New Zealand Lifelines Council

WAKA KOTAHI NZ TRANSPORT AGENCY

Spark New Zealand

Firstgas

TRANSPOWER
Keeping the energy flowing

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Vector

Land Information New Zealand
Toitū te whenua

water NEW ZEALAND
The New Zealand Water & Wastes Association Waiora Aotearoa

EQC
EARTHQUAKE COMMISSION

CIVIL DEFENCE
National Emergency Management Agency
Te Rākau Whakamarumaru

GNS SCIENCE
TE PŪ AO

LIFELINES GROUPS -

Lifeline utility representatives collaborate with scientists, emergency managers and other professionals in regionally-based Lifelines Groups.

Members of the Groups exchange information and support collective projects to reduce infrastructure outage risks and to promote readiness for emergency responses when outages occur.

In these ways, the Lifelines Groups support member utilities in meeting their obligations under section 60 of the CDEM Act 2002.

Source: Guide to the National CDEM Plan 2015, Chapter 7, Clusters.

LIFELINES GROUPS – WHAT LIFELINE UTILTIES WANT

Maintaining / building inter-lifeline relationships and mutual knowledge of interdependencies

Raised awareness and commitment to building resilience in your own organisation

Information on wider impacts to support your own risk assessments

Meeting legislative obligations

Access to, and understanding of how to use, hazard information

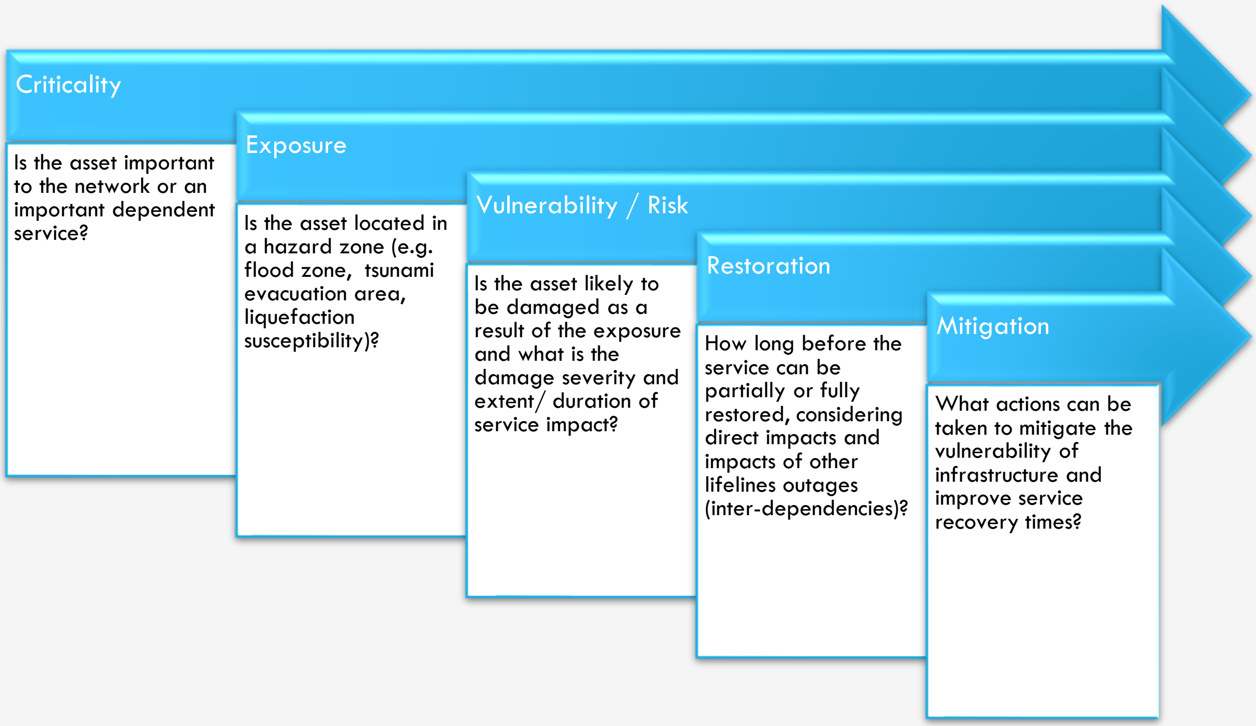
Building staff/management/Board/Council knowledge

Contribution to wider community resilience

Understanding collective response arrangements / visibility of response plans

Information to support 'resilience' business cases for funding

YOUR BASIC LIFELINES PROJECT – MULTI-HAZARD / ALL 'LIFELINES' ASSETS



Regional Resilience Improvement Programme (monitored by lifelines/CEG).

