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NZGIS4EM Symbology for Emergency Management

Prepared by NZGIS4EM Symbology working group (Fire Emergency NZ, Bay of Plenty Regional Council, Land Information NZ, Northland Regional Council, MCDEM, Eagle Technology) on behalf of NZGIS4EM

Document Approval

Name	Title	Signature	Date
Derek Phyn	Waikato REgional Council / NZGIS4EM Chairperson		Nov 2018
Craig MacAlpine	FENZ/NZGIS4EM symbology working group		Nov 2018

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Revision history

Author	Version	Dates	Comments
Craig MacAlpine	0.1	August 2018	Review and draft symbols in consultation with Symbology Working Group.
NZGIS4EM Symbology Working Group	0.1	August 2018	Version 0.1 drafted for consultation with the NZGIS4EM community at the SIG.
Craig MacAlpine	0.2	October 2018	Ongoing review and draft symbols in consultation with Symbology Working Group.
NZGIS4EM Symbology Working Group	0.2	October 2018	Version 0.2 draft for consultation with NZGIS4EM committee and technical advisors
NZGIS4EM Symbology Working Group	1.0	December 2018	Version 1.0 is released to the NZGIS4EM community and available for public use
NZGIS4EM Symbology Working Group	Review	6 monthly	A review of the document will be done 6 monthly by the NZGIS4EM symbology working group

Intended Audience

In December 2018, this document is intended to be released to the NZGIS4EM community for use/review and consultation. The symbols and documentation are in an early draft stage. All suggestions for changes or new symbols to be added are greatly welcomed. Please provide your feedback by emailing NZGIS4EM@gmail.com.

Acronyms and Glossary

CDEM	Civil Defence Emergency Management
EMSINA AHSS	Emergency Management Spatial Information Network Australia All Hazards Symbology Set
ESRI	Environmental Systems Research Institute
FENZ	Fire and Emergency New Zealand
GIS	Geographic Information Systems
HSWG	Homeland Security Working Group

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Infographic	Graphics used to visually summarise information, data or knowledge
MCDEM	Ministry of Civil Defence & Emergency Management
NAPSG	National Alliance for Public Safety GIS Foundation
NZGIS4EM	New Zealand Geographic Information Systems for Emergency Management
SIG	Special Interest Group: Gathering of individuals to discuss a topic of common interest. Usually held in parallel with major conferences.
UNOCHA	United Nations Office for Coordination of Humanitarian Affairs

NZGIS4EM

During 2016 and 2017, a series of major emergencies occurred in New Zealand. Geographic Information Systems (GIS) proved critical to generating and sharing intelligence, but lacked coordination across the country. In 2017, Eagle Technology facilitated a series of New Zealand Geographic Information Systems for Emergency Management (NZGIS4EM) workshops in Wellington, Auckland, Christchurch and Palmerston North. The workshops were led by Paul Doherty, formerly Eagle Technology, now with National Alliance for Public Safety GIS Foundation (NAPSG). A community of practice rapidly formed alongside the workshops, adopting the name NZGIS4EM. An Interim Committee was established, chaired by Derek Phyn from the Waikato Regional Council supported by Kate Waterhouse from the Bay of Plenty Regional Council as Secretary.

The Interim/Elected Committee was intended as a shared and coordinated voice for the use of GIS in Emergency Management across New Zealand. The core roles of the Committee were to advocate, educate, advise and to support, guide, and recommend best practice for GIS and Emergency Management practitioners while ensuring alignment to the principles and purpose of the Coordinated Incident Management System (CIMS). The Committee was not mandated to make decisions on behalf of the NZGIS4EM community or with regards to any products or services. However, the Committee could vote to make recommendations for decisions by a national governance group that was yet to be formalised.

At present the NZGIS4EM community has over 300 members from public, private, academic and charitable sectors. If you are interested in joining, contact Derek Phyn at nzgis4em@gmail.com.

