Introduction

Ten years ago I began to record and report on earthquake damaged houses in the Mt Pleasant suburb of Christchurch. Initially, during 2012 there were no publically available facts on our houses. The official maps and results were either difficult to interpret at a suburb level, or simply did not match reality.

What I and others needed to know for our own decisions was...

- how many earthquake damaged dwellings?
- how many being repaired?
- how many being rebuilt?
- how long would it take to recover housing?

26 surveys record the progress of at least 1,475 (90%) of houses after the February 22, 2011 earthquake. How the surveys began, and why are in a background document (here).

House Repairs

Peak activity was in January 2015 when at least 93 houses were undergoing earthquake related repairs (Figure 1A). In Jan. 2021 there were at least nine repairs underway (Figure 1B). 'At least' here means house repairs recognised and counted by the presence of tradespeople, scaffolding, and works signage. Other repairs can occur without such obvious evidence, or be completed between the mostly three month surveys.

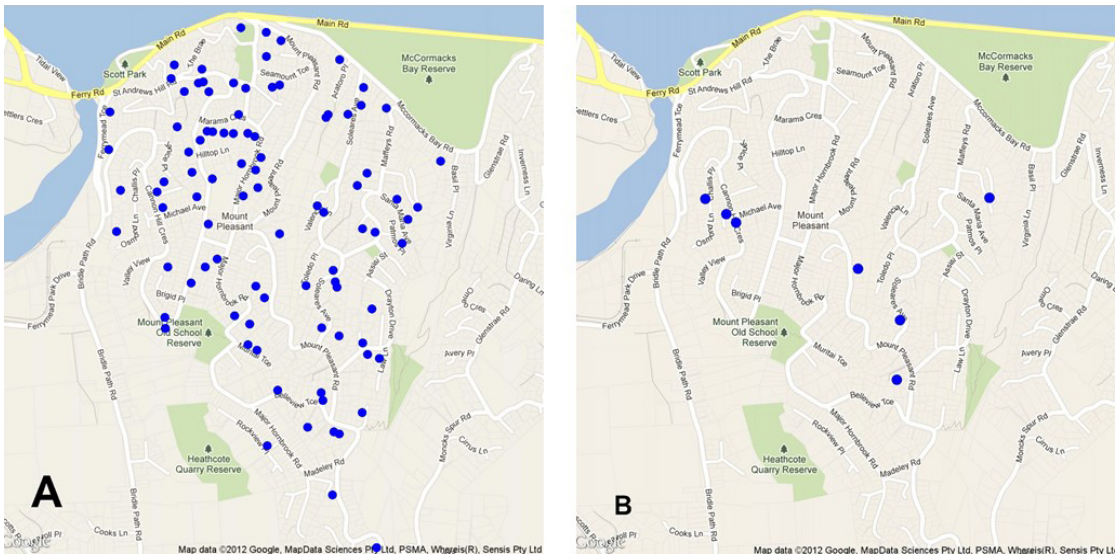

Figure 1. Snapshots of repairs underway. **A**. Jan. 2015 (93 houses). **B**. Jan. 2021 (eight houses, two at one location.).

A total of 1092 completed repairs have been recorded. There are another 40 or so repairs to be done. So earthquake repairs appear practically complete.

However, while repairs underway at any one time are reducing, repairs will continue for another six years (i.e., until 2026, see Figure 2). It may take longer if there are more re-repairs and if more putative rebuilds (i.e., uneconomic to repair, or sold 'as is') turn into repairs.

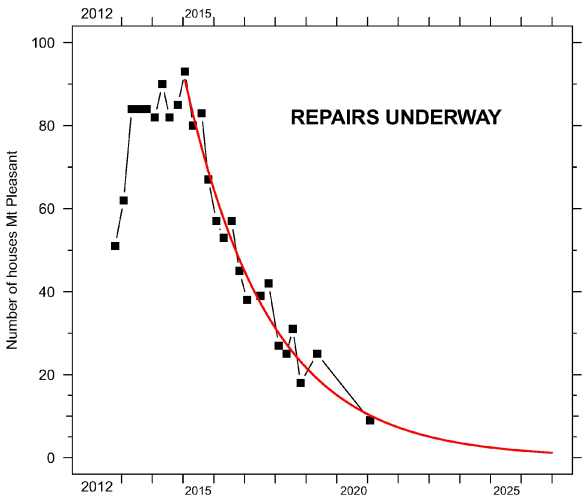

Figure 2. Repairs underway at each survey. Expect repairs to continue until 2026 (red line)

Demolition and Rebuild

By Oct. 15, 2012 (the first survey) there were already 101 houses demolished (Figure 3A). By the 26th survey (Jan. 31, 2021) there had been 408 house demolitions (Figure 3B). Demolitions concentrate on the lower slopes of Mt Pleasant.

