was the performance of buildings better, about the same, or worse than expected for the shaking that occurred?

A. *It is difficult to generalise because of the variability of the ground shaking, soil conditions and building characteristics. However, preliminary observations indicate that building performance was as expected, perhaps a little better. This applies to unreinforced masonry (URM) buildings (many of which were extensively damaged), strengthened URM buildings (which suffered generally little or no damage), to 1935-65 vintage buildings, and to post-1976 buildings.*

6. ***Christchurch City Council Policy for repair and reconstruction***

*Q.* Christchurch City Council has changed its policy to require 2/3 of current standards when repairing buildings damaged in the earthquake. Is this policy justified?

*A. Yes. It is in the interests of the community and the owners to achieve as nearly as is reasonably practicable to that of a new building. 2/3 is a reasonable compromise, which reduces the risk of collapse in an earthquake from about 10 times to 3 times that of a new building.*

Q. Won't this be hard to meet for some heritage buildings and for other owners who simply wish to resume use of their building quickly?

*A. It will vary a lot with the nature of the building and the damage. Often the difference in cost will be justified in the reduction of risk it provides. For speedy repairs it may be possible to allow "interim securing" to improve the integrity of the building for immediate use, on the basis that within say 3 years, strengthening to Council requirements would be carried out. This would at least allow owners to plan for the more extensive work involved.*

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Sunday, 19 September 2010 12:35 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: A further query I've just remembered

Hi 9(2)(a) thanks for the update. I will pass on to our comms people and they will review today. I will get back to you tomorrow as soon as I have feedback. Cheers Hugh

--- original message ---
From: 9(2)(a) [redacted]@ccc.govt.nz>
Subject: A further query I've just remembered
Date: 19th September 2010
Time: 12:16:29 pm

Did I understand it correctly that for residential properties it might be or would be the insurer who accesses the Building Recovery Office for consents etc rather than the resident themselves?

Please can you clarify?

Thanks

9(2)(a) [redacted]

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Sunday, 19 September 2010 12:30 p.m.
**To:** Ian Simpson
**Subject:** RE: WFCP meeting in Bucharest

So I will decline tomorrow. Cheers H.

--- original message ---
From: "Ian Simpson" <isimpson@eqc.govt.nz>
Subject: RE: WFCP meeting in Bucharest
Date: 19th September 2010
Time: 12:17:04 pm

Hugh,

I thought 9(2)(a) had declined on my behalf before she went on holiday? I support the idea of the World Forum, but to be horribly blunt, this trip looked a bit too much like a jolly - there was more time scheduled for visiting castles than the actual discussions. I agree we should decline this year (due to the event) and look at contributing in the future.

Cheers,

Ian.

From: Hugh Cowan [mailto: 9(2)(a) [redacted]
Sent: Saturday, 18 September 2010 9:37 p.m.
To: Ian Simpson
Subject: Fwd: WFCP meeting in Bucharest

Hi Ian,

The following was sent to 9(2)(a) and me. Perhaps 9(2)(a) has already shared this with you but just in case.....I have not responded. Perhaps we can attend next year - as part of our strategy for managing perceptions and (over)pricing of perils....

H.

---------- Forwarded message ----------

From: 9(2)(a) [redacted]
Date: Fri, Sep 17, 2010 at 11:46 PM
Subject: WFCP meeting in Bucharest
To: "hacowan@eqc.govt.nz" <hacowan@eqc.govt.nz>
Cc: 9(2)(a) [redacted] @eqc.govt.nz>

Dear 9(2)(a) [redacted]

I kindly ask you to confirm participation of one or EQC representatives to the World Forum for Catastrophe Programmes. I strongly need your confirmation till Monday, September 20. On Tuesday the hotel is closing the reservation period.

As I already informed you, thanks to 9(2)(a) [redacted] the World Forum for Cat Programs will take place in Bucharest between October 11-15. First day, October 12 the meeting will take place together with the International Catastrophe Risk Forum (ICAR) (www.icarforum.ro/2010/ ).

I am looking forward to meeting an EQC representative here.

Best regards,

9(2)(a) [redacted]

Counselor

Romanian Catastrophe Insurance System (PAID)

30 Puskin street, district no. 1, Bucharest, Romania

email: 9(2)(a) [redacted] @paidromania.ro

tel. 9(2)(a) [redacted]

fax. [redacted]

mo [redacted]

mob [redacted]

www.paidromania.ro <http://www.paidromania.ro/>

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 11:03 p.m.
**To:** David Brundson
**Subject:** RE: Draft TOR re Structural Engineers

Dave, impressive start. Thanks. M 9(2)(a) [redacted] is 9(2)(a) [redacted] Cheers Hugh

--- original message ---
From: "Dave Brunsdon" <db@kestrel.co.nz>
Subject: Draft TOR re Structural Engineers
Date: 20th September 2010
Time: 10:08:32 pm

Hi Hugh

I've quickly put together the attached draft TOR for you to see if I have captured and understood the essence of what you're after, and the steps that I propose. And my thoughts on where the further 'technical outreach' needs to go - some of which I'm sure has been covered.

Let me know what you think in the morning.

Kind regards
Dave

--
Dave Brunsdon - Director
db@kestrel.co.nz - [redacted]
Wellington Office - P 04 499 4433 - F 04 499 4445 Kestrel Group - Risk, Continuity and Emergency Management - www.kestrel.co.nz <http://www.kestrel.co.nz/>

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 6:43 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: Christchurch Earthquake Project (New EQC project)

Hi 9(2)(a) [redacted] nothing attached. Cheers Hugh

--- original message ---
From: 9(2)(a) [redacted]@canterbury.ac.nz>
Subject: RE: Christchurch Earthquake Project (New EQC project)
Date: 20th September 2010
Time: 6:15:05 pm

Dear Hugh,

Further to our conversation from last Saturday, please find attached a brief proposal for liquefaction/lateral spreading investigations/research related to the 2010 Darfield Earthquake.

As agreed upon, the research is split in three phases; the first phase including the reconnaissance currently under will be financially supported by EQC and University of Canterbury. We will make all payments initially from department accounts until we receive the requested EQC funds. Budget for Phase A is only included.

Phases B and C are longer term research and for these we will seek funding from the Natural Hazards Platform, ECan and CCC. We will also use research funds from our EQC Capability Programme, and will have in kind contribution from both University of Canterbury and University of Auckland.

This is a very preliminary draft and only indicative for Phases B and C where further more detailed research programme will be developed in due time upon consultation with research partners and geotechnical profession.

Let me know if I have to make amendments and how to proceed from here.

Regards
9(2)(a) [redacted]

PS. I've used the Biennial template (didn't know which one is the most appropriate)

9(2)(a) [redacted]
Department of Civil and Natural Resources Engineering

University of Canterbury
Private Bag 4800, Christchurch 8140
NEW ZEALAND
[redacted]
E-mail 9(2)(a) [redacted]@canterbury.ac.nz
Web: http://www.civil.canterbury.ac.nz

-----Original Message-----
From: Hugh Cowan [mailto:hacowan@eqc.govt.nz]
Sent: Saturday, 18 September 2010 8:56 p.m.

To: 9(2)(a)
Subject: RE: Christchurch Earthquake Project (New EQC project)

9(2)(a) am comfortable with scope and budget as proposed. Suggest that you copy 9(2)(a) and 9(2)(a) from now on, incl prev message so they can/may assist with subsequent phases of project. Cheers Hugh

--- original message ---
From: 9(2)(a) @canterbury.ac.nz>
Subject: Christchurch Earthquake Project (New EQC project)
Date: 18th September 2010
Time: 8:32:26 pm

Hi Hugh,

I will prepare a short proposal as we have agreed upon this morning. The proposal will include three stages, the first one immediate reconnaissance involving 13 students and 5 staff from UC over 1-2 weeks (depending on task).

My preliminary figures for the first stage (geotech reconnaissance) are:
EQC contribution: 9(2)(i) (salaries for 13 students: 711 hours + 9(2)(i) for surveying equipment - GPS units and distance/slope measuring devices).
UC contribution: 9(2)(i) (3 vehicles, 5 staff salaries: 175 hours, technician support ,SWS equipment) Let me know if the above figure is acceptable (I can reduce student salaries if needed: I've used 9(2)(i) hour for 10 students and 9(2)(i) hour for
3 team leaders).

Regards,
9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Private Bag 4800 Christchurch, 8140 New Zealand
Phone: 9(2)(a)
Fax: 9(2)(a)
Email: 9(2)(a) @canterbury.ac.nz

---

From: Hugh Cowan [mailto:hacowan@eqc.govt.nz]
Sent: Sat 18/09/2010 10:48 a.m.
To: 9(2)(a)
9(2)(a)
Subject: RE: Earthquake information and interpretation - A map with links is needed.

