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Resourcing the Canterbury rebuild:
Issues and outlook
A supplementary report

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GLOSSARY

BaU	Business as Usual
BRANZ	Building Research Association of New Zealand
CBD	Central Business District
CCDU	Christchurch Central Development Unit
CCG	Construction Client Group
CDC	Canterbury Development Corporation
CERA	Canterbury Earthquake Recovery Authority
CESB	Canterbury Employment and Skills Board
CILT NZ	Chartered Institute of Logistics and Transport NZ
CSSL	Canterbury Skill Shortage List
DBH	Department of Building and Housing
DoL	Department of Labour
Fletcher EQR	Fletcher Earthquake Recovery
LBP	Licensed Building Practitioners
MCDEM	Ministry of Civil Defence and Emergency Management
NZTA	New Zealand Transport Agency
PMO	Project Management Office
QS	Quantity Surveyor
RACER survey	<i>The Resource Availability for Christchurch Earthquake Reconstruction survey</i>
RecRes	Reconstruction Resourcing
RONs	Roads of National Significance
SCIRT	Stronger Christchurch Infrastructure Rebuild Team
STMS	Site Traffic Management Supervisor

INTRODUCTION

This report is the output of a longitudinal study that was established between the University of Auckland and Resilient Organisations, in conjunction with the Building Research Association of New Zealand (BRANZ), to evaluate the ongoing resource availability and capacity for post-earthquake reconstruction in Christchurch.

The purpose of the research project, entitled 'Disaster Reconstruction Resourcing' (RecRes), is to gain an understanding of resource issues relevant to the built environment during disaster response and recovery, and of solutions to problems. The project includes three components: the online survey; in-depth interviews, and case studies.

The *Resource Availability for Christchurch Earthquake Reconstruction (RACER)* online survey (www.recres.org.nz/survey) is the first step in the project, surveying construction industry practitioners and recovery participants across Canterbury to understand real-time resource challenges during post-earthquake repair and reconstruction. The preliminary data captured by the online survey between November 2011 and January 2012 is presented in the main RecRes report¹ *Preliminary Results from the Resource Availability for Christchurch Earthquake Reconstruction (RACER) Survey, January 2012*.

As a supplement, this report features a detailed analysis of how the different reconstruction sectors mobilise and manage material, human and process resources in a changing operational environment. Based on interview data, feedback and experiences reported by industry practitioners, this report incorporates evidence-based and 'best practice' in supplying the Canterbury reconstruction.

By drawing together key supply issues arising in the following sectors: housing repair, horizontal infrastructure restoration, and demolition and repair of commercial buildings, the research can assist relevant stakeholders to understand and manage resources better.

Information sources

The material in this report has been drawn from various sources, including:

- Interviews in September 2011, November 2011 and February 2012.
- Feedback and comments from industry practitioners on the main RecRes report entitled *Preliminary Results from the Resource Availability for Christchurch Earthquake Reconstruction (RACER) Survey, January 2012*.

¹ The main RecRes report can be accessed on the project website <http://www.recres.org.nz/publications>

Table 1: Basic profile of the interviewees

Interview time	Interviewees
September 2011	<ul style="list-style-type: none"> • 3 project managers from Fletcher EQR • 6 builders for the housing repairs managed by Fletcher EQR • 1 manager from SCIRT
November 2011	<ul style="list-style-type: none"> • 2 managers from SCIRT • 5 builders for the housing repairs managed by Fletcher EQR • 1 manager from CERA
February 2012	<ul style="list-style-type: none"> • 2 managers from SCIRT • 2 project managers from the SCIRT delivery teams • 1 manager from Fletcher EQR • 2 representatives from large consultancy companies • 2 major contractors for commercial building repair • 4 demolition contractors • 2 managers from CERA

This report also draws from materials presented at:

- The CCG (The Construction Client Group) meetings in November 2011, February 2012, and March 2012.
- The CILT NZ (Chartered Institute of Logistics and Transport NZ) International Conference 2012, 5 – 7 March, Wellington and Christchurch.