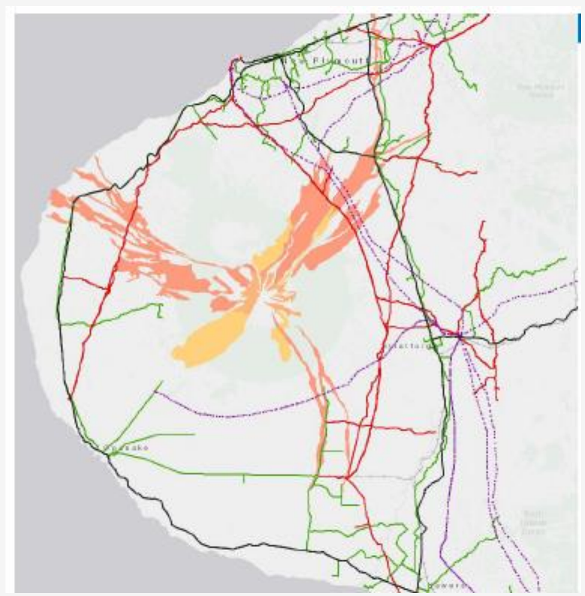
- Lifeline Utility Mitigation Projects (e.g. network resilience upgrades).

- Prioritised Lifelines Projects (e.g. hotspots plans).

- CDEM Projects (e.g. Generator Plan, Helicopter Plan)

THE FOLLOWING TYPES OF DELIVERABLES

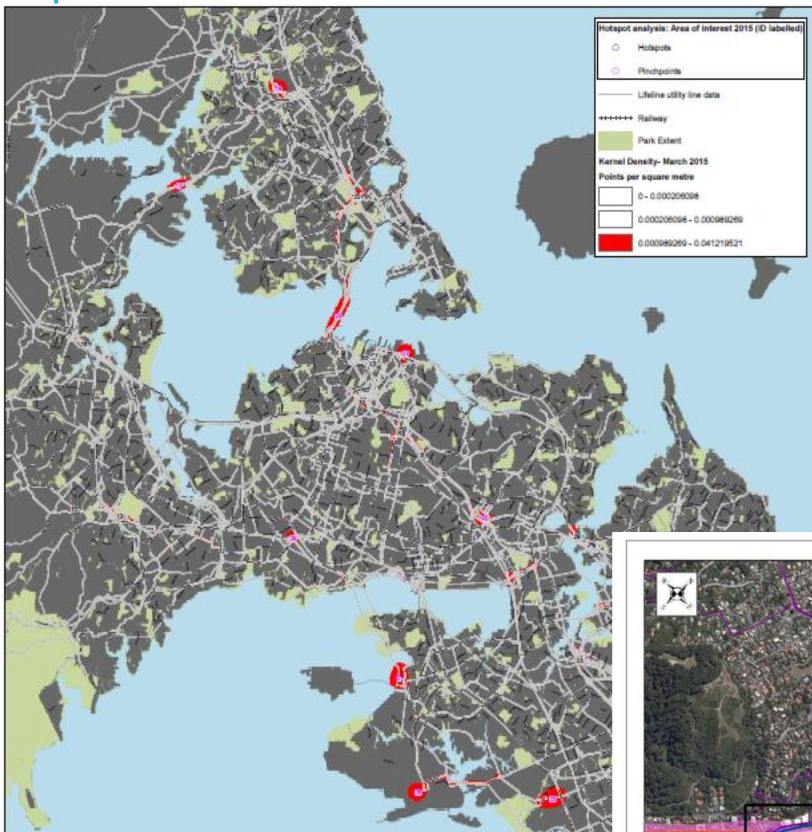
- Mapped critical assets and hazards (ability to view)
- Assessment of vulnerability, recovery times and potential mitigations.
- Interdependency Analysis
- Hotpots/ Pinchpoints