Thanks 9(2)(a) it may not be possible at such short notice, but if this summary could be assembled by Monday morning I would appreciate receiving a copy (with whatever caveats may apply) to inform a meeting that EQC will have with Govt officials and Cabinet on Monday afternoon.
Many thanks to all those who have been developing our scientific understanding of this event so far. Regards, Hugh

--- original message ---
From: 9(2)(a)
Subject: Earthquake information and interpretation - A map with links is needed.

Date: 18th September 2010
Time: 10:27:48 am

Hi 9(2)(a) and all

Good comments, of course.

Please would someone 9(2)(a) ) put together a map showing where the instrument stations are, a record of accelerations at each site (could be a link on the map), and a response spectrum for horizontal movement plotted in the conventional way with the 1170 values for all soil types for comparison (could also be a link on the map).

This will give some "factual" information for all to see, and clearly show how complex and variable the situation is. It will also help all of us who are trying to interpret building / infrastructure / liquefaction behaviour in different parts of Christchurch.

It would also be great to flash in front of MPs as a simple visual reminder of the complexity that confronts the interpretation of the meaning of this earthquake.

However, we still need to distil things down to simple statements for those for whom this is enough. Better that than nothing.

Regards to all

9(2)(a)
Office: 9(2)(a)
Mobile: 9(2)(a) Email: 9(2)(a)

From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 2:15 p.m.
To: 9(2)(a)
Cc: 9(2)(a)
Hugh Cowan; 9(2)(a)
9(2)(a)
Subject: Christchurch spectra versus NZS1170 - The current code does not tell us if an "old" building should be damged or not.

Hi Guys,
We must not jump to a conclution for any thing at this moment. Every earthquake surprised many seismologists and engineers and this one certainly does too. Jump to a premature conclusions will hinder out lateral thinking. I may be too negative and a bit grumpy because I haven't had much sleep since the earthquake. Please do not feel being offended.

We also need to compare the design spectra from old codes and the NZS1170.50 (as sent out by GNS and 9(2)(a)) is essentially irrelavent to the structures in most parts of the Canterbury as many house and structures were designed long before the current code. The current code does not tell us if an "old" building should be damged or not. We will have a lot explanations to do after the dust down and after we complete the information collection phase.

I suspect that some records may have been influnced by the dancing of heavy stuff around the instrument or the response of the concrete blocks (where instrument was bolted down) on soggy soil in farm land. It would be absolutely necessary for us to visit strong-motion recording stations and record all the possible damage for both contents as well as any structural damage. I visited quite a few stations but it is important to talk to the people from these stations as most was cleaned up and people did not respond to phone messages. Would any structural engineers and an experienced builder like to joint me for the trip some time next week (if I get approval from my boss who has supported me for many years?

When I was in Canterbury, I even could not get a post-graduate to come with me even though 9(2)(a) tried to help me to find one. The damges at strong-motion stations will give us a very clear picture on the performance of NZ residential houses around the immediate area.

Cheers,
9(2)(a)

9(2)(a) @canterbury.ac.nz>

17/09/2010 13:41

To

9(2)(a)

9(2)(a) Hugh Cowan <HACowan@eqc.govt.nz>,
9(2)(a)

cc

Subject

RE: Christchurch spectra versus NZS1170

Thanks 9(2)(a) for admitting this. I tried my best to convince you guys on this in yesterday's meeting; but could not. For Christchurch the 10% in 50 yrs hazard factor is 0.22, which is in CRUDE terms an indication of design level PGA. We have recorded PGAs in either side of this value in different parts of Christchurch. Based on the response spectra of some records; it is clear that the response demand was much less than (about half) the design level demand for short period structures; slightly less than design level for medium period structures and equal to (or even higher than) the design demand for long period structures.
Once we admit this, a lot of things will start making sense. We will find the questions a lot easier to answer:

1. Why little damage in low rise and residential buildings?
Because the demand for these buildings was much less than the design level.
2. Why so much damage in the areas of soft soil?
Because the soft soil has a longer period for which the demand may be equal to (I suspect even greater than in some very soft soils) the design level demand.
3. How have our tall buildings fared in this close-to-design-level event?
I have noticed/observed non trivial damages (including plastic hinges) in tall RC frame buildings (periods likely to be in the range of 1sec) and we have to admit that most of our tall buildings have performed as well as we expected them to perform in a design level event. One thing we must note is: our design code allows some damage and inelastic response in a design level event; but it does NOT mean they MUST damage significantly in a design level event. It will be interesting to see how many flexible buildings (say taller than 8 storeys) people have noticed/observed not to have incurred any significant damage; personally I have NONE. So far, I have gained access to three buildings falling in these categories and the damage categories I would assign to these buildings is moderate (very close to severe) and minor (very close to moderate), and minor. With several factors built in the design process (to increase the demand or reduce the capacity) it is not a surprise that the tall buildings have seen off this event by having minor-moderate damage. Isn't this what we expect from our structures?
4. Are we likely to have a bigger earthquake?
Certainly YES, but based on my several conversations with seismologists a bigger earthquake in the Alpine fault does not result in similar level of PGA in Christchurch (using the available attenuation relationship) but the duration of shaking is likely to be longer. Again, the shaking is likely to be dominated by low frequency (i.e. longer duration) as the high frequency components may be filtered out or restrained while travelling for a long distance. Hence, a bigger earthquake in the Alpine fault may not necessarily be more damaging to the low period buildings (which dominates our building stock).
5. Are we likely to have more damaging (note this does not necessarily mean bigger) earthquakes?
Possible (not necessarily probable), but mainly for low rise and residential buildings which have periods less than 0.25 sec; but the same cannot be said about the soft soils and flexible high rise structures. To have a shaking to induce a design level demand from high frequency (low period) structures, the source should be at a closer distance and some forward directivity effect may help. Maybe another rupture of an unknown fault in the Canterbury plains at a closer distance?

I know not everybody will buy into these, but to me these are plausible conclusions based on my limited knowledge, experience, and observation.
I am always open to learn more, so please do respond if you have more plausible explanations for the different levels of damage for different types of structures/soils we have observed so far.

Cheers

9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Private Bag 4800 Christchurch 8020, New Zealand
Ph: +9(2)(a)
Fax:
<http://www.civil.canterbury.ac.nz/staff/9(2)(a)
http://www.civil.canterbury.ac.nz/staff/9(2)(a)

---

From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 10:07 a.m.
To: 9(2)(a)
9(2)(a)
9(2)(a) Hugh Cowan; 9(2)(a)
Subject: Re: Christchurch spectra versus NZS1170

Hi 9(2)(a)

Thanks for these plots - they are very important in my mind. It suggests the event has been much closer to the 10% in 50 yr event than is currently being discussed around town. That has major implications into the thinking behind build-back, tolerable impact, and guidelines, including the heritage buildings.
I will circulate this to others because there is a current perception that the building stock only experienced about 30-60% of the 500 year demand. I would be interested in the records on firm ground class also - to try to reconcile the lack of damage on firm soil sites in the west of the city.

Regards, 9(2)(a)

----- 9(2)(a) /GNS wrote: -----
To: 9(2)(a) /GNS@GNS
From: 9(2)(a) /GNS
Date: 16/09/2010 18:23
cc: 9(2)(a) /GNS@GNS, 9(2)(a) /GNS@GNS, 9(2)(a) /GNS@GNS
Subject: Christchurch spectra versus NZS1170

9(2)(a) and others

I attach a spreadsheet showing plots of spectra in Christchurch City (and Kaiapoi) compared to NZS1170 Class D Deep or Soft Soil Z=0.22 R=1 (i.e. 500-yr return period). Sites closer to the source than Riccarton High School are not included. The spectra are as recalculated with record-specific filter bands by 9(2)(a) so may vary slightly from those on the Geonet website. For the periods plotted (up to 4.5s, as covered by NZS1170), I expect any differences to be minor.

The first plot includes both horizontal components, the second the larger of the two horizontal components at each period, and the third the larger component for four sites near the central city. Some sites likely to have been affected by liquefaction are excluded.

NZS1170 spectra are for the stronger component.

All plots show the geometric mean ("median") of all the sites included in each plot.

The spectra standing out well above the others at short period are for Heathcote Valley School. Its spectra are the weakest at periods beyond 1s. It may well be sited on a wedge of colluvium, as iut is at the base of the Port Hills, near to the entrance to Lyttelton tunnel. The historic hotel that was demolished was only about 200-300 metres down the road.

The median of the four central city spectra are close to NZS1170 R-=1 values from about 0.25s to 1s, and stronger than NZS1170 for periods of about 1.5s and stronger, considerably so for periods above about 2s.