Research methods

The methodology adopted in this project provides quantitative documentation of the magnitude and timing of resources required for the Canterbury rebuild, along with qualitative explanations of the dynamics of reconstruction. The research methods include the following, with a focus on informing the reconstruction and publicising lessons learned for use during future events in New Zealand:

- The *Resource Availability for Christchurch Earthquake Reconstruction* (RACER) online survey (www.recres.org.nz/survey), launched every 4 months.
- Interviews which uncover what makes for recovery resourcing best practice and the organisational factors in resource availability.
- Case studies of recovery projects which provide information on procurement efficiency and improvements for construction organisations involved in the reconstruction in Christchurch.

The purpose of the interviews is to better understand how construction organisations and recovery agencies are addressing the resource challenges. In September 2011, November 2011 and February 2012, interviews were conducted with individuals from CERA, Fletcher EQR, SCIRT, private sector clients, and consulting and construction

companies². The questions and discussions during the interview included the following areas:

- Current and potential resource constraints on the rebuild efforts.
- Resourcing practices currently employed by various sectors and organisations.
- Dynamics of the construction market.
- Interactions and dependencies between sectors, organisations and agencies in the procurement process.

Next steps

This report is useful for individual construction organisations, industry federations and associations, CERA, Department of Building and Housing (DBH), and recovery agencies as they plan for the next phase of the reconstruction and recovery process. It will help inform future estimations of resource availability for the reconstruction. The approach to this research will be adjusted in response to the changing operational environment as recovery continues.

COMMON ISSUES AND THEMES

This section summarises the current key issues common to construction organisations involved in rebuilding. Matters specific to individual sectors are also described.

There is common interest and experience in:

- Finding ways to meet both immediate skill demand and longer-term business needs to cope with anticipated demand. This means consideration of:
 - Ways to recruit additional personnel to support recovery operations.
 - Ways to maximise existing capacity.
 - Ways to retain and secure expertise.
 - Ways to train staff and increase capability.
- Developing methods for organisational development to cope with anticipated changes. These methods include such as, upskilling, partnering with peer organisations and collaboration with multi-agencies.
- Utilising the learning curve experienced during the reconstruction in Christchurch to improve operations and process, re-focus recruitment and develop new organisational strengths.
- Exploring the use of innovative technology and techniques such as social media, new IT systems and techniques, satellite phones, web-based seminars teleconference, video conference facilities and GPS.
- Learning from peer organisations in supplying construction work and collaboration with supply chain partners.

² A number of interviewees preferred not to disclose their identity, so the detailed profiles of interviewees are not presented here.

Other issues identified by the interviews were considered important by companies or sector groups. They include:

- Earthquake-related work has affected a wide range of 'Business as Usual' (BaU) projects.
- There is more mobility of human resources in the organisation and industry, and from local, national and international perspectives.
- Prioritising resource stocks and flows is required to support the reconstruction in Christchurch.
- Partnering as a form of collaboration has emerged to secure resources and to mitigate against risks of resource constraints during the rebuild process (e.g. Stronger Christchurch Infrastructure Alliance model, supply chain partnership and partnering between peer organisations in the same work category). These innovative methods of delivering projects deserve further attention to discover how they might affect resource flows across the built environment.
- A strong sense of leadership and ownership of the Canterbury rebuild is shown in some organisations at the operational level.
- Undesired behaviours are surfacing as a result of resource shortages, such as a 'gold rush' mentality in some construction companies which lack of adequate capacity and work quality concerns.
- The consenting process may create a bottleneck to the construction work flows due to the LBP (Licensed Building Practitioners).

