WELLINGTON AFTER THE 'QUAKE

Wellington After the 'Quake

The Challenge of Rebuilding Cities

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View to the southwest over Wellington's central business district, built largely on reclaimed land susceptible to liquefaction during a major earthquake. The Wellington fault runs close to the base of the hills in the background. (Photo: Lloyd Homer, Institute of Geological & Nuclear Sciences)

The *Wellington after the 'Quake* conference sought to answer the questions faced by everyone in authority when cities commence recovery after a disaster: *What happens next? What do I do now?*

I proposed the conference within the Earthquake Commission (EQC), both to provide background for our own disaster management planning and to assist public and private planning for disaster recovery. All other government agencies or departments, local authority councils, businesses, or large organisations that face severe damage in a disaster need to plan their recovery. In order to do so, they, like EQC, need a basis for their planning.

The conference set out such a basis by identifying the problems sure to be faced and by indicating possible solutions based on world and New Zealand experience. Much of the planning in the public sector relating to disasters has focused on the response phase — people's needs immediately after a disaster. So, too, with businesses, disaster recovery planning has focused on ways of getting the business up and running immediately, somewhere, somehow. Neither has dealt to any extent with the longer-term recovery from a disaster, including reconstruction of facilities, rebuilding of communities, and rebuilding of organisations.

This conference brought together world and New Zealand authorities, with academic and technical expertise and with practical experience.

The conference concentrated on Wellington, but by bringing to bear the best knowledge from around the world, its results are applicable to many cities around the world. The insights from this conference should be of value in every city that faces a risk of natural disaster.

The conference was substantially supported by major sponsors, who are listed on the back of this booklet. The Earthquake Commission thanks the sponsors on its own behalf and on behalf of all those who attended the conference. Thanks are also due to the members of the organising committees for their invaluable help in making the conference a success.

IAN McLEAN

Chairperson, The Earthquake Commission

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Introduction

The theme of this conference was recovery — the challenge of rebuilding cities after a disaster.

Emergency management needs to look beyond the emergency response phase. It should examine the restoration of the affected region, including its services and facilities and the lives of its resident and working population.

After the big quake in Wellington, central government functions would be jeopardised, an economic crisis might arise, vital national transport exchanges would be severely hampered, business, industry and tourism would be severely disrupted and stress would extend far beyond the boundaries of the Wellington region.

Recovery is a very long process and needs to be considered and planned for in the pre-impact period, together with planning for the immediate response and mitigation. Knowledge of the mechanisms and procedures of recovery is a relatively new area of disaster research. However, recent attention to the vulnerability of physical utilities, although addressed to the response phase, has also been invaluable in increasing our awareness of what might be involved in reconstruction. There is increased understanding of the potential problems that must be considered and resolved before the disaster strikes a community or region. Only by using this in recovery planning will it be possible to act effectively to reduce human suffering, minimise economic loss and disruption in the private sector, and restore some normality to the affairs of the nation.

Government and responsibility

The preservation of the executive, legislative, and judicial arms of government is critical in order to preserve the sovereignty of the nation and demonstrate that the democratically elected government is continuing its function. The government should also be capable of responding to the extra demands occasioned by the earthquake.

The likelihood of damage on a scale that would render the majority of government buildings unusable is low, and the government's initial task

would be to ensure that it continued to function effectively from the current parliamentary complex. Nevertheless, politicians have accepted that Wellington is sufficiently vulnerable to warrant a plan to remove key elements of the central executive from Wellington in order to ensure continuity of government.

There needs to be a sensible balance of responsibilities between those affected. The government expects individuals, businesses, and local authorities to play their part and take prime responsibility for disaster management. They must be encouraged and empowered to minimise, mitigate, and manage disaster.

Government does not shirk its responsibilities, but wants the risk to be shared. Central government continues to cover a large proportion of infrastructural recovery costs. But in doing so, it transfers appropriate responsibility for the recovery as a whole on to those with a direct interest. Among local authorities and those directly affected, there is inevitably a far superior appreciation of local risks than in central government, and recovery is most likely to be successful when the local community has control over the speed and direction of the recovery effort.