NZGIS4EM Symbology Working Group

A subgroup of interim committee members led by Craig MacAlpine, Fire and Emergency New Zealand (FENZ), volunteered to form a Working Group to identify or draft a symbol set as the basis for a recommendation of a National Symbology Standard for Emergency Management. This document represents the first step towards developing the symbol set.

Purpose

NZGIS4EM Symbolology for Emergency Management

The purpose is to draft a set of symbols to form a basis for discussion with the NZGIS4EM community. Version 0.1 was released at the annual NZGIS4EM Special Interest Group (SIG) held on the 20 August, 2018 at the NZ ESRI User Conference (NZEUC) hosted by Eagle technology in Auckland. Feedback from the SIG participants was incorporated into Version 0.2. This version was then reviewed and approved by the NZGIS4EM Committee in November 2018. The symbols are intended for use in information products including maps, reports, dashboards, infographics, and websites.

All suggestions for changes or new symbols to be added are greatly welcomed.

Please provide your feedback by emailing NZGIS4EM@gmail.com.

Use of consistent symbols enhances information exchange, increases shared situational awareness, reduces production time and increases familiarity with standardised information products across the emergency management sector. Standardising the design of information products such as maps is a core requirement to ensuring that information is readily able to be interpreted by all viewers.

Consistent symbols can also indicate that the information presented uses common data and schemas, or a single source of truth. Furthermore, standards support interoperability and integration of data to enable shared information across organisations and operating systems in emergencies.

Scope

It is intended that this work on symbolology for emergency management may one day form the basis of a recommendation for a National Technical Symbolology Standard for Emergency Management, in the first instance sponsored by the Ministry of Civil Defence & Emergency Management (MCDEM) under the CDEM Act 2002. The standard should be regularly reviewed to evolve over time in the context of national and international best practices.

Approach

The majority of symbols considered by the NZGIS4EM Symbolology Working Group were sourced or adapted from the ANSI INCITS 415-2006 – Homeland Security Mapping Standard – Point Symbolology for Emergency Management which is based on the Homeland Security Working Group (HSWG) Version 2.20, released September, 2005. This is in recognition of the current use of these symbols in incident management systems by Fire and Emergency New Zealand (FENZ).

From 2003 onwards, FENZ formerly the New Zealand Fire Service (NZFS), in conjunction with National Rural Fire Authority (NRFA) and Ministry of Civil Defence & Emergency Management (MCDEM) worked on a symbol set based on HSWG and symbols sourced from NZFS and NZRA. The resulting symbol set was never formally adopted by these agencies, however, internal use highlighted the value of consistent symbolology. Some NZFS and NZRA symbols were adopted into the HSWG symbol set.

The HSWG symbol set has gaps in some symbol categories (NAPSG, 2013). These gaps were seen as an opportunity to start with a relatively open established baseline and place no bounds on possibilities by asking ‘which symbols would emergency management agencies in New Zealand additionally want to include’ alongside identifying ‘which symbols would emergency management agencies in New Zealand

want customised to be more recognisable for our national context'? Where an international symbol standard did not meet the requirement, a symbol was customised by Craig MacAlpine, FENZ.

The group acknowledges there are several other symbolologies for emergency management currently available or in development in the public domain. The working group have sourced or adapted some symbols from these sets, particularly from National Alliance for Public Safety GIS (NAPSG). Further symbols will be added and customised following consultation with stakeholders, the NZGIS4EM community, and updates to existing symbolologies. For example, later in 2018 a major update is expected of the Emergency Management Spatial Information Network Australia (EMSINA) Australian All Hazards Symbolology.

Existing Emergency Management Symbolology

Emergency Management Spatial Information Network Australia (EMSINA) All Hazards Symbolology Set

The Intergovernmental Committee on Surveying and Mapping (ICSM) and the Australia New Zealand Land Information Council (ANZLIC), supported by EMSINA developed the All Hazards Symbolology (AHSS) for adoption by emergency management agencies across Australia and New Zealand.

