

Lessons learned from one of New Zealand's most challenging civil engineering projects: rebuilding the earthquake damaged pipes, roads, bridges and retaining walls in the city of Christchurch 2011 - 2016.

Project prioritisation – right thing, right time, right place

Story: Project Prioritisation

Theme: Programme Management

A document which outlines how SCIRT prioritised the 634 construction projects within its programme of work.

This document has been provided as an example of a tool that might be useful for other organisations undertaking complex disaster recovery or infrastructure rebuild programmes.

For more information about this document, visit www.scirtlearninglegacy.org.nz

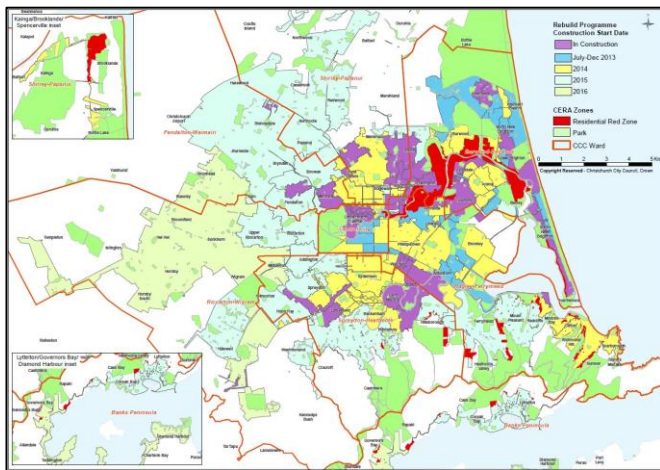


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Project prioritisation – right thing, right time, right place

Doing the right thing at the right time in the right place – as well as coordinating all the work to minimise disruption – was key to the Alliance objectives.



SCIRT rebuild programme prioritisation map: July 2013

A project prioritisation process evolved to ensure SCIRT repaired and rebuilt the right projects in the right order.

The process was created and managed by SCIRT's Project Definition Team. A team of scoping managers and asset owner representatives were responsible for:

- Initiating projects
- Prioritising work
- Scoping what should be included
- Feeding this information to the design teams.

Prioritising the work involved understanding and managing the influences on the programme while completing the most important projects first (see attachment – Project Prioritisation Management Plan).

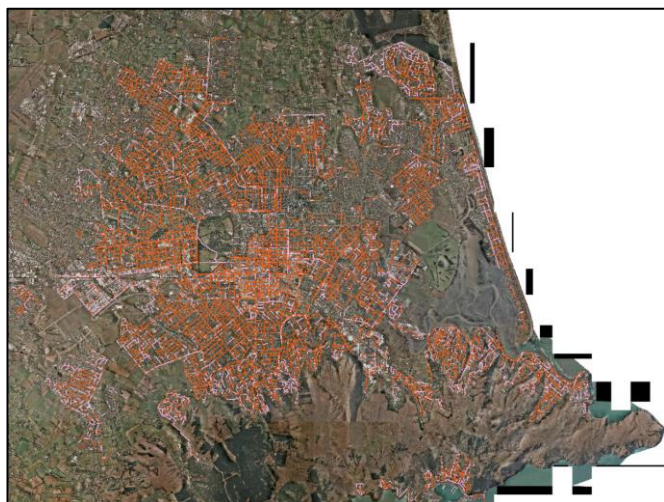
The highest priority projects included:

- Those with the most damaged assets
- Those that served the most people

- Those costing the most to maintain
- Those with internal and external programme interdependencies.

The main challenges included:

- **Dealing with a complex asset base** – Damage to the three waters (wastewater, storm water and fresh water) networks, roads and associated structures (pump stations, retaining walls, culverts) all had to be considered, with each having different damage and priorities. The water supply network was easiest to fix – a small renewal programme was sufficient, meaning if it was broken, it was fixed. Storm water and wastewater networks were more complex, and had to be considered from the hydraulic whole catchment view. Road repairs were based on the levels of service needed to support the recovery of the city and to minimise the effects of the earthquakes on those communities trying to recover.
- **An unknown scope of work** – Most of the damage was not visible above the ground, so getting a clear picture of the extent of the scope took time. Continuous asset assessment helped this become clearer as the programme evolved.
- **Other rebuild programmes** – Getting information about other rebuild programmes at a detailed level so it was useful. Value-adding opportunities had to be considered to optimise the SCIRT and external programmes, e.g. the ultra-fast broadband (UFB) rollout, the Central City Blueprint and the Port Hills recovery.
- **Balancing programme priorities and commercial/financial deliverables** – To get all of the work done within SCIRT's five and a half year timeframe, there was a delicate balance between



Widespread damage: A city-wide view of the wastewater (sewer) network damage. Orange meant repair or renewal work was required.

making sure projects were constructed in the right order, and giving the right amount of work to Delivery Teams so they had a continuous work flow.