Regards

9(2)(a) [redacted]



---

9(2)(a)

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 4:26 p.m.
**To:** 9(2)(a)
**Subject:** FWD: Latest on Community meetings
**Attachments:** Latest on Community meetings

9(2)(a) grateful if you would discuss with 9(2)(a) and adapt roster for public meetings. Cheers, hugh

9(2)(a)

**From:** 9(2)(a)@ccc.govt.nz>
**Sent:** Monday, 20 September 2010 2:46 p.m.
**To:** 9(2)(a) Hugh Cowan; 9(2)(a) 9(2)(a)
**Cc:** 9(2)(a)
**Subject:** Latest on Community meetings
**Attachments:** Ward by Ward Meetings for September.DOC; EQC public meeting notice.doc

See latest (and hopefully final) schedule of meetings attached.

Regards,

9(2)(a)

<<Ward by Ward Meetings for September.DOC>> <<EQC public meeting notice.doc>>

9(2)(a)
Communications Unit
DDI: 9(2)(a)
Mobile: 9(2)(a)
Email 9(2)(a)@ccc.govt.nz
Web: www.ccc.govt.nz <http://www.ccc.govt.nz/> Christchurch City Council Civic Offices, 163-173 Tuam Street, Christchurch, 8011 PO Box 237, Christchurch, 8140 Please consider the environment before printing this email

# Public Meetings – Held by Ward

**Wednesday – 15 September**

Burwood Pegasus - Horseshoe Lake Residents Assoc.
Shirley Cricket Club - 7.30pm
9(2)(a) to Chair

NOT FOR CCC PROMOTION – organised by residents association and attended by CCC

**Thursday – 16 September**

~~Hagley Ferrymead - Avonside Girls High School Hall, Avonside Drive - 5.30pm~~
~~9(2)(a) to chair~~

We now direct people to 9(2)(a) meeting at 5pm at Shirley Intermediate. Meeting can be run again at 6pm if necessary (lots of people turning up and people turning up too late for 5pm start – 9(2)(a) not happy to postpone start time from 5pm.

Burwood Pegasus - Burwood Primary School, New Brighton Road 7.30pm
9(2)(a) to Chair

**Friday – 17 September**

~~Shirley Papanui - Papanui RSA, 55 Bellvue Avenue - 7.00pm~~
~~9(2)(a) to Chair~~

We now direct people to 9(2)(a) meeting at 5pm at Shirley Intermediate. Meeting can be run again at 6pm if necessary.

**Saturday – 18 September**

Riccarton Wigram - Oaklands School Hall, Cunningham Place - 4.30pm
9(2)(a) to Chair

Covers Wigram and Ilam electorates but both MPs will have held their meetings before this one.

**Tuesday - 21 September**

Spreydon Heathcote Cashmere Club, Hunter Terrace 7.30pm
9(2)(a) to Chair

Covers Port Hills electorate but MP happy for this one to go ahead.

**Wednesday – 22 September**

Fendalton Waimairi - Boardroom, Fendalton Service Centre - 7.30pm
9(2)(a) to Chair

Covers Ilam electorate but MP will have his meeting the week before.

**Thursday 23 September**

Lyttelton/Mount Herbert Lyttelton Main School hall 7pm
Ruth Dyson to chair

**Friday 24 September**

Akaroa Wairewa Akaroa Sports Pavilion 5pm
9(2)(a) to chair

**Ruth Dyson, MP for Port Hills**
**in conjunction with the**
**Lyttelton/Mt Herbert Community Board**

**will be hosting a special public meeting for residents**

**to discuss earthquake-related issues**

**on Thursday, 23 September 2010 at 7.00pm**

**at Lyttelton Main School Hall, Oxford Street**

The reason for the meeting is to provide some information about what has happened as a result of the earthquake, the impact it has had on the homes in your area; and provide you with the opportunity to ask any questions of the experts you may have in relation to this.

People with the appropriate expertise to explain what has happened will be in attendance to provide a briefing on the role of EQC post an event like this and discuss what some of the possible options might be for the future.

## Speakers Include

9(2)(a) **to discuss EQC-related issues**
9(2)(a) **rom the CTU to discuss employment-related issues**
9(2)(a) **MSD**
**CCC Recovery Managers**
**CCC officers to discuss water, waste & roading issues**
**NZ Insurance Council representative**

Lyttelton has always had a strong sense of community and the strength of those bonds will see us through this difficult time.

For information and advice call the Christchurch City Council Helpline 941-8999.

Please tell family, friends and neighbours to come along to the meeting.

***We can rebuild our communities***

Hon Ruth Dyson, MP for Port Hills, 642 Ferry Road, Woolston, PO Box 19661, Christchurch 8081.
Telephone: 389-2262 Fax: 389-2235 Email: porthills.mp@parliament.govt.nz

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 1:29 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: Liquefaction related claims

Quite possible. Remember this is self reported, so we are working through these as priority.

--- original message ---
From: 9(2)(a) [redacted]@auckland.ac.nz>
Subject: RE: Liquefaction related claims
Date: 20th September 2010
Time: 1:17:25 pm

Thanks again Hugh.

If you have an update tomorrow morning, and it is easy enough for you to email it, I would be grateful.

Could some of the 2759 and 3091 be the same, that is both uninhabitable and not weatherproof?

9(2)(a) [redacted]

From: Hugh Cowan [mailto:HACowan@eqc.govt.nz]
Sent: Monday, 20 September 2010 1:11 p.m.
To: 9(2)(a) [redacted]
Cc: 9(2)(a) [redacted]
Subject: RE: Liquefaction related claims

9(2)(a) [redacted]al, the 12pm update - As at 12pm: 64,274 claims; 2,759 uninhabitable and 3,091 not weatherproof.

From: 9(2)(a) [redacted]@auckland.ac.nz]
Sent: Sunday, 19 September 2010 7:56 p.m.
To: Hugh Cowan
Cc: 9(2)(a) [redacted]
Subject: Liquefaction related claims

Hugh

Does anyone in the EQC have a count on the number of liquefaction related claims received so far.

If the information is easily available it might be useful to us on Tuesday evening.

Regards

9(2)(a) [redacted]

**********
**********

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 12:12 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** FW: Guides to EQCover

Hi 9(2)(a)

A colleague at Internal Affairs (CDEM) drew to my attention a sense in which, in her view, our "insurers guide" to EQC cover is easier to understand than the "household guide", because the insurers guide has a better illustration. I said I would pass this comment on to you.

Cheers
Hugh

**From:** 9(2)(a) [redacted]@dia.govt.nz]
**Sent:** Monday, 20 September 2010 11:35 a.m.
**To:** Hugh Cowan
**Subject:** Guides to EQCover

Hi Hugh,

As discussed, if you compare these two documents, you will quickly understand what I meant.

Cheers, 9(2)(a)

http://www.eqc.govt.nz/downloads/pdfs/an-insurers-guide-to-eqcover2.pdf

http://www.eqc.govt.nz/downloads/pdfs/household-guide-eqc-cover.pdf

9(2)(a)

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 12:08 p.m.
**To:** 9(2)(a)
**Subject:** RE: Guides to EQCover

Hi 9(2)(a)

Sorry for hanging up at short notice....and thanks for the info about the different documents. I will pass on to others handling this area. Cheers, Hugh

**From:** 9(2)(a) @dia.govt.nz]
**Sent:** Monday, 20 September 2010 11:35 a.m.
**To:** Hugh Cowan
**Subject:** Guides to EQCover

Hi Hugh,

As discussed, if you compare these two documents, you will quickly understand what I meant.

Cheers, 9(2)(a)

http://www.eqc.govt.nz/downloads/pdfs/an-insurers-guide-to-eqcover2.pdf

http://www.eqc.govt.nz/downloads/pdfs/household-guide-eqc-cover.pdf

====



====

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 11:56 a.m.
**To:** 9(2)(a) [redacted]
**Cc:** 9(2)(a) [redacted]
**Subject:** RE: Liquefaction related claims

Hello 9(2)(a) [redacted]

We don't have a reliable count of liquefaction-related claims, but of the 63,214 claims at 8.00 am this morning; 2,745 uninhabitable and 3,073 not weatherproof. You can be confident that a high percentage of the self-reported cases of "uninhabitable" are likely to involve some kind of damage to foundations.

Regards
Hugh

**From:** 9(2)(a) [redacted]@auckland.ac.nz]
**Sent:** Sunday, 19 September 2010 7:56 p.m.
**To:** Hugh Cowan
**Cc:** 9(2)(a) [redacted]
**Subject:** Liquefaction related claims

Hugh

Does anyone in the EQC have a count on the number of liquefaction related claims received so far.

If the information is easily available it might be useful to us on Tuesday evening.

