Chapter 9.8
Port of Napier

Locality and Layout of Berths

The Port of Napier (Port) is situated north of Bluff Hill within Hawke Bay. It is a breakwater port with the breakwater lying south of Pania Reef. The cargo stacking areas and the area adjacent to the main berths are on reclaimed land.

The layout of the berths is shown on the attached plan. All the main berths may be classified as open pile structures. The date each berth was constructed is shown on the plan. The working draughts of the berths varies from 9.2m to 11.5m.

Port of Napier July 2001

Layout of Services

Water

The Port receives its drinking water from the Napier City Council (NCC) ring main that traverses the base of Bluff Hill. There are two feeds of 150mm diameter and one of 65mm diameter. All three connections are protected with backflow preventors. There are ring main feeds behind both Kirkpatrick and Higgins Wharves. Although there is no separate fire reticulation system, there are a large number of fire hydrants on the drinking water pipe network.

Wastewater Reticulation

Seventeen independent pump stations, situated on two different systems, pump the Port's wastewater to the NCC sewerage network. One system discharges into a NCC manhole at the bottom of Coote Road and the other into a manhole at the bottom of Hornsey Road. The Port of Napier maintains the network.

High Tension (HT) Voltage Reticulation

Hawke's Bay Networks' high tension 11 kV reticulation is ring-fed throughout the Port. Two main below-ground feeders enter the Port, one from the eastern end and one from the western end of Bluff Hill. HB Network maintains this reticulation.

Low Tension (LT) Voltage Reticulation

There are 11 transformer substations strategically placed on the HT reticulation. The 400v LT reticulation is inter connected and has limited capability of providing a ring main type system. The average power demand of the Port is approximately 2000kVA.

The Port of Napier maintains the LT reticulation.

Communications

Telephones

The Port of Napier has a local area network (LAN) made up of an integrated fibre and copper cable reticulation. The communication cable reticulation is owned and maintained by the Port of Napier. At present Telecom have a 200 pair gas-filled cable connected. This cable feeds directly into the PONL PABX, which is situated in the Port Administration Building. This system will be mirrored in the Port Operations Building. A second 15 pair independent Telecom incoming cable is located at a junction box at the container cleaning amenity. This cable is not connected but is able to be used as an alternative feed if there is an outage on the main cable.

Mobile Phones

The Port utilises a large number of mobile phones, which are connected to the Telecom Cellular Network.

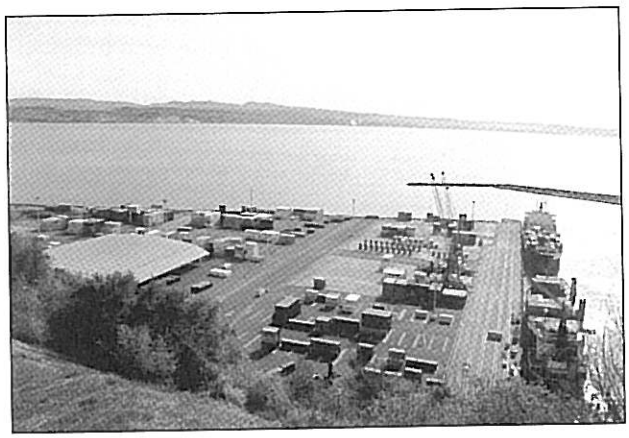
VHF and UHF Radios

Cargo operations activities use UHF radios while marine operations are handled on the VHF frequency.

Wharf Importance

No. 1 Wharf is regarded as the most important, mainly because it is the newest wharf to be designed to modern design codes. The land-based wharves, including No. 1, are considered to be more useful from

a cargo handling point of view than the No. 3 and No. 4 finger wharves. "A" Wharf is a sheet piled structure and is used as the Port's tug berth. The Port's container terminal is situated behind No. 5 (north) and No. 5 (south) Wharves. Breakbulk cargo is mainly handled from No. 1, No. 2 (north) and No. 2 (south).



No 5 Kirkpatrick Warf Port of Napier July 2001.
(Photo courtesy HBRC)

Hazard Ranking

The Port's 8 main wharves were assessed for each of the defined hazards in terms of their vulnerability, the impact on a wharf during the hazardous event and the effect on normal cargo handling operations while the wharf was repaired.