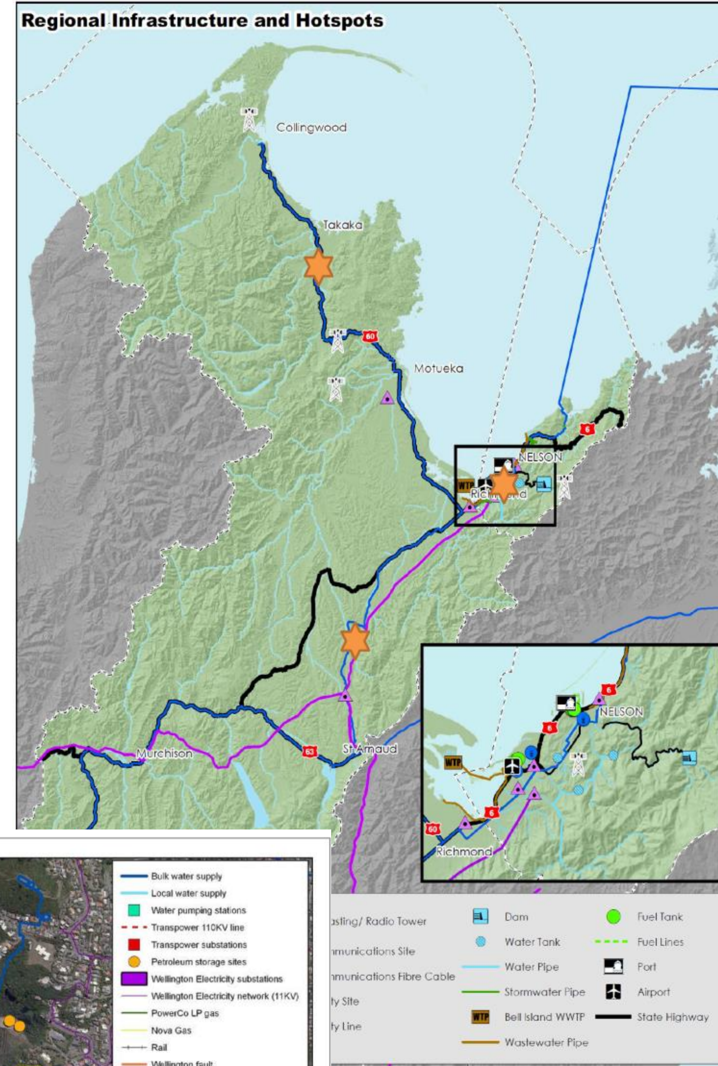


The degree to which the utilities listed to the right are dependent on the utilities listed below	STDC water	SDC water	NPDC water	Wastewater - all	Telecomms	Roads	Airport	Port	Powerco Gas	FirstGas	Trans power	Rail	Fuel	Contact	Trust pwer	Kupe (gas/ LPG)	Kordia	Nova Gas	Comments
Electricity	2	3	2	3	3	2	2	2	1	2	3	1	3	3	3	3	2	3	All utilities are dependant on electricity to function (except roads which only affects traffic lights). Where backup generation enables the majority of the service to function, the rating is a 2 instead of a 3.
Gas	1	1	3	2	1	1	1	1	3	3	1	1	1	3	1	3	1	3	Gas fired electricity generation sites are most dependant. There is also dependencies within the network - transmission/gas require production sites to be operational.
Fuel (if power out)	3	3	3	3	3	3	3	3	3	3	3	3		1	1	2	3	1	The '3's reflect sectors that rely on backup generators in a power failure.
Fuel (power on)	2	2	2	2	2	3	3	3	2	2	2	3		2	2	2	2	2	Most are rated as '2' reflecting the need for fuel to operate vehicles during response. Roads, airport, rail and the port are more critically reliant on fuel to operate.
Roads	3	3	3	3	3	3	3	3	3	3	2	2	3	3	2	2	2	2	The port and airport require vehicle access to operate. In a response, roads become critical for access to sites. Those rated a '2' consider helicopter access to be feasible (lower number of sites to access
Rail	1	1	1	1	1	1	1	2	1	1	1		1	1	1	2	1	1	Required to bring some products to the Port and to distribute LPG to the South Island.
Airport	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	Could become critical for bringing in emergency resources and evacuation, but not critical to the operation of other lifelines.