Regards

9(2)(a) [redacted]

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 10:43 a.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: A further query I've just remembered

9(2)(a) [redacted] if you would like me to attend I will be in Chch tomorrow and Wed. Regards, Hugh

--- original message ---
From: '9(2)(a) [redacted]
Subject: RE: A further query I've just remembered
Date: 20th September 2010
Time: 10:22:46 am

9(2)(a)

Thanks Great work that you have done on the draft. I am happy with the outline from the Insurers perspective however I could suggest a couple of things that I will not be easy to detail in this email but would rather discuss with you.

Are you about on Tuesday afternoon or any time Wednesday? I am fly back tomorrow mid day and will be in Christchurch until Friday evening.

Best regards

9(2)(a) [redacted]
ANZIIF (Snr Assoc) CIP
Insurance Council of New Zealand
PO Box 474 Wellington
New Zealand 6140
9(2)(a) [redacted]
Fax 0064 4 473 3011
9(2)(a) [redacted]
www.icnz.org.nz


-----Original Message-----
From: 9(2)(a) [redacted]@ccc.govt.nz]
Sent: Sunday, 19 September 2010 12:16 p.m.
To: hacowan@eqc.govt.nz; 9(2)(a) [redacted]
Subject: A further query I've just remembered

Did I understand it correctly that for residential properties it might be or would be the insurer who accesses the Building Recovery Office for consents etc rather than the resident themselves?

Please can you clarify?

Thanks

9(2)(a) [redacted]

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Monday, 20 September 2010 8:11 a.m.
**To:** Ian Simpson
**Subject:** FWD: Re: 9(2)(a) [redacted]
**Attachments:** Re: 9(2)(a) [redacted]

Ian, will hope to discuss today. Hugh

9(2)(a)

**From:** 9(2)(a)@canterbury.ac.nz>
**Sent:** Sunday, 19 September 2010 9:52 a.m.
**To:** Hugh Cowan
**Subject:** 9(2)(a)
**Attachments:**

Happy to accept the changes.

Just noting my expectation that we will bring term into the terms and conditions that we agree. I am presuming a term of somewhere between 3-6 moths at the onset, any continuation beyond that would be subject to need. But agree with the one month review,

Document with changes accepted attached

9(2)(a)

On 19/9/10 9:34 AM, "Hugh Cowan" <9(2)(a) wrote:

hi9(2)(a)

Some suggested changes to wording. For example - response to recovery, and Christchurch to Canterbury (Selwyn and Waimak won't like a ChCh focus) and I dropped one para which seemed like duplication. See what you think. I have pulled the review back to 1 month, believing that if we get the guiding principles sorted first, then in discussion with Ian we can reach consensus on the term - recognising that there is an opportunity cost for you that must be managed fairly too.

If you get this back by tonight I'll forward to Ian so he will read before arriving to office.

cheers
Hugh

--

9(2)(a)

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Tuesday, 21 September 2010 5:17 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: Meeting with the Minister and Mayor

Hi 9(2)(a) [redacted] yes, I will be there. Cheers Hugh

--- original message ---
From: 9(2)(a) [redacted]@EQC.govt.nz>
Subject: Meeting with the Minister and Mayor
Date: 21st September 2010
Time: 5:09:37 pm

Good afternoon

9(2)(a) [redacted] has now arranged for there to be a meeting in Christchurch tomorrow with the Minister, the Christchurch City Council (Mayor, CEO +2).

Unfortunately, it is for 9am – 10am and Ian will not be in Christchurch by then. He has asked if you gentlemen would be kind enough to attend this in his place. 9(2)(a) [redacted] would be most happy for you to do so. The meeting is scheduled to take place at Deans Avenue.

Could you please confirm your attendance????

Kind regards

9(2)(a) [redacted]

9(2)(a) [redacted] | Earthquake Commission (EQC)

Majestic Centre | 100 Willis Street | P O Box 790 | Wellington

9(2)(a) [redacted] | Email: 9(2)(a) [redacted]@eqc.govt.nz

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Tuesday, 21 September 2010 4:22 p.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: Darfield earthquake talk for GeoNZ 2010

A better idea probably, thanks Hugh

--- original message ---
From: 9(2)(a) [redacted]@gns.cri.nz>
Subject: RE: Darfield earthquake talk for GeoNZ 2010
Date: 21st September 2010
Time: 4:17:59 pm

Hello Hugh,

If you don't have an electronic copy, I can get the data from your thesis (our library has a copy).

9(2)(a) [redacted]

"Hugh Cowan" <hacowan@eqc.govt.nz>
21/09/2010 14:26

To
9(2)(a) [redacted]@gns.cri.nz>
cc

Subject
RE: Darfield earthquake talk for GeoNZ 2010

Re thesis info, I probably should have recorded that on papyrus :) more accessible than floppy disk

--- original message ---
From: 9(2)(a) [redacted]@gns.cri.nz>
Subject: Darfield earthquake talk for GeoNZ 2010
Date: 21st September 2010
Time: 2:08:57 pm

Hello 9(2)(a) and Hugh,

I'm planning to present a talk entitled something like "The seismotectonic

context of the 2010 Darfield earthquake" at the Special Session on the earthquake at the GeoNZ conference in Auckland in November. From GNS this will include 9(2)(a) [redacted] and I plus some other GeoNet people (depending on

whether or not the people who put out the portable seismographs present separately on the rapid response).

I'd also like to include you two guys as authors, as a lot of the relocations of larger aftershocks and interpretations of crustal structure

which I will be covering hinge on the results from Hugh's PhD thesis.
There is a really nice story emerging on how both the initial thrust and subsequent strike-slip sub events were controlled by crustal structure, and the sequence as a whole provides a new insight into how continental collision is being accommodated east of the rangefront. I've already talked to Hugh about being a co-author, and I'd also like to include you as well 9(2)(a) if you are happy to be involved.

I'm away for most of the next week attending my daughter 9(2)(a) wedding.

But I'll try to get you a draft abstract well before the Oct 18 submission

deadline.

All the best

9(2)(a)

p.s. Hugh, do you still have an electronic version of your final thesis earthquake hypocentres?

9(2)(a)

**From:** Hugh Cowan
**Sent:** Tuesday, 21 September 2010 3:10 p.m.
**To:** 9(2)(a)
**Subject:** FWD: URGENTS
**Attachments:** URGENTS

9(2)(a)

**From:** 9(2)(a)@ipenz.org.nz>
**Sent:** Tuesday, 21 September 2010 2:31 p.m.
**To:** Hugh Cowan
**Subject:** URGENTS

**Importance:** High

Many thanks

Regards
9(2)(a)

9(2)(a)

IPENZ Engineers New Zealand
Delivery: Ground Floor, Engineers New Zealand, 158 The Terrace, Wellington 6011
Postal: PO Box 12 241, Wellington 6144
**T**
**M** 9(2)(a)
**F**

www.ipenz.org.nz



**From:** 9(2)(a)
**Sent:** Tuesday, September 21, 2010 2:30 PM
**To:** 9(2)(a)
**Subject:**

URGENT
SEMI URGENT
MEDIUM
LOW
NON URGENT

IN PROCESS
LEFT MSG

**0800 Call Logging Details** SAMPLE

| Time Call Taken - dd-mm-yy | Name | CONTACT DETAILS | | | EC | |
|---|---|---|---|---|---|---|
| | | Main Contact Phone Number | Mobile | Address | Spoken to? | Lodge Claim on Line? |

| | | | | | |
|---|---|---|---|---|---|
| Fri-10-Sep-10 | 9(2)(a) | | | | yes |
| Mon-13-Sep-10 | 9(2)(a) | | | | |
| Mon-13-Sep-10 | 9(2)(a) | | | | |
| Mon 13/9 | 9(2)(a) | | | Y | Y |
| Tue-14-Sep-10 | 9(2)(a) | | | Y | Y |
| Tue-14-Sep-10 | 9(2)(a) | | | Y | Y |
| Tue-14-Sep-10 | 9(2)(a) | | | | |
| Tue-14-Sep-10 | 9(2)(a) | | | y | y |
| Tue-14-Sep-10 | 9(2)(a) | | | y | y |

| | | | |
|---|---|---|---|
| Tue-14-Sep-10 | 9(2)(a) | y | y |
| Tue-14-Sep-10 | 9(2)(a) | y | y |
| Tue-14-Sep-10 | 9(2)(a) | | |
| Tue-14-Sep-10 | 9(2)(a) | | |
| Wed-15-Sep-10 | 9(2)(a) | yes | yes |
| Wed-15-Sep-10 | 9(2)(a) | Yes | |
| **Wed 15 Sep 10** | 9(2)(a) | **Yes** | |
| Wed 15 Sep 10 | 9(2)(a) | Yes (as not their house yet they cannot lodge claim b EQC trying to contac owner of house) | |
| Thu-16-Sep-10 | 9(2)(a) | y | y |
| Thu-16-Sep-10 | 9(2)(a) | y | y |
| Thu-16-sep-10 | 9(2)(a) | y | y |
| Thu-16-sep-10 | 9(2)(a) | y | y |

| | | | |
|---|---|---|---|
| Thu-16-sep-10 | 9(2)(a) [redacted] | y | y |
| **Thu-16-Sep-10** | 9(2)(a) [redacted] | Y | Y |
| **Thu-16-Sep-10** | 9(2)(a) [redacted] | Y | Y |
| Thu-16-Sep-10 | 9(2)(a) [redacted] | | |
| Fri-17-Sep-10 | 9(2)(a) [redacted] | | |
| Thu-16-Sep-10 | 9(2)(a) [redacted] | no | |
| Mon-20-Sep-10 | 9(2)(a) [redacted] | y | No |
| Mon-20-Sep-10 | 9(2)(a) [redacted] | y | y |

| Tue-21-Sep-10 | 9(2)(a) | | | | | y |
|---|---|---|---|---|---|---|
| | | | | | | |