Wellington city, with the Wellington region, has started its pre-impact planning process and is in a good position to be in control of its own destiny. The emergency management planning and preparation done have satisfied central government departments, whose role would be to support them rather than compete with or replace city initiatives. Although no recovery programme will ever be without problems, conflict and upheaval, a framework has been established and a dialogue started with all essential participants, including central government. This will ensure that the rebuilding of Wellington takes place in an environment of cooperation and coordination.

Plan in advance

Advance planning for urban relocation and reconstruction after future urban earthquake disasters should be an integral part of risk mitigation. In most places, there has been a marked neglect of disaster recovery plans compared with preparedness plans. However, it is becoming increasingly important to

manage reconstruction as efficiently and effectively as possible. Apart from the general desire to reduce human suffering, there is a need to restore the economy and business activity quickly, and there are many other pressures to expedite recovery.

From the standpoint of the victims, the period of reconstruction and general community recovery can never be short enough. People want to return to normal conditions quickly. They seldom want to relocate, even after experiencing the worst impacts of disaster. Damage is seldom extensive enough to make relocation a real option, and in any case the funds needed are not usually available. Existing procedures and organisational arrangements favour piecemeal decision-making, and few communities have the kind of pre-disaster plans needed to effectively influence post-earthquake reconstruction and relocation decisions. Past earthquake events have shown that the normal ways of doing business are not adequate to accommodate the needs, particularly in terms of the pressure for speed in approving projects and the volume of applications.

We can prepare for calamity by having sound, popular, well-understood urban design policies in place long before disaster strikes. However, the implementation of these proposals should not be deferred until then. Plans for a better city deserve to be actioned immediately. Although a major tremor will leave its mark, those who survive the catastrophe will still inhabit a familiar place.

We can also lower the vulnerability of the city to future events by having a reconstruction plan in place before the big earthquake occurs. The plan should include:

- designation of a lead agency to manage the reconstruction;
- detailed maps of the earthquake hazard and inventories of the local buildings and infrastructure;
- identification of areas where reconstruction should be limited to lower densities or relocated;
- identification of less hazardous areas that can serve as receiving areas for relocated development; and

- identification of financing mechanisms that will support reconstruction, particularly for affordable housing and other non-market uses.

Social impact

There is a need in New Zealand to look more closely at the social impact of earthquakes. Community recovery following disaster consists of three interdependent components — social, economic and physical. A major impact on any one component in the system will have dramatic effects on the other two. For community recovery to be effective, plans must include contingencies for all three elements. To date, New Zealand has not adequately planned for the long-term social and economic effects of disasters.

The impact on a city is far greater than the obvious costs of repairing damaged drains and cables. There are also hidden costs in the provision of long-term community support services. Accommodation, employment, health and general community wellbeing are all significantly affected after disasters. As one example of the extra burden on already overloaded support services, if 20% of the population in the Wellington region became homeless, there would need to be plans for sheltering or rehousing approximately 80,000 people, including the provision of food, water and medical care.

The social relationships and conditions that exist before any disaster will be carried forward into the relief and recovery periods. Those individuals without financial resources will find it even more difficult to meet daily needs. Those with compound problems — the poor elderly, poor single-parent families, poor families with disabled members — will not only find it difficult to find temporary assistance, but the organisational and social relationships that made it possible to function in normal times may be absent for an extended period after the earthquake.

It is also particularly important to be sensitive to the cultural perceptions of the Maori and their community structures, to establish linkages beforehand with the various marae, and to use Maori liaison officers in all dealings, especially during the rescue and recovery phases. Cultural awareness of other ethnic groups is also needed during recovery.

Many smaller businesses are vulnerable, particularly to short periods of disruption of essential services such as electricity and water — the so-called "lifelines". If one knows what businesses are dependent upon which lifeline systems, it allows emergency managers, in conjunction with lifeline service providers and the business communities, to engage in informed, strategic planning before and after a disaster for ways to reduce economic disruption.

Physical resources and logistics

Considerable physical resources will be required to reinstate Wellington after a major earthquake, and the success of the recovery effort will centre around the planning and preparation that has been done in anticipation of the disaster. Surveys of the resources required for reconstruction were presented in a way that allowed analysis of various recognised categories of materials, plant and labour. This assessment forms a valuable starting point for realistically gauging the time required for recovery and the likely availability of resources to complete the reinstatement within a particular period.