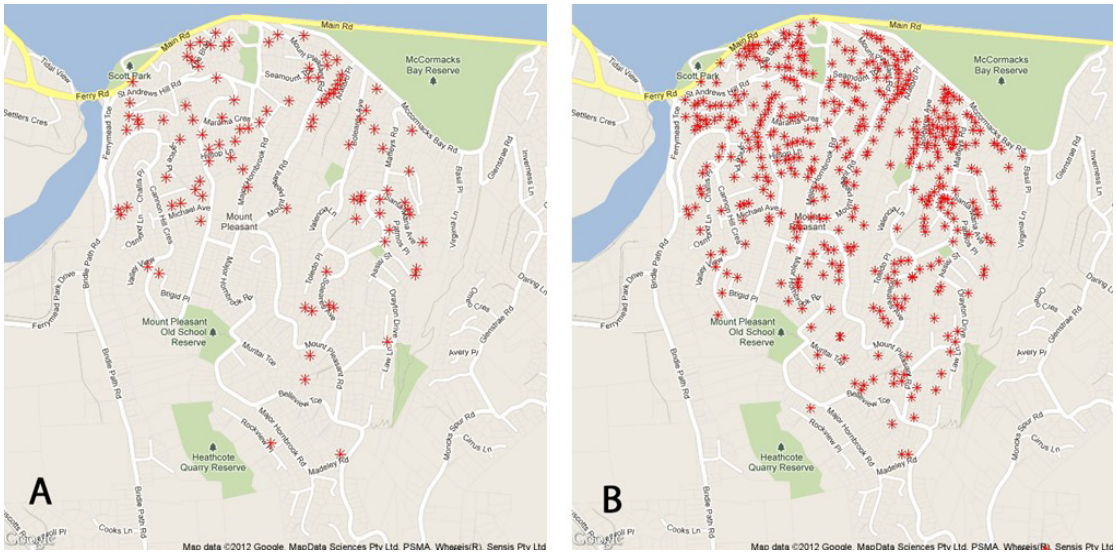

Figure 3. Mt Pleasant demolished houses. A. Oct 2015 (101 houses). B. Jan. 2021 (408 houses) .

Recovery began with three rebuilds underway (out of 96 demolished) on the first survey. Peak activity was in April 2015 with 72 houses being rebuilt. In Jan. 2021 there were 30 rebuilds under way (Figure 4).

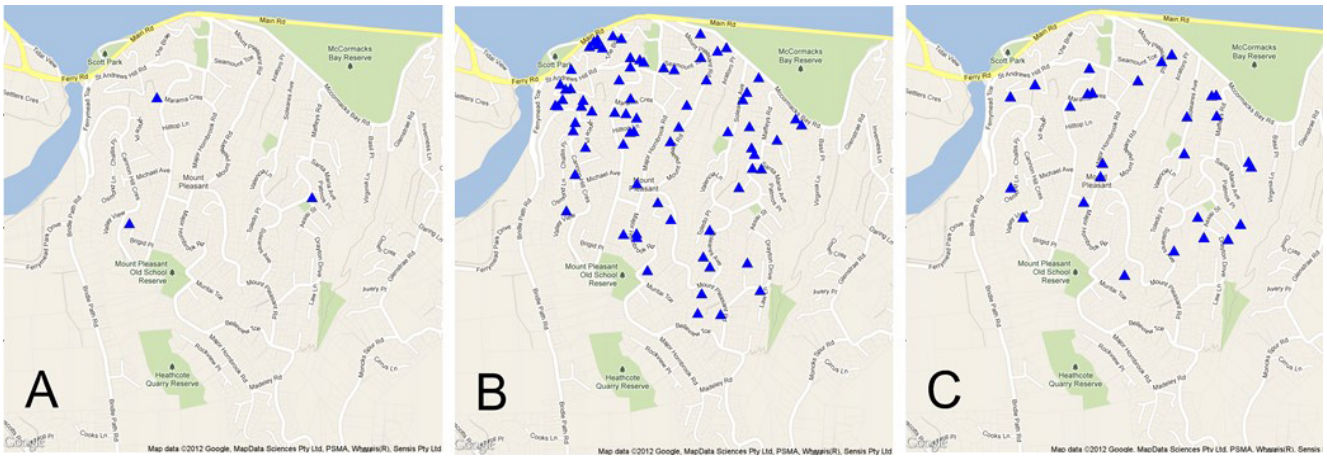

Figure 4. Rebuild activity slow to start (**A**. Oct. 2012), increases (**B**. April 2015) then decreases (**C**. Jan. 2021)

Rebuilds will continue for some years. A decreasing rate of house completion along with the number of remaining demolished house sites (67 on Jan. 30, 2021 shows that we can anticipate the rebuild to continue until 2030 (Figure 5).

