Comparison of Sumner Tsunami Evacuation Modelling with the Evacuation Dynamics that occurred during the 2016 Kaikōura Tsunami Event

Information Sheet
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Information Sheet for Participant

About the research

The evacuation of Sumner following the November 2016 Kaikōura tsunami warning provides a valuable learning opportunity to assess evacuation dynamics from a real tsunami event. The tsunami warning and evacuation order was ‘complex’ and so provides valuable insights on evacuation response which has the potential to inform tsunami evacuation planning for future tsunami events. This research will be valuable as the Christchurch coastal suburb of Sumner is exposed to a range of tsunami hazards and may face events which would require evacuation. This research is supported by the Christchurch City Council, Christchurch City Council Civil Defence and Emergency Management, and Environment Canterbury.

Aims of the research

Specifically, this research project seeks to gain an understanding of evacuation dynamics for the coastal community of Sumner following the 2016 Kaikōura Earthquake and Tsunami event (e.g. what happened? who was involved? where did people evacuate to? how long did it take to evacuate?). We aim to achieve this by evaluating official reports and reviews, media reports, public surveys conducted by GNS Science after the event, and through this survey of Sumner residents.

In particular, a unique opportunity exists to learn from this event. Recent research by Lina Le, a Master of Science in Disaster Risk and Resilience at the University of Canterbury, developed a geospatial tsunami evacuation model for Sumner in partnership with Canterbury Civil Defence an Emergency Management Group to inform evacuation planning for Christchurch. We will compare the evacuation dynamics from the November 2016 tsunami evacuation to the modelled evacuation results. We expect this will strongly benefit the model design and input parameters leading to more accurately modelled outputs.

The findings of this research will be useful to the Sumner community and emergency management agencies. The results of this research will aim to inform current and future tsunami evacuation planning, and contribute towards effective evacuation response of the Sumner community, and more broadly for New Zealand.

This research is being undertaken by Associate Professor Thomas Wilson (University of Canterbury), Dr Matthew Hughes (University of Canterbury), Professor David Johnston (GNS Science), Lina Le, Laura Tilley, Danielle Barnhill and Vanessa Stewart (University of Canterbury). This research is in
collaboration with the Christchurch City Council, Christchurch City Council Civil Defence and Emergency Management, and Environment Canterbury.

**What will the research be used for?**

The findings will be shared with Christchurch City Council, Christchurch City Council Civil Defence and Emergency Management, and Environment Canterbury to assist with current and future tsunami evacuation planning.

The research will also be written as a manuscript for submission to a peer-reviewed journal that specialises in hazards and disaster management.

**Your involvement in the study**

If you choose to take part in this study, your involvement in this project will be informing the researchers of the dynamics of Sumner evacuation following the November 2016 Kaikōura earthquake (e.g. what happened? who were involved? where did people go? how long did it take to evacuate?) through completing a survey. If you evacuated Sumner following the warning you will be invited to draw your evacuation route on an enlarged version of the map below. We estimate the survey will take approximately 30 minutes.
In the performance of the tasks and application of the procedures there are no risks.

Participation is voluntary and you have the right to withdraw at any stage without penalty. You will have the option to amend/change/remove any information you provide on the survey form.

At any time during the process of this research, if you feel any distress or discomfort we will offer you support and provide you the ability to withdraw from the study. Information and support is available at the Mental Health Education and Resource Centre (www.mherc.org.nz/seeking-help, 033655344).

You may ask for your raw data to be returned to you or destroyed at any point before 1 September 2018. If you choose to withdraw, we will remove information relating to you. However, once analysis of raw data starts on 25 September 2018, it will become increasingly difficult to remove the influence of your data on the results. After 1 December 2018 you will be unable to withdraw your raw data due to time constraints in completing the project.

You may be assured of the complete confidentiality of data gathered in this investigation: your identity will not be made public without your prior consent. To ensure anonymity and confidentiality, your personal identity will not be included in the produced document. Only the researchers (Thomas Wilson, Matthew Hughes, David Johnston, Lina Le, Laura Tilley, Danielle Barnhill and Vanessa Stewart) will have access to the data, the data will be securely stored in locked and secure facilities and in password-protected electronic form and will be destroyed after five years.

