



National Infrastructure Plan

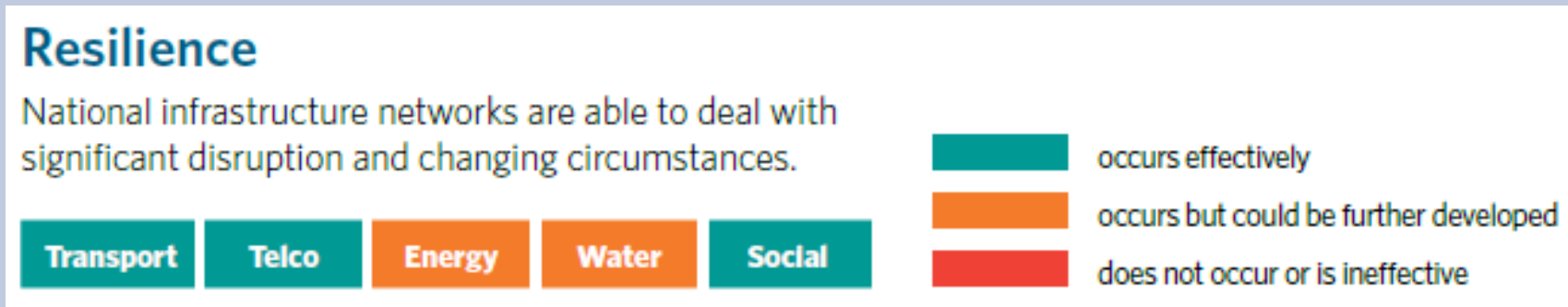
Resilience Indicators, Pinchpoints & Hotspots

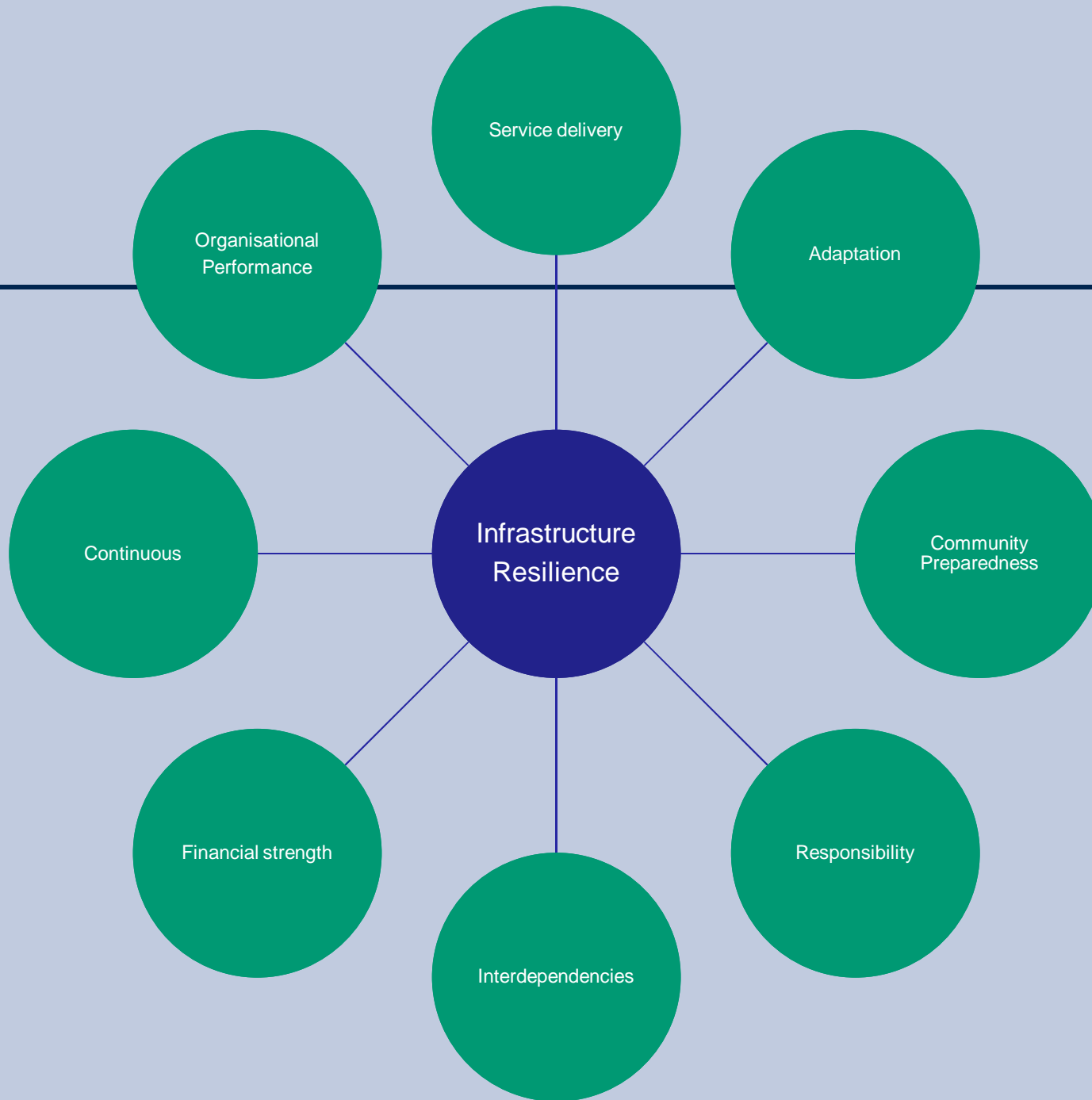
National Lifelines Forum Interactive Session

7 November 2013

Infrastructure Resilience

- “ The Plan defines resilience as:
“National Infrastructure networks are able to deal with significant disruption and changing circumstances”
- To achieve a common understanding, a series of resilience attributes have been developed for testing with stakeholders
- Envisage a hierarchy of indicators within and across sectors to support high level assessments of infrastructure resilience as presented in the National Infrastructure Plan 2011:





Resilience

“ Service Delivery

- . Focus on national, business and community needs in the immediate and longer term

“ Adaptation

- . National infrastructure has capacity to withstand disruption, absorb disturbance, act effectively in a crisis, and recognise changing conditions over time

“ Community Preparedness

- . Infrastructure providers and users understand the infrastructure outage risks they face and take steps to mitigate these. Aspects of timing, duration, regularity, intensity, and impact tolerance differ over time and between communities

“ Responsibility

- . Individual and collaborative responsibilities are clear between owners, operators, users, policy-makers and regulators. Responsibility gaps are addressed

Resilience (cont)

“ Interdependencies

- . A systems approach applies to identification and management of risk (including consideration of interdependencies, supply chain vulnerabilities and weakest link vulnerabilities).

“ Financial Strength

- . Financial capacity to deal with investment, significant disruption and changing circumstances

“ Continuous

- . On-going resilience activities provide assurance and draw attention to emerging issues, recognising that infrastructure resilience will always be a work in progress

“ Organisational Performance

- . Leadership and culture are conducive to resilience, including; Leadership & Culture, Networks and Change Ready. Future skills requirements are being addressed

Transport

Resilience Expectation

Assessed Resilience



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
Local Roads	Suburban	Low	Low		Desired Movement
	Main arterial with alternate	Medium	Medium		
	Main arterial . no alternate	Medium	Medium		
	Strategic freight routes	High	Medium	↑	
National Roads	National with alternate	Medium	Medium		
	National . no alternate	High	Medium	↑	
Road/Rail Link Span	Cook Straight ferries & terminals	Medium	Medium		
Rail	Suburban (incl .rolling stock)	Medium	Low	↑	
	National (incl. rolling stock)	High	Medium		
	National Train Control Centre	High	Low	↑	
Ports	Individual Ports	Medium	Medium		Compliance International Ship and Port Security Code
	Ports with specialist facilities	High	Medium	↑	Compliance International Ship and Port Security Code
	Ports Network	High	Medium	↑	Compliance International Ship and Port Security Code
Airports	Regional airports	Medium	Medium		
	Airways NZ	High	High		
	International airports	Medium	Medium		

Indicators, Pinchpoints & Hotspots...

- “ Understand how the indicator sheets work
- “ What is missing, improvements:
 - . In first order categories?
 - . In second order categories?
- “ Are the Expected and Assessed Resilience levels appropriate?
- “ In terms of targeting our energies, what do you see is the biggest priority?

Transport



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance
					Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
Local Roads	Suburban	Low	Low		
	Main arterial with alternate	Medium	Medium		
	Main arterial . no alternate	Medium	Medium		
	Strategic freight routes	High	Medium	↑	
National Roads	National with alternate	Medium	Medium		
	National . no alternate	High	Medium	↑	
Road/Rail Link Span	Cook Straight ferries & terminals	Medium	Medium		
Rail	Suburban (incl .rolling stock)	Medium	Low	↑	
	National (incl. rolling stock)	High	Medium		
	National Train Control Centre	High	Low	↑	
Ports	Individual Ports	Medium	Medium		Compliance International Ship and Port Security Code
	Ports with specialist facilities	High	Medium	↑	Compliance International Ship and Port Security Code
	Ports Network	High	Medium	↑	Compliance International Ship and Port Security Code
Airports	Regional airports	Medium	Medium		
	Airways NZ	High	High		
	International airports	Medium	Medium		

Energy - Electricity



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
Generation	Individual Generator <300MW	Low	Medium		
	Individual Generator >300MW	Medium	Medium		
	River Chain >300MW	Medium	Medium		
Transmission	66kV	High	Medium	↑	
	110kV	High	Medium	↑	
	220kV & >	High	Medium	↑	
	HVDC	Medium	Medium		
Distribution	Embedded generation	Low	Medium		
	Distribution <	Medium	Medium		
	Distribution 11kV	Medium	Medium		
	Distribution	Medium	Medium		
Retail	Retail functionality	Low	Medium		
	Customer Interface	High	Medium	↑	

Energy . Gas



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
Sources	Gas Fields < X TJ/day	Blue	Green		MED?
	Gas Fields > X TJ/day	Green	Green		MED?
	Imported LPG	Green	Green		MED?
Transmission	Maui	White	White		Commerce Commission, GIC
	Vector . to Huntly	Green	Green		Commerce Commission, GIC
	Vector . Huntly to Auckland	White	Green	↑	Commerce Commission, GIC
	Vector . National	Green	Green		Commerce Commission, GIC
	Large Commercial	White	Green	↑	Commerce Commission, GIC
Distribution	Residential/small commercial	Blue	Green		Commerce Commission, GIC
	Large commercial	Green	Green		Commerce Commission, GIC
	LPG Bottled	Green	Green		MED, LPGA?
	LPG Networked	Blue	Green		MED, LPGA?
Retail	Retail functionality	Blue	Green		?
	Customer Interface	White	Green	↑	?

Energy - Oil



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
International	International supply ex Australia			↑	National Energy Security Organisation (NESO)
	International supply ex Asia			↑	National Energy Security Organisation (NESO)
	International supply ex elsewhere			↑	National Energy Security Organisation (NESO)
Refinery	Refinery				
	Refinery to Auckland (RAP)			↑	
	Coastal distribution				
Regional Storage	Auckland, Wellington, Christchurch			↑	
	Elsewhere				
Distribution	Urban				
	Rural				
Retail	Retail . Individual sites				
	Retail . Area availability			↑	
	Customer Interface			↑	

Telecommunications



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
International	Cables		Low	↑	Full redundancy on Southern Cross cable capacity
	Satellite		Medium	↑	
Backhaul (Main trunk lines)	National		Medium	↑	
	Regional		Medium	↑	
	Local exchanges		Medium	↑	
Access (to local exchanges)	Landline - voice		Medium		
	Landline . Data (incl Broadband)		Medium		
	Mobile		Medium		
Radio Telephony		Low	Medium		
111	6 Telecom Core Exchanges		Medium	↑	
ICAP = Initial Call Answering Platform	2 Telecom ICAP Exchanges (Palmerston North & Christchurch)		Medium	↑	
	2 ICAP call centres (Wgtn & Chch, warm backup Palmerston North)		Medium	↑	
Television	Regional		Medium		
	National		Medium	↑	
Radio	Regional		Medium		
	National		Medium	↑	
Retail	Customer Interface		Medium	↑	

Water



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance
					Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
	Lakes	Low	Low		
	Rivers	Medium	Medium		
Rural Water	Irrigation	Low	Medium		
	Reticulation	Medium	Low	↑	
Urban Water	Private laterals	Low	Low		
	Street	Medium	Medium		
	City mains	High	Medium	↑	
	Reservoirs	High	Medium	↑	
Urban Wastewater	Private laterals	Low	Low		
	Street	Medium	Medium		
	City mains	High	Medium	↑	
	Treatment facilities	High	Medium	↑	
Urban Stormwater	Private laterals	Low	Low		
	Street	Medium	Medium		
	City mains	High	Medium	↑	
	Discharge	High	Medium	↑	

Social




		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
Education	Pre-School	Low	Medium		
	Primary School	Medium	Medium		
	Secondary School	Medium	Medium		
	University/Post Secondary	Medium	Medium		
Justice	Police	High	Medium	↑	
	Corrections	Medium	Medium		
	Courts	Low	Medium		
Health	Laboratories	High	Medium	↑	
	Medical Centres	Medium	Medium		
	Local/Specialised Hospitals	Medium	Medium		
	Regional Hospitals	High	Medium	↑	
Housing	Individual Houses	Low	Medium		
	Housing Blocks	Medium	Medium		
	Suburbs	Medium	Medium		
Defence	Airforce Assets	High	High		
	Navy Assets	High	High		
	Army Assets	High	High		

Interdependencies



		Resilience Expectations	Assessed Resilience	Desired Movement	Indicator Sources/Points of Assurance
Transport	Telco	Medium	Medium		Transport global : Transport Monitoring Indicator Framework (TMIF) Best Practice Asset Management Plans eg. PAS 55 or IIMM 2011 Business Continuity Management eg. Standards NZ BCM Annual Financial Reports Resilient Organisations Practices
	Energy	Low	Medium	↑	
	Water	Low	Medium		
	Social	Low	Medium		
Telco	Transport	Low	Medium	↑	
	Energy	Medium	Low	↑	
	Water	Low	Medium		
	Social	Low	Medium		
Energy	Transport	Medium	Medium		
	Telco	Low	Medium	↑	
	Water	Medium	Medium		
	Social	Low	Medium		
Water	Transport	Medium	Medium		
	Telco	Low	Medium	↑	
	Energy	Low	Medium	↑	
	Social	Low	Medium		
Social	Transport	Medium	Medium		
	Telco	Low	Medium	↑	Health only
	Energy	Low	Medium	↑	Health only
	Water	Low	Medium	↑	Health only

Infrastructure Interdependencies

 Is dependent on these sectors										
This sector	Electricity	Petroleum	Gas	Telecom	Water	Sewer	Roads	Rail	Ports	Airports
Electricity	H	M	L	M	H	L	M	H	H	L
Petroleum	H	M	L	M	H	L	H	H	H	L
Gas	M	M	NO	H	M	L	M	L	L	L
Telecom	H	M	L	M	H	L	M	L	L	L
Water	H	M	L	M	NO	L	M	L	L	L
Sewer	H	M	L	M	M	NO	M	L	L	L
Roads	M	M	L	M	L	L	M	L	L	L
Rail	M	H	L	H	L	L	M	NO	L	L
Ports	H	M	L	M	M	L	M	M	NO	L
Airports	H	H	L	H	M	L	M	M	L	NO

H - Critical for service to function

M - Important for normal operation but can function for a time without

L - Not critical

NO - no dependence (same system)

Sector	Description
Electricity	Powerstations, substations, lines and cables
Petroleum	Ports, refineries, roads, petrol stations
Gas	Extraction sites, refineries, roads, pipelines
Telecom	Cell towers, servers, switch boards
Water	Reservoirs, pumps, pipes, purification
Sewer	Treatment plants, pipes, pumps, lift stations
Roads	Bridges, obstructions, traffic signals
Rail	Rails, overhead cables, points
Ports	Wharfs, cranes, fuel storage
Airports	Runways, lights, radar, communications, fuel

Infrastructure Interdependencies

Dependency List		This sector is	dependent on	Type of dependency	
Normal Operations			this sector		
H	Electricity	Electricity			H - Critical for service to function
M	Electricity	Petroleum	fuel for backup generators, repair vehicles		
L	Electricity	Gas			
M	Electricity	Telecom	SCADA systems, communication with crews in the field		
H	Electricity	Water	cooling, boilers		
L	Electricity	Sewer			M - Important for normal operation but can function for a time without
M	Electricity	Roads	transport of workers/delivery of supplies for repair and maintenance		
H	Electricity	Rail	bulk coal delivery (not critical for hydro)		
H	Electricity	Ports	coal import(?)		
L	Electricity	Airports			
H	Petroleum	Electricity	refinery operations		L - Not critical
M	Petroleum	Petroleum	fuel for backup generators, repair vehicles		
L	Petroleum	Gas			
M	Petroleum	Telecom	SCADA/refinery operations, communications, point of sale purchases		
H	Petroleum	Water	cooling, fire suppression at refineries		
L	Petroleum	Sewer			NO - no dependence (same system)
H	Petroleum	Roads	distribution, transport of workers/delivery of supplies for repair and maintenance		
H	Petroleum	Rail	distribution		
H	Petroleum	Ports	crude oil import, transport by coastal tanker to storage tankers		
L	Petroleum	Airports			
M	Gas	Electricity	production, pumping/pressurizing pipelines		
M	Gas	Petroleum	fuel for backup generators, service vehicles		
NO	Gas	Gas			
H	Gas	Telecom	SCADA, communication with crews in the field		
M	Gas	Water	cooling		
L	Gas	Sewer			
M	Gas	Roads	service vehicles/delivery of supplies for repair and maintenance		
L	Gas	Rail			
L	Gas	Ports			

Infrastructure Interdependencies

L	Gas	Airports	
H	Telecom	Electricity	cell towers, servers, switch boards
M	Telecom	Petroleum	fuel for backup generators, service vehicles
L	Telecom	Gas	
M	Telecom	Telecom	communication with crews in the field, control systems
H	Telecom	Water	cooling
L	Telecom	Sewer	
M	Telecom	Roads	transport of workers/delivery of supplies for repair and maintenance
L	Telecom	Rail	
L	Telecom	Ports	
L	Telecom	Airports	
H	Water	Electricity	pumps and lift stations, treatment plant operation, control systems
M	Water	Petroleum	fuel for backup generators, service vehicles
L	Water	Gas	
M	Water	Telecom	SCADA control systems, communication with crews in the field
NO	Water	Water	
L	Water	Sewer	would water service be shot down to a facility if the sewer system isn't functioning?
M	Water	Roads	transport of workers, delivery of supplies
L	Water	Rail	
L	Water	Ports	
L	Water	Airports	
H	Sewer	Electricity	pump and lift stations, treatment plant operation, control systems
M	Sewer	Petroleum	fuel for backup generators, service vehicles
L	Sewer	Gas	
M	Sewer	Telecom	SCADA control systems, communication with crews in the field
M	Sewer	Water	treatment plant operation
NO	Sewer	Sewer	
M	Sewer	Roads	transport of workers/delivery of supplies for repair and maintenance
L	Sewer	Rail	
L	Sewer	Ports	
L	Sewer	Airports	
M	Roads	Electricity	traffic lights
M	Roads	Petroleum	fuel for repair/maintenance vehicles

Infrastructure Interdependencies

L	Roads	Gas	
M	Roads	Telecom	communications with crews in the field, SCADA
L	Roads	Water	
L	Roads	Sewer	
M	Roads	Roads	repair and maintenance vehicles
L	Roads	Rail	
L	Roads	Ports	
L	Roads	Airports	
M	Rail	Electricity	power for trains (metro), control systems, signaling, stations
H	Rail	Petroleum	fuel for backup generators, fuel for trains (diesel)
L	Rail	Gas	
H	Rail	Telecom	SCADA, communications
L	Rail	Water	
L	Rail	Sewer	
M	Rail	Roads	passenger transport, transport of workers/delivery of supplies for repair and maintenance
NO	Rail	Rail	
L	Rail	Ports	
L	Rail	Airports	
H	Ports	Electricity	crane operation, control systems
M	Ports	Petroleum	fuel for backup generators, fleet vehicles, equipment, trucks to transport goods
L	Ports	Gas	
M	Ports	Telecom	operations communications
M	Ports	Water	fire suppression
L	Ports	Sewer	
M	Ports	Roads	transport of goods to/from facility
M	Ports	Rail	transport of goods to/from facility
NO	Ports	Ports	
L	Ports	Airports	
H	Airports	Electricity	control tower/terminal operations
H	Airports	Petroleum	fuel for planes
L	Airports	Gas	
H	Airports	Telecom	flight control, emergency communication
M	Airports	Water	fire suppression, passengers (?)

Infrastructure Interdependencies

L	Airports	Sewer	for passengers (?)
M	Airports	Roads	fuel delivery, passenger transport
M	Airports	Rail	fuel delivery, passenger transport
L	Airports	Ports	
NO	Airports	Airports	

Pinchpoints . Nationally Significant

- “ Northland
 - . New Zealand Refining Company (NZRC)
- “ Auckland
 - . Ports of Auckland
 - . Auckland International Airport
- “ Wellington
 - . Avalon Tower, Lower Hutt
 - . Wilton Substation
 - . Central Park Substation
- “ Canterbury
 - . Wastewater Treatment Plant & ocean outfall
 - . Cass Peak air traffic control radar installation
- “ Otago
 - . Dunedin Fuel Terminal

Hotspots . Nationally Significant

“ Auckland

- . Wiri Oil Terminal
- . Auckland Harbour Bridge
- . Greenlane Roundabout
- . Newmarket viaduct

“ Wellington

- . Thorndon / Kaiwharawhara
- . Haywards
- . Paekakariki / Pukerua Bay

“ Canterbury

- . Lyttelton Road Tunnel and control centre
- . Ferrymead Bridge
- . Timaru Port & Tank Farm

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