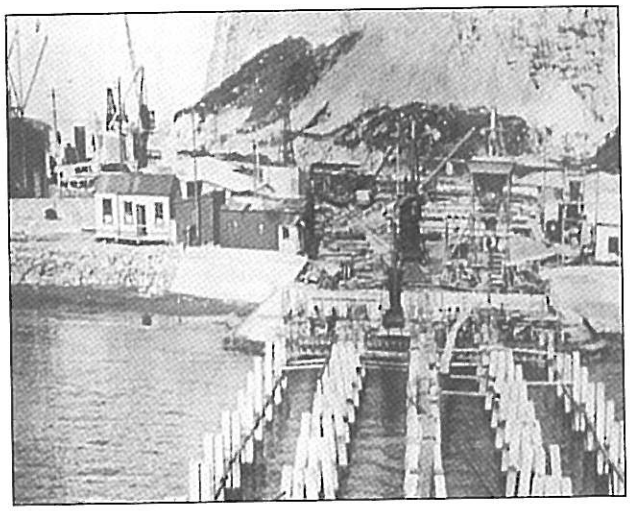
These aspects were scored with totals given for each wharf for each of the defined natural hazards. The hazards themselves were also ranked to develop the total scores.

This procedure is similar to the assessment for roading networks. It enables a ranking schedule to be developed which identifies those wharves likely to pose the greatest risk to the Port, and thus the region's recovery, following a natural disaster.

Results of Risk Assessment

The hazard ranking process has shown that seismic activity is the natural hazard most likely to cause major disruption to cargo handling at the Port. This is followed by flooding, wind, landslip volcanic ash and wild fire in descending order of their potential for causing major disruption to operations.

Given the Port's vulnerability to major seismic activity an investigation of wharf structures and reclamations was carried out.



No 3 Geddis Wharf under construction 1939.

There are four main components of seismic activity:

Ground Shaking

The rock armouring to the reclamation faces can be expected to yield and deform under seismic load. However, because they are relatively flexible, they can survive seismic events with only minor damage. Some of the rock armour may drop off in minor earthquakes and this could get progressively worse for large earthquakes. Although this would result in some shallowing of the berths, it would not close them or render them useless. Grab dredging would be required to clear the berths.

The principal concern is whether piles passing through the reclamation batter faces could survive any slumping or deformation. Given past experiences, the piles could be expected to remain serviceable after minor or medium events. However, in a major event, the embankment deformation for the land-backed wharves could render the piles incapable of carrying their design loads.

Wharves supported on raking piles can experience failure from low level events in the pile/subsoil skin friction and pile/deck reinforcing bond, yield in the pile reinforcing steel and shear failure in the deck beams for transverse events. For longitudinal events most wharves should suffer little damage. The exception is Wharf No. 3, which has longitudinal raking piles. This wharf deck structure will suffer damage in the region of these piles.

For wharves which are tied back to concrete deadman anchors, the anchors and back wall will yield for medium transverse events and fail for major events.

All wharf structures should be fully serviceable following a minor earthquake and most following a medium event. Although a major earthquake is likely to severely damage the horizontal force resisting elements, most wharves will still be serviceable with loading and draft restrictions.

Liquefaction

The seismic stability analysis carried out for the design of the No. 1 wharf indicates that there is little potential for massive failure as a result of liquefaction. The site geology of the harbour can be simplified into four units - recent fill, marine silts, interbedded sand and sandstone and basement siltstone. Of these, only the marine silt and sand layers are susceptible to liquefaction. Any silt layers that have not been removed by dredging or displacement by reclamation fill are generally thin and sporadic. There is a possibility that some of the sand layers within the interbedded sands and sandstone are prone to liquefaction. However, any liquefaction that does occur will be localised because of the fragmented nature of the sand layers.

Fault Displacement

This hazard is not expected to occur on this site.

Ground Settlement

This hazard is not expected to occur on this site.

The investigation has identified some design shortcomings in the older wharves. However retrofitting or strengthening them would be expensive and is not economically viable. While it is recognised that not all risks can be practically eliminated, mitigation measures should be incorporated where possible.

Flooding

In assessing this hazard, flooding was defined as normal floods due to heavy rainfall, tsunami and severe storm. Flood conditions should not unduly affect cargo operations and an isolated storm would only disrupt operations while it was in progress. However a tsunami would completely disrupt the cargo handling operation. The extent of structural damage to the wharves would depend on the number of large vessels berthed at the time. Large vessels are likely to break their moorings and collide with adjacent vessels and berths, causing structural damage. Otherwise the wharves should remain structurally sound apart from loss of armouring below the wharves due to the action of incoming and outgoing waves. All buildings would be extensively damaged.

1890's Repairing monoliths on Breakwater after storms

Landslip

Rock fall from Bluff Hill could be expected but, with three entrances located away from the base of the bluff, this is not expected to significantly disrupt access to the Port.

Wind

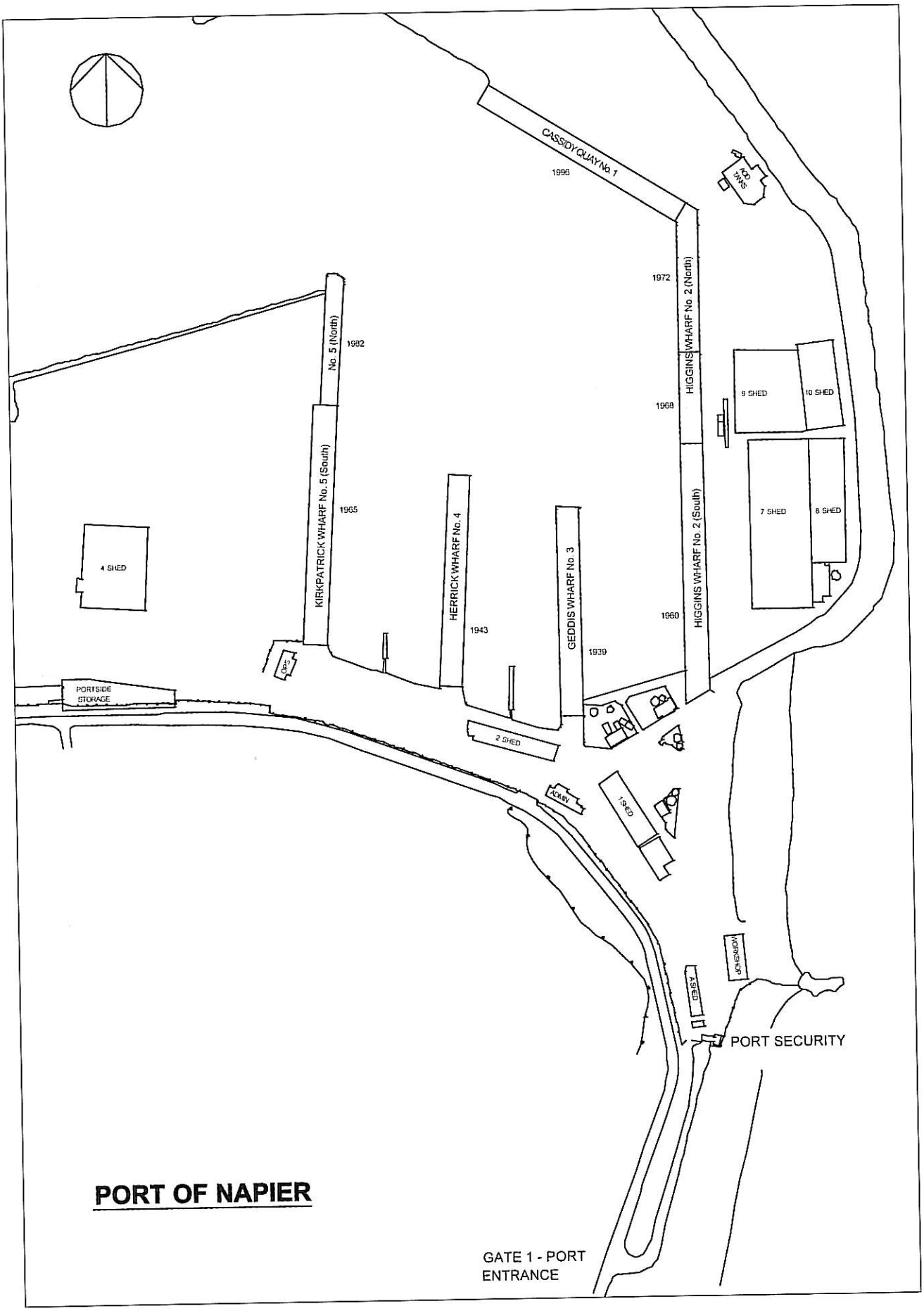
Severe wind will only affect wharf operations and cargo handling, not the wharf structures themselves.

Volcanic Ash

Cargo handling operations will cease during an ashfall. The Port would rely on external contractors to remove the ash and dispose of it.

Wild Fire

This is not expected to occur within the Port.


CASSIDY QUAY No. 1
1996
KPD TANKS
1972
HIGGINS WHARF No. 2 (North)
No. 5 (North)
1982
1968
9 SHED
10 SHED
KIRKPATRICK WHARF No. 5 (South)
1965
HERRICK WHARF No. 4
1943
GEDDIS WHARF No. 3
1939
HIGGINS WHARF No. 2 (South)
1960
7 SHED
8 SHED
4 SHED
PORTSIDE STORAGE
2 SHED
ADMIN
1 SHED
WORKSHOP
ASHED
PORT SECURITY
PORT OF NAPIER
GATE 1 - PORT ENTRANCE