9(2)(a)

IPENZ, Engineers New Zealand
Ground Floor, 158 The Terrace
PO Box 12 241, Wellington 6144

9(2)(a)

www.ipenz.org.nz

9(2)(a)

**From:** Hugh Cowan
**Sent:** Tuesday, 21 September 2010 11:16 a.m.
**To:** 9(2)(a)
**Subject:** FWD: Fronting up in Fendalton
**Attachments:** Fronting up in Fendalton

Hi 9(2)(a) grateful if you would consider who could assist. I could represent corporate tomorrow if that helps. Please let 9(2)(a) know and cc me. Cheers Hugh

9(2)(a)

**From:** [redacted]@ccc.govt.nz>
**Sent:** Monday, 20 September 2010 8:45 p.m.
**To:** Hugh Cowan
**Subject:** Fronting up in Fendalton

Hi Hugh.

I've been asked by our community board advisor for Fendalton/Waimairi if anyone from EQC will be coming to the Fendalton meeting on Wednesday night.

Originally this was put on the desirable list rather than the essential list for EQC attendance but the extent of damage that's come to light in very small pockets might be sufficient to cause a rethink here.

It's also in Gerry Brownlee's electorate!

Your thoughts?

Regards,

9(2)(a)

9(2)(a)

**From:** Hugh Cowan
**Sent:** Tuesday, 21 September 2010 10:23 a.m.
**To:** 9(2)(a)@tonkin.co.nz
**Subject:** FWD: RE: Earthquake information and interpretation - Final Draft FAQs
**Attachments:** RE: Earthquake information and interpretation - Final Draft FAQs

9(2)(a)

**From:** 9(2)(a)
**Sent:** Tuesday, 21 September 2010 12:18 a.m.
**To:**
**Cc:** 9(2)(a) Hugh Cowan; Hugh Cowan;

**Subject:** RE: Earthquake information and interpretation - Final Draft FAQs
**Attachments:** Canterbury Earthquake Briefing FAQs.doc

Thanks for all the feedback. I have made changes in producing the attached.
I need some help with who it is on behalf of. In the absence of suggestions I will go with what I have put, but expand on the names of organisations.

Regards

9(2)(a) Mobile:

-----Original Message-----
From: 9(2)(a) @canterbury.ac.nz]
Sent: Sunday, 19 September 2010 6:39 p.m.
To:
Cc: Hugh Cowan; 9(2)(a) HACowan@eqc.govt.nz;
Subject: RE: Earthquake information and interpretation - Draft FAQs

9(2)(a)

This looks good. I've made some comments and suggestions for improvement in the attached document.
Regards,
9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Private Bag 4800 Christchurch, 8140 New Zealand
Phone
Fax: +6
Email: 9(2)(a) @canterbury.ac.nz

---

From: 9(2)(a)
Sent: Sun 19/09/2010 12:08 p.m.
To:
Cc: 9(2)(a) 'Hugh Cowan';

[redacted]
HACowan@eqc.govt.nz; [redacted]
Subject: RE: Earthquake information and interpretation - Draft FAQs

Hi 9(2)(a) and all

Many thanks for the information, particularly the strong motion data. It underlines the variability and the difficulty in drawing early conclusions.

Nevertheless, I have attempted to summarise the situation in the attached draft FAQs. I think these are an improvement on where we were last Thursday
- but then I wrote them!

It is still important in my view to try and describe our best interpretations in simple terms. I plan to use this or something like it to hand out to MPs at the briefing on Tuesday night.

I am happy to receive suggestions for improvement to the document from any of you but particularly 9(2)(a) [redacted]
9(2)(a) [redacted]

All for now.

Regards and many thanks.

9(2)(a) [redacted] Mobile:

-----Original Message-----
From: 9(2)(a) [redacted] @canterbury.ac.nz]
Sent: Saturday, 18 September 2010 12:56 p.m.
To: [redacted]
Cc: [redacted] 9(2)(a) [redacted] Hugh Cowan [redacted]
HACowan@eqc.govt.nz; [redacted]
Subject: RE: Earthquake information and interpretation - A map with links is needed.

Hi 9(2)(a)

I am attaching a few documents, which provide information on:
where (and how far from the fault) the stations are what are the PGA, PGV and PGD recorded at these different stations how do response spectra of some records compare with design spectra

The spreadsheet is based on the data shared by 9(2)(a) [redacted] on NZSEE clearinghouse site. 9(2)(a) [redacted] pdf file plots the PGA values at different sites on a map but as you can notice some values are different from those in the spreadsheet. 9(2)(a) might have made some preliminary corrections for some obvious errors.

Regards
9(2)(a)

9(2)(a) [redacted]

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Christchurch, New Zealand
9(2)(a)

---

From: 9(2)(a)
Sent: Sat 18/09/2010 10:28 a.m.
To:
Cc:
'Hugh Cowan'
HACowan@eqc.govt.nz;
Subject: Earthquake information and interpretation - A map with links is needed.

Hi 9(2)(a) and all

Good comments, of course.

Please would someone 9(2)(a) put together a map showing where the instrument stations are, a record of accelerations at each site (could be a link on the map), and a response spectrum for horizontal movement plotted in the conventional way with the 1170 values for all soil types for comparison (could also be a link on the map).

This will give some "factual" information for all to see, and clearly show how complex and variable the situation is. It will also help all of us who are trying to interpret building / infrastructure / liquefaction behaviour in different parts of Christchurch.

It would also be great to flash in front of MPs as a simple visual reminder of the complexity that confronts the interpretation of the meaning of this earthquake.

However, we still need to distil things down to simple statements for those for whom this is enough. Better that than nothing.

Regards to all

9(2)(a)

9(2)(a)

From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 2:15 p.m.

9(2)(a)

Hugh Cowan;

Subject: Christchurch spectra versus NZS1170 - The current code does not tell us if an "old" building should be damged or not.

Hi Guys,
We must not jump to a conclution for any thing at this moment. Every earthquake surprised many seismologists and engineers and this one certainly does too. Jump to a premature conclusions will hinder out lateral thinking. I may be too negative and a bit grumpy because I haven't had much sleep since the earthquake. Please do not feel being offended.

We also need to compare the design spectra from old codes and the NZS1170.50 (as sent out by GNS and 9(2)(a) is essentially irrelavent to the structures in most parts of the Canterbury as many house and structures were designed long before the current code. The current code does not tell us if an "old" building should be damged or not. We will have a lot explanations to do after the dust down and after we complete the information collection phase.

I suspect that some records may have been influnced by the dancing of heavy stuff around the instrument or the response of the concrete blocks (where instrument was bolted down) on soggy soil in farm land. It would be absolutely necessary for us to visit strong-motion recording stations and record all the possible damage for both contents as well as any structural damage. I visited quite a few stations but it is important to talk to the people from these stations as most was cleaned up and people did not respond to phone messages. Would any structural engineers and an experienced builder like to joint me for the trip some time next week (if I get approval from my boss who has supported me for many years?

When I was in Canterbury, I even could not get a post-graduate to come with me even though 9(2)(a) tried to help me to find one. The damges at strong-motion stations will give us a very clear picture on the performance of NZ residential houses around the immediate area.