Please indicate to the researcher on the consent form if you would like to receive a copy of the summary of results of the project. We would be really glad to share this with you.

If you have any concerns or questions about participation in this project, please contact Matthew Hughes on 0223609936. Alternatively you can email uc.tsunami.research@gmail.com or contact Thomas Wilson at thomas.wilson@canterbury.ac.nz or 03 369 4503 ext. 94503 for further information.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in the study, you are asked to complete the consent form before the interview. Alternatively, the form can be filled out at the start of the interview if you would prefer to talk through the consent form and receive any clarification.
Comparison of Sumner Tsunami Evacuation Modelling with the Evacuation Dynamics that occurred during the 2016 Kaikōura Tsunami Event

Consent Form for Interviewees

Confidentiality

☐ I understand there is no risk associated with taking part in this research.
☐ I have been given a full explanation of this project and have had the opportunity to ask questions.
☐ I understand what is required of me if I agree to take part in the research.
☐ I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable (before 1 December, 2018).
☐ I understand that any information or opinions I provide will be kept confidential to the researcher and the researcher’s supervisor and that any published or reported results will not identify the participants.
☐ I understand that all data collected for the study will be kept in locked and secure facilities and in password protected electronic form and will be destroyed after five years.
☐ I understand that I can contact the lead researcher Thomas Wilson on +64 3 369 4503 Ext 94503 or thomas.wilson@canterbury.ac.nz or researcher Matthew Hughes matthew.hughes@canterbury.ac.nz for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz)
☐ I would like a summary of the results of the project.
☐ By signing below, I agree to participate in this project.

Name: ________________ Signed: ________________ Date: ________________

Email address (if would like a summary of findings):
________________________

If you require any support services, please contact lead researcher Thomas Wilson on +64 3 369 4503 Ext 94503 or thomas.wilson@canterbury.ac.nz
Reactions to the 14th November 2016 Earthquake – Sumner

TO RETURN THIS SURVEY: Please contact MATTHEW HUGHES: 0223609936, email this booklet (consent form and survey) to uc.tsunami.research@gmail.com or return it in the pre-paid envelope.

Q1. Where were you when the earthquake occurred on Monday 14th November 2016 at 12.02 a.m.? (Please be very specific, e.g. give the address, nearest street corner or landmark)

_________________________________________________________________________________________________________

Q2. Did the earthquake wake you up? (Tick only one)

- Yes
- No
- Not applicable (I was already awake)

Q3. How strong did the earthquake feel to you? (on Monday 14th November 2016 at 12.02 a.m.) (Tick only one)

- Not felt
- Heard but not felt
- Gentle, hardly recognised as an earthquake (like light trucks passing)
- A jolt or mild, but unmistakably an earthquake (like heavy traffic passing)
- Moderate (could still stand up)
- Violent/severe
- Strong/powerful (hard to stand up)

Q4. For how long did you feel the earthquake shaking? ________ seconds (as best you can estimate) OR

- Don’t know
- Not felt

Q5. How much damage did the earthquake do to your home? (Tick only one)

- None
- Slight
- Moderate
- Severe
- Totally destroyed
- Not applicable

Q6. What did you do after the earthquake stopped? (Please give details)

_________________________________________________________________________________________________________

_________________________________________________________________________________________________________

Q7a. Did you evacuate your home/location? (Tick only one)

- Yes
- No (skip to Q10)

Q7b. Did you evacuate more than once? (Tick only one)

- Yes
- No

Q8. If you did evacuate, was it because of a possible tsunami? (Tick only one)

- Yes (skip to Q11)
- No

Q9. If not because of a possible tsunami, why did you evacuate? (Please give details)

_________________________________________________________________________________________________________

_________________________________________________________________________________________________________

Q10. If you did not evacuate, why not? (Please give details)

_________________________________________________________________________________________________________

_________________________________________________________________________________________________________
Q11. What warned you of a possible tsunami coming? (Tick all that apply)