Port	1	1	1	1	1	1	1		1	1	1	1	3	1	1	3	1	1	Port operations are important for bringing in fuel for regional use and exporting petroleum and LPG.
Water Supply				3	2	1	2	2	1	1	1	1	1	2	1	1	1	1	Required for fire fighting (at Port and Airport) though there is storage on site amd cooling (eg: NP telephone exchange). Important for staff, but bottled water can be provided.
Wastewater	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Not essential for other utilities to function.
Telecommunications - landline	1	1	2	2		1	1	1	1	1	0	1	1	1	1	2	1	1	Important for some remote monitoring/control processes, but otherwise dependency is reduced (unless cellular networks are down).
Telecommunications - cellular	2	2	2	2		3	3	3	2	2	2	2	2	2	2	2	2	2	In a disaster, important for coordinating communications, however most rate as a '2' assuming that other comms methods are available.
Telecommunications – internet	1	1	2	2		2	2	2	2	1	1	1	1	1	1		1	2	Becoming increasingly important as part of monitoring and communication processes.
Telecomms - broadcasting	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1		1	Obviously important in a major disaster for public communications, for other lifelines, may be important for key public health messaging around water supply

Figure 4-1: Interdependency Matrix – During / Post Disaster Event

HOTSPOTS - WELLINGTON, AUCKLAND, WAIKATO





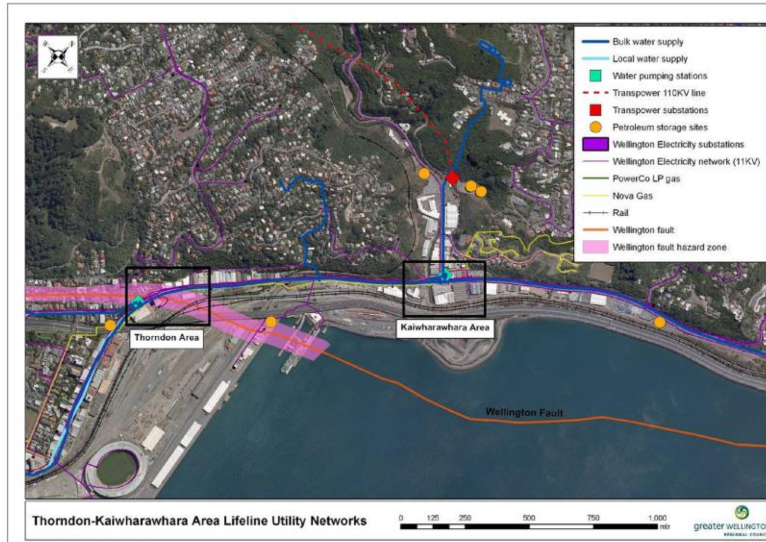


Figure 1.2 – Thorndon area aerial photograph with some key Lifelines highlighted

THROUGH TO REGIONAL, INTEGRATED ‘PROGRAMME BUSINESS CASES’