Cheers,
9(2)(a)

9(2)(a) @canterbury.ac.nz>

17/09/2010 13:41

To

9(2)(a)

[redacted]

Hugh Cowan <HACowan@eqc.govt.nz>,

9(2)(a)

[redacted]

cc

Subject

RE: Christchurch spectra versus NZS1170

Thanks 9(2)(a) for admitting this. I tried my best to convince you guys on this in yesterday's meeting; but could not. For Christchurch the 10% in 50 yrs hazard factor is 0.22, which is in CRUDE terms an indication of design level PGA. We have recorded PGAs in either side of this value in different parts of Christchurch. Based on the response spectra of some records; it is clear that the response demand was much less than (about half) the design level demand for short period structures; slightly less than design level for medium period structures and equal to (or even higher than) the design demand for long period structures. Once we admit this, a lot of things will start making sense. We will find the questions a lot easier to answer:

1. Why little damage in low rise and residential buildings?

Because the demand for these buildings was much less than the design level.

2. Why so much damage in the areas of soft soil?

Because the soft soil has a longer period for which the demand may be equal to (I suspect even greater than in some very soft soils) the design level demand.

3. How have our tall buildings fared in this close-to-design-level event?

I have noticed/observed non trivial damages (including plastic hinges) in tall RC frame buildings (periods likely to be in the range of 1sec) and we have to admit that most of our tall buildings have performed as well as we expected them to perform in a design level event. One thing we must note is:

our design code allows some damage and inelastic response in a design level event; but it does NOT mean they MUST damage significantly in a design level event. It will be interesting to see how many flexible buildings (say taller than 8 storeys) people have noticed/observed not to have incurred any significant damage; personally I have NONE. So far, I have gained access to three buildings falling in these categories and the damage categories I would assign to these buildings is moderate (very close to severe) and minor (very close to moderate), and minor. With several factors built in the design process (to increase the demand or reduce the capacity) it is not a surprise that the tall buildings have seen off this event by having minor-moderate damage. Isn't this what we expect from our structures?

4. Are we likely to have a bigger earthquake?

Certainly YES, but based on my several conversations with seismologists a bigger earthquake in the Alpine fault does not result in similar level of PGA in Christchurch (using the available attenuation relationship) but the duration of shaking is likely to be longer. Again, the shaking is likely to be dominated by low frequency (i.e. longer duration) as the high frequency components may be filtered out or restrained while travelling for a long distance. Hence, a bigger earthquake in the Alpine fault may not necessarily be more damaging to the low period buildings (which dominates our building stock).

5. Are we likely to have more damaging (note this does not necessarily mean bigger) earthquakes?

Possible (not necessarily probable), but mainly for low rise and residential buildings which have periods less than 0.25 sec; but the same cannot be said about the soft soils and flexible high rise structures. To have a shaking to induce a design level demand from high frequency (low period) structures, the source should be at a closer distance and some forward directivity effect may help. Maybe another rupture of an unknown fault in the Canterbury plains at a closer distance?

I know not everybody will buy into these, but to me these are plausible conclusions based on my limited knowledge, experience, and observation. I am always open to learn more, so please do respond if you have more plausible explanations for the different levels of damage for different types of structures/soils we have observed so far.

Cheers
9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Private Bag 4800 Christchurch 8020, New Zealand
Ph:
Fax:
9(2)(a)

---

From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 10:07 a.m.
9(2)(a)
Hugh Cowan;
Subject: Re: Christchurch spectra versus NZS1170

Hi 9(2)(a)

Thanks for these plots - they are very important in my mind. It suggests the event has been much closer to the 10% in 50 yr event than is currently being discussed around town. That has major implications into the thinking behind build-back, tolerable impact, and guidelines, including the heritage buildings.
I will circulate this to others because there is a current perception that the building stock only experienced about 30-60% of the 500 year demand. I would be interested in the records on firm ground class also - to try to reconcile the lack of damage on firm soil sites in the west of the city.

Regards, 9(2)(a)

----- 9(2)(a) ote: -----
To:
Fro
Date: 16/09/2010 18:23
cc: 9(2)(a)

Subject: Christchurch spectra versus NZS1170

9(2)(a) and others

I attach a spreadsheet showing plots of spectra in Christchurch City (and Kaiapoi) compared to NZS1170 Class D Deep or Soft Soil Z=0.22 R=1 (i.e. 500-yr return period). Sites closer to the source than Riccarton High School are not included. The spectra are as recalculated with record-specific filter bands by 9(2)(a), so may vary slightly from those on the Geonet website. For the periods plotted (up to 4.5s, as covered by NZS1170), I expect any differences to be minor.

The first plot includes both horizontal components, the second the larger of the two horizontal components at each period, and the third the larger component for four sites near the central city. Some sites likely to have been affected by liquefaction are excluded.

NZS1170 spectra are for the stronger component.

All plots show the geometric mean ("median") of all the sites included in each plot.

The spectra standing out well above the others at short period are for Heathcote Valley School. Its spectra are the weakest at periods beyond 1s.
It may well be sited on a wedge of colluvium, as iut is at the base of the Port Hills, near to the entrance to Lyttelton tunnel. The historic hotel that was demolished was only about 200-300 metres down the road.

The median of the four central city spectra are close to NZS1170 R-=1 values from about 0.25s to 1s, and stronger than NZS1170 for periods of about 1.5s and stronger, considerably so for periods above about 2s.

Regards

9(2)(a)

# Technical briefing on Canterbury Earthquake

This briefing note fills a need for the best possible information to be available on technical aspects and implications of the Canterbury Earthquake. The following questions and answers summarise the views of experts who are involved in examining the impact of the earthquake and gathering data to better understand its implications.

Special effort has been made to describe a very complex situation in simple terms. Those wanting more detail should visit websites such as GNS, New Zealand Society for Earthquake Engineering and Christchurch City Council.

1. **Intensity of ground shaking**

   Q. How does the intensity of ground shaking in the 4 September earthquake compare with that used in the design of new buildings and infrastructure?

   A. *Building performance and damage caused suggests that this was a moderate earthquake with much less impact than expected from a "design" earthquake. However, liquefaction damage suggests that the ground shaking was nearer a design earthquake in those areas. Measurements of ground shaking from more than 70 instruments show peak accelerations similar to those expected in a design earthquake. This is borne out by the felt intensity reported by people to GNS.*

   *It will take some time to get a more detailed appreciation of the situation, but experts believe that greater damage would have resulted if the strong shaking had lasted for longer.*

2. **Future earthquake affecting Christchurch and Canterbury**

   Q. Does this earthquake mean that there will not be similar shaking in Christchurch for hundreds of years?

   A. *Unfortunately, no. Earthquake events on other faults can produce shaking as great, or greater, than that experienced on 4 September. There is no significant change in the probability of future shaking in Christchurch, for example by the Alpine Fault, as a result of the earthquake.*

3. **Design Standards for earthquake**

   Q. Will earthquake design standards for buildings and infrastructure in Christchurch / Canterbury need to be changed as a result of the earthquake?

   A. *No, it is most unlikely. There is no reason evident so far to suggest they should be increased or decreased. The performance of buildings and infrastructure was generally as expected by experts. The earthquake is a reminder that good engineering design and good quality construction is important.*

4. **Soil liquefaction / lateral spreading**

   Q. Liquefaction and lateral spreading occurred in a number of areas. Did geotechnical expert expect this?

   A. *Yes. Many parts of Christchurch and surrounding areas are known to be susceptible to liquefaction of underlying soils. Because ground shaking varies with location and soil properties also vary greatly, it is difficult to predict exactly where liquefaction will occur. Lateral spreading, which is associated with liquefaction, tends to occur near streams and waterways as the soil mass moves towards them.*

*Q.* Is it possible to reduce the amount of soil liquefaction / lateral spreading that occurs in an earthquake?

*A. Yes, engineering measures such as ground densification, gravel columns, and retaining measures can significantly reduce the effects. They do cost money but they can be very effective in reducing liquefaction and associated damage to buildings.*

*Q.* Is it possible to reduce the damage to buildings caused by liquefaction and lateral spreading?

*A. Yes. Robust foundations, tying of floor slab to buildings, using piled foundations, ground improvement or densification of the liquefiable layers are well accepted measures. The choice of method will depend on cost-effectiveness. The recent earthquake shows that it is well worth investigating for liquefaction potential at a building site and taking steps to reduce the damage it can cause.*

Q. Does the extensive damage in some areas due to liquefaction / lateral spreading in the Darfield earthquake mean that there should be restrictions on development in other areas of Canterbury?

