



Survey +Spatial NZ Disaster Response and Recovery Group

Version 210608 (yyymmdd)

Additional Documentation to be read in conjunction with this Documentation

Version	Name
200121	Company Charter (Company Volunteer)
200121	Volunteer Charter (Personal Volunteer)
Xxxxx (not prepared)	Training Program/manual
Yyyyy (not prepared)	Company Volunteer List
Zzzzz (not prepared)	Personal Volunteer List

S+SNZ Disaster Response and Recovery Group

1. Purpose

The purpose of this initiative is to establish a volunteer Disaster Management and Recovery group, from Survey and Spatial New Zealand (S+SNZ), to work with other national organisations in responding to emergency situations, as required. The group will be made up of survey professionals drawn from across the various S+SNZ streams. These volunteers can be called on in times of emergency to deliver reliable and consistent measurement and positioning information relevant to needs of the emergency situation.

Aims:

- Build a coordinated national network of surveying professional volunteers (organisations and individuals) able to respond to immediate disaster recovery needs
- Provide leadership and coordination of volunteer surveyors for information acquisition when a disaster strikes
- Develop a strategy and establish a framework that can stimulate and coordinate volunteer surveying disaster recovery efforts in the event of future disasters
- Connect and raise awareness with national emergency response teams so they understand when and how to call on volunteer surveyors to support a response (and planning)
- Provide basic training for volunteers to ensure they are technically prepared for any future events.
- Develop a catalogue of resources and/or capabilities that can be accessed to support response requirements.
- Adopt policies and standards for volunteer data collection that are interoperable with the needs of broader government response teams and ensure nationally, optimal geodetic survey standards are met.

2. Background

Natural hazards are part of life in New Zealand. As a community we need not only to mitigate against the 'Big 5' (Earthquakes, Tsunami, Volcanos, Landslides and Floods), but also to respond with the appropriate volunteers in an efficient manner when a major incident triggers an emergency response.

Survey + Spatial New Zealand (S+SNZ) is the national body for surveyors and spatial professionals, covering both land and sea. With a central National Office and regional branches, it is ideally structured

to coordinate a National Emergency Response support team made up of volunteers from across the regions.

There is an existing spatial volunteer group to support emergency management response (GIS4EM). In addition to spatial support, S+SNZ see an opportunity to make use of members' skillsets in survey measurement and positioning to support emergency response situations, as well as drawing attention to vulnerable environments (including buildings) and conditions during planning and assessment of risk.

Case study: The 2011 Christchurch Earthquake Response

The 2011 Christchurch earthquake response drew on the expertise of land surveyors and hydrographic surveyors. At the height of the response there were approximately 20 land surveyors working in shifts with the USAR teams along with surveyors assisting the Civil Defence Emergency Management (CDEM) team in assessing buildings and mass movement.

The land surveyors' ability to accurately measure and monitor and report movement to the millimetre (mm) provided certainty in determining the movement of structures from their original position and tracking any ongoing movement during aftershocks. This helped ensure the safety of the rescue teams working in the buildings in the immediate search and rescue efforts, and enabled engineers and geologists to provide risk assessments and set priorities around re-establishing infrastructure, building, and slope stability during and after the earthquake period. With surveyors involved in the response teams within CDEM, interpretation of the captured data could also be supplied.

Hydrographic surveyors carried out a check survey of the main navigation channel into Lyttleton Harbour immediately after the earthquake to determine if there was any significant uplift of the seafloor that would limit vessel access to the port. This was followed by a similar survey of Akaroa Harbour, identified as an alternative to Lyttleton. Surveyors also assessed tide gauge damage and affected data streams in their reduction of hydrographic surveys and the reinstatement of height datums in ports and harbours to ensure safety at sea.

Current Challenges

When the call was made to the survey community for assistance following the Christchurch earthquake, some of the challenges that those first responders faced were:

1. **Accessing surveyors.** Finding surveyors - locally, regionally or nationally - who could attend and assist with the response, thereby allowing those local professionals directly impacted to focus on managing their own business and personal response situations;
2. **Being able to access survey Systems (including equipment, software, processing and datasets).** Much of the local 'survey equipment' was stored in earthquake affected buildings which were not safe to enter, thus rendering it inaccessible for use. The need for engineers to establish an acceptable level of risk to extract instruments and processing equipment became paramount – but potentially an unnecessary distraction if systems could have been made

available from elsewhere. Permissions to access restricted roads, tunnels, areas of damage and purchase fuel for vehicles and generators must be facilitated early-on.

3. **Coordination.** There would have been value from being able to act in a coordinated and consistent manner, to ensure that the delivery of data to end users (USAR teams, Engineers Geologists, Port Managers and Harbour Masters) was in a standard or appropriate format which could then easily be interpreted.

4. **Preparation.** Surveyors had to put together systems and cope with situations on the fly which they were not prepared for despite their professional experience and training. Some advanced training and response planning would better prepare surveyors to respond effectively when needed. 'Preparation is the key, but nothing can prepare you'.