- [ ] The earthquake (natural warning)
- [ ] Other community members
- [ ] Official warning from Civil Defence (on social media, radio, TV...)
- [ ] Other (please describe)
- [ ] Other household/family members
- [ ] Emergency services (e.g. Police, Fire Service)
- [ ] Tsunami sirens
- [ ] I never thought/ have never been aware there could be a tsunami

Q12. What sources of information did you use to decide to evacuate or not? (Tick all that apply)

- [ ] The earthquake (natural warning)
- [ ] Other household/family members
- [ ] Other community members
- [ ] Emergency services
- [ ] Official warning from Civil Defence (on social media, radio, TV...)
- [ ] Other (please describe)

Q13. What was the MAIN reason that made you decide to evacuate? (Tick only one)

- [ ] The earthquake (natural warning)
- [ ] Other household/family members
- [ ] Emergency services
- [ ] Official warning from Civil Defence (on social media, radio, TV...)
- [ ] Other (please describe)
- [ ] Not applicable

Q14. What did you do before evacuating? (Tick all that apply)

- [ ] Nothing (evacuated immediately)
- [ ] Gathered life essentials (food, water...)
- [ ] Called family or friends
- [ ] Sought further official information (from radio, TV, internet)
- [ ] Gathered my pets
- [ ] Gathered family/household members
- [ ] Collected valuables (jewellery, money etc.)
- [ ] Assisted others in evacuation (e.g. friends or neighbours)
- [ ] Discussed action plan with family/other community members
- [ ] Other (please describe)
- [ ] Not applicable

Q15. How long did all of these actions take, before you actually started evacuating? (Tick only one)

- [ ] One minute or less
- [ ] 1-10 minutes
- [ ] 10-30 minutes
- [ ] 30 minutes-1 hour
- [ ] 1-3 hours
- [ ] Longer than 3 hours
- [ ] Not applicable

Q16. What time did you evacuate?

Q17. Where did you evacuate to? (Please be very specific, e.g. give the address, nearest street corner or landmark)

Q18. Once you started evacuating, how long did it take to reach your destination? _______ minutes (as best you can estimate)
Q19. How did you travel to your evacuation destination? (Tick only one)

☐ 1. Car
☐ 2. Foot
☐ 3. Public transportation
☐ 4. Bicycle or similar
☐ 5. Other (please describe)
☐ 6. Not applicable

Q20. Were you in need of any assistance for evacuating? (Tick only one)

☐ 1. Yes (please describe)
☐ 2. No (skip to Q22)
☐ 3. Not applicable

Q21. If yes, how did this affect the evacuation process? (Tick only one)

☐ 1. I received the support I needed
☐ 2. It delayed the evacuation, but I evacuated anyway
☐ 3. It was a barrier so I did not evacuate

Q22. How long did you stay at your evacuation point? _______ hours _______ minutes (as best you can estimate)

Q23. Why did you decide to return from your evacuation point? (Tick all that apply)

☐ 1. When I felt it was safe (after seeing evidence that there was no danger)
☐ 2. After discussing with others
☐ 3. After a reasonable time
☐ 4. When I received an official ‘All Clear’ message
☐ 5. Not applicable
☐ 6. Other (please describe)

Q24. What is your gender? (Tick only one)

☐ 1. Male
☐ 2. Female
☐ 3. Gender diverse
☐ 4. Prefer not to disclose

Q25. In what year were you born? ____________ or ☐ Prefer not to disclose

Q26. Which best describes the situation you are living in? (Tick only one)

☐ 1. Family with children
☐ 2. Alone
☐ 3. Family without children
☐ 4. With non-family
☐ 5. Prefer not to disclose
Q27. Please draw your evacuation route on the map:
Reactions to 14th November 2016 Kaikoura Earthquake Tsunami – Sumner Survey

Q28. Did you encounter any traffic congestion or were you aware of congestion problems? [ ] Yes  [ ] No (skip to Q.30)

Q29. If yes, which roads or areas were congested? Please indicate these roads and areas on the map

____________________________________________________________________________________________________
____________________________________________________________________________________________________
____________________________________________________________________________________________________
____________________________________________________________________________________________________

Q30. On average, how slow do you think traffic was moving in these congested areas? _________ km/h (as best you can estimate)

Q31. How long were these roads or areas congested for? From _________ a.m. until _________ a.m. (as best you can estimate).