Other more general issues raised include:

- The need to translate ways of coping, innovating and collaborating during the rebuild projects in Christchurch into 'Business as Usual', and to transfer best practice to benefit the construction industry nationwide.
- The risks of organisational expansion which may compromise the quality of work and the need to meet sustainable development goals.
- The need to divert resources from new construction and investment in other parts of New Zealand to meet recovery priorities in Christchurch.
- The case for a co-ordinating office inside CERA to manage building activities across sectors, with a clear mapping and understanding of the resources and capacity in the marketplace.
- The lead-in time required to establish a new organisation such as SCRIT, CERA or PMOs

RESIDENTIAL REPAIR

The primary impediments to housing repair and rebuild were identified by the RACER survey and reported in the main RecRes report. These issues, such as land liquefaction and multi-insurance decisions, are unique to Canterbury. To solve the problems requires a systems approach. This section reports the resource issues in relation to housing repairs managed by Fletcher EQR.

General issues for housing repairs

The major issues identified during the interviews are summarised below:

- Three levels of accreditation exist in Fletcher EQR, these are:
 - Main contractors and builders being a member of either Master Builders or Certified Builders.
 - Where builders have elected not to join the above organisations then Fletcher EQR will accept the alternative standard of being a Licensed Building Practitioner (LBP).
 - A small number of finishing trades (plastering and painting) can be accredited as main contractors where the scope of repairs matches their skills and experience.
- As of November 2011, at the then expected level of activity, the EQC predicted that Christchurch will be short of 30,000 workers. This number is subject to change as the scope of rebuild becomes clearer; where to accommodate a large number of incoming workers and their families is of concern.
- The Fletcher EQR PMO model, which assigns full responsibility to main contractors for the entire repair of a house, is consistent with the standard delivery method for house repairs and new builds pre-disaster. As reported by the builders interviewed, some main contractors have difficulty in supervising their tradesmen and subcontractors. In this large post-disaster environment, it is essential to consider the project management requirements for mitigating the risk of quality issues.
- By the time the interviews were conducted in September and November 2011, there was a lack of consistency of work procedures across the hubs regarding the management of contractors and builders; as a result, builders who work for varied hubs at one time had difficulty in meeting different requirements in terms of quality of work, and their availability to do the job.
- The gap between the EQC inspector's scope and contractors' re-scope causes significant replication of work during the scoping stage.
- Trades such as plasterers and painters are in short supply; the electrical trades are anticipated to be the major 'pinch point' for resources for the recovery³. The shortage of quantity surveyors (QS) particularly affects the progress of EQR housing repair work.
- Emergency repairs caused by aftershocks (for instance the 23 December aftershock caused 6000 emergency repairs) are disruptive and constantly divert resources from housing repair work.
- The focus of EQR has shifted from recruiting the accredited contractors to prioritising rebuild projects within available resources.

Implications

- The major challenge of resourcing for housing repairs rests with a lack of skill and experience of people working at the lower levels of the construction

³ This result is based on the first (CDC) workforce survey, the RecRes baseline study survey between November 2011 and January 2012 and the interviews in September 2011 and November 2011.

industry. The overall standard of a house repair is influenced by the quality and productivity of these workers.

- The latest information from Fletcher EQR is that a standardised work procedure across the hubs is being put in place. Measuring the efficiency of standardisation is required.
- A mechanism of managing home owners' expectations needs to be set up across all the hubs regarding house repairs.
- More stringent quality control systems will be beneficial, particularly for managing subcontractors and tradespeople who work on collaborated and bundled projects.
- Baseline data such as EQC's house damage assessment, insurance claims and the sequence of work have been used for resource requirement prediction. Qualitative information including the behaviours of individuals and organisations in response to resource shortages, the market drivers, and project delivery mechanisms can be used to improve the predictions of resource demand and supply.

RESTORATION OF HORIZONTAL INFRASTRUCTURE

There is a consensus that the infrastructure rebuild which is managed by the Stronger Christchurch Infrastructure Rebuild Team (SCIRT) is leading the Canterbury reconstruction. Innovation in project delivery by using an alliance-like structure was highlighted by the interviewees as a key contributor.

