A691569

Otago Civil Defence Emergency Management Group

Agenda for a meeting to be held at the Otaru Room, Dunedin City Council, 50 The Octagon, Dunedin, on Friday 14 November 2014 commencing at 12.30 pm

Membership

Cr Stephen Woodhead	Otago Regional Council
Mayor Bryan Cadogan	Clutha District Council
Mayor Tony Lepper	Central Otago District Council
Mayor Dave Cull	Dunedin City Council
Mayor Vanessa van Uden	Queenstown Lakes District Council
Mayor Gary Kircher	Waitaki District Council

Apologies

In attendance

Confirmation of Agenda

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1. **Welcome**
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4. **Minutes previous Meeting 22 August 2014 (attached) ..... 2 - 3**
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7. **Otago Lifelines Project Report (attached, Ref. A691617).....9 – 67**
8. **Review CDEM Group Arrangements (attached, Ref. A693503)..... 68 - 119**
9. **Next meeting**
   Friday 20 February 2015 – Oamaru, hosted by WDC

A664827

Otago Civil Defence Emergency Management Group

Minutes of a meeting held in the Council Chamber, Otago Regional Council, 70 Stafford Street, Dunedin on Friday 22 August 2014 commencing at 11.35 am

Present	Cr Stephen Woodhead	Otago Regional Council (Chair)
	Mayor Bryan Cadogan	Clutha District Council
	Mayor Dave Cull	Dunedin City Council
	Mayor Vanessa van Uden	Queenstown Lakes District Council
	Mayor Gary Kircher	Waitaki District Council

Apologies Mayor Tony Lepper
The apology was received on the motion of Mayor Cull and Mayor van Uden.

In attendance
Mr Peter Bodeker, Otago Regional Council
Mr Steve Hill, Clutha District Council
Dr Sue Bidrose, Dunedin City Council
Mr Adam Feeley, Queenstown-Lakes District Council
Mr Michael Ross, Waitaki District Council
Mr Charles Hakkaart, CDEM Co-ordinator
Mr Wayne Scott, Group Controller
Mrs Janet Favel, Otago Regional Council (Minute taker)

Confirmation of Agenda
There were no changes to the agenda.

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1. **Minutes previous Meeting 20 May 2014**
   The minutes of the previous meeting held on 20 May 2014, having been circulated, were adopted on the motion of Mayor Cadogan and Mayor Kircher.

2. **Matters arising from previous minutes**
   There were no matters arising from the minutes.

3. **Otago CDEM Update – CDEM Coordinator's Report (Report A659529)**
   The following items in Mr Hakkaart's report were discussed:
   - Risk Reduction Committee – the Lifelines Project report would be presented to the Committee at the end of August.
   - Readiness and Response Committee – work under way on a Coastal Tsunami Response Plan, to be followed by an Inland Tsunami Response Plan.

- Recovery Committee – legislation required that a Recovery Manager be appointed, and work was progressing on assessing the size of the position. It was expected that the current CDEM review would assist with this work.
- Welfare Committee – Government required that a Welfare Manager be appointed, and Mayor van Uden noted the need to have this position filled while the review was under way. Mr Bodeker anticipated that the review would point to the need for paid professional people on Council's staff. Mr Hakkaart commented that the Welfare Committee was working on identifying a Welfare Manager, and a set up and maintenance phase. A database of welfare resources available in the Region was being prepared. He noted that the Group needed to supply the temporary housing resource information requested by MoBIE.
- Recovery and Welfare Manager positions - Mayor van Uden considered that appointments should be made, if necessary in a temporary capacity, to get work under way.
- Training – mostly localized.
- Revised National CDEM Plan – a submission had been made on behalf of the Group. The Ministry would coordinate national events but the Group was responsible for running them.
- Group Capability Assessment to be carried out from November 2014 to February 2015. Mr Hakkaart advised that a matrix of issues to be worked on would be circulated to EMOs and workshops and interviews would be arranged. TLAs would carry out their own assessment through interviews with their Mayor, CE, and EMO, the interviews to take place in January. He noted that this assessment was in the nature of an audit, and documentation and evidence were required.
- CDEM review - Mr Hakkaart noted that three EMOs had left recently, which meant that plan implementation was delayed.

4. Review CDEM Group Arrangements – Verbal update

Mr Bodeker advised that the Otago CDEM review was under way, and the consultants were carrying out interviews by phone. Workshops would be carried out with stakeholders if necessary. The process would be to present the review to the next CEs' meeting, then to the Mayoral Forum, then circulate it to Councils. Cr Bidrose commented that the interview was useful, but she would have preferred to have the EMO present. She had discussed this with the consultant and it was agreed it would be useful to have EMOs involved.

Mr Bodeker advised that he had received confirmation of district controllers.

5. Next meetings

Friday 14 November 2014 – Dunedin, hosted by DCC
Friday 20 February 2015 – Oamaru, hosted by WDC

The meeting closed at 12 noon.

Chairperson

OTAGO
CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP

REPORT

Document ID: A691780

To: **Otago CDEM Group**
From: **CDEM Co-ordinator**
Date: **14 November 2014**

Subject: **OTAGO CDEM UPDATE**

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1. Precis

The purpose of this report is to update group members on CDEM activities in Otago.

2. Risk Reduction

The Otago Lifelines Project has now been completed with the report and its recommendations to be presented to the CEG and Joint Committee.

The development of the Risk Reduction Strategy has been delayed but will be discussed again at the next meeting of the Risk Reduction Committee on 18th November.

The committee proposes to have discussions with the ORC in respect to considering CDEM in the development of the RPS and some early input has already been provided.

3. Readiness and Response

There has been little progress at a coordinated Group Level in the implementation of EMIS.

The Coastal Tsunami Plan Working Party has met and the framework of the document developed and some sections drafted. Responsibility for further drafting has been agreed and the next meeting is scheduled in 2015.

A full test of the National Warning System (NWS) was conducted at 1000 hours on 16 October 2014.

This test message was sent as per the requirements under Section 19.3.25 of the Guide to the National Civil Defence Emergency Management Plan.

23.5% of the contacts on the NWS list did not reply within 30 minutes and 19% still did not reply within 60 minutes. (For comparison, the previous test in June resulted in a 35% non-response rate after 30 minutes and 34% after 60 minutes.) 13% of contacts did not respond to the test message at all. These non-response rates are a significant improvement from the last test.

The Group Office did respond within the 30 minutes.

CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP

4. Recovery

The Recovery Committee meeting was abandoned with no one attending.

MCDEM is leading a project to review the recovery sections of the Civil Defence Emergency Management (CDEM) Act 2002. MCDEM has developed a set of policy proposals for changing the CDEM Act, which have been approved in principle for further consultation. MCDEM is now seeking input from CDEM Groups on these proposals, and their operational implications, before presenting final proposals to the Minister of Civil Defence for consideration.

The scope of the review of the CDEM Act is recovery from small to moderate scale emergencies. The review seeks to:

- signal the importance of recovery by giving it more prominence in the Act;
- conform to the core CDEM principle of 'act locally, coordinate regionally, support nationally', which underpins local devolution;
- provide authority and a mandate to those directing, managing and coordinating the recovery;
- better support a smoother transition from the focus on response to the focus on recovery;
- enable effective and proportionate approaches to recovery that can be scaled and adapted to different scenarios; and
- ensure a principled approach, with an appropriate level of safeguards in the use of any extraordinary powers.

5. Welfare

The Welfare Advisory Group met on 13 October. They recommended a proposal for preparation of a Welfare Centre Register and adoption of a standard Welfare registration form that aligns with EMIS that can be used at Welfare Centres. Both these items were also discussed at the Readiness and Response Committee meeting where the Welfare Centre Register project was agreed although not by all, and the adoption of a welfare registration form was unable to be agreed on. Progress with the Welfare Centre Register project will be subject to the resourcing and appointment of a Group Welfare Manager. This will be dependent on the review of Otago CDEM arrangements to be reported to the Joint Committee.

The final draft of the MCDEM Director's Guideline for Welfare is expected to be available for consultation March – April 2015. The changes to Welfare arrangements signaled in the draft revised CDEM National Plan are expected to come into force following this along with the revised CDEM National Plan (Second half 2015).

6. Training/Exercises

On Thursday 4th September there was a National Exercise Programme (NEP) Group meeting in Wellington which I attended by on behalf of the Otago CDEM Group.

The National Exercise Programme (NEP) concept was established through a project initiated and managed by MCDEM with representation from the CDEM sector.

The NEP was established to facilitate s systematic continuum of regular exercise events, linking all levels of CDEM. Exercises within the programme include activities focused on:-

- The response to an emergency by one or more CDEM Groups and the provision of mutual aid by other CDEM Groups;
- Recovery arrangements related to emergencies, including the transition from Response to Recovery;
- Government (MCDEM) assistance to CDEM Group response/recovery
- Cluster cooperation/support;
- National coordination/control.

The NEP is essentially concerned with inter-Group and tier 3 and 4 CDEM exercises.

- Tier 3 is Inter Group exercise (across CDEM Groups, may include MCDEM)
- Tier 4 is National exercise (NZ or part thereof, including central government)

The NEP Group meets once a year.

Among other things there was discussion over the next tier 4 exercise. The next one is due 2016.

The Group was asked for its priorities for a tier 4 exercise in 2016.

The last Tsunami event exercise was 2010 when the exercise scenario ended just prior to the wave hitting the NZ coast. It is proposed the next exercise takes the scenario beyond this point.

This will allow the Group to test
- Implementation of corrective action plans from 2010 exercise,
- Mass evacuation plans,
- New welfare arrangements (given proposed changes to welfare provisions at end this year),
- New personnel since last exercise,
- Community awareness and readiness through activities/workshops prior to exercise.

It is intended that the exercise will involve all groups one way or another (either dealing with impact or supporting). Some discussion about the exercise event being a regional source tsunami meaning little warning so could be a more real time exercise.

	Phase 1 (up to impact)	**Phase 2 (post impact)**	**Phase 3 (post impact)**
Date	Wednesday 31 August 2016.	Two weeks after Phase 1 (for one day). *14 September 2016.*	Two weeks after Phase 2 (for one day). *28 September 2016.*
Response or Recovery Phase	From PTWC notification through to tsunami impact.	Post impact (response and recovery elements)	Post impact (response and recovery elements)

	Phase 1 (up to impact)	Phase 2 (post impact)	Phase 3 (post impact)
Elements to test or practise	• NCMC, ECC and EOC activations, • EMIS, • Public notifications, • PIM, • Evacuations etc.	• Welfare arrangements, • Recovery arrangements, • Post impact assessments, • PIM etc.	Interoperability between CDEM Groups and the NCMC.
Delivery method	Full scale exercise.	As welfare and/or recovery arrangements may not be well embedded within CDEM Groups by 2016, it may be worthwhile holding a tabletop exercise (or series of) within CDEM Groups to discuss arrangements.	Once arrangements have been discussed within CDEM Groups, a wider tabletop discussion could between Group Controllers and the NCMC.
Participants	NCMC, CDEM Groups and Partner agencies together.	Individual CDEM Groups with appropriate partner agencies.	NCMC and Group Controllers.
Phase length	1 day	1 day	1 day

There was some concern that with proposed changes to Welfare arrangements, revised Welfare Plans etc may not be sufficiently in place to exercise properly. However having said this there was also the thought that an exercise that picks up as the tsunami hits the coast will include and test recovery.

Given that we as a group are about to develop a tsunami response plan, which will hopefully see community plans developed, an exercise based on a tsunami may be good for Otago. We could build up to the exercise by having workshops with people involved to discuss the tsunami risk, indicate the possible extent of a tsunami wave on our coast and in our coastal communities, etc. Planning for a tsunami exercise will allow us to think about how many people may be involved and what welfare services will be needed where etc.

Also a reminder that a shakeout drill will be held in 2015. A date in October is being considered.

7. Revised National CDEM Plan

While the *National CDEM Plan* may be made by an Order in Council earlier in 2015, it will not come into force until the *Guide to the National CDEM Plan* is updated. The Guide can't be issued for consultation until the Plan is made.

It is likely that the Guide and the Welfare Director's Guideline will be issued for consultation around the same time March - April 2015 and will come into force in the second half of 2015

CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP

8. Otago CDEM Group Capability Assessment

Information has been sent out to the TLA EMOs and they are scheduling workshops to complete the self assessments. Meetings are being scheduled for the MCDEM audit team to met members in the week beginning 19 January 2015.

MCDEM have requested that they meet in three separate meetings of about 20 minutes at each TLA:

1. Group Joint Committee member (Mayor)
2. CEG member (CEO) / Controller
3. EMO and maybe hazard risk manager but imagine can be anyone else you think they should talk to.

With the departure of the Waitaki EMO, Waitaki CDEM have already undertaken their self assessment workshop which went well.

9. Group Office

A review of progress on the Group work plan has been completed as well as a review of progress against the recommendations from the last Capability Assessment report. From this a revised work plan through the end 2017 has been drafted. This work has been included in the Review of Otago CDEM Arrangements report.

What this work has highlighted is there is still considerable work in front of the Otago CDEM Group particularly in implementing the various plans that have been developed over the past few years.

Charles Hakkaart
CDEM Coordinator

OTAGO
CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP

REPORT

Object ID: **A691617**

To: **Group Joint Committee and Coordinating Executive Group**

Date: **14 November 2014**

Subject: **Otago Lifelines Project – Vulnerability and Interdependency Assessment**

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1 Précis

The Vulnerability and Interdependency Assessment Report, the result of the Otago Lifelines Project, has been completed and the final report is attached.

Alex Sims will be in attendance to present the report.

The report contains a number of recommendations that are presented to the committee for adoption.

2 The Project

The Otago Lifelines Project is a joint project with funding from the MCDEM Resilience Fund and has been completed within the budget of $80,000.

Lisa Roberts from Infrastructure Decisions Limited was the project manager and plan writer with considerable support from the ORC Hazards Team.

The project was undertaken over seven months with information provided by lifelines infrastructure organisations overlaid on hazard information provided by the ORC. The criticality and interdependency of the infrastructure was discussed and prioritised via a number of workshops. Some 30 lifelines organisations and emergency services agencies contributed their infrastructure information, participated in the workshops, and commented on drafts of the report.

