MEMBERS' EVENING, 2011

The fifth Members' Evening was held on 16th April 2011. Once again, the instructions to the presenters were simple: *show us your interests and infect us with your enthusiasm*. It is hoped that other members, especially those who are amateur, will offer short presentations to continue the success of the Members' Evenings into future years.

Escape from Christchurch

Richard Hamblin

Geology field trips can be fascinating and exciting, but one to New Zealand that ends with a Magnitude 6.1 earthquake has to be truly memorable. At the time of the Christchurch earthquake, 21 February 2011, our tour had just ended, and most of the group were in and around the city centre prior to flying home that evening. Sue and I had gone out for the day, and were at the Ferrymead Heritage Park, east of Christchurch, which turned out to be very close to the epicentre (Fig. 1). When the earthquake occurred, we were in an aircraft storage and restoration building, and in retrospect it is surprising that nothing fell on us, considering how much was stored in that building, including items hanging from the roof. The volunteer to whom we were talking, a veteran of the M7.1 earthquake in the previous September, was horrified and estimated this to be at least M8. In retrospect his over-estimate was due to the September event originating 40 km away at a depth of 10 km, whereas in this case he was almost at the epicentre with the focus only 5 km down, so the local intensity was much greater (intensity is the local effect of the earthquake, while magnitude is a measure of its absolute power).

The earthquake

We had no personal experience of such things, but I can say that there was absolutely no warning, no sound before the shock, just a very violent and totally sudden shaking. This shaking felt to be horizontal rather than vertical, and was accompanied by a loud rumbling noise, as well as the sound of Sue screaming. We then encountered our first example of Kiwi kindness that day: almost as soon as the volunteer had finished explaining how to take a back route off the site and look for a taxi on the main road, a chap from the tram shed next door came over to tell us that the manager of the Heritage Park lived in the city centre and would drive us there.

Damage to the building in which we had been standing was surprisingly slight, although a Wessex helicopter transmission system weighing over a ton had moved sideways about a metre, demonstrating the horizontal nature of the movement. Otherwise the only real damage to the site appeared to be quite minor cracks in the paths, but once we got out onto the main road we found more damage nearer to the epicentre. The Heathcote River Bridge was out of action to the north of the park, a train was derailed on the railway bridge south of the park, and we found huge cracks in the roads, with vertical displacements of up to a foot as well as horizontal shearing. However for about three kilometres between the epicentre and the city centre there was very little damage, apart from extensive liquefaction (Fig. 2). Liquid mud had emerging into people's gardens, and through cracks in the road, as a

Figure 2. *A silt volcano built on a grass verge by water and sediment extruded due to liquefaction of the ground when vibrated during the earthquake.*

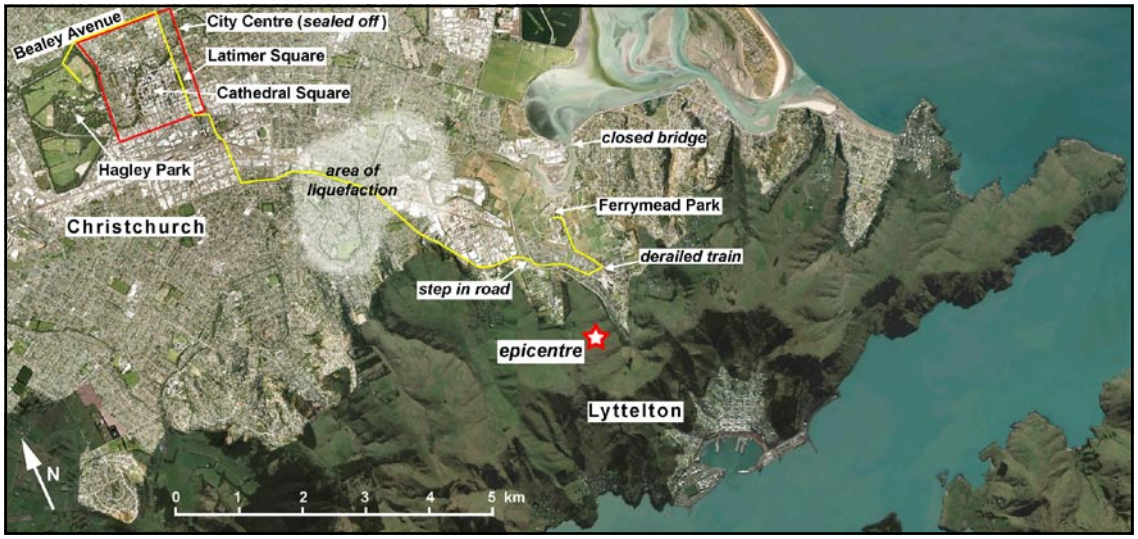

Figure 1. *Satellite image of the area around Christchurch, with the yellow line marking our route back into the city after the earthquake (base image after Google Earth).*

Figure 3. *The manager's garden with grey mud expelled by the liquefaction in the foreground, and debris from the two collapsed walls of his neighbours.*

result of the city having been built on marshland and the silt beneath the marsh liquefied when vibrated by the earthquake. We were then confronted by some very British understatement: the manager telephoned his wife, who was at their home in the city, and she said that she was unharmed, the house was undamaged, but the garden was a bit of a mess. We assumed that this meant liquefaction, but when we called there the next day, we found that, in addition to liquefaction, the neighbour's side wall and the back wall of the adjacent church had both collapsed into their garden (Fig. 3).