EMSINA have a process for accepting symbolology changes and are interested in considering whether there are opportunities for alignment between NZGIS4EM and EMSINA, particularly once EMSINA publish their latest symbolology set version. NZGIS4EM are in discussions with EMSINA and plan to review the new EMSINA symbols for adoption when released.

Environmental Systems Research Institute (ESRI) Emergency Management Symbol Sets

Environmental Systems Research Institute (ESRI) has designed emergency management symbols for ArcGIS. There are no restrictions on use. Some public domain symbols are attributed to the Noun Project, which are icons created by the global community.

Homeland Security Mapping Standard (HSWG)

The Symbolology Working Group has considered ANSI INCITS 415-2006 – Homeland Security Mapping Standard – Point Symbolology for Emergency Management. The group has not yet considered the current standard ANSI INCITS 415-2006 (R2017) Information Technology - Homeland Security Mapping Standard.

National Alliance for Public Safety GIS (NAPSG) Foundation

National Alliance for Public Safety GIS (NAPSG) Foundation is a not-for-profit organization that specialises in decision-support technology for public safety and emergency management. The NAPSG symbol set is reviewed and updated frequently. For more detailed information, see [NAPSG Overview Document: Incident Symbolology – Phase 3](#). NZGIS4EM are in discussions with NAPSG and plan to review any new NAPSG symbols for adoption when released.

United Nations Office for Coordination of Humanitarian Affairs (UNOCHA)

United Nations Office for Coordination of Humanitarian Affairs (UNOCHA) designed all hazards symbols for use across multiple audiences, including the general public, during disaster and humanitarian relief. The symbols are available for use in the public domain and suggest crediting OCHA whenever possible. They can be downloaded from the Noun Project in any colour required.

Symbols selected by NZGIS4EM

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Of 155 draft symbols selected by the NZGIS4EM Symbology Working Group, 51 symbols were customised by FENZ. The remainder were sourced from HSWG (70), NAPSG/UNOCHA (7), NRFA (22) and NZFS (7). Table 1 summarises a selection of existing symbol sets for emergency management.

Table 1. Symbology Sets for Emergency Management

Organisation	Purpose	Formal Standard	License	Shapes	Border	Symbols adopted	Accept suggestions for new symbols
EMSINA AAHS	Emergency Management	No	Public Domain	No	Yes	0	Yes
ESRI EM	Emergency Management	No	Public Domain	Yes	No	0	Yes
HSWG/ ANSI INCITS 415	Emergency services	Yes	Public Domain	Yes	Yes	70	Unsure
NAPSG	Emergency responders	No	Public Domain	Yes	Yes	<5	Yes
UNOCHA	Humanitarian and disaster relief	No	Public Domain	No	No	<5	Humanitarian symbols only

Design of the NZGIS4EM Symbology for Emergency Management

Symbol set	The symbol set includes point symbols. Future work will cover lines, polygons and attributes or levels e.g. indicating status.
Shape	The shape of the symbol represents categories of symbols <ul style="list-style-type: none">• Incidents are represented as diamonds with a black outline• Operations are represented as circles with a green outline• Infrastructure are represented as squares with a black outline
Border	ANSI INCITS 415-2006 allows for border colours to change to indicate the extent of damage or level of operation.
Colour	All symbols are on a white background to be visible irrespective of the basemap or imagery used. The symbols are designed to be distinctive when printed in either colour or black and white. Where colour elements were added, they did not affect any black and white representation.
Naming	Each symbol is named according to its representation and the size of the symbol e.g. Flood_256.png
Format	The symbol set is published in Portable Network Graphics (PNG) format at 256 x 256 pixels suitable for printing large A0 to A3 maps for planning and briefing

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purposes. If a small symbol is required (below 12 point), the category shape can be used as the symbol. For instance, use a diamond to represent an incident.

NOTE - NZGIS4EM symbology working group will consider providing further formats and sizes requested (this will include .svg) after the 6 month review period.

Use of NZGIS4EM Symbology for Emergency Management

The Emergency Management Symbology for New Zealand is available for download from the NZGIS4EM website, see nzgis4em.wordpress.com.