Assuming a reconstruction period of four years, there would be a manageable demand on available materials, plant, and labour from within New Zealand. The demand for labour could be satisfied by redeployment of existing resources from within New Zealand, but there would be a major problem with their accommodation requirements, e.g. the 15,000 extra workers required for construction work once demolition had been completed.

However, there is a major shortage of contractors skilled in the demolition of tall buildings and heavy structures. The immediate post-earthquake phase will also require large numbers of engineers with assessment skills and assessors for damaged structures. Contingency plans should be put in place to bring in US or other overseas expertise.

The work of the Wellington Earthquake Lifelines Group, which to date has focused primarily on pre-recovery phase activities, serves as a useful template for extending planning to the recovery phase. The key to success will be to involve the private sector in appropriate response planning

exercises, as the majority of resources used for recovery will come from the private sector.

The recruitment and training of the necessary labour resources and the management of their deployment calls for the skills of organisations that have had experience with large-scale project management. These organisations, perhaps in a consortium, could provide the necessary interface between property owners and their insurers for managing the recovery phase.

By strategically involving offshore organisations and maximising the skills and resources they can provide, a more timely, economical and effective recovery could be achieved.

The logistics of the situation are daunting. Severe disruption of road and rail and their associated structures will occur because of land modification and landslips. This will prevent the movement of heavy equipment into and throughout the region. In turn, this will hinder demolition and the clearing of sites to enable any rebuilding to proceed. The feasibility of creating emergency beach landing facilities away from existing port areas, where facilities will be unusable, needs investigating. Strategic stockpiles of rebuilding and repair materials could be established on the Wellington side of the mountains and areas designated for tipping spoil. It could take more than four years to rebuild some of the damaged structures, and some will never be rebuilt because of owner and tenant flight.

The Civil Defence Act is written around disasters of short duration. Consideration should be given to establishing provisions for coordinated action, such as is possible in the Philippines and USA under their legislation.

Legislation

Existing legislation, which is not designed to cope with an emergency situation, may have to be suspended or a moratorium imposed for a term. It was a widely held view of people consulted that the consent procedures of the Resource Management Act and some aspects of the Building Act would not operate effectively under the conditions envisaged.

However, once there is sufficient political momentum, the fact that the existing rules do not work will not matter. They will be changed to meet the exigencies of the situation. This is not seen as fatal to the long-term prospects for the existing legislation — one should not expect standard rules to operate under emergency conditions. Some design criteria may be changed, and the performance-based code will almost certainly have to be reviewed in the light of actual performance. What may have been considered adequate before the quake may be considered quite inappropriate after it.

From a practical point of view, it may become necessary to set aside some problems to enable planners and building inspectors to focus on those priority areas of the city and environs that can be returned to normality first.

Recent events in the Philippines and Japan

Experience in the reconstruction efforts in the Philippines showed the wisdom of mobilising human and material resources in systematic phases. What might have been scientifically and technically rational solutions are not always politically and socially acceptable, and might have to be modified to secure the necessary cooperation and participation from the local community. Early-warning systems, as well as education of the public, were important to reduce loss of life and mitigate damage to physical infrastructure. Finally, good political leadership was vital at both national and local levels.

In Kobe, there were detailed plans for emergencies, but the authorities had not expected so much damage to transportation systems and lifelines, such extensive subsidence and liquefaction damage, or such loss of lives and homes of reconstruction workers. To respond better, they advise:

- having quake-proof water tanks at schools, hospitals and other major buildings;
- having back-up control systems, facilities and plant for all businesses;
- providing alternative connecting routes;
- having an underground tunnel for utilities; and
- securing communications by use of satellites, etc.

Insurance and reinsurance

Damage from the most recent earthquakes in Los Angeles, where the structural characteristics of most buildings are similar to Wellington's, was much more extensive than predicted by the insurance industry. Damage to some modern buildings, e.g. some steel-framed ones, as well as older ones, exceeded the worst expectations of structural engineers. A contributor to these results was the record-high ground motions experienced. The total direct loss of about US$20 billion and an insured loss exceeding US$12 billion (much of it to earthquake-resistant residential construction) constitute the largest insured losses in US and world earthquake history, excluding major fire following the shaking. Similar, pro-rated scenarios are expected for the Wellington earthquake, unless the lessons of very recent history are carefully studied and applied.