On our way into the city, we listened to the car radio and were not over impressed by the degree of planning apparent. It was clear that all public transport had ceased and that people in the centre were being urged to go home, but they were also urged to keep their cars off the streets! There was no mention of any meeting place for tourists, but it was apparent that people were gathering in Latimer Square, so the manager took us as near there as he could. As we approached the city centre, it became apparent that there was much more damage here, presumably because the thick silty soils beneath the city had amplified the earthquake shock waves. The roads were badly cracked and heaved (Fig. 4), there was more severe liquefaction, and there were floods caused by broken water mains and sewers as well as by the expulsion of water during the liquefaction. There were queues of traffic because all power was off, and we saw our first totally collapsed buildings (Fig. 5).

After sitting in the manager's car for two and a half hours to travel five kilometres we thanked him profusely, and walked the rest of the way to Latimer Square. There were collapsed buildings everywhere, and it did appear that churches had suffered worst, because they are relatively old and just the right size to collapse when subjected to severe lateral movement. Some churches that were not completely destroyed had obviously suffered damage in the earlier earthquakes as well as in the new one (Fig. 6). Most houses in New Zealand are single story and made of timber, so they are safe during earthquakes, but many people had added brick facia walls to their wooden houses, and many of these had fallen away from the main structures.

Figure 5. *Total destruction of a brick building along the main road into town.*

Figure 4. *A road cracked and heaved, and then flooded by a burst water main.*

Figure 6. *A church that was damaged by both the earthquakes that struck Christcurch, in February of 2011 and in the previous September.*

The evacuation

It was clear that we could not get back to our hotel, in Cathedral Square, as the whole centre was already sealed off west of Latimer Square. Most of the people in the square were city workers on their way home, and no-one knew where tourists were meant to gather. The authorities were attempting to clear the square, because it was right beside the Canterbury Television building (Fig. 7). This had collapsed and was burning fiercely, helicopters were bombing it with water, and Latimer Square was needed for landing the helicopters. One of the workers sent a text to our daughter for us, to let her know we were alright. On the advice of a policeman, we walked north up Madras Street looking for a motel to put us up, but all we found were more cracked roads (Fig. 8) and more collapsed buildings. Looking across to Cathedral Square, we could see that our hotel was still standing, but the Cathedral looked rather different from how I remembered it that morning (Fig. 9), since the tall spire had completely collapsed (Fig. 10).

When we reached Bealey Avenue the situation was much better, although the roads were still cracked, and we had no trouble getting a room in a motel because all

Figure 7. *The Canterbury Television building in Madras Street, wrecked and then on fire after the earthquake (photo: Mark Mitchell).*

Figure 8. *A cracked road in the city centre.*

their guests were leaving! We then spent a miserable night in a motel with no power, no water, no telephones working, and a manager who didn't speak English! Having no power or water, we managed to buy some crisps and soft drinks from a corner shop. Aftershocks (which reached up to M5) seemed almost continuous throughout the night as we lay in bed. With each, there was a long, low rumble before the main shaking began, and the next rumble generally started before the shaking had finished. This lonely night in a motel was the worst part of the whole experience. When we met up with our friends the next day, and someone commented how lucky we were to have had a warm bed for the night, I felt that I would rather have spent the night in a tent with the rest of the group.

When we woke up the world looked brighter but we still had no idea what to do. Would we be able to return to our hotel soon enough for it to be worth waiting on in Christchurch? And would we be able to collect the rental car that was organised, since we didn't have the paperwork with us, we didn't know where the rental company was, and there were still no telephones working. Fortunately by then the road block opposite our motel was manned by the New Zealand Army, who were very friendly and were able to tell us that tourists should go to Hagley Park (Fig. 1). We walked the length of Bealey Avenue, and along the edge of the park. This was the limit of the sealed area of the city centre, with the roads into it blocked by tanks.