Alex Sims will be making a presentation on the project to the National Lifelines Conference.

The report resulting from this project along with the recommendations contained in it have been discussed by the Risk Reduction and Readiness and Response Committees and have been endorsed for adoption by the CEG and Joint Committee.

3 The Report

A copy of the Final Report is attached.

There are nine Hotspots identified (where a number of sectors' critical infrastructure assets are located within a hazard zone):

- South Dunedin / Portsmouth Drive (South Dunedin sub-station and GXP servicing 17,000 customers)
- Kawarau Gorge (electricity transmission to Queenstown fibre cable and SH6 road access)
- Roxburgh Dam (substation/switchyard and three major transmission lines)
- Waitaki Bridge (SH 1 road access, transmission lines, fibre cable, and railway)
- Lindis Pass (SH 8 road access, fibre cable and transmission lines)
- Taieri Plain (SH1 and 86 road access, International Airport, Rail line and transmission lines and sub-stations)
- Katiki Straight (SH1 road access, transmission lines and fibre cable)
- Three Mile Hill (road access, transmission lines and substations)
- Clyde (significant electricity hub, SH8 road access)

Pinchpoints (where a single sector critical infrastructure asset is located in a hazard zone):

- Port Otago – Bulk fuel Supply
- Dunedin Water Supply
- Waitaki and Clutha River Crossings Telecommunications
- SH 8 Road access Christchurch – Queenstown
- Benmore Critical electricity hub
- Dunedin's Northern Motorway

The report identifies that roads and electricity are the two most critical services for other services in the region to function. Fuel, the Port, and water supply are also identified. These services are of course also critical to other community services that need to continue to function during an emergency and are critical to the recovery of the community after an event, eg Health Services and Emergency Services (Fire, Police and Civil Defence).

National significant sites for electricity generation reside in Otago (Otago provides between 35 – 40 % of New Zealand's Electricity).

The report has recommended that:

1. Lifelines organisations' representatives present the findings and recommendations from this project to their Executive Teams and seek endorsements for ongoing participation in a regional Lifelines Group.
2. The Otago CDEM Group convenes a working group of local and regional CDEM and lifelines representatives to recommend an appropriate model for lifelines sector and CDEM sector engagement (Lifelines Group and Lifelines Utility Coordination). This should include consideration of appropriate ways to progress a number of projects identified in the report:
    a. Regional Fuel Contingency Plan
    b. Regional Reconnaissance Plan
    c. Regional Emergency Generator Management Plan
    d. Lifelines-CDEM Sector Communication Protocols
    e. Lifelines–CDEM Sector Communication Systems

The report does identify a number of future mitigation programmes and projects.

4 Discussion

The two recommendations propose the establishment of a Lifelines Group and while there was some enthusiasm from participants of this project for further joint meetings and projects, there was no preference expressed about how any group would be structured, governed or funded.

From a CDEM perspective lifeline utilities are expected to have some form of arrangement in place to engage with and ensure participation, and coordination through the 4Rs of emergency management.

CDEM guidelines do not state who is responsible for initially convening a lifelines group, however in all other regions the initial establishment has been facilitated by the CDEM Group.

Lifelines Groups vary in their approach from CDEM Group led to being led by the lifelines sector itself with administration support from the CDEM Group. Depending on the model adopted funding can come from the sector, CDEM Group or both and coordinators/project manager being a sector employee, or a CDEM Group employee.

The current Otago CDEM Group model is to encourage each participant to provide their own resource to undertake their responsibilities under CDEM with the Group having an overview/coordination with some administration/facilitation role.

The recommendations in respect to future projects have been included in the revised Group Work Plan.

5 Recommendations

1. The Group Joint Committee and CEG receive the report.
2. The Group Joint Committee and CEG adopt the report and:-
    a. support the establishment of an Otago Lifelines Utilities Group (Terms of Reference and arrangements to be determined following consultation), and
    b. include the recommended projects within the Otago Group work plan.

Charles Hakkaart
CDEM Co-ordinator

Otago Lifelines Project

Final Draft Report
V0.5 Aug 2014

Preface

Acknowledgements

This project has been convened and administered by the Otago Civil Defence Emergency Management Group which has also contributed funding along with the Ministry of Civil Defence and Emergency Management.

The project was managed by the following project team.

Project Sponsor: Gavin Palmer (Otago Regional Council)
Project Manager and Plan Writer: Lisa Roberts (Infrastructure Decisions Limited)
Project Team Members: Michael Goldsmith, Graeme Hall (to Dec 2013) and Alex Sims (Otago Regional Council).

The contribution of time and effort made by the following lifelines organisations and staff is gratefully acknowledged:

Aurora/Delta (Michael Kean, Tracey Willmott)
Central Otago District Council (Jon Kingsford)
Chevron (Andrew Sheriff)
Chorus (Ross Hunt)
Clutha District Council (Jules Witt, Mohammad Rahman)
Contact Energy (Mike Craighead)
Dunedin Airport (Stu Casey)
Dunedin City Council (Gene Ollerenshaw)
Kiwi Rail (Neil Campbell)
Kordia (Allan Mordecai)
Liquigas (Gary Heaven)
Meridian Energy (Paul Lloyd)
Network Waitaki (David Paterson)
New Zealand Oil Services (BP / Z) (Steve Simpson)
New Zealand Transport Agency (Graeme Hall, John Jarvis)
Nova Energy (Colin Anderson)
OtagoNet Ltd (Carl Rathbone)
Pioneer Generation (Peter Mulvihill)
Port Otago (Lincoln Coe)
Queenstown Airport (Mark Harrington)
Queenstown Lakes District Council (Denis Mander)
Transpower (Adam Henderson, John Mackenzie)
Trustpower (David O'Connor)
Vodafone (Murray Dixon)
Waitaki District Council (Neil Jorgensen)

A number of key stakeholder organisations also contributed to workshops and provided information on critical community sites, including:

New Zealand Police (Alastair Dickie)
New Zealand Fire Service (Rodger Smith)
Southern District Health Board (Paul McNamara)
St John (Doug Third)
Ministry of Social Development (Christine McBratney)

Disclaimer

This report is general in its application and subjective in its recommendations. While every effort has been made to ensure the accuracy of the report, no liability whatsoever can be accepted for any error or misprint.

Most of the hazard information used for this project has been prepared at a regional scale and does not replace any requirement for detailed site-specific geological, geotechnical or other investigation. Readers of the report are advised to consult with Otago Regional Council team as to the suitability of hazard information used in this report for other applications.

Infrastructure information in this report is current at the time of application but ongoing changes will occur. Information in this report should therefore not be taken to indicate the current state of hazard vulnerability or preparedness of the lifeline utilities described.

The lifelines infrastructure information in this report was provided by lifelines organisations themselves and the Otago Regional Council is not responsible for the disclosures made or withheld. The decision as to which information to disclose was the responsibility of each individual utility.

Document History

Version	Issue Date	Notes
0.1	February 2014	Working draft Sections 1 and 2, for discussion at March 2014 meetings.
0.2	March 2014	Sections 1 and 2 updated following feedback. Sections 3 and 5 drafted based on March workshop inputs.
0.3	May 2014	Report updated following inputs from utilities on V0.2.
0.4	July 2014	Sections 4 and 6 drafted based on May workshop inputs, other sections updated.
0.5	August 2014	Final draft report completed following July workshop and circulated for final review.

Table of Contents

Executive Summary

Project Overview

Lifeline utility organisations provide important services to the community, including telecommunications, transport, water and energy services. Following a major disaster, restoration of lifelines services are critical to a community's ability to recover from the event.

This report presents the outcomes of an assessment of the potential impacts on Otago's critical lifeline utility assets from failure of another lifelines service and/or following a natural hazard event. The project included an analysis of 'hotspots' (where a number of critical assets are co-located) and 'pinchpoints' (single points of vulnerability in individual networks). Potential mitigation measures to improve resilience in the lifelines sector are presented in Section 7.

The project follows on from many other lifelines projects undertaken in the last 25 years in New Zealand (including Dunedin City in 1998). The approach for this project has been to take a strategic, qualitative assessment of hazard-related lifelines risk focused on the region's most critical assets. The hazard information is available to individual lifelines organisations to undertake more detailed quantitative risk assessment and mitigation option development, where appropriate.

The Region's Critical Lifelines Infrastructure

For this project, lifelines organisations rated the criticality of their assets as nationally, regionally or locally significant, as defined in Section 2.1. Key points in relation to Otago's critical lifelines infrastructure include:

- Otago is a significant generator of electricity, providing between 35 and 40% of New Zealand's electricity requirements from the Clutha and Waitaki Rivers. 'Nationally significant' sites include Benmore, Roxburgh and Clyde switchyards, which are all a critical part of the national grid, and Halfway Bush substation which supplies a large part of Dunedin, including the CBD.
- Many parts of the State Highway network have long detour times, for example if SH 6 from Cromwell to Queenstown is closed, the alternative route adds around 4 hours to the journey. Where local roads offer alternatives these are often highly limited in terms of capacity.
- The telecommunications sector is complex with a high level of inter-connectivity between various providers which share parts of the network and exchange messages between networks. The Otago region is supplied via several fibre cables along a coastal and inland route shared by a number of providers.
- While there is a single point of supply of fuel into the region (via Marsden Refinery near Whangarei and Ports of Otago), fuel can be trucked from other major South Island ports if they are operational.
- Water supply and wastewater networks are different from other sectors in that there are stand-alone schemes in Dunedin City and many of the region's towns. Many of these schemes are reliant on single water sources, notably a large amount of Dunedin's water supply comes from raw water line from Deep Creek and Deep Stream (though projects are underway to provide redundancy for these critical assets).

Figure 1 illustrates the region's infrastructure 'hotspots' and 'pinchpoints'. Two of the most significant areas include:

- The low lying South Dunedin and harbourside area, which is at risk of flooding, storm surge, tsunami and liquefaction. It contains a number of critical utilities, including the South Dunedin sub-station and South Dunedin GXP which services the South Dunedin area, the Dunedin telecommunications exchange, the Tahuna wastewater treatment plant and the Musselburgh pumping station which pumps all of Dunedin's wastewater to the treatment plant.
- The Kawarau Gorge has numerous locations prone to alluvial fan activity, rock fall and landslides, many of which interact with the areas appreciable seismic risk. The electricity transmission lines to Queenstown run along or near the Gorge as does SH6 and the main inland fibre cable owned by Chorus.

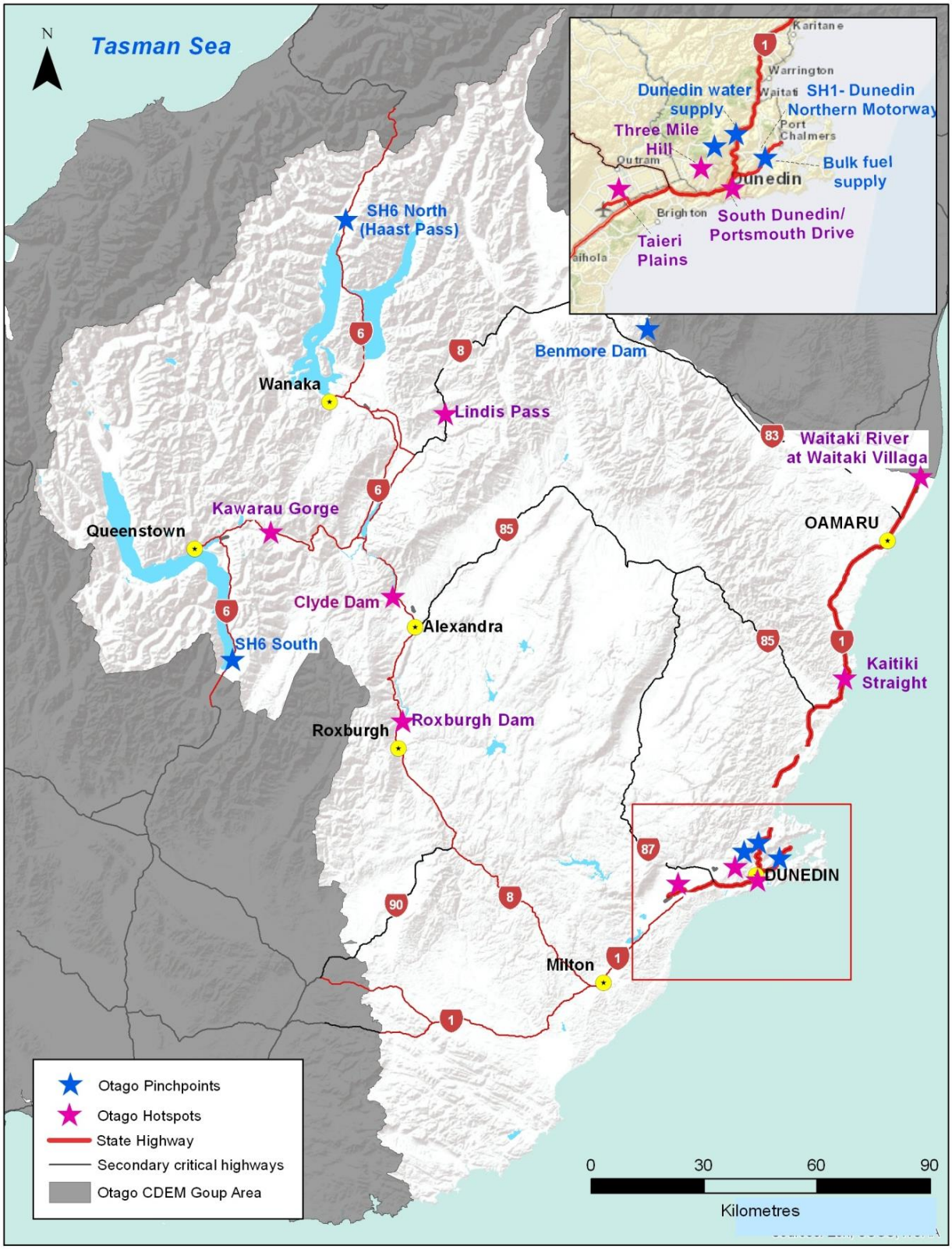


Figure 1: Otago Region's Hotspots and Pinchpoints

Lifelines Infrastructure Interdependencies

Many past hazard events have demonstrated the interdependencies that occur in the lifelines sector. In a widespread electricity failure, most fuel stations cannot pump fuel, port operations cease, wastewater pump stations start overflowing within hours and, as the duration of outage lengthens, telecommunications and water supplies are disrupted.