In major Australian disasters, the degree of non-insurance surprised not only the insurance industry, but also governments and welfare agencies. The 1994 bushfires in New South Wales revealed that 22% of the homes and 52% of the contents of homes totally destroyed by fire were not insured. People choosing not to insure their prime assets ranged across the socio-economic spectrum. Under-insurance was also a problem. The percentage by which homes were generally under-insured in these bushfires was 30%, and in some socio-economic groups it was as high as 50%.

There is a section of the community that does not believe in insurance and chooses to carry the risk themselves, believing that a disaster can never happen to them. However, it is this section that becomes the major beneficiary of appeal funds, which means that instead of transferring their risk to an insurance company, they have merely transferred their risk to the generosity of their fellow citizens. If adequate insurance is in place, a large element of disaster trauma can be eliminated.

The Earthquake Commission (EQC) will meet its responsibilities for the rebuilding of Wellington by planning meticulously for the event, leaving nothing to chance. If necessary, EQC can move its operations to an alternative site near Auckland. Its plan is to link into the insurance industry's emergency plan, obtain additional claims-assessing resources from overseas,

and operate its office, expanded by temporary telephone and inputting staff. Constant review will be needed to maintain currency with available technology, increasing knowledge of seismic disasters and the circumstances of all the partner organisations involved. This plan is the first step in a four-part process of responding to a catastrophe, the whole of which involves planning, initialising the plan, sustaining the catastrophe response organisation during the emergency and, finally, shutting down the operation in an orderly manner.

Because of Wellington's high seismicity and insurance density, reinsurers have been carefully monitoring and analysing the earthquake risk for some time. Primary insurance companies in New Zealand and other interested parties have already been notified of the results of corresponding model calculations. On the whole, reinsurers should have no difficulty with the Wellington earthquake, although some allowance should be made for the ongoing privatisation of earthquake cover for commercial/industrial risks. There will be enough reinsurance capacity available provided that information is explicit enough to quantify the risk precisely and the price of the cover is adequate for both insurer and reinsurer.

Economics and finance

There are a number of similarities between the coming Wellington quake and the recent Kobe disaster. Both cities are important ports and their economies contribute a significant proportion of their respective nation's gross domestic product (nearly 10%). However, the relative magnitude of loss, ability to rebuild and access to financial resources are all vastly different. The indirect loss model suggests that Wellington would suffer disproportionately greater indirect losses, bringing total losses to 300 to 500 percent of New Zealand's annual national savings. This is due to differences in the capacity and scale of the two economies.

There is a need to anticipate the major issues that would confront those responsible for the implementation of monetary and economic policy if a major earthquake occurred in Wellington. It would be valuable to run an occasional contingency planning exercise, involving Treasury, the Reserve

Bank and other major participants in the financial system. It could well uncover potential weak spots in the financial system, which might threaten to destabilise it unless corrected. It could illuminate the issues that would confront the bank in sustaining price stability. It could provoke consideration of whether the rather fragmented arrangements for co-ordination of financial and economic policy now prevailing would be adequate to deal with such a crisis or require special machinery. It could also stimulate discussion on whether there might be "gaps" in the provision of certain types of finance to meet such an emergency, e.g. the availability of equity finance (or temporary substitutes for it) that would help carry worthwhile enterprises through their temporary difficulties without becoming excessively indebted. This might require collective action in addition to what individual financial enterprises would be able to provide.

What happens next? What do we do now?

- Planning for recovery from any disaster is about people as well as buildings. People come from a wide variety of ethnic and social backgrounds. They have diverse needs, and may be hungry and frightened and homeless, and English may be a second language to them. They will want to rebuild their lives while the politicians, engineers and planners will want to rebuild their city.

- The time to plan for rebuilding is before the disaster, not after it has happened. We need to know in advance what we want to restore, what we want to redesign and what we want to relocate, so that people already know what is to be done when the time comes and can move to implement the plans for recovery efficiently. We need to have had time to work through the consultation and decision processes with due deliberation and care, without the stresses of immediacy and the understandable desire of the affected population to restore some degree of normalcy to their lives as quickly as possible.

- In any disaster, the people who are affected will want to know who is in charge and who sets the priorities. Now is the time to determine with

the utmost clarity what the arrangements will be. There is no time after the disaster for a committee to sit down to try and decide these things.

- Ownership of the rebuilding plans has to be shared by central government, regional councils, city and district councils, the insurance industry, private business, and the local communities. However, the question of who is to coordinate all of the activities is yet to be resolved.