In the park there was a lot of liquefaction and cracked paths, and some large trees had fallen (Fig. 11). A tourist evacuation camp had been set up in a marquee that had been erected for a flower festival, and there the Red Cross were organising the evacuation. Air New Zealand and the Air Force were laying on free flights for anyone as far as Wellington, now that the airport had re-opened; and the Salvation Army were laying on food and drink. Considering that this disaster had been completely unexpected, we were impressed by the

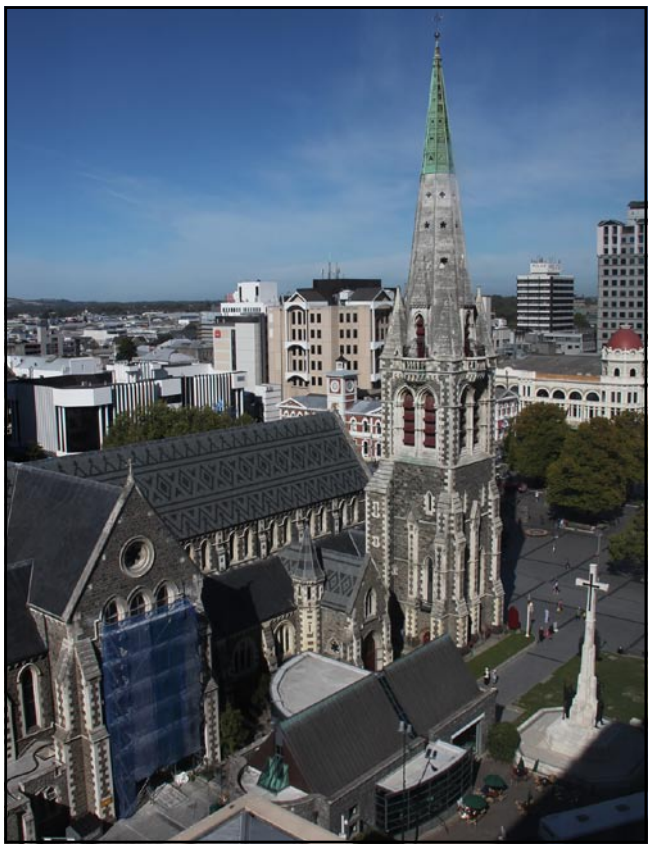

Figure 9. *Christchurch Cathedral before the earthquake.*

efficiency of the official and voluntary organisations, and also by the complete lack of panic. A liaison officer lent us a mobile telephone to ring home and tell them what was happening. If I have to be in another major earthquake, New Zealand is definitely the place to be!

By now it was obvious that we weren't going back to our hotel (where our luggage lay unscathed) before we were due to return home, and we were no nearer to our rental car, so it seemed sensible to accept the offer of evacuation. We were rapidly registered by the Red Cross as evacuees number 1229971, and allocated a flight that afternoon. The only delay was when the Prime Minister of New Zealand appeared on the scene, but we managed to avoid talking to him and go by coach to the airport. At the airport we met up with other members of our group, who we caught up with because the airport had been closed for twenty-four hours. There was

Figure 11. *Fallen tree in Hagley Park, next to the tourists' evacuation camp.*

Figure 10. *Christchurch Cathedral after the earthquake (photo: Totally Cool Pix).*

some delay issuing boarding cards until it was decided that our Red Cross card would do as a boarding card, and the immigration officials took some persuading to allow passengers through with no ID, but it was not long before we were on our way to Wellington. There we found another Red Cross enclave, which directed us to the Air New Zealand desk. They accepted us as evacuees, and since we were booked on an Air New Zealand flight home, and we did have our passports, they put us on a flight to Auckland that evening.

In Auckland we found the Red Cross again and they were as efficient as ever. By the time we arrived, all the nearby hotels were full, and they asked us if we were prepared to stay the night with a family who had volunteered to put up evacuees. We were introduced to John and Linda Lewis who put us up in their house on Herald Island for the next two nights. They were both born in England, and we spent our time agreeing how wonderful the New Zealanders are! We telephoned Air New Zealand the next morning and they put us on their flight to London the next day. A number of others from our group were on the same flight, and we met other evacuees, but those people who had lost their passports, including the EMGS Secretary, were delayed in Wellington to be issued with new passports.

Only in June was our luggage rescued from the hotel in Cathedral Square, which is still sealed off.

Photographs on the back cover

Clockwise from the caption:

Remains of the Oxford Terrace Baptist Church.
Collapsed buildings on the edge of town.
The Pyne-Gould offices in the city (photo: Canada Post).
Failure of brickwork on a house (photo: Martin Hunter)
Fractured street near the city centre.
Fissure-style silt volcano created where liquefied soil had erupted along a crack in the road surface.
Landslide caused by the earthquake, at Sumner, east of Ferrymead (photo: Brisbane Times)
Collapsed shops close to the city centre.
Photos by Richard Hamblin except as credited

After the earthquake, Christchurch, New Zealand, 2011