In a major disaster, telecommunications and transport services become critical for other lifelines to coordinate and undertake response activities.

Most lifelines organisations have contingency arrangements for power failure, however, as indicated from Figure 2, these typically do not enable full service delivery after a few days.

Figure 2 illustrates the extent of lifelines sector interdependence in Otago.

Lifelines Sector / *Dependant on*	Airport	Broadcasting	Electricity	Fuel	Gas	Ports	Rail	Roads	Telecomms	Wastewater	Water Supply
Airport	0	3	2	2	3	3	3	1	3	2	2
Broadcasting	2	0	2	3	3	3	3	2	3	3	3
Electricity	2	3	1	2	3	3	3	2	2	3	3
Fuel	3	3	1	1	3	1	3	1	2	3	2
Gas	3	3	2	3	3	1	2	1	2	3	1
Ports	3	3	1	2	3	0	1	1	2	3	2
Rail	3	3	2	1	3	3	0	1	3	3	3
Roads	2	3	3	2	3	3	3	1	2	3	3
Telecomms	2	3	2	3	3	3	3	2	1	3	3
Wastewater	3	3	1	3	3	3	3	2	2	0	2
Water Supply	2	3	1	3	3	3	3	2	2	3	0

1 = Critical for Service to Function
2 = Critical for service to function but some backup or part function.
3 = Not required for service to function.
0 = Not Applicable

Note: This figure illustrates the impact on lifelines services following 1 week of outage of another lifelines service, in an emergency response situation. Dependence levels may be different in business-as-usual or shorter/longer duration outages.

Figure 2: Lifelines Sector Interdependencies

Lifelines Infrastructure Vulnerability to Hazards

The potentially most damaging natural hazards for the region, from an infrastructure perspective, are major storms (with associated flooding, high winds and landslides) and earthquakes (with associated ground shaking, liquefaction and landslides).

Flooding:

All State Highways have flood prone areas and many wastewater and water pump stations and treatment plants are in flood prone areas along the coast or rivers.

However flooding tends to cause disruption to most lifelines infrastructure only during the event itself, with services restoring once the flood waters recede. The exception is fast moving river flood waters which have the potential to scour abutments and damage bridges as well as assets carried under bridges.

Apart from these exceptions, it is the high winds and landslides associated with some storms that can cause more costly damage and longer recovery times.

Taiere Bridge carries critical water pipes for Dunedin

Long duration, high wind events will typically cause electricity disruption and associated knock-on impacts to other lifeline networks.

Major landslides can close roads for weeks to months, also causing delays to recovery of other lifelines networks. Otago's sparsely populated region means that detour routes can add hours when State highways are closed.

More specifically, a storm causing major flooding and landslides through the Kawarau Gorge could potentially cause loss of electricity supply to Queenstown for days to weeks, and cause major disruption to road vehicles.

Earthquakes:

There is earthquake risk across the region and a number of areas considered susceptible to liquefaction such as the Taiere basin and embayments of coastal Otago.

Most critical infrastructure sites have been designed to withstand seismic events. However a major earthquake is likely to cause significant damage to underground local distribution networks, particularly in liquefaction prone areas and for older and brittle assets.

The potential regional impacts associated with these and other natural hazards are further described in Section 5.

Mitigating Lifelines Infrastructure Vulnerabilities

Through the development of this project, lifelines organisations identified the following projects to enable a more effective response and recovery from a major disaster.

1. Regional Fuel Contingency Plan – to facilitate access to fuel by lifeline utilities and other key CDEM response agencies in a significant fuel shortage.

2. Regional Reconnaissance Plan – to optimise the use of limited helicopter resources for rapid damage assessment and logistical support.

3. Regional Emergency Generator Management Plan – to assess the available resources in the region and recommend how these are most effectively allocated.

4. Lifelines – CDEM Sector Communication Protocols – protocols for lifelines organisations and CDEM to communicate and coordinate during response and recovery.

5. Lifelines – CDEM Sector Communication Systems – to consider the use of alternative communications systems in the event of a major failure of normal communication methods.

As well as these recommended collective projects, all lifelines organisations have ongoing programmes to mitigate the potential impact of hazards on their own networks, such as seismic screening programmes and regular critical asset inspections.

Significant planned projects to mitigate risk of infrastructure failures are detailed in Section 7.

Lifelines Sector Going Forward

In many regions, lifelines projects have been followed on by the establishment of Lifelines Groups, to maintain the relationships that have been developed and progress the collective projects identified. Section 7.3 provides a brief overview of how these Groups operate.

It is recommended that:

1. Lifelines organisations representatives present the findings and recommendations from this project to their Executive Teams and seek endorsement for ongoing participation in a regional Lifelines Group.

2. The Otago CDEM Group convene a working group of local and regional CDEM and lifelines representatives to recommend an appropriate model for lifelines sector and CDEM sector engagement (Lifelines Group and Lifelines Utility Coordination). This should include consideration of appropriate ways to progress the projects identified in Section 7.1.

1. Introduction

1.1 Scope and Purpose

Regional lifelines projects have been carried out across many regions in New Zealand. In Otago, the first lifelines project focused on the Dunedin City area and was completed in 1998.

This project covers the jurisdiction of the Otago Civil Defence Emergency Management (CDEM) Group[1].

Lifelines projects aim to assess the potential impacts of hazards on the region's lifelines infrastructure and identify mitigation strategies to reduce that risk.

However the purpose of undertaking lifelines projects is not just to carry out an engineering assessment of risk and identify risk reduction strategies. The other purpose is perhaps best expressed in the mission of the National Lifelines Committee (which coordinates and supports the regional lifelines projects and groups):

"Enhancing the connectivity of lifeline utility organizations in order to improve critical infrastructure resilience."

In other words, the collaboration that occurs between lifelines organisations during the project enhances the understanding of each other's networks and operations and improves coordination across the sector in both preparedness and response to major hazards.

The project also provided the opportunity for lifelines organisations to engage with key stakeholders including CDEM agencies and critical community service providers such as health and emergency services.

[1] The CDEM Group area includes the Otago Region as well as all of the Waitaki District Council area (some of which is in the Canterbury Region). In this report, references to the Otago Region are inclusive of the whole CDEM Group area.

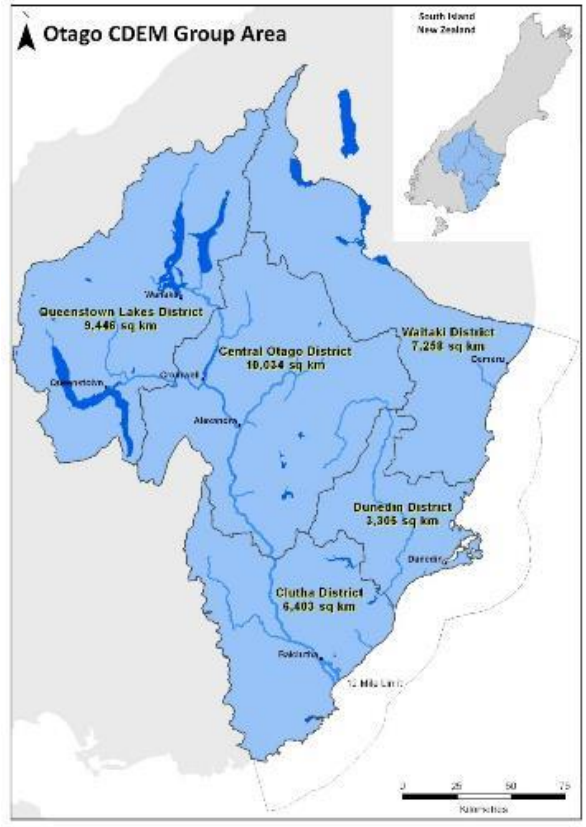


Figure 3: Otago CDEM Group Area

1.2 Lifeline Infrastructure

Lifelines organisations provide important infrastructure services to the community. The CDEM Act 2002 defines lifeline utilities[2] as providers of water, wastewater, telecommunications, gas, electricity, fuel, road, rail plus some other specified entities including, in the Otago region, Dunedin and Queenstown Airport and Port Otago.

The region's lifeline utility providers include:

- Allied Petroleum (Fuel)
- Aurora/Delta (Electricity)
- BP (Fuel)
- Caltex (Fuel)
- Central Otago District Council (Transport and Water)
- Chorus (Telecommunications)
- Clutha District Council (Transport and Water)
- Contact Energy (Electricity Generator)

[2] In this report the term 'lifelines organisation' is used synonymously with 'lifeline utilities' as defined in the Act.

- Dunedin Airport (Air Transport)
- Dunedin City Council (Transport and Water)
- Kiwi Rail (Rail Transport)
- Kordia (Broadcasting and Telecommunications)
- Liquigas (Gas)
- Meridian Energy (Electricity Generator)
- Mobil (Fuel)
- Network Waitaki (Electricity Distributor)
- New Zealand Transport Agency (Road Transport)
- Nova Energy (Gas)
- OtagoNet Ltd (Electricity Distributor)
- Pioneer Generation (Electricity Generator)
- Port Otago (Sea Transport)
- Queenstown Airport (Air Transport)
- Queenstown Lakes District Council (Transport and Water)
- Transpower (National electricity transmission)
- Trustpower (Electricity Generator)
- Vodafone (Telecommunications)
- Waitaki District Council (Transport and Water)
- Z (Fuel)

1.3 Project Benefits

Through participation in the Otago Lifelines Project, lifelines infrastructure providers achieve the following benefits - they:

- have the latest regional hazard information available (in GIS files where available);
- have maps of critical lifelines and community sites in the region (to enable them to take into account supply to these sites when prioritising their response and recovery);
- use the latest hazard data to understand the likely impact of natural hazards on their assets and services;
- understand the impact of these hazards on other utilities that they rely on, and therefore the knock-on impact to their own services (interdependency impacts);
- gain knowledge of potential mitigation measures to reduce vulnerability to hazards that can feed into long term asset management plans; and
- have the opportunity to facilitate communication with other lifelines organisations and critical community service providers about hazard mitigation and to establish 'pre-event' relationships.

The project outputs therefore support an improved, coordinated response to major hazards by and between CDEM agencies and lifeline utilities. However it is noted that the scope of this project does not include development of operational response processes.

Finally, participation in the project helps lifeline utilities in meeting the requirements of the CDEM Act 2002, which include that each lifeline utility organisation must:

- ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency;
- make available to the Director in writing, on request, its plan for functioning during and after an emergency;
- participate in the development of the national CDEM strategy and CDEM plans.

The Director's Guidelines for Lifeline Utilities and CDEM Groups (DGL 16/14) published June 2014 expand on these legislative requirements.

1.4 Project Approach

The project has been undertaken as follows:

1. Identification and mapping of critical lifelines infrastructure and community facilities in the region (Section 2), including the identification of 'hotspots' and 'pinchpoints' (defined in Section 4).
2. Assessment of the interdependencies between the lifelines sectors (the extent to which each utility relies on other utilities for them to function), summarised in section 3.
3. Spatial mapping of critical infrastructure over the region's significant natural hazards.
4. An assessment of the likely impact of those hazards on the critical lifelines infrastructure (summarised in Section 5).
5. Development of response and restoration principles and priorities (Section 6).
6. Identification of potential mitigation options to reduce the impacts identified and a future improvement action plan aimed at improving the region's infrastructure resilience (Section 7).

2. Otago's Lifeline Infrastructure Sectors

2.1 Critical Lifelines Infrastructure Assets

Each lifelines organisation in the Otago region has categorised its assets as Criticality 1, 2 or 3 (***nationally, regionally*** or ***locally*** significant). The approach is summarised in Figure 4. In general, the criticality approach takes into account the number and type of customers affected, both directly and indirectly, if an asset fails.

This section provides an overview of the lifeline utilities in the Otago region, how they operate and critical areas of the network, rated according as shown below.

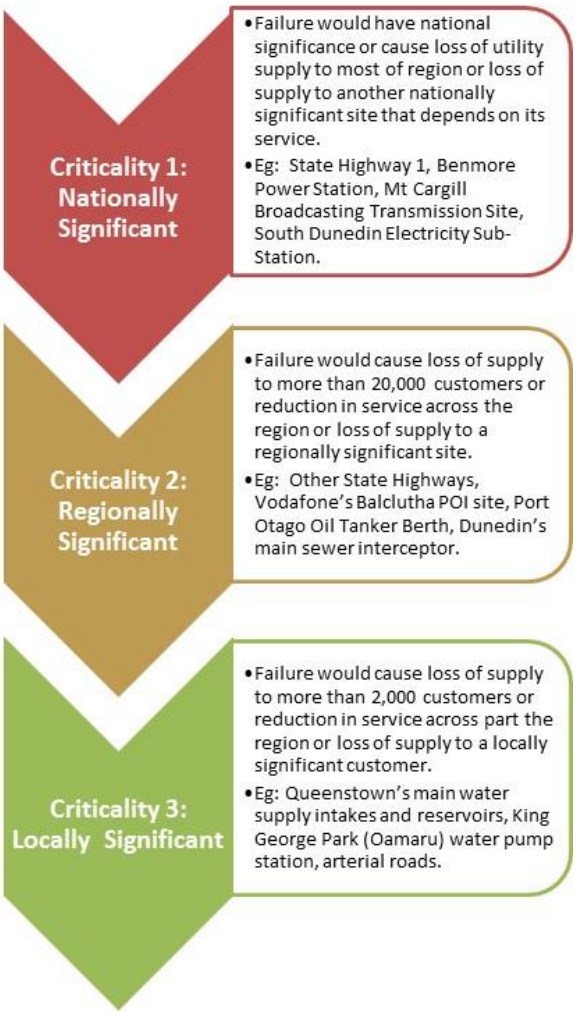


Figure 4: Defining Critical Lifelines Infrastructure Assets

2.2 Electricity

2.2.1 Sector Overview

New Zealand's national electricity grid is illustrated in Figure 5. Electricity networks are broadly comprised of:

- generation sources (grey nodes);
- Transpower's national transmission grid;
- electricity lines distributors which connect to the Transpower grid and distribute to consumers;
- electricity retailers - which buy wholesale electricity and sell to consumers (not part of the scope of the project as they do not operate network assets); and
- Consumers (demand nodes shown in blue in Figure 5).