General issues for horizontal infrastructure rebuild

- The South Island can be difficult to get parts for specialist plant, resulting in inefficiencies and lower outputs.
- There is a lack of inventory in specialist fittings for pipe connections.
- The lack of Site Traffic Management Supervisor (STMS) specialists is a concern due to the complex traffic conditions in the quake-affected areas.
- The New Zealand Transport Agency (NZTA), as one of the owner participants in SCIRT, is concerned about the difficulty in procuring teams for its RONS (Roads of National Significance) programme in Canterbury when SCIRT is doing the horizontal infrastructure rebuild at the same time.
- Emergency repairs cause disruptions to the parallel maintenance and rebuild work managed by SCIRT.
- Strong leadership is shown in the SCIRT delivery teams, particularly with young people stepping up to take a lead role in rebuild projects.
- There is a tendency toward design changes and innovative technology (e.g. shifting from deep mains to a shallow pump system and upgrading material specifications). However, there is a shortage of accredited laboratories for testing construction materials.

Implications

- Changes to design standards or material specifications may increase the lead time for new materials and components to come to the market.

- Built-in resilience of infrastructure also requires consideration of increasing people's resilience.
- Phased reconstruction schedules at both national and local levels are beneficial. The challenge is to consider network dependencies and potential for synergies.
- SCIRT seeks to secure long-term employment opportunities for local people and provide relevant training where required. How to promote and transfer this culture of sharing and encouraging to the wider construction industry should be further investigated.

DEMOLITION AND REPAIR OF COMMERCIAL BUILDINGS

A significant number of commercial buildings damaged by the earthquake are being demolished. The major resource concerns with regard to the demolition of commercial buildings are outlined below.

General issues for demolition of commercial buildings

- Variations exist between the economic models of recycling demolition materials used by the Ministry of Civil Defence and Emergency Management (MCDEM) and the Canterbury Earthquake Recovery Authority (CERA).
- Waste management was initially overlooked as an area for attention due to the lack of guidelines within local authorities prior to the earthquakes.
- In pursuit of speed, some demolition contractors are inclined to manage debris flows rather than recycling.
- Specialist operator capability is needed for critical waste streams, and some waste management and recycling specialists and plant have had to be brought in from Auckland.
- Dumping sites and recycling facilities are anticipated to be in short supply in the Canterbury region.
- Fatigue becomes a critical service inhibitor for drivers who work on waste management in the demolition sector.

Implications

- The damaged buildings need to be made safe before waste can be moved. This requires a formalised communication protocol between both demolition contractors and structural engineers.
- Waste issues, if not managed well, may become an obstacle to recovery. A nationwide waste management plan for all forms of waste in response to natural disasters needs to be formalised.
- Other temporary holding and bulk waste locations should be identified in the Canterbury region to manage the increased waste flows.

General issues for repair of commercial buildings

- There is a shortage of design professionals for safe deconstruction and demolition of commercial buildings.

- Multi-stakeholder involvement in the structural assessment stage may cause unnecessary replication of assessment work. For instance, the insurer, the building owner and the Christchurch City Council use the same or different structural specialists to assess one damaged building, and no information-sharing mechanism exists between these stakeholders.
- Inspections of earthquake-prone buildings conducted by other local authorities have created some resource bottlenecks for recovery work in Christchurch. For example, structural assessment for earthquake risks in other New Zealand cities has pulled specialists away from the Christchurch rebuild, particularly structural engineers.

Implications

- Commercial viability is a major consideration for stakeholders such as insurers, potential investors, tenants and building owners.
- The establishment of Christchurch Central Development Unit (CCDU) inside CERA to lead the rebuild of Christchurch Central will create confidence and certainty in recovery of the commercial sector.
- The increasing trend to retrofit buildings at risk of earthquake in other New Zealand cities will cause resource problems in Christchurch.