There will be no restrictions on the use of the symbol set unless restrictions are implied through adoption of an international standard. Refer to page 12 for sources.

The symbol sets for emergency management listed in table 1 are all published in the public domain. This appears preferable to licensing under Creative Commons as all types require attribution in products.

An option for consideration would be offering the symbols created by NZGIS4EM for download from the Noun Project, with a suggestion to attribute NZGIS4EM where possible and notify use and/or feedback via email.

References

ESRI Emergency Management Symbol Style (2018):

esri-styles.maps.arcgis.com/home/item.html?id=41f01365fe4f4aee89af5fd817fc97b2

Homelands Security Working Group (2005) Incidents Symbology Reference, Version 2.20, Released September 14: www.fgdc.gov/HSWG/ref_pages/Incidents_ref.htm

O'Rourke, P. (2015) Overview Document: Incident Symbology – Phase 3, National Alliance for Public Safety GIS Foundation in partnership with Ardent Management Consulting:

www.nisconsortium.org/portal/resources/bin/Overview_Document:_I_1424817090.pdf

NAPSG Foundation (2018) Symbology: <https://napsg-web.s3.amazonaws.com/symbology/index.html#/>

The Noun Project (2018) thenounproject.com

NZFS (2005) New Zealand Fire Service Standard Incident & All Hazards Symbology Used by Emergency Services in New Zealand

NZGIS4EM Training Story Map Series (2018): <http://arcg.is/2ixzcqV>

UNOCHA Humanitarian Icons (2012)

reliefweb.int/report/world/world-humanitarian-and-country-icons-2012

Natural Hazards



Flood²



Wind⁴



Tropical Cyclone²



Tornado^{2,6}



Storm Surge⁴



Tree Down⁴



Snow & Ice^{2,6}



Avalanche^{2,6}



Earthquake⁴



Tsunami⁴



Subsidence²



Landslide²



Landslide Dam⁴



Volcanic Threat⁴




















Volcanic Eruption⁴










Incidents



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Warning Generic ⁴	Unknown ⁴	Power Outage ⁴	Vehicle ¹	Air ¹	Rail ¹	Marine ¹	Cruise Ship ⁴
							
Medical ⁵	Quarantine ⁴	Poisoning ¹	Hazardous Material ¹	Toxic substance ^{4,5}	Toxic Gas ¹	Radioactive Material ¹	Cell Tower ⁴
							
Bomb Threat ¹	Bomb Explosion ¹	Unexploded Ordnance ¹	Shooting ¹	Rioting ¹	Displacemen t ¹	Pandemic ⁴	Coastal Erosion ⁴
							
Ground Contaminati on ⁴							

Fire - Incidents

							
Fire ^{4,5}	Hot Spot ^{1,5}	Origin ^{1,5}	Residential Fire ^{1,4}	Vegetation Fire ^{4,5}	Sprinkler ⁴	Private Fire Alarm ⁴	False Alarm ⁴
							
Natural Disaster ^{4,5}							

Hazardous Material - Incident *International standard not possible to modify this category*