Figure 5 also clearly illustrates that while Otago is not a major consumer of electricity on a national scale, there is a significant amount of NZ's electricity generated in the region (primarily hydro power generation).

2.2.2 Electricity Generation

Otago's electricity generation sites include:

- Contact Energy's Clyde (432MW) and Roxburgh (320MW) Hydro Power Stations on the Clutha River, which together produce nearly 10% of NZ's electricity. The Clyde Power Station is most critical as it houses the control centre for the Roxburgh and Hawea Dams as well.
- Meridian's six hydro power stations on the Waitaki River, generating a maximum of 1540MW from Ohau, Benmore, Aviemore and Waitaki stations and supplying a further 25-30% of NZ's electricity demand. Benmore is New Zealand's second largest power generation site.
- Trustpower supplies around 130MW from 4 schemes (combination of wind and hydro), the largest being Waipori Falls generating 72MW.
- Pioneer Generation's 15 generation sites (a combination of hydro, gas and wind), generating a total of 43MW, with no single site producing over 10MW.

Most of the electricity generated is transmitted into Transpower's national grid at switchyards, the exception being Trustpower's generators which are embedded in the Dunedin electricity distribution network.

Loss of any single power generation dam or station would not cause a loss of supply to end customers unless it occurred concurrently with other major generation failures in the country. However loss of one of the larger stations would cause a reduction in national security of supply. Therefore Meridian's and Contact's stations are rated criticality 1 (except for Lake Hawea rating a 2) and Trustpower's stations are rated 3.

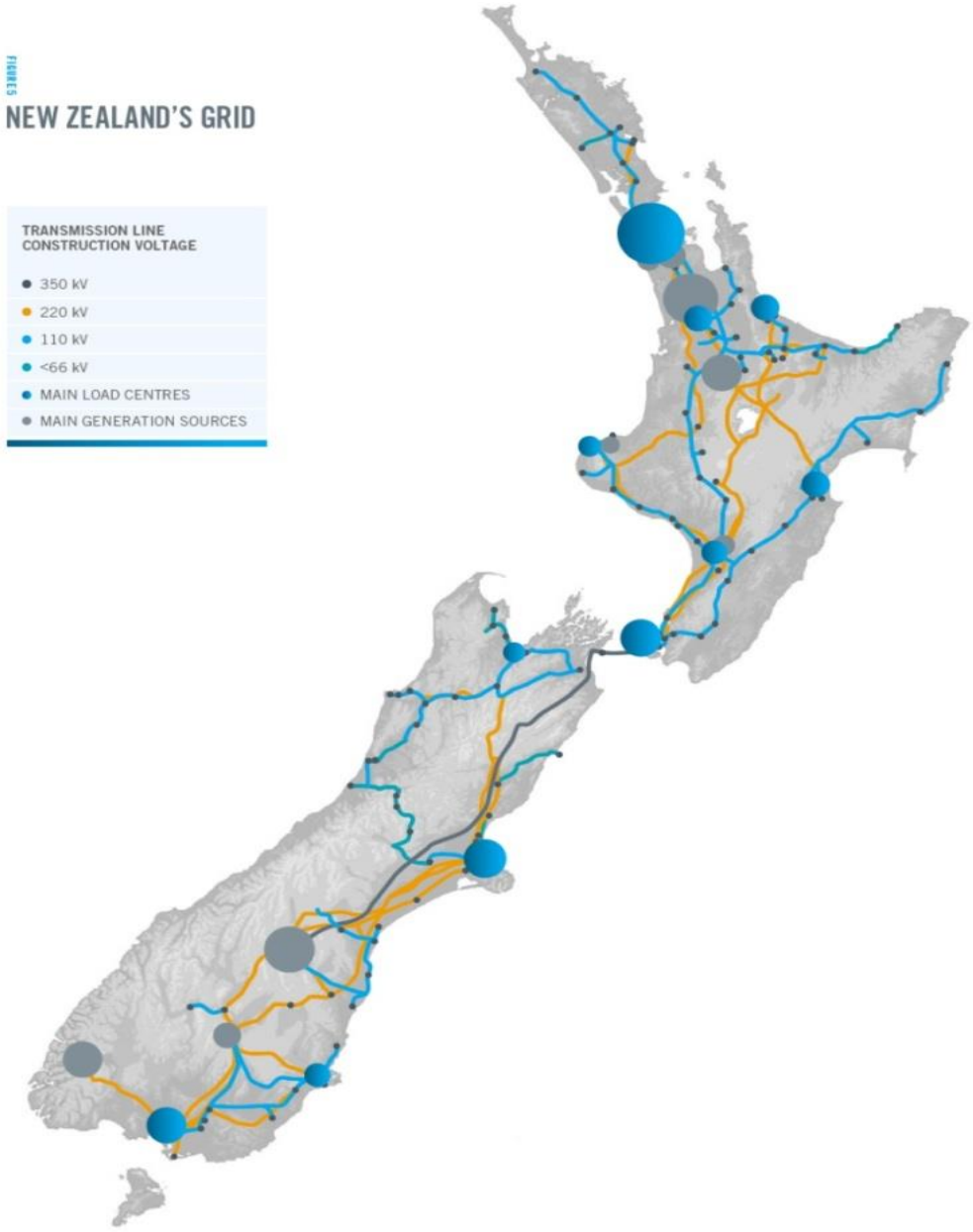


Figure 5: New Zealand's National Electricity Grid

2.2.3 Electricity Transmission and Distribution

Transpower manages and operates the national grid, supplying to three electricity lines companies in the Otago Region:

1. Aurora Energy
   - 6th largest electricity lines distributor in NZ
   - supplies to around 84,000 customers in Dunedin and Central Otago
   - delivers around 1400GWh annually
   - network around 5,500km of lines and cables and 36 zone substations
   - Transpower supplies into network at 5 GXPs, the most critical being Halfway Bush which supplies nearly 40,000 customers in Dunedin.
2. OtagoNet
   - supplies around 14,800 customers
   - covers a large area with a network of around 4400km of lines and cables and 32 zone substations
   - delivers around 420GWh annually
   - Transpower supplies network at 3 GXPs at Balclutha, Naseby and Ranfurly.
3. Network Waitaki
   - supplies approximately 12,000 consumer connections
   - network of 1,800km of power lines
   - delivers around 230GWh annually
   - Transpower supplies into network at 4 GXPs, the most critical being Oamaru supplying around 10,500 people. The Weston Switching Station is also critical to the supply of electricity to these people.
   - Network Waitaki has identified some 33kV lines as critical because of lack alternate distribution routes.

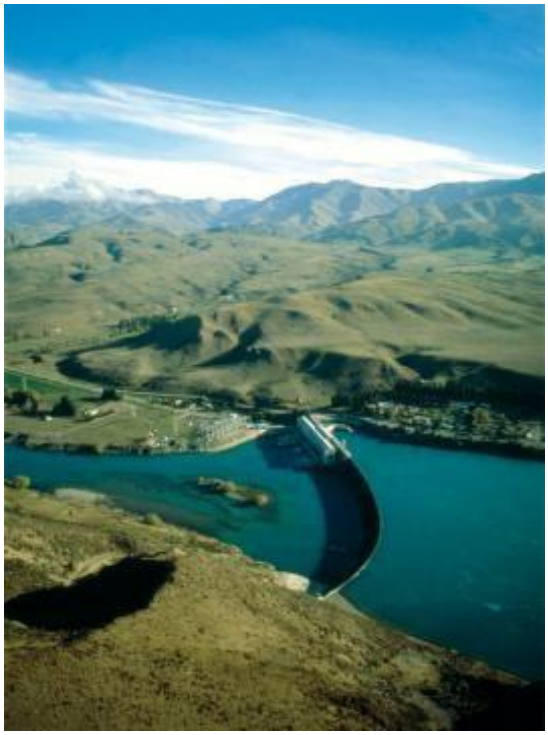
For this project, Transpower's transmission lines have been rated as criticality 1 (>200MW), criticality 2 (>50MW) and criticality 3 (all other lines). The highest capacity line is the 350kV HVDC line from Benmore to Haywards (Wellington), loss of which would result in loss of transmission capacity between the North and South Islands. However when all generators are operating, each island is able to generate sufficient capacity to meet demand within the island.

There are a number of highly critical switchyards and stations, most significantly:

- Benmore, a major hub which can supply the HVDC transmission line and the national grid.
- Halfway Bush substation, which supplies a large area of Dunedin, including the CBD.
- South Dunedin substation, servicing that area.
- Three Mile Hill, which is a key switching station supplying Halfway Bush and South Dunedin.
- Roxburgh and Clyde switchyards which are key transmission hubs on the national grid.
- Cromwell substation which supplies Queenstown.

Most of the larger switchyards have redundancy within the station, such that failure of single assets is likely to result in a reduction in capacity rather than total loss.

The transmission and distribution companies also have their own communications networks which enable communications in remote areas where other services are unavailable and for remote control of the network.



Waitaki Power Station

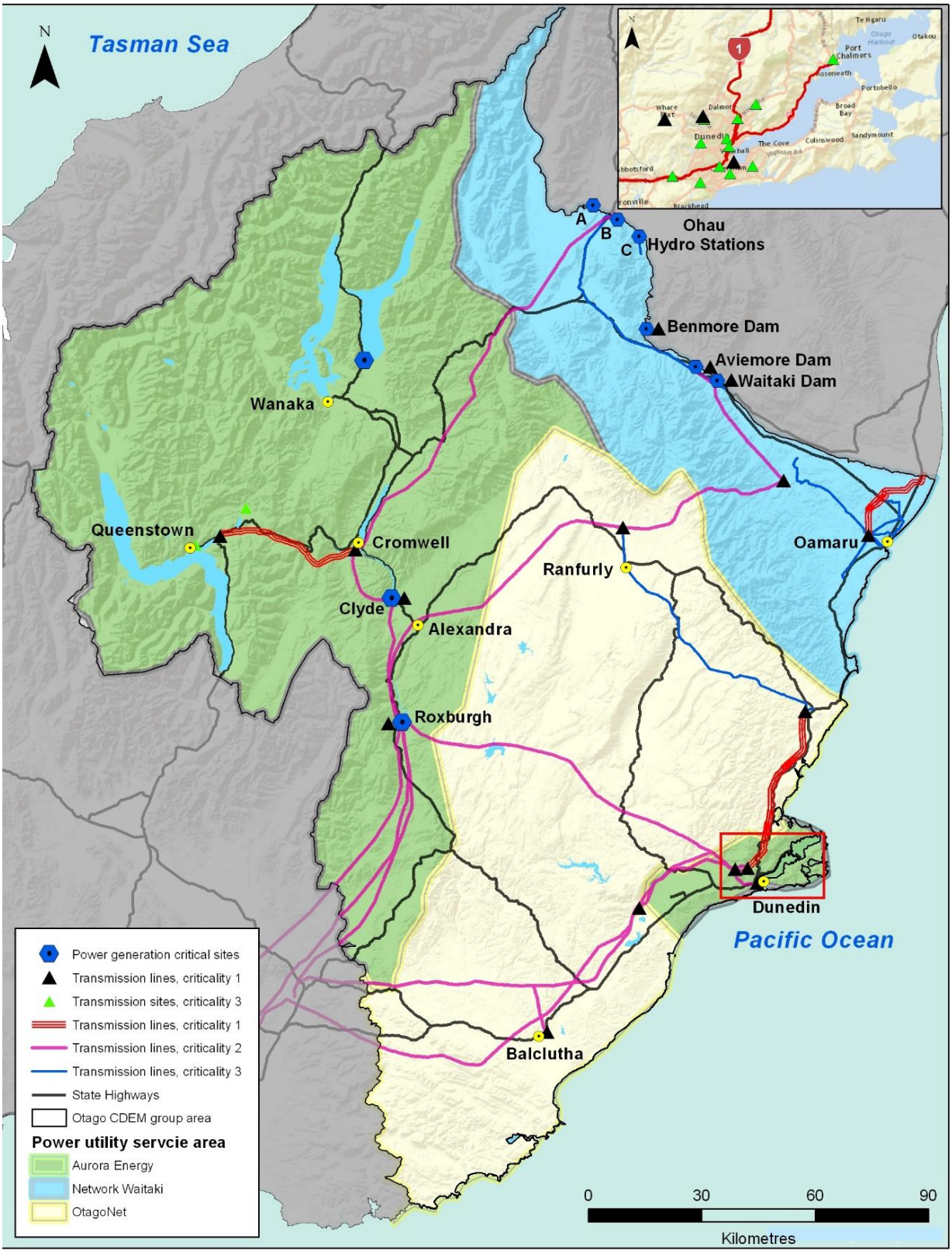


Figure 6: Otago Region's Critical Electricity Infrastructure

2.3 Fuel

2.3.1 National Supply Chain

Around ¾ of New Zealand's fuel is refined at the Marsden Refinery, south of Whangarei, and distributed by ship to ports around the country (and by pipeline to Auckland) as illustrated in Figure 7. The remainder is refined overseas and shipped directly to ports from overseas sources.

Figure 7: New Zealand's Fuel Supply Chain

Therefore Marsden Refinery, though it is not located in the region, is a critical fuel site for Otago and all of New Zealand.

Otago's fuel comes in via around 27-30 annual bulk fuel shipments to Port Otago's oil berth. It is piped from the berth to three terminals on the City waterfront owned by Fulton Hogan:

- Chevron Terminal (10Ml petrol, 500kL diesel)
- Z Terminal, operated by NZ Oil Services (12Ml of diesel, 5Ml of light fuel for ship bunkering).
- BP Terminal, operated by NZ Oil Services Ltd (7Ml of petrol, 6Ml of diesel and 0.9Ml of jet) – the jet fuel supplies airports in the Otago and Southland regions. An additional 2ML of jet fuel storage capacity is in development for BP Dunedin.