In summary, from the total houses demolished, and those expected to be demolished , Mt Pleasant is 3/4 through its rebuild recovery ten years on from the Feb. 22, 2011 earthquake.

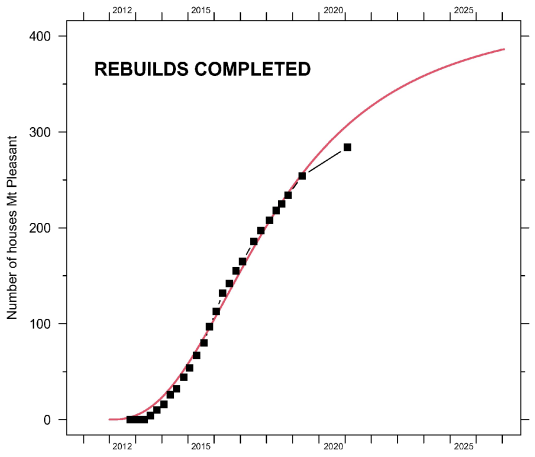

Figure 5. Rebuilds begin a year after the Feb. 2011 earthquake and will continue until 2030 (red line).

The 2030 estimate for complete rebuild has uncertainty because of complications. For example, six sites appear ‘land-banked’, also the seven houses that have displayed extreme damage and been mostly vacant since 2011, plus 16 houses where owners have ‘cashed-out’ for a rebuild. The final rebuild estimate of over 400 houses to be rebuilt does NOT include the 29 house sections acquired as Red Zone or forfeit to Christchurch City Council, or the house section that is now part of local school grounds, or the section now part of the wider road intersection at the Ferrymead bridge.

The loss of houses on Mt Pleasant is somewhat offset by the 61 new homes built on sections that were bare at the time of the earthquakes.

Tony Aldridge

February, 2021

Acknowledgements. Surveying could not happen without the encouragement, support and hospitality of local residents, plus our Community Committee and the Hagley-Ferrymead Community Board. Thank you all. In addition, a special thanks to Linda Rutland, Derek McCullogh and Jocelyn Papprill who continued to encourage and promote the suburb survey. I am grateful to Dr. Glen Metcalf (Mt Pleasant), Judith Pay & Ken Mulvey (Halswell) for support, discussions and especially hospitality when I was displaced from Christchurch.

Residents continue to volunteer information plus corrections about their progress, house and land status. Further information is always appreciated through the Mt Pleasant Memorial Community Centre (community@mpcc.org.nz).

Analysis, mapping and graphics were made possible with the open source software R (R core team, http://www.R-project.org/), R packages ggmap, ggplot2 (David Kahle, Hadley Wickham), and Google Maps (http://maps.google.co.nz/). Dr Kahle (Baylor University) generously helped with questions about ggmap that enabled quick and efficient mapping of houses on Mt Pleasant.

Supplementary Material

to

Mt Pleasant, Christchurch

Mapping the Damage and Recovery

October 2012 - May 2019

Background to Mapping the Damage and Recovery of Mt Pleasant houses

Eight years ago I began to record and report on earthquake damaged houses in the Mt Pleasant suburb of Christchurch. There have been 25 surveys of houses at mostly three month intervals. Almost 45,000 records have now accumulated for nearly 1,700 homes. As with any large amount of data, a summary or graphic only has value once you appreciate how the surveys began, and their purpose. This is how it started.

Being so near to the earthquake epicentre, our Mt Pleasant house contents exploded at 1:51pm, 22nd February, 2011. There was no shaking. That came after, and was to continue for some years. We were not alone wondering if our house could be repaired or needed to be rebuilt. New Zealand's Earthquake Commission (EQC) undertook at least one city wide house survey of damage. Results were only ever released to insurers and government. Like many we were left wondering "what's next?" and "when."

By October 2012 most of Mt. Pleasant land had been zoned as ready for repair and rebuilding. Government and insurers promised that residential repairs and rebuilds "will be wrapped up by 2016". Ground truth was to give a very different view.