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Hazardous
When Wet¹



Explosive¹



Flammable
Gas¹



Flammable
Liquid¹



Flammable
Solid¹



Non-Flammable
Gas¹



Organic
Peroxides¹



Oxidizers¹



Infectious¹

Operations



Temporary
Emergency
Medical
Operation¹



Temporary
Hospital⁴



Temporary
Ambulance
Station⁴



Temporary
Fire Station⁴



Temporary
Police⁴



Temporary
Pharmacy⁴



Temporary
Triage⁴



Temporary
Fire
Hydrant^{1,4}



Ambulance⁴



Medical
Evacuation
Helicopter
Station⁴



Emergency
Water
Distribution
Point⁴



Emergency
Food
Distribution
Point⁴



Check Point¹



Road Block⁴



Fire
Appliance
Urban (AVL
status)⁴



Customs
Service¹



Civil
Defence
Centre⁴



Community
Led Centre⁴



Assembly
Area⁴



Staging
Area⁴



Casualty
Clearing
Point⁴



Cooling
Centre⁴



Warming
Centre⁴



Incident
Control
Point^{4,3}



Coordination
Centre⁴



Communication^{3,5}



Logistics³



Ground
Support
Unit³



Safe
Forward
Point⁵

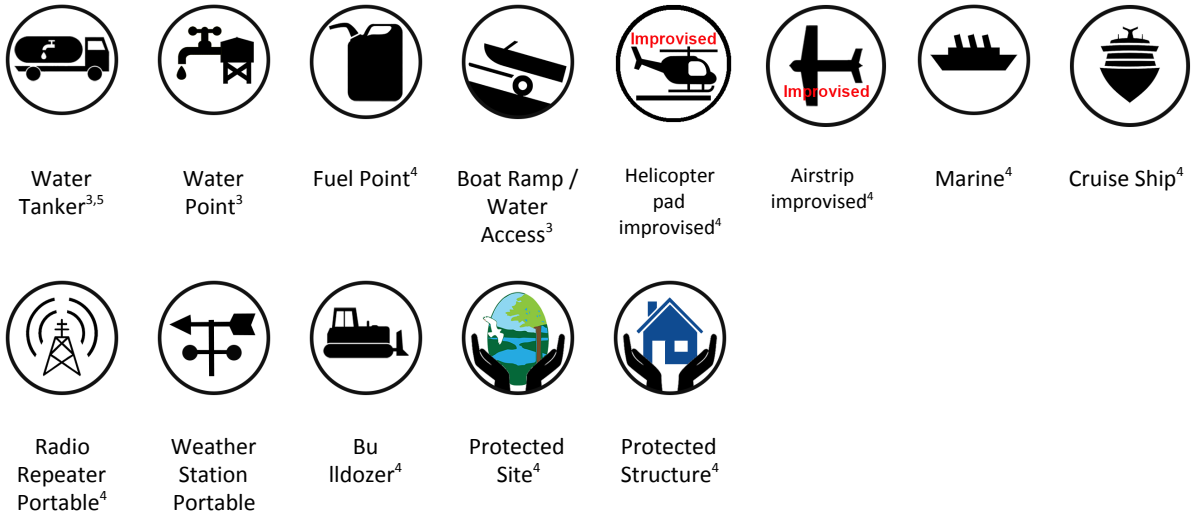


Situation
Unit³

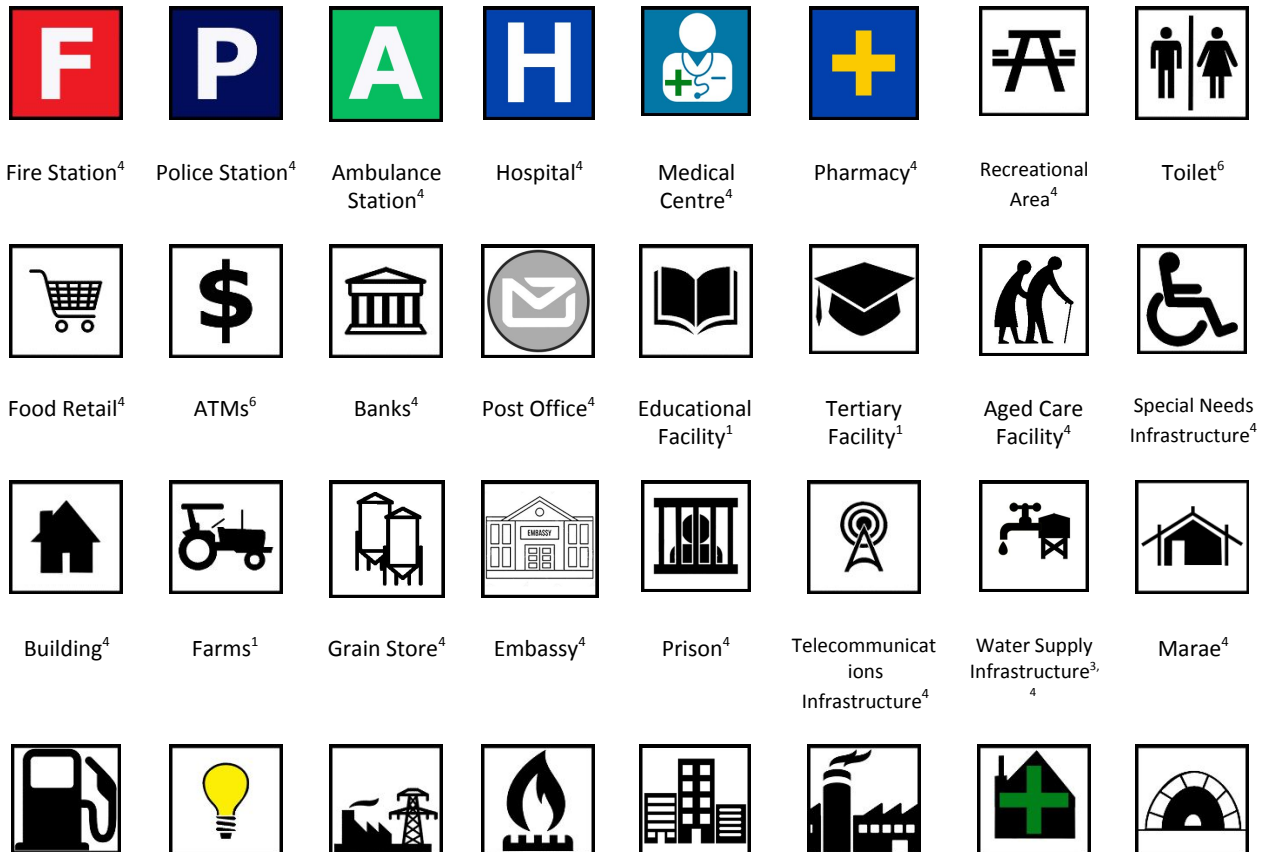


Safe Zone³






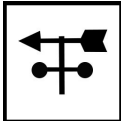











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Infrastructure