Q32. Did you observe stages/surges of evacuation traffic? At what times did these occur?

____________________________________________________________________________________________________
____________________________________________________________________________________________________
____________________________________________________________________________________________________
____________________________________________________________________________________________________

Q33. Do you have any other comments about the evacuation?

____________________________________________________________________________________________________
____________________________________________________________________________________________________
____________________________________________________________________________________________________
____________________________________________________________________________________________________

Q34. Prior to the Monday 14th November 2016 Earthquake, how would you describe your knowledge of tsunami hazards and the need to evacuate? (Tick only one)

[ ] 1. Non-existent  [ ] 3. Very poor
[ ] 2. Poor  [ ] 4. Fair
[ ] 5. Good  [ ] 6. Very good

Q35. If you were aware prior to the 14th November 2016 Earthquake of tsunami hazards and the need to evacuate, what were your information sources? (Tick all that apply)

[ ] 1. I was not aware of tsunami hazards and the need to evacuate  [ ] 2. Civil Defence information (e.g. back of phone book, pamphlets)
[ ] 5. Formal education – tertiary education (university/polytechnic)  [ ] 6. Media coverage of previous tsunamis (e.g. 2004 Boxing Day Tsunami, 2011 Japan Tsunami)
[ ] 7. Documentaries (television or movies)  [ ] 8. Books, or articles in magazines/newspapers
[ ] 9. Public information sessions - Civil Defence  [ ] 10. Public information sessions - Other
[ ] 11. Discussions with Civil Defence Staff  [ ] 12. Discussions with family and friends
[ ] 13. Other (please describe)
Q36. How did your prior awareness of tsunami hazards influence your behaviour BEFORE the 14th November 2016 Earthquake? (Tick all that apply)

1. I had discussed/prepared an evacuation plan for my family/household
2. I had prepared a go-bag
3. I had arranged to check on my neighbours
4. I had prepared an emergency kit
5. It did not influence my behaviour
6. Other (please describe)

Q37. Did your prior awareness of tsunami hazards influence your behaviour IMMEDIATELY AFTER the 14th November 2016 Earthquake? (Tick only one)

1. Yes
2. No
3. Not applicable

Q38. How did your prior awareness of tsunami hazards influence your behaviour IMMEDIATELY AFTER the 14th November 2016 Earthquake? (Tick all that apply)

1. It did not influence my behaviour
2. Moved to higher ground
3. Moved inland/away from beach
4. Gathered essential items before evacuating
5. Alerted or check on family/friends/neighbours
6. Listened to radio for further information
7. Monitored websites (e.g. GeoNet, Civil Defence, City Council) for further information
8. Monitored social media (e.g. Facebook, Twitter) for further information
9. Other (please describe)

Q39. Following the 14th November 2016 Earthquake, how would you describe your knowledge of tsunami hazards and the need to evacuate NOW? (Tick only one)

1. Non-existent
2. Very poor
3. Poor
4. Fair
5. Good
6. Very good

Q40. Which of the following preparations have you made in case of another significant earthquake and tsunami evacuation? (Tick all that apply)

1. I have made no preparations
2. Discussed evacuation plan with family/household members
3. Arranged to check on neighbours to ensure they are aware of evacuation
4. Prepared a go-bag containing essential items
5. Identified evacuation routes/destinations
6. Made yourself aware of evacuation zone information (e.g. through Christchurch City Council Website)
7. Ensured easy access to online information updates (e.g. bookmarked Civil Defence website on your phone)
8. Prepped an emergency kit with essential supplies (e.g. food and water for 3 days)
9. Other (please describe)
Thank you for your participation, it is greatly appreciated.

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