

# Insight into the Emergency Mobile Alert system and Public Information Management in New Zealand

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### **ABSTRACT**

New Plymouth city's water supply infrastructure suffered major damage as Ex-Tropical Cyclone Gita passed over New Zealand on 20 February 2018. By 19:50 a State of Local Emergency had been declared due to the disruption of the drinking water supply in New Plymouth and power supply across the region.

This report (written by members of the Taranaki Incident Management Team and a Senior Advisor from the Ministry of Civil Defence Emergency Management) focuses on the feedback received by the Taranaki Civil Defence Emergency Management (CDEM) Group's Public Information Management team following activation of the Emergency Mobile Alert (EMA) system on the evening of Wednesday 21 February 2018, to warn people in New Plymouth District that tap water must be boiled. The report gives a practitioner's insight into making the decision to send one of New Zealand's first EMAs and the subsequent handset issues experienced by members of the public with this new system, including various misunderstandings about how the EMA system works.

### **Keywords**

Emergency Mobile Alert, cell broadcast messaging, practitioner's insights, public information management, Taranaki, New Zealand.

### **INTRODUCTION**

The New Zealand Government wanted to reduce the potential impacts of fast-moving threats such as tsunamis, wildfire and hazardous substance incidents through the implementation of an effective warning system that could alert 'at-risk' communities quickly and reliably. The government tasked the Ministry of Civil Defence & Emergency Management (MCDEM) to lead a project, to establish a system that can be used by multiple agencies.

The Emergency Mobile Alert system uses cell-broadcast technology to send alerts about serious threats to mobile phones over a defined area. Cell broadcast works on a 'push' basis, which means there is no requirement on the public to subscribe to receive the alerts. Furthermore, in New Zealand, the public cannot opt-out of receiving alerts. EMA complements and does not replace other channels used for public alerting.

The project commenced in November 2016 and had a target completion date of 24 December 2017. The project successfully launched New Zealand's Emergency Mobile Alert capability in November 2017 with the first nationwide test of the system. This was supported with a broad public advertising campaign and a subsequent

Colmar Brunton survey, which estimated that approximately 34% of the population received the test message. This percentage will grow as new handsets come into the market and older handsets are retired. The average turnover of mobile phones is two years.

The project achieved the following benefits for the emergency management sector:

1. Where possible provides appropriate lead-time to allow the public to take action (i.e. time to effect warnings and faster public response time).
2. Greater potential to reduce risk to life and property (i.e. higher penetration of warnings in targeted areas).
3. Safer and more appropriate use of emergency resources (i.e. reduced time spent on alerting and warning and reduced 111 call loading).
4. Ability to target effective information to at risk communities (i.e. limit disruption and recovery time).

User agencies are responsible for ensuring that these benefits are realised on an ongoing basis, with MCDEM providing oversight and maintaining its role as system custodian. Since the system went live in November 2017, it has been used four times to warn communities at risk (as at 1 June 2018).

Globally, the use of cell broadcasting is not necessarily new as it was used in Hong Kong for SARS in 2003 but it is becoming increasingly more popular. Some other countries that have implemented this technology include the Netherlands (2012), Lithuania (2012), Japan (2007), Israel (2014), Chile (2011), USA (2012), Taiwan (2016), South Korea (2012), Sri-Lanka (2009) and Canada (2018).

## Method

This paper provides an insight into the decision making around using a new piece of technology available to emergency management practitioners in New Zealand. Information presented in this paper was gathered using the social science method of participant observation. The authors of this paper from the Taranaki Civil Defence Emergency group were both members of the Incident Management Team, one the Intelligence Manager, and the other the Response Manager. The contributing author from the Ministry of Civil Defence Emergency Management was heavily involved in the implementation of the EMA system and supported the Taranaki CDEM team throughout this first large-scale use of the technology.

At the time of this emergency occurring no forethought was given to writing a scientific paper about the emergency. Therefore, the tracking of communications statistics only occurred post-event. A comprehensive debriefing paper written by the PIM team manager, along with other debriefing meetings assisted the authors with compiling this paper and developing the conclusions.

## The emergency

Ex-Cyclone Gita tracked through New Zealand on Tuesday 20 February 2018 with associated high winds and storm surge experienced in Taranaki. The high winds caused widespread damage to much of the Taranaki Region from approximately 16:00 to midnight. Lifeline utilities including roads, power, telecommunications and water supplies within the region were impacted. A State of Emergency was declared for Taranaki Region on Tuesday 20 February at 19:50.