AND A WIDE RANGE OF OTHER PROJECTS

Regional critical sites and priority routes

Organisational resilience benchmarking

Shared resource dependencies

And into the more operational space

Lifeline utility-CDEM protocols

Emergency communications plans

Regional fuel, generator, electricity plans

Air operations / reconnaissance plans

Climate Change, resilience study update

Business Plan,
Generator Plan,
Hotspots, Fuel Plan,

Climate Change, resilience study update

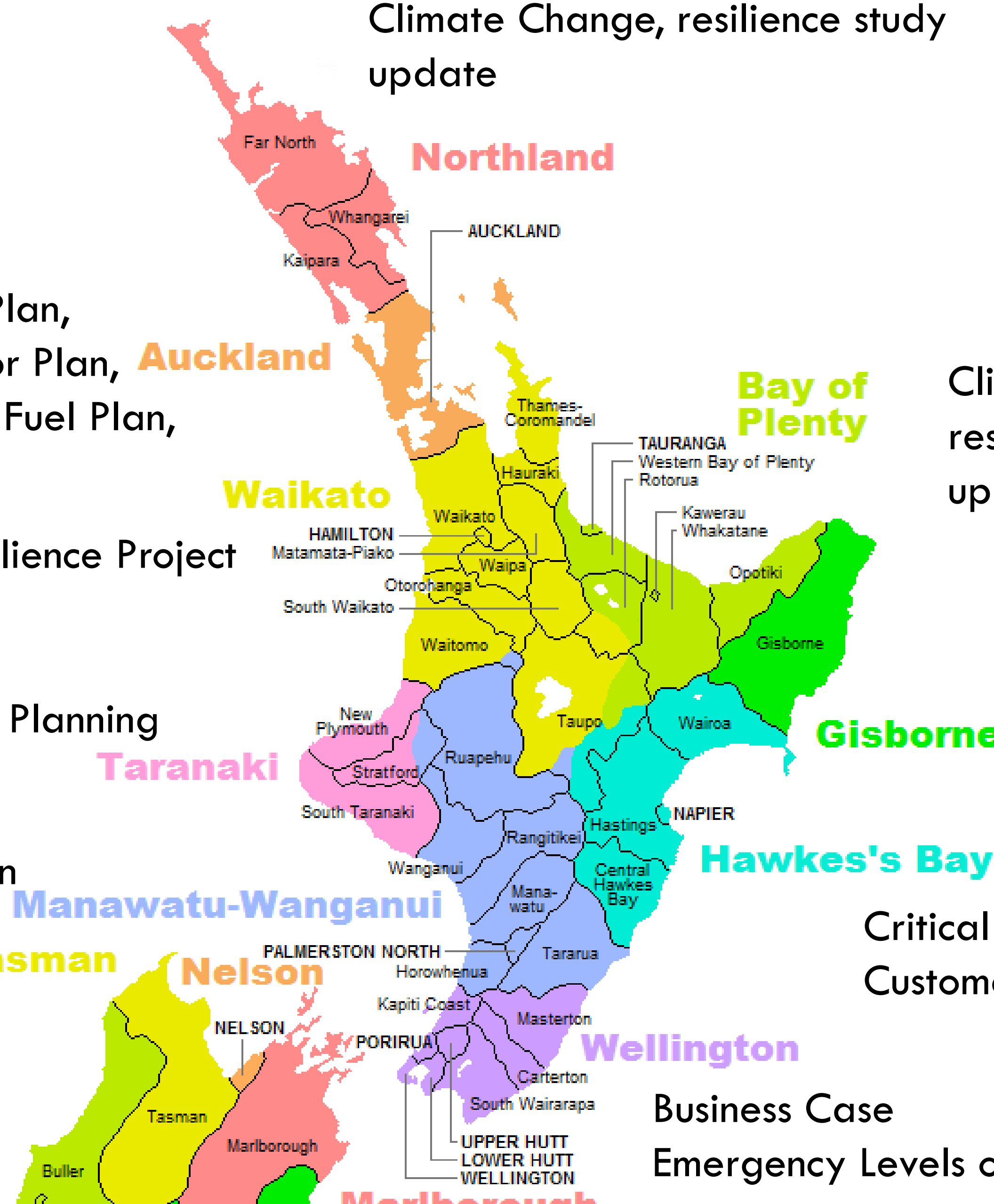
Resilience Project

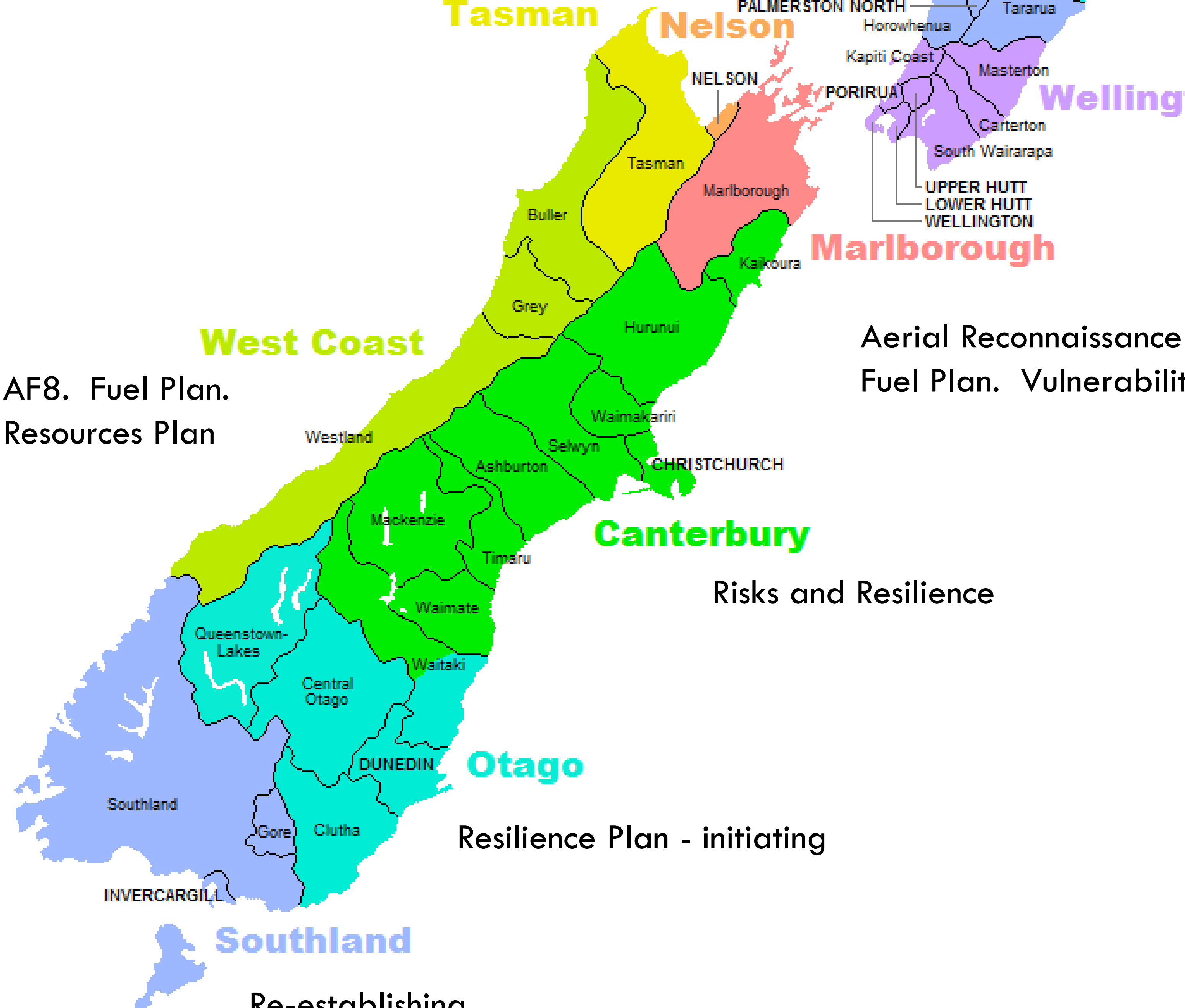
Volcanic Planning

Generator Plan
Debris Mgt

Critical Sites / Customers

Business Case
Emergency Levels of Service