Mobil have a terminal in Bluff. They supply their Southland sites from Bluff and Otago sites from the BP terminal in Dunedin.

The terminals have capacity to hold around 2 weeks jet fuel demand and 1 month petrol/diesel demand, however the levels vary and the jet fuel tanks are run to near empty before re-filling.

All of Otago's fuel is normally supplied from these terminals, however if needed, Otago's fuel can be trucked in from Timaru, Lyttleton or Bluff. There is sufficient capacity in the trucking operations to do this.

2.3.2 Fuel Distribution

Fuel is distributed from Chevron and Z terminals by two operators (Pacific Fuelhaul and Allied Petroleum) and two operators from BP (RD Petroleum and Allied Petroleum) to fuel stations and customers around the region.

There is no consolidated view of service station numbers and capacity, nor the extent of backup generation for pumping at these sites. This is an area for future work.

2.4 Gas

Gas is used in the Otago region for both industrial (e.g. Macraes Gold Mine) and domestic purposes. Gas is sourced from the Taranaki region and brought to Otago by rail and ship. If there is a failure in the supply chain or insufficient capacity to meet demand, typically in winter, gas can be imported from Australia within 1-3 weeks.

LiquiGas Dunedin Site

Liquigas brings in 70% of the region's LPG supply by ship to Port Otago, with an annual throughput of 20,000 tonnes. This is stored at Liquigas's Dunedin depot which holds 1300 tonnes of bulk LPG before being distributed by road tankers to 4 LPG distributors in the region – Rockgas Contact, Ongas, Elgas and Nova Energy.

Nova Energy brings in the remaining 30% of gas to the region via rail from Taranaki. It is also a gas distributor, supplying LPG to reticulated customers in Dunedin (via over 33km of underground pipe) as well as to their cylinder customers.

The most critical sites for Nova Energy include the LPG Vapourisation Facility on Hillside Road and the 20 tonne tanks at Balclutha and South Dunedin, the latter supplying key industrial customers.

As well as Nova Gas, three other gas providers in the Otago region include:

- Rockgas, which provides a reticulated gas supply in Queenstown and cylinder distribution services.
- Ongas, which provides bulk support to service station outlets in Dunedin a reticulated gas supply in Wanaka, mainly around the business district and cylinder distribution across the wider region (based in Wanaka).
- Elgas which provides bottled gas only.

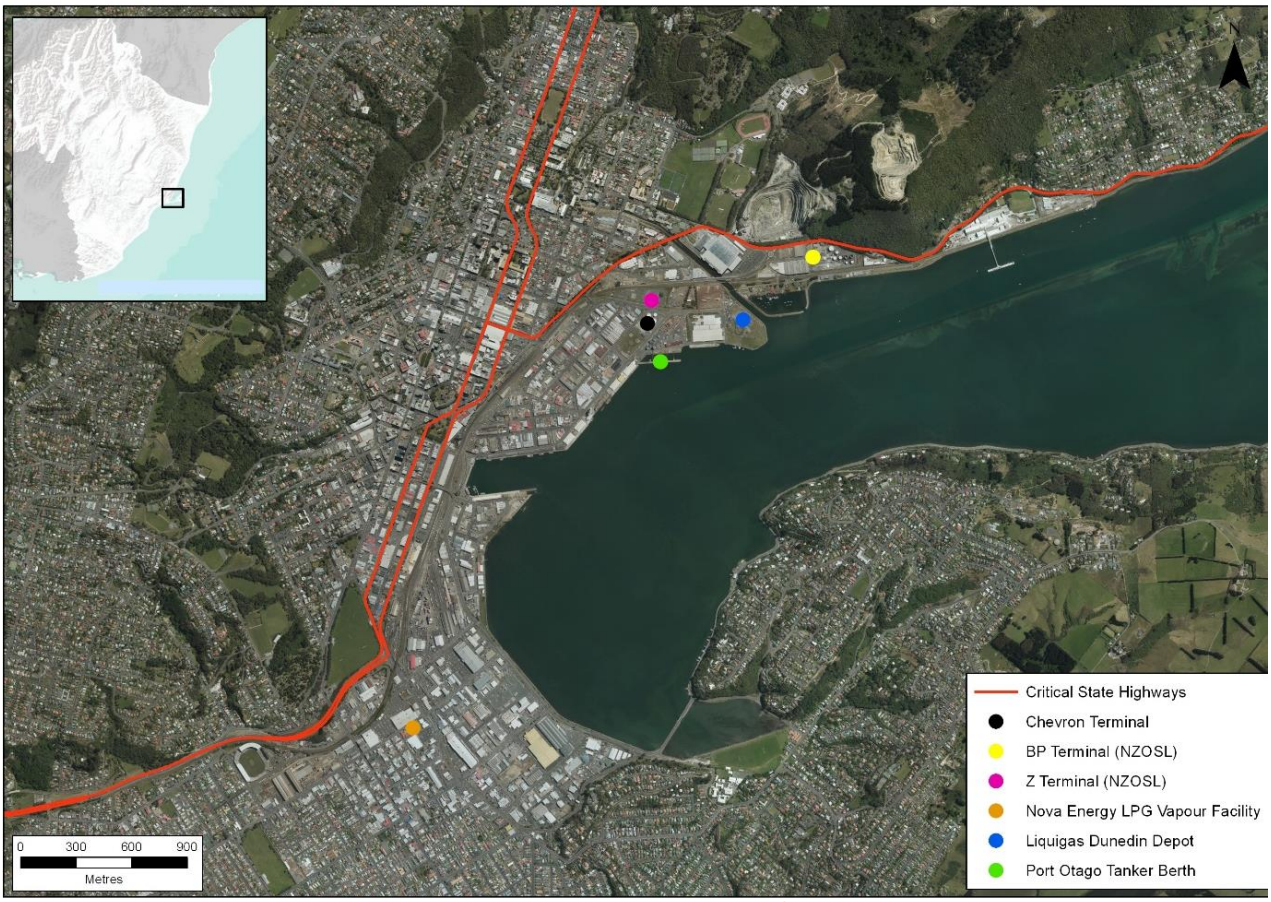


Figure 8: Otago's Critical Fuel and Gas Infrastructure

2.5 Transport

2.5.1 Roading

There is around 10,500 km of public road in the Otago CDEM region, owned and managed by the road authorities illustrated in Figure 9. The New Zealand Transport Agency (NZTA) operates the state highways and local authorities the public local roads.

The topography is predominantly flat to rolling however there are some mountainous areas throughout the region making for challenging road alignments and increased exposure to severe weather events such as strong winds, ice, snowfall and heavy rain events. Many of the limited routes in and out of the region are highly susceptible to periodic closure due to natural hazards

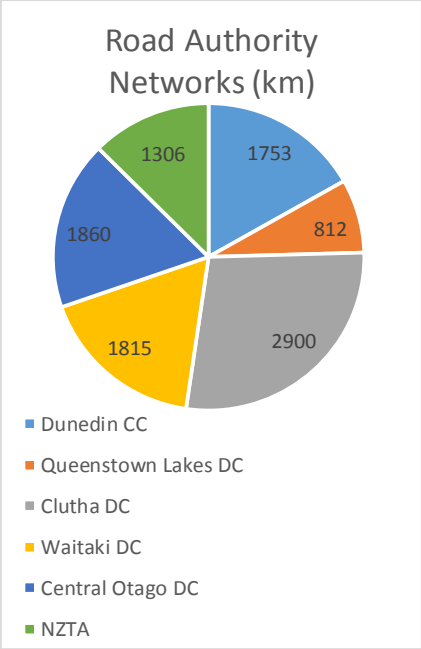


Figure 9: Public Road Network

The One Network Road Classification (ONRC) is considered to be appropriate as a basis for ranking the road criticality for the purposes of this lifelines project, as follows:

- Criticality 1 – 'National' ONRC roads (connect major population centres, ports or international airports and high traffic volumes).
- Criticality 2 – 'Regional' ONRC roads (make a significant contribution to the region, connect regionally important locations such as airports, tertiary hospitals)
- Criticality 3 – 'Arterial' (connect regionally important locations such as regional hospitals or may be critical due to lack of an alternate route).

Road authorities have further refined their classifications taking into account criticality considerations outlined in Attachment 1.

Figure 10 illustrates the region's critical roads categorised on this basis.

2.5.2 Airports

Significant air transport facilities in Otago include:

Dunedin Airport

Dunedin Airport services Air New Zealand, Virgin Australia and Jetstar, which fly to other regional airports around New Zealand and to Sydney, Brisbane and Melbourne. The nearest major airports are Invercargill (2.5 hours drive), Christchurch (4.5 hours drive) and Queenstown (3.5 hours drive).

Dunedin is primarily a passenger airport, with around 850,000 passengers and 500 tonnes of freight were transported through Dunedin Airport in 2013.

The Airport is self-sufficient for 3-4 days with backup services as outlined in Section 3. JetA1 (fuel) is trucked to the Airport from Dunedin or Christchurch.

Queenstown Airport

Queenstown Airport is smaller than Dunedin, though perhaps of equal significance given the importance of Queenstown to national tourism.

Around 1.2 million passengers were transported through Queenstown Airport in 2013.

Air BP store around 3 days supply of JetA1 which is trucked from Dunedin.

Other airports in the region considered critical include:

- Oamaru airport, where larger aircraft such as 737s are able to land and is only 1 hour drive from Dunedin.
- Wanaka can also facilitate jet arrivals and departures.

2.5.3 Port Otago

Port Otago is primarily an export port with 80% of freight exported – all logging from Southland and Otago is exported via ship. Most of the exported products are brought to the Port by rail and most of the imported product is fuel.

If the port were inoperable for any reason, some product could be transferred to Bluff or Timaru. The impact would be more significant in the food industry as products from dairy factories and meatworks are exported through Port Otago and it is more difficult to reduce production than, say, for logging.

The fuel wharf is considered the most critical of the 7 wharves in Dunedin.

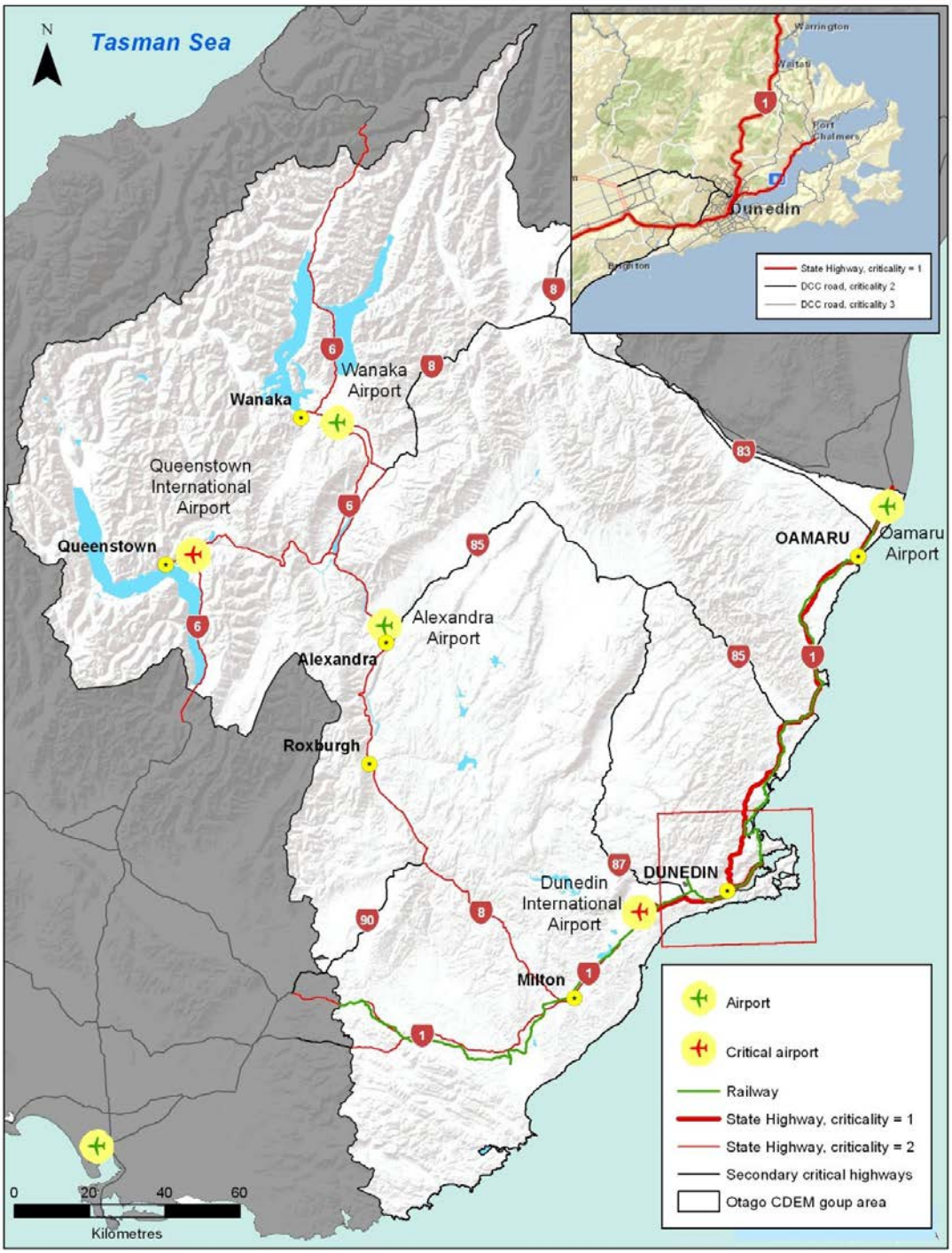


Figure 10: Critical Transport Infrastructure

2.5.4 Kiwirail

There is around 300km of rail track in the Otago region and 8 tunnels. Further information on the criticality of the network to the region, and the impact of failure, was not available for this report.

2.6 Water Supply

Figure 11 illustrates the number of consumer connections supplied from Council water supply schemes in the Otago Region.

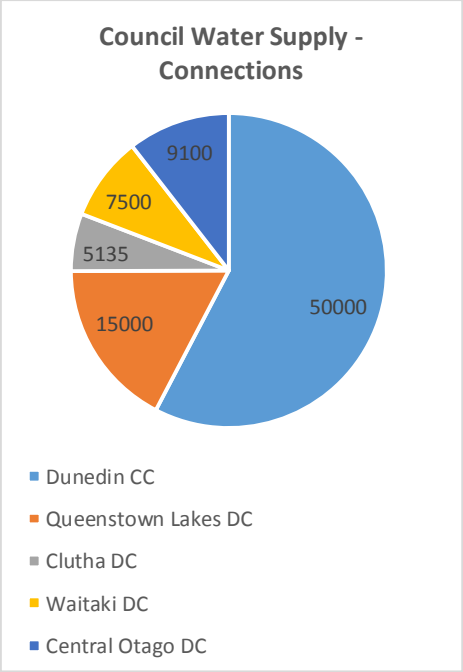


Figure 11: Number of Council Water Supply Connections

2.6.1 Dunedin City Council

An overview of Dunedin City Council's water supply network is as follows:

- Raw water for Mount Grant is sourced from Deep Creek (around 20%) and Deep Stream (around 80% of supply) and piped to the Mount Grand Water Treatment Plant (WTP) – these pipes are highly critical for security of supply. A notable point of vulnerability is where both pipes cross the 80 year old Taieri River Bridge.
- Mount Grand WTP supplies between 40 and 70% of Dunedin's water and is therefore another significant critical asset.
- The Southern WTP supplies between 20 and 50% of Dunedin's Water, depending on water quality and electricity prices. It is supplied by Silverstream and the Taieri bore field, supplemented by Deep Creek/Deep Stream when electricity prices are high and/or raw water quality is low.
- Around 10% of supply is from smaller WTPs in Mosgiel (supplying the Mosgiel area) and Port Chalmers (mainly servicing cruise ships in summer).
- Water is mostly gravity fed from WTPs with some small areas supplied by booster pumps.

Dunedin City Council also provides smaller water supply schemes in Outram, West Taieri, Rocklands and Waikouaiti (also supplying Karitane and Merton).

2.6.2 Queenstown Lakes District Council

Queenstown Lakes District Council operates 8 water supply schemes (Queenstown, Wanaka, Arrowtown, Lake Hawea, Glenorchy, Lake Hayes, Luggate and Arthurs Point) supplying around 60% of the dwellings in the District. Water predominantly sourced from much of which is sourced from Lakes Wakatipu, Wanaka and Hawea. The intakes and treatment plants for all their schemes are rated as Criticality 3.

2.6.3 Waitaki District Council

Waitaki District Council operates 23 urban and rural water supply schemes supplying 20,000 people (95% of the District's population).

Two sites are considered critical from a local perspective:

- Oamaru's Redcastle Road Raw Water Pump Station which supplies around 15,000 people (there is 10 days of raw water storage); and
- The King George Park pump station which supplies around 4,000 people (there is around 1 day's treated water storage).

2.6.4 Central Otago District Council

Central Otago District Council operates 9 schemes, the two largest being Alexandra and Cromwell which each serve around 5,000 customers (approximately 6,150 connections). The treatment plant, bore fields and main pump station in these schemes have been rated Criticality 2 ('regionally significant').

Other schemes at Clyde, Roxburgh, Naseby, Omakau / Ophir, Ranfurly, Pisa Village and Patearoa supply a further 2,950 dwellings.

Water reservoirs in Cromwell, Alexandra, Ranfurly, Roxburgh and Little Roxburgh Village have been rated Criticality 3 (local significant) as have the water source and treatment facilities in the remaining schemes.

2.6.5 Clutha District Council

The two largest schemes are Balclutha and Milton:

- Balclutha is sourced from the Balclutha River and has two offsite reservoirs and two smaller onsite reservoirs servicing around 2,000 properties.
- Milton is sourced from the Tokomariro River and has two reservoirs servicing around 1,000 properties including the Otago Corrections Facility.

The Council also runs 16 rural water schemes and 8 small town supplies.

2.7 Waste Water

Figure 12 illustrates the number of consumer connections supplied from Council wastewater schemes in the Otago Region.

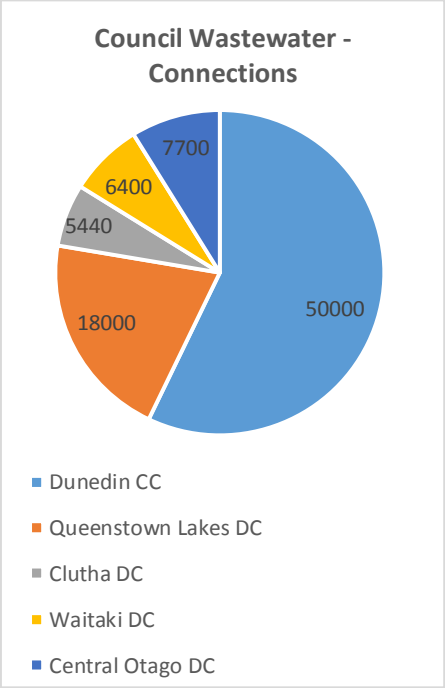


Figure 12: Number of Council Wastewater Connections

2.7.1 Dunedin City Council

The Tahuna Wastewater Treatment Plant (WWTP) treats around 70% of Dunedin's wastewater, with a smaller wastewater treatment plant at Brighton Road. Tahuna WWTP is a highly critical facility, along with the Main Interceptor Sewer and the Musselburgh pump station which respectively collect and pump most of the City's wastewater to the Tahuna WWTP. Primary treatment occurs at the Mosgiel WWTP and it is then pumped to Green Island for Secondary treatment. Smaller self-contained wastewater schemes are provided in Middlemarch, Seacliff, Waikouaiti and Warrington.

2.7.2 Queenstown Lakes District Council

Queenstown Lakes District Council provides wastewater reticulation to 72% of the dwellings in the District, discharging to 4 treatment plants in Wanaka, Hawea, Luggate and Queenstown.

The serviced areas include Queenstown-Frankton-Kelvin Heights-Arthurs Point-Lakes Hayes-Arrowtown, Wanaka, Hawea, Luggate and Glenorchy.

The treatment plants at Queenstown, Hawea and Wanaka are rated Criticality 3, along with a number of the largest pump stations.

2.7.3 Waitaki District Council

Waitaki District Council provides 10 reticulated wastewater schemes servicing around 16,000 people.

Of the 28 pump stations in the networks, 3 pump stations in Orwell Street, Beach Road and Regina Lane rate as Criticality 3, servicing between 3,000 and 9,000 people each.

2.7.4 Central Otago District Council

Central Otago District Council provides a reticulated wastewater network to around 7,700 properties in 8 schemes – Alexandra, Cromwell, Bannockburn, Roxburgh, Naseby, Omakau, Lake Roxburgh Village and Ranfurly. From a wastewater perspective, the District's critical sites are the treatment plants in Alexandra and Cromwell together with large and terminal pump stations in those towns.

In addition, wastewater pump stations in Roxburgh, Bannockburn and Pisa have been rated Criticality 3.

2.7.5 Clutha District Council

Clutha DC provides reticulated wastewater to around 5,500 properties across 11 wastewater schemes, the two largest being Balclutha and Milton, servicing the same population as the water supply.

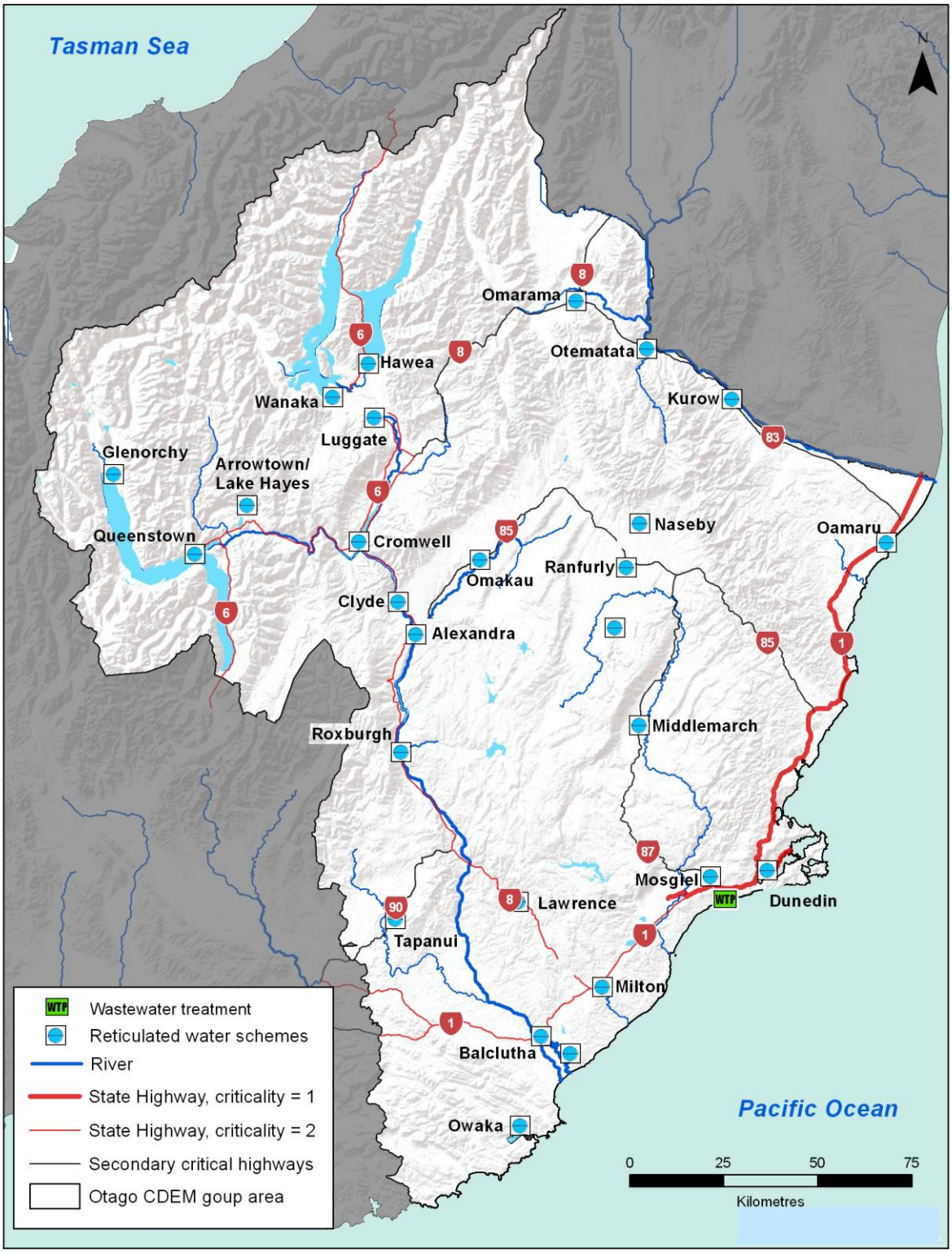


Figure 13: Otago's Urban Water Supply and Wastewater Schemes

2.8 Telecommunications

The telecommunications sector is one of the most complex of the lifelines sectors, partly because of the rapid change of technology, providers and user preferences, but also because of the level of inter-connectedness between the various providers which share parts of the network and exchange (voice and data) messages between networks.

2.8.1 Mobile (Cellular) Networks

There are 4 major building blocks to cellular networks.

- The **Cell Site** provides the local coverage, and a mobile phone will connect to the cell site with the strongest signal, usually, but not always the nearest cell site.
- **Transmission** links connect the cell site to the Aggregation Node and the Aggregation Node to the Exchange. The transmission links are fibre, copper or microwave radio (increasingly, transmission links are moving to fibre connections).
- The **Aggregation Node** is a Base Station Controller (BSC) for a 2G (GSM) phone or a Radio Network Controller (RNC) for a 3G phone. Transmission links then connect the aggregation point to the exchange.
- The exchange (**Mobile Telephony Exchange, or Strong Node**) is the brains of the operation; it makes the connection between the caller and the called. If the transmission links are broken, the call cannot be completed. It is not possible for a cell site to work in local mode.

Exchanges/strong nodes are connected by fibre transmission links. If these links are broken, the network functionality will be severely impacted and they are therefore heavily protected with redundant links and automatic failovers.

2.8.2 Fixed Line Networks

The Otago region is supplied via two main fibre routes – a coastal and inland route shared by a number of providers, shown in

.

Roadside Cabinets are the first aggregation point for Digital Subscriber Line (DSL) broadband connections and connection point for landline phone services.

Telephone exchange buildings (**Local Exchanges**) which operate direct copper pair connections to customer premises.

If an exchange becomes isolated from the nationwide network of exchanges, it will continue to operate in local mode, meaning that local phones will be able to call local phones from the same network. 111 service may be rerouted to a local number, such as the local police station or answered by a Chorus technician at the exchange building.

Links between exchanges are used for carrying long distance traffic such as tolls, fixed to mobile, international, 0800, 111 services etc. These links may be fibre cables, copper cables or microwave radio links.

Increasingly, other operators are installing fixed line exchange equipment as local loop unbundling[3] becomes the norm.

2.8.3 Major Telecommunications Providers

Vodafone

Vodafone operates mobile network services in Otago providing 2G & 3G coverage across all of the region's major towns and highways and 4G (LTE) coverage in Dunedin city.

Fixed-line data and voice services for many business customers are provided via the "Blue network" (formerly TelstraClear network).

Vodafone also operates a high-capacity fibre-optic transmission ring that passes through Dunedin in the east, south to Invercargill, and up through Queenstown in the west.

Vodafone-branded consumer fixed-line voice/data services are also provided through the region under wholesale from Chorus.

Vodafone have around 60 cell sites providing cellular services in the region and 200 fixed line service sites (exchanges and road side cabinets). They identified 3 sites as 'regionally critical', including:

[3] The process of allowing multiple telecommunications operators to use connections from the telephone exchange to the customer's premises.

- The Dunedin POP (Point of Presence) – from where fixed line services into Dunedin are provided.
- The Balclutha POI (Point of Interface) – provides a voice interconnect between Vodafone fixed-line and other networks in the region.
- North East Dunedin Radio Access Network transmission hub.

Chorus

Chorus provides fixed line services across the region to retail service providers who in turn supply value-add services to customers.

The network consists of a mixture of technologies including fibre, copper and radio and assets include fibre and copper cables and roadside cabinets.

Chorus owns and manages the lines that link from consumers to roadside cabinets, the roadside cabinets, and most of the links between cabinets and key network nodes.

Chorus also has a fibre optic trunk transmission ring that provides connectivity northwards with the rest of the country. The eastern side follows the coast through Dunedin and into Southland, the western side follows the Mackenzie Country, Lindis pass and into Central Otago before heading south along SH6 to Southland. Both sides of this network have elements of shared fibres with other national network providers.

Network control is based in Hamilton, with local contracting companies engaged for network augmentation and maintenance activities.

Telecom

Telecom owns cellular and landline exchanges plus some fibre trunks and links. Telecom exchanges have duplicated processors on each site and there is diversity in the 'daisy chain' networks which allow some exchanges to be fed from the other direction if a cable fails.

Information on the criticality of these cell sites and exchanges was not made available for this project.

Other Providers

The telecommunications network is becoming more diverse. Other providers in Otago include (but are not limited to).

- 2degrees, which owns a number of cellsites in the region.
- Kordia – historically a broadcasting transmission business (TV and FM Radio) - its business is now 50% telecommunication services including WAN, Internet access and phones.
- FX provides a fibre optic trunk network across New Zealand.

2.9 Broadcasting

Kordia's Mt Cargill Transmission facility in Dunedin's North East Valley is the main broadcast transmission site for Otago providing Freeview Digital Terrestrial Television and all FM radio services. Loss of the site would cause almost total loss of these services in Otago and Southland, rating it as a Criticality 1 site. Other sites include Mt Studholme, Big Hill, Razorback, Otago Base, Mount Stuart, Kuriwao, Obelisk, Queensberry, Mt Maude, Coronet Peak and Queenstown.

Kordia provides a managed environment (watertight, ventilated, and powered) with associated towers (antenna aperture) for others to locate their transmission equipment such as Police, Ambulance, Transpower, Vodafone and Telecom cellular).

The Mt Cargill site is unmanned and is monitored from the Transmission Control Centre (TCC), located in Avalon, which is a 24/7 operation.

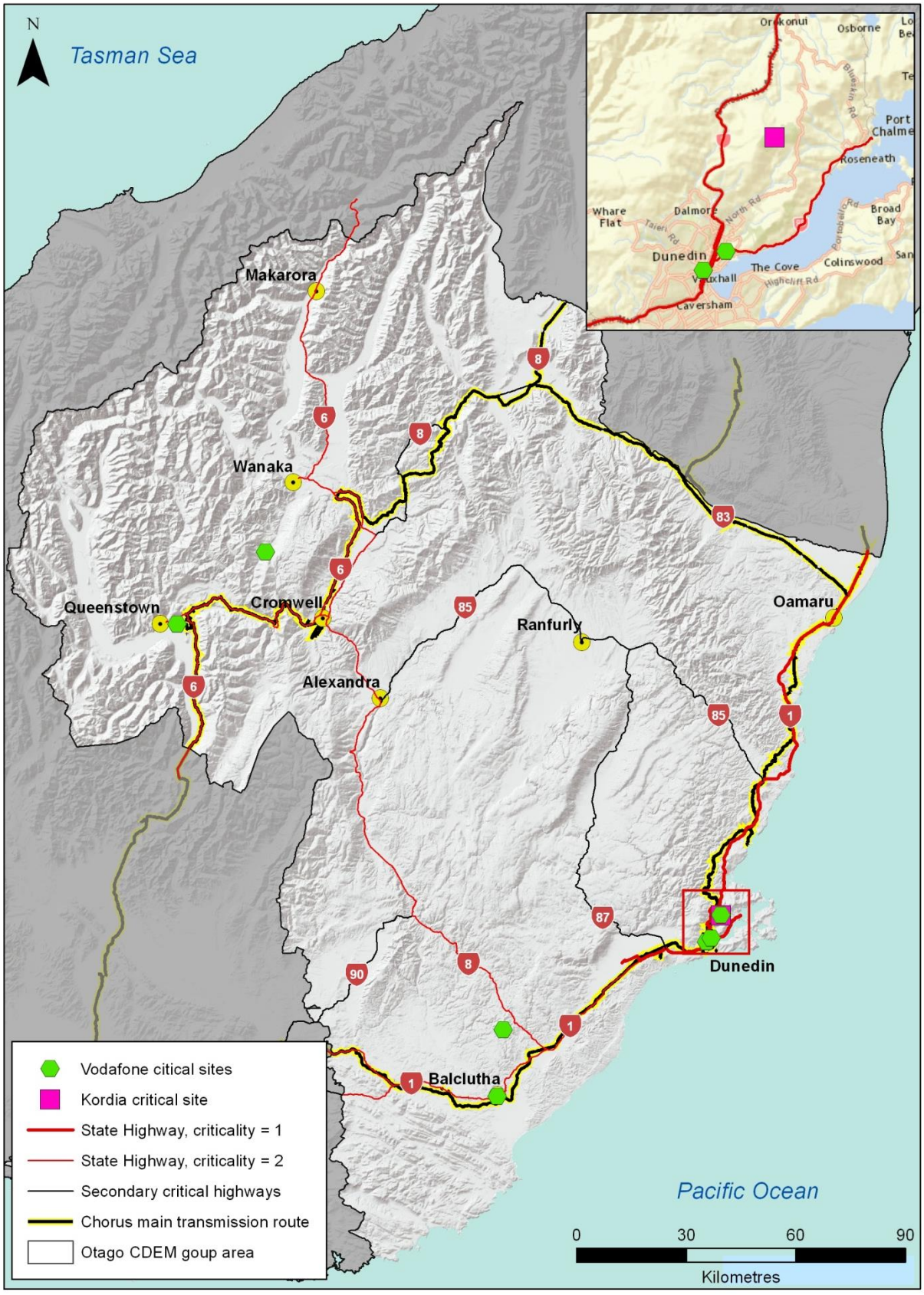


Figure 14: Critical Communications Infrastructure

3. Lifelines Infrastructure Interdependencies

3.1 Lifelines Sector Interdependence

All lifelines services rely to some extent on some or all of the other lifelines services in order to operate. Therefore, a hazard impacting on one lifelines network is likely to have a knock on effect on others. To mitigate the risk that arises from this interdependence, many lifelines have backup services should the lifelines service they rely on fail such as on-site generators and water tanks.

Figure 15 summarises the extent of interdependence between lifelines sectors and the level of backup arrangements in place. The figure reflects the impact on lifelines services following 1 week of outage of another lifelines service, in an emergency response situation. Dependence levels may be different in business-as-usual or shorter/longer duration outages. It is noted that in some cases there is dependence within a sector. For example, lines companies are dependent on Transpower and local authority road agencies are dependent on NZTA.

3.1.1 Dependence on Electricity

During normal operations, electricity is the utility that most others are dependent upon, and is required to operate all the other lifeline utilities to some degree. Because of this dependence, most utilities have backup generation at their critical sites.

However a widespread regional power outage would, after varying periods of time, still impact on telecommunications, water supply, wastewater, gas, fuel supply and traffic management services.

3.1.2 Police

Dunedin Police Station is the main regional facility. It is self-sufficient for 24 hours through stored water (potable and non-potable for firefighting etc.) and on-site generators. I&T provide backup communication systems and all repeaters have battery backups.

Smaller police stations in the region do not have backups for lifelines services but would rely on portable power generators, bottled water, etc. Stations are located at:

- Oamaru
- Balclutha
- Queenstown
- Alexandra.
- Wanaka
- Mosgiel

3.1.3 Dependence on Telecommunications and Broadcasting

A major telecommunications failure is likely to have major impacts on the business sector, however most utilities could continue services at near full capacity without telecommunications in the short term. Some utilities would need to revert to manual operation and monitoring of facilities. Response to service requests would be impaired and there may be a reduction in water supply and wastewater effluent quality.

However the situation changes in an emergency because telecommunications become critical for coordinating response activities. There is a high reliance on the cellular network for voice communications and this network may become overloaded during or shortly after an event. However the copper, fibre and wireless infrastructure (including cellular) provides diversity and is very resilient. Most utilities use a combination of the above technologies to monitor their own infrastructure and some have their own dedicated network of links and radio.

Broadcasting services also become more critical in an emergency for providing important public information.

3.1.4 Dependence on Transportation

Short-term road failures are unlikely to directly impede other utilities ability to provide service in business-as-usual operation. However, as with telecommunications failure, response to service requests and asset failures would be affected. Also, staff need to be able to access facilities and diesel and plant needs to be transported to construction sites and this would become critical in longer-term road failures.

Lifelines Sector	*Dependant on*	Air Services	Broadcasting	Electricity	Fuel	Gas	Ports	Rail	Roads	Telecomms	Wastewater	Water Supply	Comments
Air Services		0	3	2	2	3	3	3	1	3	2	2	Dunedin Airport self sufficient 3-4 days with backup generators for terminal building and control tower plus 500,000l water, and on site wastewater treatment/disposal. Fuel critical but 3-4 days storage and larger aircraft could refuel at destination airports. Road access critical but airport serviced from 3 directions providing alternates if one closed.
Broadcasting		2	0	2	3	3	3	3	2	3	3	3	Mt Cargill Transmission Facility is self sufficient for generators / fuel for 20 + day. Reliance on helicopters for access if there is road closures to sites.
Electricity		2	3	1	2	3	3	3	2	2	3	3	Distributors and generators rely on Transpower network being operational. Fuel, roads and telecomms become more critical (1) in coordinating and emergency response situation. Reliance on helicopters for access if there is road closures to sites.
Fuel		3	3	1	1	3	1	3	1	2	3	2	Can gravity feed or use air compressors/pumps to supply from terminals (could also be used at fuel stations but would be unmetered supply) if electricity failure. Water required at flammable sites (petrol) but self contained water supplies being installed in terminals. All fuel comes in via ship and distributed via roads.
Gas		3	3	2	3	3	1	2	1	2	3	1	Gas comes in via rail and port and is distributed by pipe and road - Fryatt Street is the main road to and from the terminal. Water supply required for fire fighting, though alternatives are sea water pump (if electricity operating) or fire service appliance (if available).
Ports		3	3	1	2	3	0	1	1	2	3	2	Electricity backup on for emergency functions, > 24 hours would have significant impact on operations. 2/3 of cargo is transported to / from the port by rail, the rest by road. Road also required for staff access. Fuel required for ship bunkering. Water supply required for staff but could bring in.
Rail		3	3	2	1	3	3	0	1	3	3	3	Roads critical for transfer of freight and passengers. Electricity critical for network control. Fuel required to operate trains.
Roads		2	3	3	2	3	3	3	1	2	3	3	Main dependency is between NZTA and local road authorities. While traffic lights require electricity, manual traffic management can occur and in other places traffic should revert to normal road rules. Reliance on helicopters for access if there is road closures to sites.
Telecomms		2	3	2	3	3	3	3	2	1	3	3	Require electricity but main sites have generator backup while smaller sites have battery backup that can operate 4-60 hours. Telecommunications network is highly interconnected meaning many telcos rely on other's assets. Roads required for access to sites (or helicopters if roads closed)- more critical in emergenies.
Wastewater		3	3	1	3	3	3	3	2	2	0	2	Dunedin's main Musselburgh PS is the only sewer PS with backup generation on site. Most PS have emergency storage in dry conditions of between 2 and 8 hours and designed spill structures to discharge overflows safely to waterways. Treatment plants do not have backup generation though some biological treatment would still occur in ponds/wetlands.
Water Supply		2	3	1	3	3	3	3	2	2	3	0	Water pump stations and treatment plants do not have on site generators, relying on treated storage reservoirs (typically holding 1-3 days supply) to maintain supply until electricity restored. Reliance on telecommunications for automated control, loss of which could cause reduction in water quality.

1 = Critical for Service to Function 2 = Critical for service to function but some backup or part function. 3 = Not required for service to function. 0 = Not Applicable

Figure 15: Interdependency Matrix

Note: This reflects the impact on lifelines services following 1 week of outage of another lifelines service, in an emergency response situation. Dependence levels may be different in business-as-usual or shorter/longer duration outages.

In a major disaster, road access to other critical sites to enable restoration makes the road network much more critical.

Air services also become important to other lifelines in a major disaster, to assess damage, bring in equipment and spares and access sites when there is significant road disruption.

Helicopter Access to Transmission Site

3.1.5 Dependence on Water Supply

While water supply is critical for the community, only the fuel and gas sectors are reliant on this service for their network operation (required for firefighting purposes). Bottled water supply can be used to maintain a sanitary environment for staff.

3.1.6 Dependence on Gas

No other lifelines networks are reliant on gas for network operation.

3.1.7 Dependence on Fuel

If electricity is affected, diesel supply to critical sites to operate backup generators becomes more important. Even those sites with on-site diesel storage typically only hold a few days' supply. Refueling of generators deployed to other critical facilities is likely to become a significant logistical issue.

3.2 Critical Community Facility Dependence

Most critical community sectors rely on lifeline utilities to be able to function. This section summarises those dependencies.

3.2.1 Civil Defence

CDEM Agencies operate from the following primary sites in an emergency:

- Group ECC – Otago Regional Council Head Office, Stafford Street, Dunedin.
- Central Otago EOC - Council Head Office, Alexandra, with Alternate EOC - Otago Regional Rural Fire Authority Depot in Clyde.
- Clutha District EOC - Council Head Office, Balclutha, with Alternate EOC – South Otago High School, Balclutha
- Dunedin City EOC – Moray Place, Dunedin, with Alternate EOC – Forsyth Barr Stadium
- Queenstown Lakes District EOC – Council Head Office, Gorge Road, Queenstown, with Alternate EOC – St John Ambulance Base Frankton.
- Waitaki District EOC – Centennial Building, Severn Street, Oamaru, with Alternative EOC - St Kevin's College, Oamaru.