New Plymouth city's water supply was interrupted by a windblown tree, which fell and severed a section of trunk main water supply pipeline (carried on a pipe bridge) between the water treatment plant and service reservoirs in the late afternoon. About 10,200 households were in the affected zone where complete water loss was experienced in the pipelines for varying periods of up to five days until the pipe repair was complete.

By 13:00 on Wednesday 21 February New Plymouth District Council, in conjunction with the Medical Officer of Health for Taranaki, had identified the need for a boil water notice for the entire New Plymouth City water supply area (about 26,000 properties). This was due to water quality issues caused by low reservoir levels, potential ground water contamination during the initial pipe break and the possibility that raw water was about to be introduced to the reticulation system overnight. The boil water notice needed to remain in place for at least one week after pipe repairs were complete and the water reticulation system replenished. This was due to the requirement for three consecutive days of clear results before the notice could be lifted (the testing process for e. coli takes several days for each sample).

### Methods of warning the public about the risk

All available methods of contacting such a large population were utilised by the New Plymouth District Council including phone calling, door knocking, website, social media, radio, newspapers, letter drop, and television news. 70 volunteers were deployed to undertake the letter drop but only 30-40% of the 26,000 properties had been reached by Wednesday evening – 24 hours after the potential contamination had begun<sup>1</sup>.

Vulnerable residents such as elderly people who no longer subscribe to the local newspaper and are not online proved difficult to reach in a timely fashion. Taranaki has just one major network radio station with local presenters from 6am-10am on weekdays<sup>2</sup>. All other radio and television stations receivable in Taranaki are nationally broadcast and the boil water notice wasn't being read out as news at every bulletin. The council purchased advertising time on these radio stations to ensure local broadcasting of the message. This still left gaps in the population, as many young people tend not to listen to broadcast media such as radio and television – choosing instead to consume YouTube and Spotify style entertainment sources.

There were also a significant number of tourists expected to start arriving in the region for an event beginning on the Thursday morning.

### A decision to use the Emergency Mobile Alert (EMA) system for the Boil Water Notice

The Taranaki Civil Defence Group Controller was very aware of the Havelock North (located in the Hawke's Bay region of New Zealand) outbreak of gastroenteritis in August 2016 due to water supply contamination. Some 5,500 of the town's 14,000 residents became ill with campylobacteriosis. About 45 people were subsequently hospitalised in relation to the outbreak. It is possible that the outbreak contributed to three deaths (Government Inquiry into Havelock North Drinking Water, 2017).

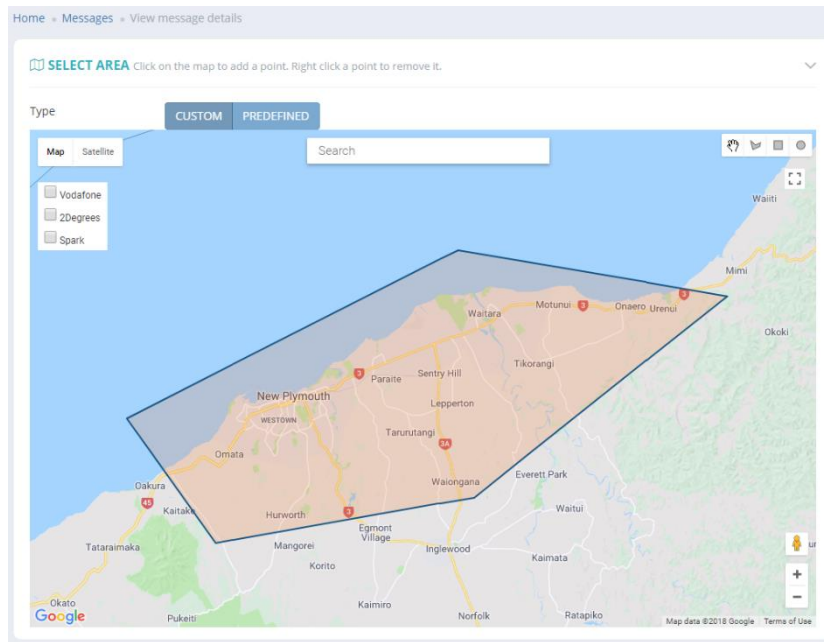
The duty group controller, the duty Emergency Management Advisor (trained and authorised to use EMA), and a New Plymouth District Council staff held a meeting at 19:00 on Wednesday 21 February to discuss whether sufficient effort had been made to warn the public about the need to boil water. The team agreed that further effort could be put into ensuring that everyone in the affected water supply area was aware of the boil water notice, particularly people arriving in the region for large-scale tourism events due to start the next day. This led to discussions about the use of EMA as a warning tool. Knowing the potential for water supply contamination to cause a major outbreak meant that the Controller considered that the risk to life met the threshold for use of the EMA system.