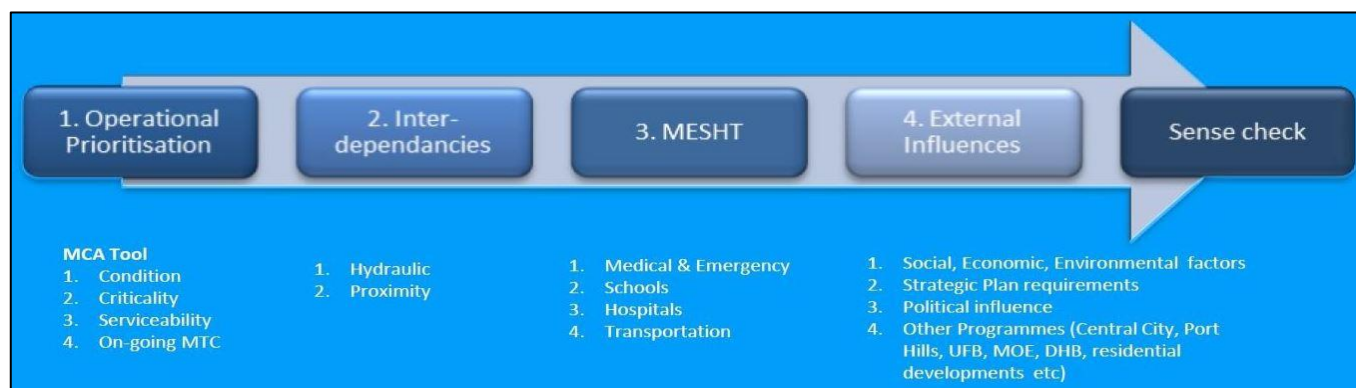
The prioritisation process incorporated and balanced operational priorities, network interdependencies, community needs and external factors to create a prioritised list of projects at both a catchment level across the city and at a project level within each catchment.

The following priorities formed the basis for the order of work, then were further developed by the programme schedule, developed to ensure SCIRT's rebuild work was completed within its time frame.

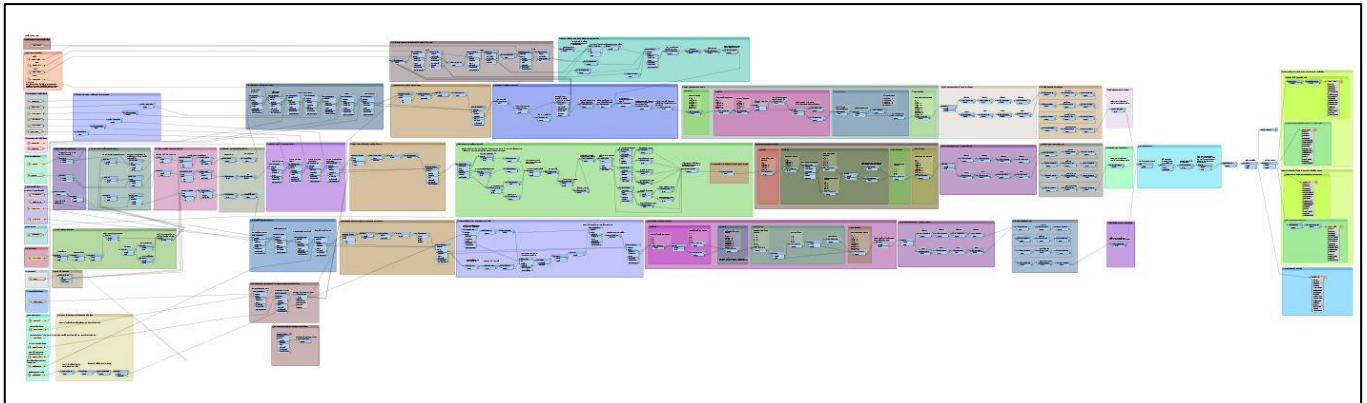
1. **Operational priorities** – A Multi-Criteria Analysis (MCA) tool individually scored earthquake damage;

criticality (the number of people served); serviceability (the level of service capacity); maintenance cost (the costs to maintain functionality)

2. **Interdependencies** – Geographic, programme and hydraulic interdependencies were considered, for example, from an engineering perspective were there downstream pump stations or lines to be repaired before the upstream lines? For resource and cash-flow programme requirements, each project package needed to be about \$10 million and include "one pass approach" considerations. Could the three waters and roading for each street be repaired at the same time or one after the other?
3. **MESHT priorities** – Where were the medical and emergency centres, schools, hospitals and main transport networks that needed to have access maintained? Many of these issues were covered by catchment area studies. Could work outside schools be completed outside of school hours or in school holidays?
4. **External influences** – What other repair programmes were planned in each area? Were there any issues regarding local and social requirements? Were there priorities for the economic recovery of business districts or community amenities? Were there access constraints, such as the central city cordon? Were there requirements for SCIRT's work to support other programmes, such as the Central City Plan or the Port Hills recovery? Red zone decisions also influenced the repair priorities and timing.