AF8. Fuel Plan.
Resources Plan

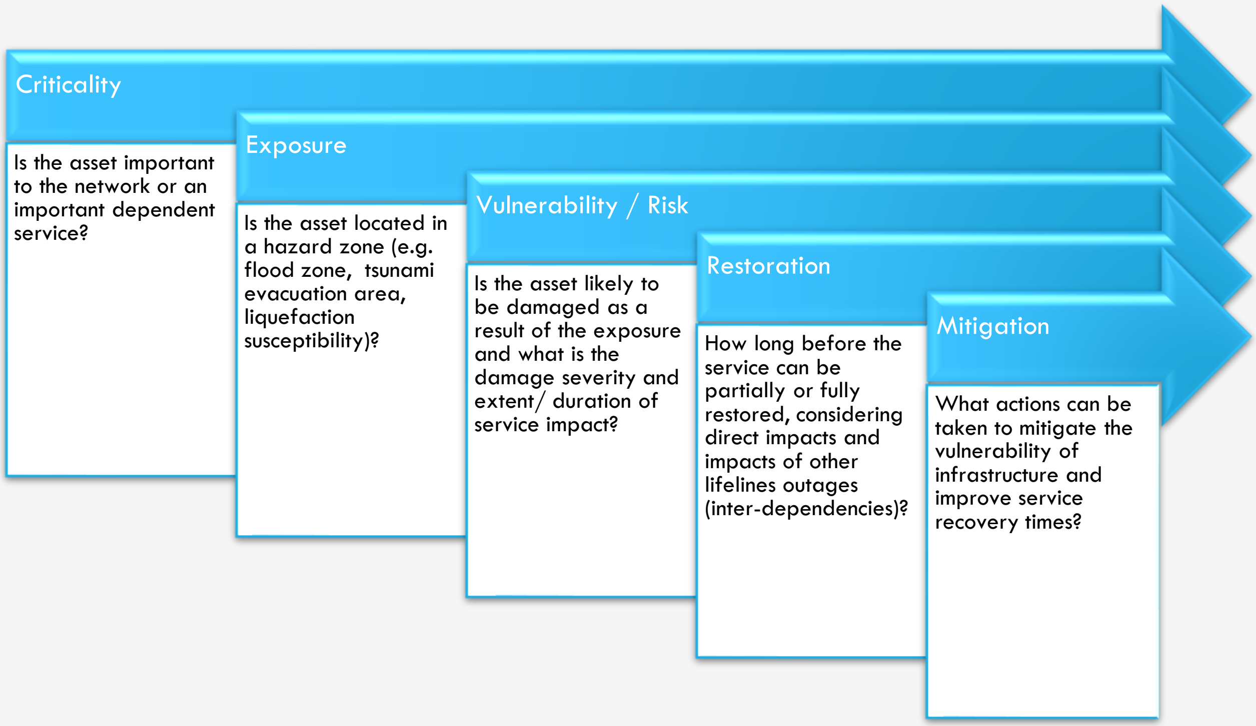
Aerial Reconnaissance
Fuel Plan. Vulnerability

Risks and Resilience

Resilience Plan - initiating

Re-establishing

HOW CAN THE RESEARCH SECTOR HELP?



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HOW CAN RESEARCH AND LIFELINES WORK BETTER TOGETHER?

- A research representative at lifelines groups that is connected into the wider research arena.
- Understand lifelines group work programmes and where research can support (timing)
- Using lifelines groups forums for research project workshops, information requests, where practical.
- Make research findings and tools publicly available.
- Maintain a central record of relevant research outcomes and applications (applied research).
- Make the application of research learnings as simple as possible.

VOLCANIC ASH IS: HARD, HIGHLY ABRASIVE, MILDLY CORROSIVE & CONDUCTIVE WHEN WET.

VOLCANIC ASHFALL

ADVICE FOR WASTEWATER MANAGERS

Impacts On Wastewater Collection And Treatment Systems

VOLCANIC ASH CAN CAUSE SERIOUS DAMAGE TO WASTEWATER COLLECTION AND TREATMENT SYSTEMS

- Cities with combined wastewater and stormwater sewers are particularly vulnerable.
- Ash can also enter sewer networks via inflow and infiltration (e.g. through illegal connections, cross-connections, gully-traps, manhole covers, cracks in sewer pipework).