A telephone call between the Taranaki CDEM duty group controller and staff at MCDEM clarified that the EMA system could be used for the purposes of a boil water notice given that the incident at the time met the thresholds defined within the Emergency Mobile Alert: Protocols for User Agencies that were developed in collaboration with and agreed to by all user agencies. The protocols state that the EMA system is used to issue high-priority alerts only as defined by three criteria: 1. Certainty, 2. Severity, 3. Urgency. As the drinking water contamination event was 'likely to occur', posed a 'severe threat' (illness and possible deaths) to the region and required action (boil water/do not drink water) to be taken immediately by the public; the decision to issue an EMA was supported.

The message was written using short messaging best practice guidance developed by GNS Science and templates prepared by the Ministry of Health that were preloaded onto the system. The extent over which drinking water was supplied to residents defined the area that the message was sent. Taranaki CDEM staff however knew from their training that many people located just outside the water supply area would also receive the message. The duration of the broadcast was initially set to 6 days, which was the duration for which people would have to boil their water. Due to unexpected handset behaviour and feedback from the public, this was later shortened to four days.

<sup>1</sup> Source: situation reports during the event.

<sup>2</sup> There are three other local community radio stations with small listener bases.



Actual message:

*Taranaki Civil Defence advise that all users in the New Plymouth area are advised to boil all water for drinking until further notice. Boil all water for: drinking, making up formula, juices and ice, washing fruits and vegetables, other cooking needs, and brushing teeth. All water (including filtered) needs to be continuously boiled for at least 1 minute. 'Instant' boil water systems do not boil water sufficiently. It is OK to use jugs with an automatic cut-off switch as long as they are full. Do not hold the switch down to increase boiling time. We encourage you to check your neighbours are aware of this information. For further details visit the New Plymouth District Council Website [www.newplymouthnz.com](http://www.newplymouthnz.com) and [www.health.govt.nz/boilwater](http://www.health.govt.nz/boilwater).*

### Feedback from the public

Taranaki Civil Defence Emergency Management broadcast the alert at 20:39 on Wednesday 21 February 2018 to all geographical areas within a broad polygon covered by the boil water notice (see Map 1).

The use of an EMA for a relatively large geographical area including over 57,500 usual residents meant that there was going to be a high level of public interest in the alert technology. As it is a one-way broadcast system, there is no way of accurately determining how many handsets actually received the alert but based on the survey results from the national test we know it could have been anywhere up to 15,000 handsets. We do know that the system performed as expected with all telecommunication companies reporting 100% success rates on delivery to cell sites within the selected area.

The Taranaki CDEM Emergency Coordination Centre staff were soon contacted by various means (phone, social media, and email) by hundreds of people who didn't receive the alert and thought they should have or received the alert and didn't want it. It also emerged that some people were receiving repeated alerts on their handsets. At the time, the guidance provided by MCDEM was that repeated alerts were a result of a setting on the handset, where the user could select a setting for them to receive reminders of the alert. However, the PIM team, in exploring this further, found that this was not the sole reason. Factors causing handset variability brought to the attention of the PIM team included the following, however we now know after subsequent investigations that the last three points were not entirely accurate (see below).

- Phone make and model,
- Phone settings and its software updates,
- The owner's ability to manage phone settings,
- Travelling out of, then returning, to the alert area, triggering a new alert each time,
- Patchy cellphone coverage (many towers were on battery power following widespread power cuts), with the alert repeated at the end of every 'dropout',

- Related to patchy coverage, delivery/reception of data switching between 3G and 4G, triggering a new alert with each change.

The complexity of issues being experienced by the public and the variety of handsets made it difficult to deliver succinct messaging to maintain public confidence in the EMA system during the event. As a result of repeated alerts many people were asking how they could turn off the alerts. Another side issue causing confusion was that for some people, the alerts were headed 'Presidential Alert'. We understand that this is caused by handsets that have been parallel imported. Parallel imported handsets may also have different technical builds and other irregularities not aligned with New Zealand standards.