A. *The potential for liquefaction exists for large areas of Christchurch and surrounding areas. Blanket restrictions would be hard to justify. It is clear from the recent earthquake that careful investigation is required to assess the suitability of sites for development. Equally important is the need to take steps in the design and construction of sub-divisions and individual buildings, to reduce the chances of liquefaction and lateral spreading.*

*Q.* If my house is damaged by liquefaction, what should I do?
*A. You should seek advice from an expert geotechnical engineer and an expert structural engineer. In many cases it will be possible to make repairs to the building and services. In other cases it may be necessary to demolish and rebuild all or part of the building. In some cases work beyond the particular site may be helpful, such as that necessary to prevent lateral spreading.*

Q. Does this mean that liquefaction damage could occur in a future earthquake, even in the same place?
*A. Yes it is possible in another strong earthquake. When making repairs or replacing the building, every opportunity should be taken to reduce the effects of liquefaction and lateral spreading. Many areas of Christchurch and Canterbury are susceptible to liquefaction and a future earthquake could cause liquefaction in different locations.*

5. **Building Performance:**

Q. Was the performance of buildings better, about the same, or worse than expected for the shaking that occurred?

A. *It is difficult to generalise because of the variability of the ground shaking, soil conditions and building characteristics. However, preliminary observations indicate that building performance was as expected, perhaps a little better. This applies to unreinforced masonry (URM) buildings (many of which were extensively damaged), strengthened URM buildings (which suffered generally little or no damage), to 1935-65 vintage buildings, and to post-1976 buildings.*

6. ***Christchurch City Council Policy for repair and reconstruction***

*Q.* Christchurch City Council has changed its policy to achieve 2/3 of current standards when repairing buildings damaged in the earthquake. Is this policy justified?

*A. Yes. It is in the interests of the community and the owners to achieve as nearly as is reasonably practicable to that of a new building. 2/3 is a reasonable compromise, which reduces the risk of collapse in an earthquake from about 10 times to 3 times that of a new building.*

Q. But didn't many buildings strengthened to 1/3 of current standards perform adequately in the 4 September earthquake? Surely that is evidence that 1/3 is all that is required?

*A. It was gratifying to see that strengthening to 1/3 prevented serious damage in many cases. But there is a concern that in longer shaking this will not be sufficient to prevent collapse. It is worth achieving 2/3 if it is reasonably practicable to do so.*

Q. Won't this be hard to meet for some heritage buildings and for other owners who simply wish to resume use of their building quickly?

*A. It will vary a lot with the nature of the building and the damage. Often the difference in cost will be justified in the reduction of risk it provides. For speedy repairs it may be possible to allow "interim securing" to improve the integrity of the building for immediate use, on the basis that within say 3 years, strengthening to Council requirements would be carried out. This would at least allow owners to plan for the more extensive work involved.*

Prepared by [redacted] with input from representatives of:

University of Canterbury

University of Auckland

GNS Science

CAENZ

NZSEE

Consulting Engineers

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Tuesday, 21 September 2010 8:18 a.m.
**To:** 9(2)(a) [redacted]
**Subject:** FWD: EQC Claims Update
**Attachments:** EQC Claims Update

9(2)(a) [redacted] there is likely to be another update at noon but this is probably ok for your purposes. Cheers Hugh

9(2)(a)

**From:** 9(2)(a)
**Sent:** Tuesday, 21 September 2010 8:12 a.m.
**To:** Ian Simpson; Hugh Cowan; 9(2)(a)
**Subject:** EQC Claims Update

As at 8am: 66,196 claims; 2,780 uninhabitable and 3,125 not weatherproof.

9(2)(a)

**From:** Hugh Cowan
**Sent:** Tuesday, 21 September 2010 3:46 a.m.
**To:** 9(2)(a)
**Subject:** RE: Earthquake information and interpretation - Final Draft FAQs

9(2)(a) this reads very well in general and thanks for pulling it together. One important detail needs to be added in case this gets circulated widely - under the Q 'what if my house has been damaged by liquefaction', please make the point that if your house is insured then engineers should not be engaged or works carried out until EQC and/or your insurer have inspected the property. Thanks, Hugh

--- original message ---
From: 9(2)(a)
Subject: RE: Earthquake information and interpretation - Final Draft FAQs
Date: 21st September 2010
Time: 12:16:55 am

Thanks for all the feedback. I have made changes in producing the attached.
I need some help with who it is on behalf of. In the absence of suggestions I will go with what I have put, but expand on the names of organisations.

Regards

9(2)(a) Mobile:

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Subject: RE: Earthquake information and interpretation - Draft FAQs

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9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Private Bag 4800 Christchurch, 8140 New Zealand
Phone
Fax: +6
Email: 9(2)(a) @canterbury.ac.nz

---

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Sent: Sun 19/09/2010 12:08 p.m.
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Cc: [redacted] 'Hugh Cowan'; 9(2)(a) [redacted]
HACowan@eqc.govt.nz; [redacted]
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Nevertheless, I have attempted to summarise the situation in the attached draft FAQs. I think these are an improvement on where we were last Thursday
- but then I wrote them!

It is still important in my view to try and describe our best interpretations in simple terms. I plan to use this or something like it to hand out to MPs at the briefing on Tuesday night.

I am happy to receive suggestions for improvement to the document from any of you but particularly 9(2)(a) [redacted] 9(2)(a) [redacted]

All for now.

Regards and many thanks.

9(2)(a) [redacted] Mobile:

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To: [redacted]
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HACowan@eqc.govt.nz [redacted]
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9(2)(a)

9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Christchurch, New Zealand
9(2)(a)

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Regards to all

9(2)(a)

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From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 2:15 p.m.
To:
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9(2)(a) Hugh Cowan;
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Cheers,
9(2)(a)

9(2)(a) @canterbury.ac.nz>

17/09/2010 13:41

To

[redacted] 9(2)(a)

Hugh Cowan <HACowan@eqc.govt.nz>,

cc

Subject

RE: Christchurch spectra versus NZS1170

Thanks 9(2)(a) for admitting this. I tried my best to convince you guys on this in yesterday's meeting; but could not. For Christchurch the 10% in 50 yrs hazard factor is 0.22, which is in CRUDE terms an indication of design level PGA. We have recorded PGAs in either side of this value in different parts of Christchurch. Based on the response spectra of some records; it is clear that the response demand was much less than (about half) the design level demand for short period structures; slightly less than design level for medium period structures and equal to (or even higher than) the design demand for long period structures. Once we admit this, a lot of things will start making sense. We will find the questions a lot easier to answer:

1. Why little damage in low rise and residential buildings?

Because the demand for these buildings was much less than the design level.

2. Why so much damage in the areas of soft soil?

Because the soft soil has a longer period for which the demand may be equal to (I suspect even greater than in some very soft soils) the design level demand.

3. How have our tall buildings fared in this close-to-design-level event?

I have noticed/observed non trivial damages (including plastic hinges) in tall RC frame buildings (periods likely to be in the range of 1sec) and we have to admit that most of our tall buildings have performed as well as we expected them to perform in a design level event. One thing we must note is:

our design code allows some damage and inelastic response in a design level event; but it does NOT mean they MUST damage significantly in a design level event. It will be interesting to see how many flexible buildings (say taller than 8 storeys) people have noticed/observed not to have incurred any significant damage; personally I have NONE. So far, I have gained access to three buildings falling in these categories and the damage categories I would assign to these buildings is moderate (very close to severe) and minor (very close to moderate), and minor. With several factors built in the design process (to increase the demand or reduce the capacity) it is not a surprise that the tall buildings have seen off this event by having minor-moderate damage. Isn't this what we expect from our structures?

4. Are we likely to have a bigger earthquake?

Certainly YES, but based on my several conversations with seismologists a bigger earthquake in the Alpine fault does not result in similar level of PGA in Christchurch (using the available attenuation relationship) but the duration of shaking is likely to be longer. Again, the shaking is likely to be dominated by low frequency (i.e. longer duration) as the high frequency components may be filtered out or restrained while travelling for a long distance. Hence, a bigger

earthquake in the Alpine fault may not necessarily be more damaging to the low period buildings (which dominates our building stock).

5. Are we likely to have more damaging (note this does not necessarily mean bigger) earthquakes?

Possible (not necessarily probable), but mainly for low rise and residential buildings which have periods less than 0.25 sec; but the same cannot be said about the soft soils and flexible high rise structures. To have a shaking to induce a design level demand from high frequency (low period) structures, the source should be at a closer distance and some forward directivity effect may help. Maybe another rupture of an unknown fault in the Canterbury plains at a closer distance?

I know not everybody will buy into these, but to me these are plausible conclusions based on my limited knowledge, experience, and observation. I am always open to learn more, so please do respond if you have more plausible explanations for the different levels of damage for different types of structures/soils we have observed so far.

Cheers
9(2)(a)

9(2)(a)
Department of Civil and Natural Resources Engineering University of Canterbury Private Bag 4800 Christchurch 8020, New Zealand
Ph:
Fax:
9(2)(a)

---

From: 9(2)(a) @gns.cri.nz]
Sent: Friday, 17 September 2010 10:07 a.m.
9(2)(a) Hugh Cowan;
Subject: Re: Christchurch spectra versus NZS1170

Hi 9(2)(a)

Thanks for these plots - they are very important in my mind. It suggests the event has been much closer to the 10% in 50 yr event than is currently being discussed around town. That has major implications into the thinking behind build-back, tolerable impact, and guidelines, including the heritage buildings.
I will circulate this to others because there is a current perception that the building stock only experienced about 30-60% of the 500 year demand. I would be interested in the records on firm ground class also - to try to reconcile the lack of damage on firm soil sites in the west of the city.