SYSTEM COMPONENT	IMPACTS OF VOLCANIC ASHFALL
Wastewater network	• Ash may enter wastewater networks if there are combined sewers, or through inflow and infiltration. • Once in wastewater networks, ash may form unpumpable masses which may cause wastewater overflows. • Ash-laden wastewater will cause accelerated damage to pump impellers (pitting and thinning of metal).
Pre-treatment	• Mechanically-cleaned screens are highly vulnerable to damage as ash can abrade moving parts and block screens which may lead to motor and gearbox damage. • Fine screens are more vulnerable than coarse screens. • Ash may damage comminutors.
Primary treatment	• Ash may damage grit classifiers. • Ash will increase the volume of sludge for disposal, and will increase the inorganic content of sludge.
Secondary treatment	• Ash can enter open-air biological reactor tanks both through airfall and via influent. • The main effect is likely to be reduced capacity (due to ash accumulation on tank floors) rather than interference with bacterial processes. pH control may help prevent 'toxic shock' to bacterial populations. • Ash may damage biofilms in trickling filters.
Tertiary treatment	• Any residual very fine ash may increase suspended solid load of effluent, which may interfere with disinfection.
Sludge treatment	• Expect an increased volume of sludge with an increased inorganic content.
General impacts	• Airborne ash may clog aeration pump filters, requiring them to be changed more frequently. • Ashfalls may affect road networks, which may affect staff access and deliveries of supplies. • Ashfalls can cause electrical power outages. • Expect increased maintenance.

Recommended Actions

WHERE TO FIND WARNING INFORMATION

See www.geonet.org.nz for ashfall forecasts in the event of a volcanic eruption.

HOW TO PREPARE

At-risk wastewater treatment plants should develop operational plans for ashfall events, including site clean-up. Plans should include provision for:

- Incorporating up-to-date information from GeoNet into operational decisions.
- Monitoring the presence of ash in raw wastewater.
- Monitoring torque on motor-driven equipment.
- Shutting down non-essential equipment.
- Covering exposed equipment such as HVAC systems, switchboards, and electric motors to protect them from airborne ash.
- Limiting the ingress of ash into buildings.
- Equipment and labour requirements for increased maintenance and site cleanup.
- Ensure that staff working outdoors are supplied with adequate personal protective equipment (long-sleeved clothing, heavy footwear, fitted goggles and properly-fitted P2 or N95 dust masks).
- Coordination with local and regional emergency plans.

Review stocks of essential items as an ashfall may affect road and air transport.

Ensure access to back-up power generation, particularly for pumping stations.

HOW TO RESPOND

Work with local authorities to limit ingress of ash into stormwater drains and sewer lines.

Step up preventive maintenance.

Consider bypassing pumping stations and treatment plants as a protective measure to avoid severe and costly damage.

Ash-laden wastewater will cause accelerated damage to pump impellers (metal pitting and thinning).

FURTHER RESOURCES:

http://www.geonet.org.nz (volcano monitoring information)

http://www.gns.cri.nz/volcano (general information on volcanic hazards)

http://volcanoes.usgs.gov/volcanic_ash (volcanic ash impacts and mitigation encyclopedia)

http://www.ivhhn.org (information on volcanic health hazards)

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Case Study: City Of Yakima, Washington State, USA

VOLCANIC ASH CAN CAUSE SERIOUS DAMAGE TO WASTEWATER TREATMENT PLANTS.

The City of Yakima, Washington State, USA, sustained US$4 million (1980 value) damage to its plant following the 1980 eruption of Mt St Helens volcano which deposited approximately 10 mm of sand-sized ash on the city. This was primarily due to damage to the mechanically-cleaned bar screen and grit classifier.

Biological reactors at the municipal wastewater treatment plant at San Martín de los Andes, Argentina, continued to function without problems despite receiving 2 cm of ashfall from the 2015 eruption of Calbuco volcano, 165 km away in Chile. This was partially because the town's storm drains and sewers are well separated, so very little ash entered the plant in raw wastewater. Photo credit: Daniel Blake

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