At the peak of public queries about the EMA system, two people were working almost exclusively on answering queries received via social media, phone and email. It is estimated that the overall workload of the PIM team doubled compared to an emergency of a similar size where no EMA was used. The majority of the queries related to issues arising with handsets (the key theme was repeated alerts) rather than confusion about the actual emergency but this was somewhat dictated by the nature of the emergency and low levels of perceived threat. Over 350 comments and queries were made on the Taranaki CDEM Facebook page, including 47 direct messages with questions that required a detailed response. The number of phone calls and emails in relation to this issue were not tracked during business hours but were reported as being constant and time consuming. The after-hours duty officer dealt with seven phone calls that took approximately two hours to complete. The public had high expectations for the Taranaki CDEM team to have detailed knowledge of the EMA technology and all the different types of handsets. Some examples of social media feedback received by the PIM team, and the responses, are still publicly available on [www.facebook.com/TaranakiCivilDefence](http://www.facebook.com/TaranakiCivilDefence).

### Investigation into Handset Variability post Cyclone Gita

This was the third but largest use of the EMA system in a live emergency context in New Zealand<sup>3</sup> and the learnings from this event were significant. The main learnings included:

1. Additional PIM resource was required to manage public enquiries caused by the extended reach of the tool as well as the handset variability issues that people experienced,
2. The lack of succinct information that could be provided to the public on handset issues due to the wide variety of handsets on the market, and
3. The previously unidentified issue of repeating alerts on handsets where the alerts reminder setting was turned off.

Public feedback to the nationwide test in November 2017 identified some of this unexpected behavior in handsets so in December 2017 the project was extended until 31 May 2018, to allow time to conduct more handset testing. Unfortunately the results of this testing were not available by the time the EMA was used in Taranaki but the public feedback that the Taranaki Public Information team collected was considered as part of the investigation. The investigation focused on two main aspects:

1. Why EMA capable handsets with the correct version of software did not receive the alert.
2. Why alerts appeared repeatedly on some handsets even with the alert reminder feature turned off.

Findings from the testing revealed that there is a limitation on 3G networks where some handsets will not receive messages longer than 90 characters. This means that even with the correct model of handset and the right software installed, some phones will still not receive messages longer than 90 characters. To mitigate this issue mobile operators have recommended that agencies reduce some messaging down to 90 characters to extend the reach. This would be dependent on the seriousness of the event and the information in the alert. MCDEM are working on developing processes to work around the issue.

Some older and parallel import handsets have latent cell broadcast capability that causes the handset to repeat EMA messages. The recommendation from mobile operators to resolve the repeating alerts issue is to avoid sending messages over prolonged periods. Unfortunately, there is nothing that can be done to correct these handsets and it is just a matter of time to phase out the old technology. These are just two more considerations when deciding to use the EMA system until the handset technology overcomes these issues.

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<sup>3</sup> It had been used three days previously, also in New Plymouth, for a large ammonia leak whereby people in the suburb of Bell Block were warned to stay indoors with windows and doors closed for a couple of hours. The day before it was used in the Buller District to alert the public of severe weather and to find a safe place.

The Ministry of Civil Defence & Emergency Management has worked closely with user agencies and mobile operators to share the learnings from the use of the system in Taranaki (as well as from the nationwide test and other recent uses of the system). This Ministry, in collaboration with user agencies, has updated public information resources, created new 90 Character predefined messages, updated existing short messages, made enhancements to the system, facilitated exercises and developed decision-making guidelines. Another nationwide test is likely towards end of 2018, where agencies will be able to assess some of these variability issues further.

## CONCLUSION

The Taranaki CDEM Group and MCDEM, upon reflection, have concluded that the EMA system was a valuable way to reach a large number of people in a short space of time for a boil water notice style of emergency. While the EMA system worked as expected, one of the ongoing challenges is the variability of handsets. The interaction between private sector mobile manufacturers and MCDEM about the diverse technical specifications and functionalities available on handsets will continue. MCDEM have issued a technical standard with regard to the setup of handsets however getting consistency across global phone manufacturers when New Zealand is such a small country is an ongoing challenge.

Given the rapidly changing nature of the technology and its variable performance on different handsets, it should only be considered as one of many sources of warning to the public. The drop-off in numbers of people consuming broadcast media such as radio and live TV means that developing better ways to communicate in a timely manner about emergencies is critical. A heavy emphasis should still be given to educating the public about taking heed of natural warning signs for natural hazard emergencies.

## ACKNOWLEDGMENTS

Thank you to the public of New Plymouth District for being cheerful, resilient and helpful in an unusual state of emergency. Thanks also particularly to the PIM team and the rest of the Taranaki Civil Defence Emergency Management staff who coped very well with an unusual set of communications requirements around this technology.

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