RECOMMENDATIONS

This section considers options for facilitating the resource requirements summarised above across sectors by drawing on our empirical analysis and in-depth interviews with key stakeholders in the Christchurch recovery. It is recommended that:

- In the face of growth opportunities and challenges, the construction organisations focus on building resilience in organisations through improvements in processes, people and relationships.
- Certainty is important – decision-making empowered by legislation to address issues of insurance and land is needed to create certainty for long-term recovery.
- A mobile building service sets up inside CERA to communicate changes to building standards to local communities and to coordinate organisations and practitioners involved in rebuild in terms of alleviating the risk of resource constraints.
- Local authorities nationwide collaborate through open dialogue and Memoranda of Understanding (MoU) to secure resources for the rebuild priorities in Christchurch.
- Resource demands and potential resource ‘pinch points’ during the rebuild period can be projected from baseline data such as the number of claims from insurers, the sequence of work, and damage patterns caused by the earthquakes. It is crucial to make this information available across the sectors.
- Strategic decisions (e.g. what gets built first, in what order they are rebuilt, how to maximise the use of resources) should be centralised and factored into recovery plans.

OUTLOOK

This section considers the resourcing challenges ahead to assist forward planning in both public and private sectors.

- The horizontal infrastructure will start to move from design to construction during the second half of 2012 and early 2013. The vertical rebuild including housing and commercial buildings is anticipated to start at the same time. The Canterbury rebuild will experience shortages of skilled labour and building expertise, wage inflation, accommodation shortages and possibly some material shortages and price escalation.
- The commercial rebuild is difficult to model due to a number of uncertainties regarding the prospects of investment in CBD and other commercial areas, an unknown numbers of tenants for CBD space, and potential (and unknown) changes to insurance policies.
- The challenge of accommodating workers from outside Christchurch is a big concern.
- If key recovery decisions are still pending by mid-2012, there is a danger of construction workers leaving the Canterbury region due to a lack of work.
- There may be a shift from traditional material procurement with competitive pricing to relationship-oriented negotiations due to material shortages; meanwhile, more in-house training and relationship-based strategies will be developed by contractors involved in the rebuild.
- Architects, project managers and engineers will be subject to shortages as planning for new buildings increases.
- There is a question around the adequacy of competency and ability of new skills being trained and recruited in New Zealand to work on rebuild projects and how new recruitment from elsewhere changes the local culture in Christchurch.
- Better phasing of work is being sought by construction organisations involved in the rebuild in order to reduce their vulnerability to the boom-bust cycles.
- There is a consensus among the interviewees regarding the need for outside support. However, how to reshape the regionally-based construction industry at geographical boundaries is a big concern.
- The supply chain attitudes and capabilities are variable, with an expectation that some will want short-term gains while others will seek long-term partnerships with construction organisations.

The RecRes project aims to develop independent sources of information from a wide spectrum of organisations ranging from sole traders to small, medium and large organisations⁴. The findings complement DoL⁵ and CERA⁶-led projects to provide a clearer understanding and combined long-term approach to the resource demands and priorities following the Canterbury earthquakes.

⁴ The size of the organisation is defined in terms of the number of employees. A micro organisation has fewer than 10 employees, a small organisation fewer than 50, a medium organisation more than 50 and fewer than 100, and a large organisation more than 100.

⁵ See <http://www.dol.govt.nz/publications/research/canterbury-rebuild/report-03.asp>

⁶ See <http://www.cesb.org.nz/projects-strategy>

CONCLUSION

At this stage of reconstruction in Christchurch, material shortages are reported by some interviewees but shortages of human resources are of most concern. The majority of rebuilding organisations have mechanisms in place to mitigate the risk of resource constraints during 2012, including sharing, borrowing, recruiting, retaining and optimising existing resources.

It has to be noted that many projected rates of growth in skills supply are to be managed by new sources that have yet to prove themselves. Typical examples come from the government skill training package and a relaxed immigration policy. Due to the mobility and value-driven nature of resources, resource availability for the Canterbury rebuild has to be examined with a broad view — locally, nationally and internationally.

Resource availability was not found to be a key constraint to the recovery over the studied period (September 2011 to March 2012), particularly the availability of construction materials and plant. However, it is anticipated it will become a factor when the reconstruction and recovery in Christchurch gains momentum. Solving prospective resource pressures involves two distinct elements: ensuring rebuild-related processes and institutional protocols are in place, and creating incentives to increase both the quantity and quality of resources available to the recovery in Christchurch.

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