5. The challenge was NOT in the measuring or data analysis skills of the surveyors.

3. Survey and Spatial Expertise

Survey professionals can add a unique set of skills to an emergency response that can support safer and more informed rescue operations and impact assessments.

Examples of where surveying expertise has been used in emergency situations include:

- Continually monitoring a structure to check if it is moving while USAR teams search the building – and then notifying the USAR team if movement occurs,
- Determining the lean of a tilt slab, walls and earthquake affected features of the built and natural landscape in which rescue operations are occurring
- Measuring the volume of material to be moved/or that could possibly move to support rescue operations
- Mapping navigable depths or changes in depth of waterways and susceptibility of coastal margins to tidal or storm flooding.
- Monitoring slip/earth mass movement including subsidence and uplift.

Our expertise is not only in reliability and consistency of measurement but also in understanding the errors that occur in measurement and mitigating those errors to determine a solution that is fit for the purpose. A surveyor is also often presented with many diverse projects and varied contacts which requires an open mind and problem-solving abilities.

The hardware (survey equipment) and software our experts use enables them to measure or determine angles, distances, heights, areas and volumes at ranges from millimeters to 100s of kilometers. Our experts also have a high level of competence in reading and understanding maps, plans, height datums and data with an appreciation of scales and map projections and presenting their results.

The experts understand the effectiveness and limitations of measuring equipment. They are trained in selecting the right equipment for the environment and then employing the appropriate techniques to

present the results with the accuracy, repeatability and consistency required.

Survey Equipment that our experts are typically trained in would include:

1. Levels
2. Total Stations
3. GPS/GNSS
4. Laser Scanners
5. Drones/UAV
6. Hydrographic systems including tide gauges, echosounders, boats and crew
7. Software including GIS for retrieval, processing and presentation of data.

4. Definition of an Emergency

S+SNZ members are in paid employment so it is therefore important to define work that is for “emergency purposes”. This includes being clear about what triggers a call to mobilise volunteers, and how this call works within of the framework of the NZ Governments Coordinated Incident Management System (CIMS <https://www.civildefence.govt.nz/resources/coordinated-incident-management-system-cims-third-edition/>)

We propose that the call for volunteers can only take place if:

1. There is an official declaration of a state of emergency, and
2. The event is both of an emergency nature and of national significance as defined by The Civil Defence Emergency Management Act 2002.

‘Emergency’ means a situation that—

(a) is the result of any happening, whether natural or otherwise, including, without limitation, any explosion, earthquake, eruption, tsunami, land movement, flood, storm, tornado, cyclone, serious fire, leakage or spillage of any dangerous gas or substance, technological failure, infestation, plague, epidemic, failure of or disruption to an emergency service or a lifeline utility, or actual or imminent attack or warlike act; and

(b) causes or may cause loss of life or injury or illness or distress or in any way endangers the safety of the public or property in New Zealand or any part of New Zealand; and

(c) cannot be dealt with by emergency services, or otherwise requires a significant and co-ordinated response under this Act.

‘National significance’ includes, without limitation, any case where the Minister or the Director considers that—

(a) there is widespread public concern or interest; or

- (b) there is likely to be significant use of resources; or
- (c) it is likely that the area of more than 1 Civil Defence Emergency Management Group will be affected: or
- (d) it affects or is likely to affect or is relevant to New Zealand's international obligations; or
- (e) it involves or is likely to involve technology, processes, or methods that are new to New Zealand; or
- (f) it results or is likely to result in or contribute to significant or irreversible changes to the environment (including the global environment)

Please note National Significance may mean offshore work as under section (d) above.

5. Working inside the CIMS framework

"New Zealand's Coordinated Incident Management System (CIMS) establishes a framework of consistent principles, structures, functions, processes and terminology for response and the transition to recovery." (Brook Barrington, Chair, ODESC, August 2019. NZ Governments Coordinated Incident Management System 3rd edition).

While the surveying professional may not be required at every emergency, the skills can play a pivotal role in any response.

The core skills of the surveying professional fit into the 'Intelligence' function of the CIMS and possibly also in a technical advisory role to the Incident Controller.