- Any system that is devised needs to be applicable to any city in New Zealand. It needs to be widely understood and ready in advance. Moreover, it needs to be tested in advance.

- Despite efforts of civil defence organisations, there is still widespread lack of awareness of the recovery aspects of disasters. There needs to be a well-directed public education campaign to communicate existing plans and any future developments.

- A considerable amount of pain and destruction can be avoided by much greater mitigation efforts. Inducements need to be created to force urgent retrofitting of buildings and other structures.

- The logistics of the situation are formidable. We need to know who plans for the temporary facilities to be provided, for the transport in of heavy equipment, for the accommodation for the workforce and their supervisors, not to mention thousands of refugees — the regional or city councils, the Ministry of Civil Defence, or the Prime Minister's DESC organisation.

- Decisions have to be made about the provision of lifelines services to ensure that mitigation work is done and recovery plans are made. The strategic importance of alternative routes, such as Transmission Gully, and alternative sources of supply needs to be emphasised.

- Procedures for planning consent and the issue of building permits would need to be streamlined to enable things to happen. To do this, and otherwise expedite reconstruction, laws would need to be changed. It seems sensible to legislate now for the post-disaster situation, so that

it can swing into effect immediately. Zones that the council would not want people to rebuild on could also be designated now.

- Cost implications of the Wellington quake, including costs of business interruption and indirect costs, would have drastic repercussions for the nation. These costs will impact directly on local businesses and local government, and the reduction in money supply will flow on to central government by the greatly reduced tax take from families and businesses struggling to survive through the recovery period. The challenge is for organisations to have thought about this in advance, to have contingency plans in place to enable them to continue to operate and to have identified sources of finance for recovery.

- There are several things you can do now to plan to recover your business operation. Firstly, make sure that you are in a safe, strong building, i.e. it is well-designed to code. Make sure the providers have a good lifelines restoration plan. Set up a management contract beforehand with a major construction firm to come in promptly to help get you up and running again.

- The role of the private sector becomes dominant in the reconstruction of devastated cities. Homeowners, the insurance industry, and owners of buildings and businesses will undertake their own reconstruction. Much can be done in advance to ensure that they can work effectively to restore normalcy to the city.

- It is costly and unnecessary for any country to ignore the knowledge of the many people who have a wealth of experience of disasters overseas, and it is costly and unnecessary for each local authority to invent its own recovery plan. Why reinvent the wheel in New Zealand, and why do so in each city? It is sensible for all organisations concerned to get together to share information and to outline the common principles that apply to all recovery undertakings.

- A strong lead from central government is required to promote planning for recovery and to communicate what is expected of all sectors of the community.

Conference Proceedings

The "Wellington After the 'Quake" conference breaks new ground in studying the impact of a major earthquake on a nation's capital city. At the same time, the conference is relevant to anyone who will be involved in the reconstruction of a major city following natural disaster, in New Zealand or overseas.

EQC and the Centre for Advanced Engineering are jointly publishing the conference proceedings in one attractive volume. The book includes the papers presented at the conference, summaries of seminar discussions and an overview of the conference highlights. Topics include:

- Organisation, government and legislation — Who coordinates recovery? What are the implications for a country when a natural disaster hits the capital city?
- Rebuild? Where? — Why do people rebuild rather than relocate? What opportunities and limitations does reconstruction present?
- Economic and social framework — How costly are earthquakes? What are the social consequences of recovery?
- Physical reconstruction — How long will reconstruction take? What resources are required? Where do those resources come from? What role should overseas organisations play?
- Legislative framework — How will current legislation affect the recovery process?
- Social aspects of recovery — What effects does recovery have on society? How will government agencies respond? What are the implications of recovery for indigenous peoples?
- Recent overseas experience — What do recent overseas disasters such as the Kobe quake and the Pinatubo eruptions have to teach about recovery?

- Insurance and financial markets — What role do insurance companies and the finance industry have in recovery? How has the Earthquake Commission prepared for disaster?
- Looking forward from the conference — Where to now?

The Wellington After the Quake conference proceedings will be available in July 1995 at **NZ$90** (within NZ)/**NZ$100** or **US$70** (overseas) per copy. The New Zealand price includes GST, post and packing; the overseas price includes packing and airmail post.

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