SCIRT's project prioritisation process.



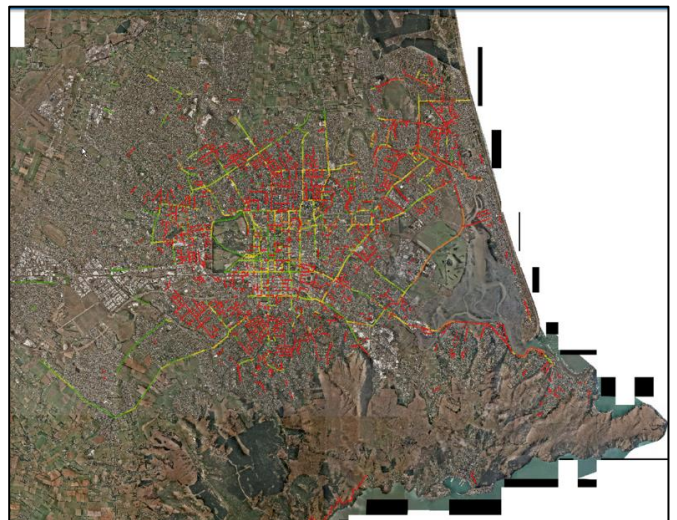
An illustration showing the prioritisation and weighting process within SCIRT's Multi-Criteria Analysis (MCA) tool.

What worked well?

- The MCA tool was a major factor in the success of SCIRT's prioritisation process. It allowed damage to be illustrated at an individual asset level but also at a programme-wide rebuild schedule level. The tool was rerun every quarter (see attachment – Multi-Criteria Analysis Asset Prioritisation Tool).
- All interested organisations could provide input (see attachment – What to rebuild, where and when). The Canterbury Earthquake Recovery Authority (CERA), the New Zealand Transport Agency (NZTA) and the Christchurch City Council (CCC) established global parameters and criteria to determine the priorities for all projects rather than determining the priority of every individual project.
- Being able to create visual outputs allowed the scale of the rebuild to be shown (see attachment – Rebuild schedule map).
- The prescriptive nature of the process gave confidence regarding the “right time, right place and right time” decisions. A defensible process was created, that, in turn, kept both the public and funders happy.
- Showing a visual representation of when the work was going to start gave confidence to the community that the right areas were being repaired first. A three-monthly update map was made available (see attachment – a copy of the rebuild

schedule map).

- MCA outputs showed the most damaged areas as the priorities. The pattern went from east to west and in the central city, a lot of old infrastructure was highlighted as near the top of the list for renewal (see attachment – Rebuild schedule map).
- Working at the hydraulic catchment level was positive as it also allowed MESHT details to be addressed at a catchment level.
- The central city rebuild programme worked well, having direct access to, and working alongside, the controlling authority (Canterbury Earthquake Recovery Authority).



An output from the MCA tool, showing the 5000 damaged assets that were top priority during the SCIRT programme.

- The extent of damage was ranked into a yearly sequence.
- Consulting with CCC, CERA and NZTA to ensure their objectives were met for the whole duration of the SCIRT programme.
- A sense check was critical. The prioritisation had to look right.
- Links to external agencies allowed SCIRT to plan for and facilitate other rebuild programmes.
- Asset owner representatives, based at SCIRT, connected SCIRT to the needs of the CCC and NZTA capital expenditure and operational expenditure programmes.

What could have been better?

- External programmes and interdependencies – Coordination with the central city and Port Hills programmes of work worked well, because SCIRT had direct access to the controlling authority. This contrasted with the experience with the District Health Board, Ministry of Education, Housing New Zealand and the Ultra-Fast Broadband rollout, all of whom had funding constraints or less flexibility to coordinate programmes with SCIRT.
- Balancing programme priorities with the needs and complexities of design and consultation requirements - For example, the suburb of Parklands was identified as a priority area but public consultation and subsequent re-design meant it took five years to repair the wastewater network. In addition, some early projects were completed quickly in areas that did not appear to be badly damaged, creating an impression of unfairness (see attachment – Rebuild actual start date map).
- Decisions about the future of red-zoned land – SCIRT identified priority projects in some of these areas with assets that were deteriorating rapidly. The slow pace of decision-making meant compromises had to be made.

Key learnings

- **Get good asset data** - from damage assessments, maintenance costs, operational issues and ground conditions. The keys to understanding what was required and being able to plan accordingly was the availability of damage information at an individual asset level.
- **Statistical data management tools take the politics out of a process** - SCIRT took time to work with interested parties to determine their requirements and priorities; as a result when the MCA produced an output it was unquestioned.
- **Providing a visual representation** of the programme for Christchurch residents and businesses gave confidence in the recovery process. It also allowed residents to see where they fitted into the bigger picture.
- **Incorporating a sense check** – did it look right? – was vital.