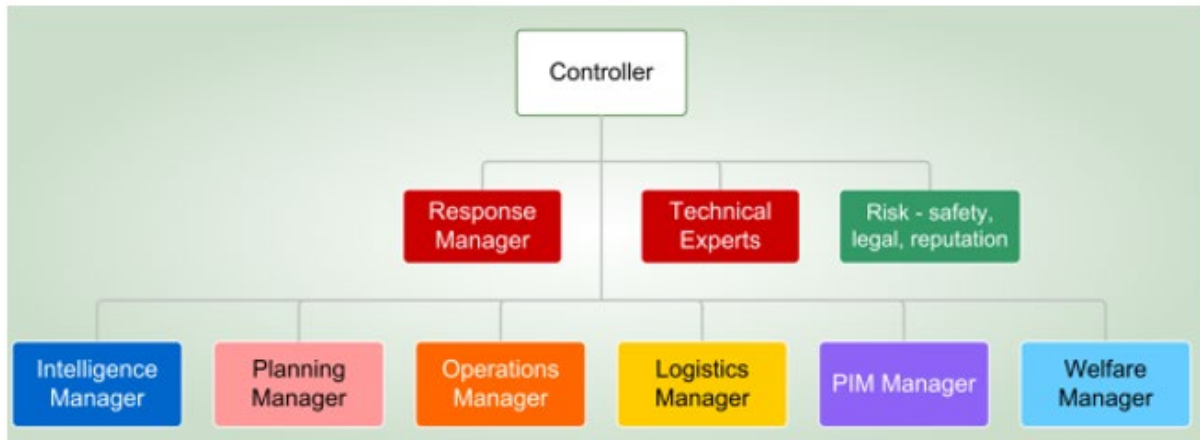
Core skills

- Evaluate and assess the quality and reliability of information
- Use a range of analytical techniques to assess and interpret information to 'add value'
- Carry out specialist measurement and monitoring tasks
- Numerical and analytical ability, problem solving, good attention to detail

The Intelligence function is defined in the NZ Governments Coordinated Incident Management System 3rd edition (<https://www.civildefence.govt.nz/resources/coordinated-incident-management-system-cims-third-edition/>). This function involves collection, analysis and dissemination of information.

The call to the land and hydrographic survey volunteers would be made through the Operations Function within the CIMS. The operations would reach out to either the Local S+SNZ representative or to National Office or Councilors Responsible (see flow diagram at end of document)

Incident Management team



Demobilization and return to normal business for the volunteer occurs at the end of the response as determined by the Incident controller.

5. The S+ SNZ Resilience Volunteers Roles and Responsibilities

During the time of an emergency event it is important that lines of communication remain open and that those who have volunteered are able to deliver on expectations.

Training for Volunteers should be ongoing.

Those who are Responsible in Council or as Regional Coordinators should at a minimum complete the Takatu, Civil Defense Foundation Course (free and on line

<https://takatu.civildefence.govt.nz/course/view.php?id=461>)

1) National Office

- i. Will maintain a national list of Individuals and Company (including systems available) Volunteers
- ii. Annually confirms that volunteers are still available for active work
- iii. Annually recruit and train volunteers
- iv. Annually passes volunteers contact details (in a manner that can be sorted as required) to S+SNZ Regional Coordinators, and S+SNZ Councilors responsible
- v. Promotes S+SNZ Resilience expertise to Professional Links
- vi. Builds relationships with national bodies (NMEA).

Encourage members to promote their disaster response expertise to clients and local. The regional coordinator may also receive the call if national office or councilors unable to be contacted. Intention is that in each region, there are contact points for the CDEM team to call upon

- vii. infrastructure managers when carrying out work.

- In an emergency
Receives instruction/requests from CIMS Controller or Operations
Communicates with Agencies (LINZ)
Receives instruction/requests from S+SNZ Regional coordinators on scene, or in the absence/unavailability of National office from the S+SNZ Councilor responsible
- Negotiates with Government contract for volunteer services in line with other professionals to minimize the economic impact on individuals and companies.

2) **S+SNZ Council**

- i. 2 x Councilors responsible (Sit on S+SNZ Council – Senior and Junior rolling 2 yrs.)
 - ii. Coordinates annual training/workshop for Volunteers
 - iii. Holds a copy of National Volunteers contact details (broken down by branch region).
 - iv. Actively engage with other bodies to promote expertise and build relationships
 - v. Coordinates with GIS4EM group and LINZ response group
 - vi. Develops standards or makes the most of/work with existing data standards and interoperability guidelines, for data collection and delivery that works within the NEMA framework.
- In an emergency
Makes contact with Regional S+SNZ coordinator – in absence/unavailability of the Regional S+SNZ coordinator – contact Volunteers & establish a NEW Regional S+SNZ Coordinator.
Take instructions/requests from S+SNZ regional coordinator
Receives instruction/requests from CIMS Controller or Operations

3) **Regional Coordinators**

- i. 1 per S+SNZ branch (Chair/ Secretary or Regional Coordinator)
 - ii. Geographically responsible for the branch's region
 - iii. Hold copy – accessible in time of emergency - of local volunteers and Councilors details
 - iv. Build & holds relationships with local Search & Rescue & other services (NEMA)
 - v. Coordinates with central for additional resources when needed.
- In an emergency
Offers of assistance made
Receives instruction/requests from CIMS Controller or Operations
Makes contact with National Office / CEO / President / Councilors
Makes contact with local & regional Volunteers
 - Attends CDEM operations center (EOC) as requested.
Coordinates all Volunteers activity under direction from Incident management team
Gives instruction/requests to S+SNZ Councilors & National Office.

4) **Volunteers**

- In an emergency

Wait until called upon.

If aware that an emergency situation is unfolding communicate with employer.

Negotiate availability for emergency call out with employer.

If called upon be clear in the time that they can commit.

Flow Diagram:

