

Chapter 13

Interdependencies

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This project, like all engineering lifelines projects, has identified the ways in which the various utility networks are dependent on each other. This can be illustrated by a simple example such as a piped network passing over a transport network bridge structure. The piped network relies on the bridge structure remaining stable during hazard events such as earthquakes or floods. Too much movement of the bridge will disrupt the piped network.

For this project, each utility network operator was responsible for assessing the risk to its own network. Where one network used property belonging to another, such as the pipe over the bridge example, those in charge of the pipe network were responsible for checking the likely performance of the bridge during a hazard.

This policy was introduced to ensure utility operators became aware of the risks to all parts of their network.

Any mitigation measures deemed necessary are to be carried out by the network that has identified the need for them. In the case of the pipe over the bridge this could mean removing the risk by relocating the pipe under the river or estuary or minimising the risk by installing flexible joints and fasteners or laying a duplicate pipe on another structure.

Because interdependencies vary between networks and will also vary immediately after an extreme emergency, the project conducted a study on interdependencies at a project workshop held in Hastings in November 2000.

Participants in the exercise joined one of the four project task groups and rated the interdependency of their utility network on other networks during normal operation and during the recovery period after a major natural disaster.

The task groups then shared their findings to improve awareness of the ways in which utility networks rely on each other.

The results of these assessments are summarised on Tables 1 and 2.

Conclusions

The results of the assessment are consistent with those expected for a provincial region that depends on national distribution networks for its power.

For Hawke's Bay, the participants decided that maintaining road transport is essential if other networks are also to be maintained, both in times of normal operation and during recovery from a natural disaster.

Standby and mains electricity were considered the next most essential networks during times of normal operation. The importance given to standby electricity supplies is surprising but may be due to a vigorous discussion that took place just before this part of the workshop on power outages in Hawke's Bay in September 2000. Standby electricity is also very important during recovery from a natural disaster.

The importance of telephone, VHF Radio and broadcast radio services increased dramatically in the recovery period after a major hazard. This is consistent with recorded overloads of telephone and cellular phone systems following events such as the ChiChi Earthquake in Taiwan. During the September 2000 Hawke's Bay power outage, the answer desk of local electricity retailer Hawke's Bay Network, was overloaded despite additional staff being on duty and the telephone network being fully operational.

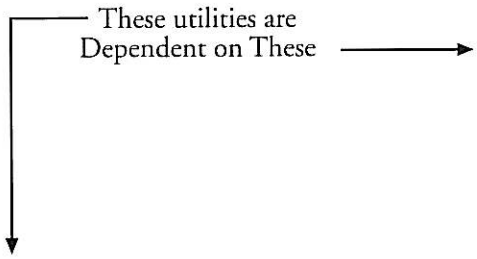
These conclusions are similar to those of other engineering lifelines projects.



Westshore Bridge on State Highway 2 is a critical lifeline for many utilities. The expressway northern extension when constructed, will mitigate the roading transportation dependence on this structure.

ASSESSMENTS

INTERDEPENDENCE OF ENGINEERING LIFELINES FOR OPERATION

	Roading	Railways	Sea Transport	Air Transport	Water Supply	Sanitary Drainage	Storm Drainage	Mains Electricity	Standby Electricity	Gas	Fuel Supply	Fuel Supply Telephone Systems	VHF Radio	Broadcasting
Roading		1	1	1	1	2	2	1	1	5	2	2	1	
Railways	5		2	1	3	1	1	5	5	1	5	2	2	1
Sea Transport	5	4		1	3	3	1	5	5	2	5	4	5	1
Air Transport	5	1	1		3	3	5	5	5	1	5	5	5	1
Water Supply	5	1	1	1		5	1	5	4	1	4	5	2	3
Sanitary Drainage	5	1	1	1	5		4	5	4	1	4	5	2	3
Storm Drainage	5	1	1	1	1	1		5	4	1	4	5	2	1
Mains Electricity	5	1	1	2	1	1	3		5	1	5	5	5	2
Standby Electricity														
Gas	3	1	1	2	1	1	2	1	1		5	2	3	1
Fuel Supply	5	2	5	1	2	1	3	5	5	1		3	3	1
Fuel Supply Telephone Systems	5	1	1	1	1	1	3	4	4	1	4		1	1
VHF Radio	2	1	1	1	1	1	1	4	4	1	4	3		1
Broadcasting	2	1	1	1	1	1	1	4	4	1	4	4	1	
Total Assessment of Dependency by other utilities	52	16	17	14	23	20	27	50	51	13	44	45	33	17

Interdependence assessment against each lifeline item on a scale from 1-5 (low-high requirement for operation)

ASSESSMENTS

INTERDEPENDENCE OF ENGINEERING LIFELINES FOR RECOVERY FOLLOWING A DISASTER

	Roading	Railways	Sea Transport	Air Transport	Water Supply	Sanitary Drainage	Storm Drainage	Mains Electricity	Standby Electricity	Gas	Fuel Supply	Fuel Supply Telephone Systems	VHF Radio	Broadcasting
		1	1	1	1	1	3	1	1	1	5	3	3	3
Roading	5		1	1	1	1	1	3	3	3	5	3	3	1
Railways	5	5		1	3	3	1	5	5	2	5	5	5	1
Sea Transport	5	1	1		3	3	1	5	5	1	5	5	5	2
Air Transport	5	1	4	4		5	1	5	4	1	4	5	3	4
Water Supply	5	1	4	4	5		4	5	4	1	4	5	3	4
Sanitary Drainage	5	1	1	1	1	1		5	4	1	4	5	3	2
Storm Drainage	5	1	1	3	1	1	3		5	1	5	5	5	3
Mains Electricity														
Standby Electricity	5	1	1	3	1	1	1	1	1		5	5	5	1
Gas	5	2	5	2	2	1	1	5	5	1		5	4	2
Fuel Supply	5	1	1	4	2	1	3	4	5	1	5		4	4
Fuel Supply Telephone Systems	4	1	1	3	2	1	1	4	5	1	5	4		4
VHF Radio	4	1	1	3	4	4	4	4	5	1	5	4	4	
Broadcasting	4	17	22	30	26	23	24	47	52	13	57	54	47	31
Total Assessment of Dependency by other utilities														

Interdependence assessment against each lifeline item on a scale from 1-5 (low-high requirement for operation)