Regards, 9(2)(a)

-----9(2)(a) wrote: -----

To: 9(2)(a)
Fro
Date: 16/09/2010 18:23
cc: 9(2)(a)
Subject: Christchurch spectra versus NZS1170

9(2)(a) and others

I attach a spreadsheet showing plots of spectra in Christchurch City (and Kaiapoi) compared to NZS1170 Class D Deep or Soft Soil Z=0.22 R=1 (i.e. 500-yr return period). Sites closer to the source than Riccarton High School are not included. The spectra are as recalculated with record-specific filter bands by 9(2)(a) so may vary slightly from those on the Geonet website. For the periods plotted (up to 4.5s, as covered by NZS1170), I expect any differences to be minor.

The first plot includes both horizontal components, the second the larger of the two horizontal components at each period, and the third the larger component for four sites near the central city. Some sites likely to have been affected by liquefaction are excluded.

NZS1170 spectra are for the stronger component.

All plots show the geometric mean ("median") of all the sites included in each plot.

The spectra standing out well above the others at short period are for Heathcote Valley School. Its spectra are the weakest at periods beyond 1s.
It may well be sited on a wedge of colluvium, as iut is at the base of the Port Hills, near to the entrance to Lyttelton tunnel. The historic hotel that was demolished was only about 200-300 metres down the road.

The median of the four central city spectra are close to NZS1170 R-=1 values from about 0.25s to 1s, and stronger than NZS1170 for periods of about 1.5s and stronger, considerably so for periods above about 2s.

Regards

9(2)(a)

9(2)(a)

**From:** Hugh Cowan
**Sent:** Wednesday, 22 September 2010 6:58 p.m.
**To:** Ian Simpson
**Subject:** FWD: FW: Meeting at Ackland Street this morning
**Attachments:** FW: Meeting at Ackland Street this morning

Ian, have asked 9(2)(a) to tell 9(2)(a) we will call friendly. Same issues came up at Welfare Advisory Group meeting tonight, it was clear that all agencies targeted had had previous dealings with this group. There were no issues raised about EQC by the agencies. Clearly the wider uncertainty in the community will need addressing at both local and national level. Regards Hugh

9(2)(a) [redacted]

**From:** 9(2)(a) [redacted]@ccc.govt.nz>
**Sent:** Wednesday, 22 September 2010 6:41 p.m.
**To:** Hugh Cowan
**Subject:** FW: Meeting at Ackland Street this morning

Hugh,

Further to our conversation. Thank you for your message of support for 9(2)(a)

Cheers.

9(2)(a)

> _____
> From: 9(2)(a) [redacted]
> Sent: Wednesday, 22 September 2010 2:01 pm
> 9(2)(a) [redacted]
> [redacted]
> Subject: Meeting at Ackland Street this morning
>
> Morning
>
> Having returned from the street meeting at Ackland Street there are
> some key messages for Council:
>
> A. Residents are feeling left in a void in these areas - no one is
> talking to them.
>
> B. Concern about driving speeds and road vibration and rubber neckers
> - suggestion that signs be put up residents only (I know this wouldn't
> stop everyone but may help).
>
> C. Concern by residents that Government/Council/EQC will make a
> decision and it will be fate a comple for the neighbourhood. Their was
> acceptance by some that houses maybe demolished and that some areas
> may not be designated for reconstruction (these are resident comments
> not Council staff) but they want to be part of the decision and not
> just have it "done to them". I am not sure what can be done about this
> but I guess it is about delivery and who hears the message first.
>
> D. Growing concern that many in the damaged areas will have to leave
> their houses after EQC/government make their decision because either
> sewer or houses or both need total reconstruction and there will not
> be any housing stock left in the city for them to move into. One
> resident commented "that housing NZ had told her they had run out of
> rentals in Christchurch". Whether true or not you can see the anxiety
> building over where these people will go after the "big decision".
>
> E. Issue of not enough portaloos - CWW staff looking at setting a LoS
> of number portaloos to number of houses - will discuss with SDC and
> WDC so some consistancy across councils. We will then populate to that

> LoS. This then gives a level playing field everywhere.
>
> F. Concern over "eject" material in backyards and material still being
> tipped on streets - I have organised with 9(2)(a) [redacted]
> that 9(2)(a) [redacted] will contact 9(2)(a) and the Council and Community
> can work out a plan to street by street clear backyards using
> community and volunteer labour. Council contractors will then clear
> each street as it is completed and we can then sweep it and wash it
> down if necessary. This needs a co-ordinated approach to maximise
> benefit and minimise diversion of recovery resources. 9(2)(a) and
> 9(2)(a) have taken this task on but will need help with organising
> volunteers to move through streets. An effective response from Council
> here will be well received in the neighbourhoods. These volunteers
> will need wheelbarrows and shovels - maybe hirequip or others can help
> here.
>
> G. Concern over security in the neighbourhood on two fronts:
>
> i. Women and children using potaloos at night
> ii Apparently 30 homes out of 100 on Robson Ave have been burgled -
> Police may have actual data on this.
> Additional security I think would be greatly appreciated in these
> damaged neighbourhoods.
>
> The issue over the extensive damage to the sewer network and ongoing
> problems we are having keeping flow paths open needs to be fully
> understood by the entire Recovery Team. As I said to the media
> yesterday (rightly or wrongly!) the sewer fix is a long haul and we
> are becoming aware that in the really damaged areas we are starting to
> create other safety hazards in continually trying to jet sand out of
> lines (road collapses etc).
>
>
> G.
>
> G.
>
>
> 9(2)(a) [redacted]
>
> Christchurch City Council
> PO Box 237
> Christchurch
>
> Teleph 9(2)(a) [redacted]
> Mobile [redacted]
> Email [redacted]
>
>

9(2)(a) [redacted]

**From:** Hugh Cowan
**Sent:** Wednesday, 22 September 2010 9:09 a.m.
**To:** 9(2)(a) [redacted]
**Subject:** RE: FW: EQC Project 09/TV580 - Development, installation and testi ng of new models in the NZ Earthquake forecast Testing Centre

Thank you 9(2)(a) I have responded already and granted the request. Sorry for not copying to you. Cheers Hugh

--- original message ---
From: '9(2)(a) [redacted]@EQC.govt.nz>
Subject: FW: EQC Project 09/TV580 - Development, installation and testing of new models in the NZ Earthquake forecast Testing Centre
Date: 22nd September 2010
Time: 8:55:27 am

Good morning Hugh

I have received this email for 9(2)(a) which I have been advised to forward to you. How would you like me to respond to this?

No doubt he received 9(2)(a) 'Out of Office' reply but I thought you would prefer if he got an actual response.

Kind regards

9(2)(a)

From: 9(2)(a) [redacted]@gns.cri.nz]
Sent: Tuesday, 21 September 2010 12:07 p.m.
To: 9(2)(a) [redacted]
Subject: EQC Project 09/TV580 - Development, installation and testing of new models in the NZ Earthuqke forecast Testing Centre

Dear 9(2)(a)

I wish to request an extension for completion of project 09/TV580 to 31 October 2010.

I regret that this request is necessary, but it comes about mainly because of the recent Darfield earthquake. 9(2)(a) [redacted] have both been heavily involved in the scientific response to this event, in particular, preparing information on the expected and actual number of aftershocks for the GeoNet website and for GNS Science press releases. This has slowed down progress on wrapping up this project.

The installation of two models and the retrospective testing have still to be completed. It is now clear that, even with a clear run on the computing aspects in the next week, the report will not be completed by the end of

September. Because unxpected computing gliches seem to be normal with an elaborate system like the testing centre, I am requesting a full extra month to complete the project.

Regards

9(2)(a) GNS Science
1 Fairway Drive, Avalon, Lower Hutt 5010 P O Box 30-368, Lower Hutt 5040 New Zealand

9(2)(a)

9(2)(a)

**From:** Hugh Cowan
**Sent:** Wednesday, 22 September 2010 9:06 a.m.
**To:** 9(2)(a)
**Subject:** RE: 9(2)(a)

Yes please

--- original message ---
From: 9(2)(a) @usgs.gov>
Subject: 9(2)(a)
Date: 22nd September 2010
Time: 8:44:53 am

Even though he is retired, would you like to get together with 9(2)(a) for lunch one day?

9(2)(a)
Geology and Environmental Change Science Center U.S. Geological Survey
MS980 Federal Center
Denver, CO 80225-0046
9(2)(a)
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