Residents streamed through the local community hub seeking advice and help from Linda Rutland, our newly appointed earthquake support person. Listening to experiences, Linda reported that a third of the Mt Pleasant homes would need to be rebuilt. The 2006 Census records Mt Pleasant as having 1,644 occupied dwellings. A third of that is 548 houses! Houses can't just appear in a few years especially when many other suburbs experience similar damage. Who was right? Residents or the insurers and government agencies?

As a member of the Insurance Watch group (http://webcentre.co.nz/iw/) I helped design, analyse, and report city wide surveys of all major insurers. Survey results, emails and meetings showed that promises of progress were not matched by results.

Promises and a sense of time mattered to residents and local businesses. Those displaced from their own homes were faced with questions about renting. Where, how long? Should children stay at the same school? Stay in Christchurch? Staying in your own home also presented difficulties. Should temporary repairs be done for a home that could be demolished? Or, have minimal repair and bear the cost of extra heating and increased risk to health? That is, until insurers assessed and honoured their policy on a house. In October 2012 there was only a handful of houses being rebuilt on Mt Pleasant. How long would it take for Mt Pleasant to recover?

At that time (2012) there were no publically available facts on our houses. There were city aggregated percentages and snapshots without clear dates or background. For example, the local government demolition map showed Mt Pleasant as having one demolished and two partly demolished houses. The Canterbury Earthquake Recovery Authority (CERA) produced similar results. A five minute walk in any direction in lower Mt Pleasant was enough to demonstrate that the truth was very different from official reports. Insurers produced progress reports on repairs and rebuilds but not at the community level to be useful for residents. In short, official maps and results were either difficult to interpret at a suburb level, or simply did not match reality.

What was reality? Extending a five minute walk to more houses was enough to indicate Linda's estimate was closer to actual suburb damage than any official statistics. The first walk extended to all the suburb and took a week. This was my first survey of what had been 1,636 homes on Mt Pleasant. I kept returning every three months and reported maps of damage and progress in the local newsletter and for the community website. I seemed well placed for this task having started working life on surveys in North Island mountains with the New Zealand Forest Service, then ten years as a scientist with the Applied Mathematics Division of the Dept. of Scientific and Industrial Research (DSIR), and

finally semi-retired after twenty plus years as a self-employed industrial statistician.

What I and others needed to know for Mt Pleasant was ...

- how many earthquake damaged dwellings?

- how many being repaired?

- how many being rebuilt?

- how long would it take to recover housing?

Within two surveys it was possible to not only confirm Linda's estimate of damage, but also predict time to recover. Reporting facts especially the slow recovery progress drew either silence or fierce criticism from officials and insurers such as *"misleading the public of Christchurch with his spurious assumptions and extrapolations."* And doubling down with *"the rebuild programme is **ramping up significantly in the second half of 2013** and insurers are completely confident about achieving the **end of 2016 completion date**, for a significant majority of the economic repairs and rebuilds they are managing."*[1] (my italics and emphasis)

I can now summarise the 25 house surveys on Mt Pleasant. You judge the extent of damage and rate of recovery. This matters because since Christchurch we have had major earthquakes from Hanmer to Cook Strait. Also, New Zealand is now preparing for an Alpine Fault magnitude 8 earthquake. I suspect that not much will be different for house damage and recovery in any other large disaster.

Surveys become practically a Census of earthquake damage.

Earthquake damage to houses was often clear from walking along a street. There were cracks through walls, or missing cladding to the temporary repairs with plywood. Early on, the plywood repairs were so obvious and on so many houses that we often heard the name 'Mt Plywood' for our suburb.

Rebuild sites were also obvious when a bare section appeared where a house once stood. By the 25th survey 401 houses had been demolished on Mt Pleasant. More information on house damage came from residents - especially houses that seemed at first glance, unscathed from the earthquakes.

After 25 surveys there were 151 (9%) of houses for which there were no records of repair or sign of earthquake damage. Of these, 113 (7%) houses appeared well maintained often with new paint. The remaining 38 (2%) appeared unchanged from 2011. So there were 9% of houses for which I was uncertain about damage, and not been included in the following results.

In summary, the surveys recorded and tracked the progress of 1,485 (91%) of houses after the February 22, 2011 earthquake.

Tony Aldridge

January 2020

[1] http://www.stuff.co.nz/the-press/editors-picks/8998326/Statistician-tracks-rebuild-progress (accessed 11 Jan. 2020)

↩ BACK TO MAIN TEXT