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Fuel Facilities ⁴	Energy Facilities Infrastructure ⁴	Generation Stations ⁴	Natural Gas Facilities ⁴	Commercial Infrastructure ⁴	Industrial Site ⁴	Pharmaceutical Manufacturer ⁴	Tunnel ^{1,2}
							
Hazardous Material Production ¹	Dam ^{1,4}	Landfill ¹	Recycling Centre ⁴	Water Depth ⁴	Weather Station Fixed ⁴	Camera/CCTV ⁴	Tsunami Siren ⁴
							
Bus Station ¹	Boat Ramp ⁴	Port ¹	Rail Station ^{1,2}	Airport ⁵	Airstrip ⁵	Helicopter Landing Site ⁴	Maintenance Facility ¹
							
Bridge ⁴							

Roads

			
Road Closed ⁴	Partial Open Road / 4WD ⁴	Road Open ⁴	Unaffected by Incident ⁴

Symbols sourced or adapted from:

¹ Homeland Security Working Group (HSWG) Version 2.20, released September, 2005:

www.fgdc.gov/HSWG/ref_pages/Incidents_ref.htm

² NAPSG Foundation (2018) Symbolology: naps-g-web.s3.amazonaws.com/symbology/index.html#

³ National Rural Fire Authority (NRFA), currently Fire and Emergency New Zealand

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⁴ New Zealand Geographic Information Systems for Emergency Management (NZGIS4EM)

⁵ New Zealand Fire Service (NZFS), currently Fire and Emergency New Zealand

⁶ United Nations Office for Coordination of Humanitarian Affairs (UNOCHA):
reliefweb.int/report/world/world-humanitarian-and-country-icons-2012 and
thenounproject.com/ochaavmu/collection/ocha-humanitarian-icons