The City and Districts also have ward or community operating centres within communities to help manage local response in an emergency.

The primary EOCs are set up to operate under emergency conditions with necessary facilities including backup power generation, telephone, data, radio and satellite communication systems and provision for catering, etc.

Primary sites are the Group ECC, Dunedin ECC and Queenstown ECC, rated as criticality 2, all other sites are rated as criticality 3.

3.2.2 Health

Dunedin Hospital

Dunedin Hospital is a 388 bed facility offering a wide range of health services and a regional helicopter retrieval service. It has backup generation

for essential supply plus around 4 days diesel storage on site. There is a water tank on site with around 20 hours supply under restricted usage. There is around 2 weeks supply of medical gases on site.

Other Hospitals

Other hospitals in the region include:

- This hospital in Queenstown is a 21 bed facility providing services including day surgery, diagnostic services, acute inpatient care (10 beds) and maternity services.
- Clutha Health First, based in Balclutha, has 15 inpatient beds, a maternity centre and outpatient department.
- Oamaru Hospital has 30 inpatient beds, a maternity centre, outpatient department and emergency departments.
- Dunstan Hospital: 24 inpatient bed hospital in Clyde. Has backup generation providing essential power only plus 24 hours diesel plus around 1-2 days water storage on site and its own wastewater treatment plant.
- Wakare Hospital: 150 bed secure psychiatric hospital in Dunedin.
- Maniototo Hospital: a 15 bed hospital including 7 elderly hospital level care, 6 acute inpatient and 2 maternity beds.

These hospitals in general have generators providing essential power supply, fuel storage of 0.5 – 1 days, water storage for 1-2 days and several days supply of medical gases on site.

Health Services are also critically reliant on the transport sector, including roads and helicopter services, to transport patients to hospital.

3.2.3 Ambulance

No information was provided for this project.

3.2.4 Fire

The NZ Fire Service has 47 fire stations located throughout Otago in most of the urban centres. Dunedin Central Fire Station houses the Region Headquarters. Located within this building is the Region's Operations Centre, a facility that allows executive oversight of emergency operations. The Operations Centre is equipped with a suite of communications technology.

Key functions at the Dunedin Central Fire Station are supplied with a UPS and emergency power is supplied by a large diesel powered generator. All other stations have been modified or built to be capable of receiving generator input for emergency power.

All fire appliances carry portable generators with a 2 – 2.5 kVA capacity. Limited supplies of drinking water are carried on each fire appliance.

Radio communication is primarily conducted on the Land Mobile Radio Network (LMRN), a shared network with New Zealand Police. All fire stations have emergency battery back-up for their station based radios. All stations are responded by one of the 3 Communications Centres located in Christchurch, Wellington and Auckland. Fall back capability is maintained in the Region's Operations Centre at Dunedin Central Fire Station.

As with all emergency services, road access is critical for the Fire Service!

Road Damage Obscured by Flood Waters

3.2.5 Corrections

Otago Corrections Facility is located in Milburn, South Otago. The prison houses low to medium-high security inmates and has a maximum capacity of 485.
Water for the Milburn facility is drawn from the Clutha DC Milton water treatment plant and the prison has an estimated storage capacity of two days.

No information was available on dependency on lifelines services.

3.2.6 Welfare

Information on key welfare sites (Civil Defence Centres) in Otago was not available for this report.

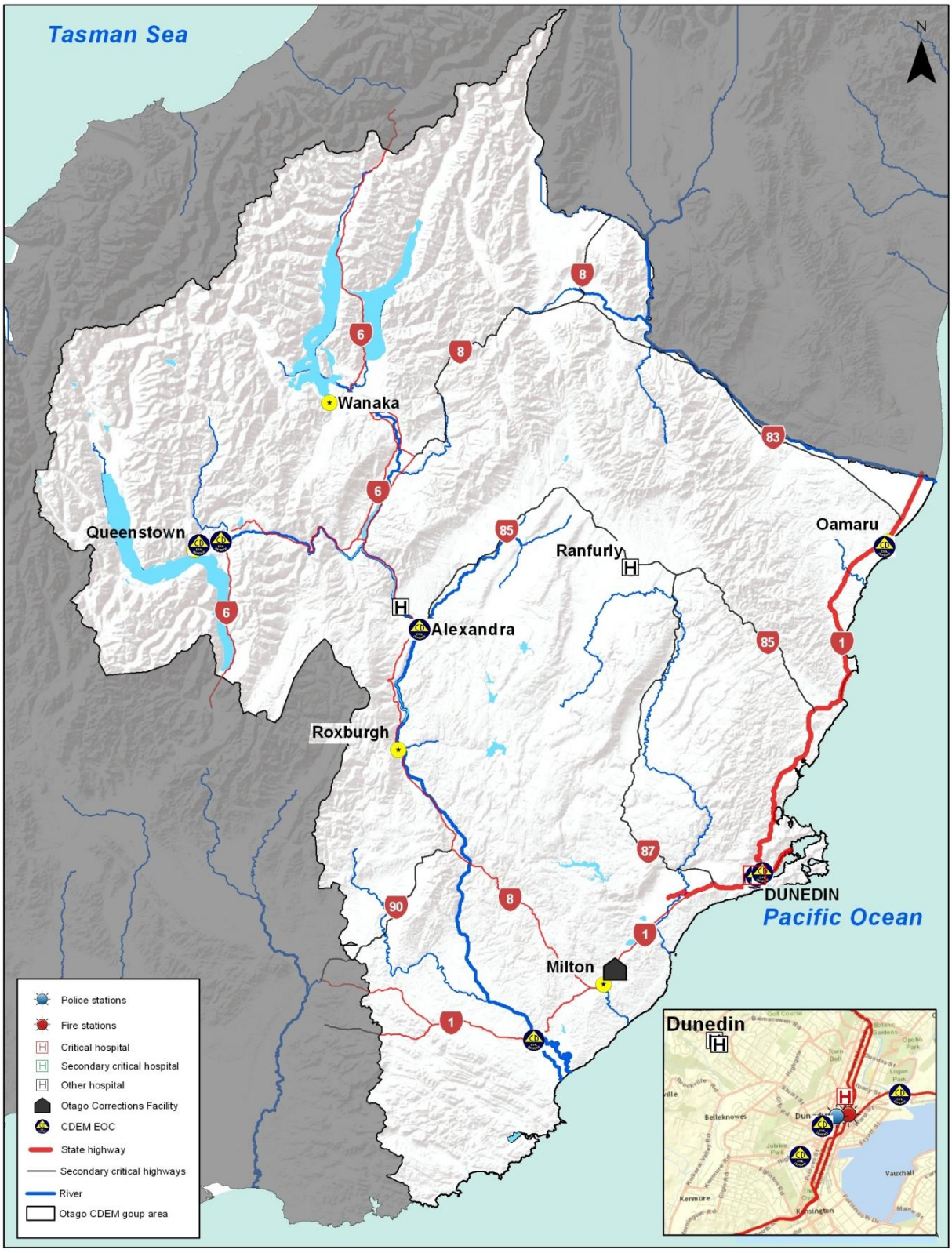


Figure 16: Otago's Critical Community Facilities

4. Infrastructure Hotspots and Pinchpoints

Hotspots are defined as areas where there are:

- a number of critical infrastructure assets from different sectors converge in a single area.
- significant single points of failure for a network or organisation (also called 'pinchpoints').

4.1 Hotspots

Figure 18 illustrates the location of the hotspots in the Otago Region where a number of critical lifelines infrastructure assets converge and are in a hazardous area (i.e. where they overlap with hazard zones mapped by ORC). The hotspot area may be a specific site (e.g.: the Waitaki Bridge), a line or route (e.g.: the Kawarau Gorge) or a larger area impacted by a single hazard (e.g.: South Dunedin, Taieri Plain).

4.1.1 South Dunedin/Portsmouth Drive

The low lying South Dunedin and harbourside area is at risk of flooding (either due to runoff from the surrounding hills or groundwater ponding from an elevated water table in South Dunedin), storm surge, tsunami and liquefaction and contains a number of critical utilities, including:

- The South Dunedin sub-station and South Dunedin GXP which services 17000 customers.
- The Tahuna wastewater treatment plant and the Musselburgh pumping station which pumps Dunedin's wastewater to the treatment plant.

Future mitigation plans:

- Transpower is evaluating a project to link the Hawea Bush and South Dunedin substations to provide back-feed options if the South Dunedin substation is not operating.
- A Dunedin City Council project is underway to assess the potential impacts of sea level rise around this area and exacerbating impacts on other hazards (storm surge, flooding).

4.1.2 Kawarau Gorge

The Kawarau Gorge has numerous locations prone to alluvial fan activity, rock fall and landslides, many of which interact with the areas of appreciable seismic risk. The electricity transmission lines to Queenstown run along or near the Gorge as does SH6 and the main fibre cable owned by Chorus. SH6 through the Gorge is the main road route from Cromwell to Queenstown with alternative routes adding around 4 hours to the journey. Without Transpower's transmission lines operating, the local generation in Queenstown would be redundant as there is no blackstart capability.

Future mitigation plans:

- Transpower is developing contingency plans that would enable quick replacement of structures and lines, but restoration is still likely to be some weeks if there is major road and transmission damage due to the hazards described above.

4.1.3 Roxburgh Dam

With Transpower's Roxburgh substation/switchyard and three major electricity transmission lines through the area, this is a key electricity hub for the South Island. Loss of the switchyard would cause major disruption to electricity supply in the South Island, though the criticality of the transmission lines depends on the time of year (demand is high in winter and the Aurora transmission lines through the area do provide some diversity).

SH8 passing by the Dam is also part of the key roading route from Dunedin to Cromwell (the alternative route of SH 85 adds another hour to the journey).

The main risks to the area are landslides, with ongoing monitoring of those located on the slopes above Lake Dunstan.

4.1.4 Waitaki Bridge

The Waitaki Bridge area is at risk from flooding from the Waitaki Rover, tsunami and from liquefaction during an earthquake. SH1, Transpower transmission lines, the Chorus fibre cable and the main South Railway line all pass over the river in close proximity.

The alternate route to SH1 via Kurow adds 1.5 hours to the journey.

4.1.5 Lindis Pass

Significant assets crossing the Lindis Pass include one of two Chorus fibre cables supplying Otago, SH8 and Transpower transmission lines. The area is most vulnerable to snow due to its altitude but parts of the road can be affected by flooding and alluvial fan activity during times of heavy rainfall. A number of landslides are mapped over the Pass and strong seismic shaking may trigger them.

To the north of the Lindis Pass, and south of Queenstown, SH6 is vulnerable to landslides and can be a difficult area to access, particularly en route to the West Coast.

4.1.6 Taieri Plain

Assets on the Taieri Plains include SH1 and SH86, Kiwirail's main trunk railway line, Dunedin International Airport, critical Transpower transmission lines and sub-stations and transmission lines connecting Mahinerangi power generation assets to the grid.

Many of these assets rely on the Taieri flood protection and drainage schemes for flood protection, however larger 'super-design' events are still possible and could potentially inundate large amounts of the Taieri Plains. The basin is bound by active faults to the north and south and consists of fine silts and sands that are potentially susceptible to liquefaction.

West Taieri is especially low-lying and may be affected by tsunami and storm surge events that restrict the passage of water down the Taieri River during high flows. Alluvial fans and landslides have been mapped on the margins of the Taieri Plains, although most assets are sufficiently set-back from slopes to be directly affected.

Future mitigation plans:

- ORC have an on-going programme of work to ensure there is backup generation available at pump stations across the Taieri.

4.1.7 Katike Strait

Assets passing through this area include SH1 Transpower transmission lines supplying areas from Waitake to Oamaru and Chorus's trunk telecommunications cable.

This area is most susceptible to coastal hazards including coastal erosion, storm surge and tsunami and will be increasingly affected by such hazards under predicted future sea level rise.

4.1.8 Three Mile Hill – Dunedin

Three Mile Hill is a critical road route into Dunedin from the south, as well as having Transpower transmission lines and a substation supplying a significant portion of Dunedin's electricity. Three Mile Hill is most susceptible to closure due to snowfall and ice.

4.1.9 Clyde

Clyde is a significant electricity hub as well as having SH8 passing through the area.

The Clyde switchyard feeds power into the National Grid for the supply of electricity North or South as well as supplying the local distribution network from Alexandra to Raes Junction and out towards the Maniototo. There is some local generation (Pioneer) which can supply a small area. Clyde PowerStation has the ability to Black Start in case of a total South Island national grid blackout.

4.2 Pinchpoints

Pinchpoints are significant areas for single sectors, in comparison to hotspots where multiple sectors' assets converge.

4.2.1 Bulk Fuel Supply – Port of Otago

The Port of Otago is the primary export port for the region and all of the region's fuel comes in via the Port. Therefore the oil and gas wharves, oil and gas terminals and oil pipelines provide a single point of supply into the region. However, ports in other regions provide alternative routes of supply (Lyttleton oil and gas, Timaru oil, Bluff), mitigating the potential regional impact of a closure of Port Otago.

4.2.2 Dunedin Water Supply

At present, the city is highly reliant on the pipelines that bring water from the Deep Creek/Deep Stream sources. The pipeline is vulnerable to a number of hazards – passing through both landslide and

liquefaction prone soils. However network upgrades are underway to provide diversity and mitigate the risk of failure of those pipelines.

4.2.3 Regional Telecommunications

The two fibre cable telecommunications routes that connect Otago and Southland with the rest of the world cross major river systems that stretch from the southern alps to the coast; the Waitaki River on Otago's north coast and the Clutha/Mat-Au River to the west. The extent of service disruption will depend on the level of diversity around the location of the where the cable fails.

4.2.4 SH 8

SH 8 is a critical regional transport route and the main route from Christchurch to Queenstown. It is highly vulnerable at several points to slips and flooding and the alternate route is via SH1/SH85 which adds approximately 1 hour to the journey.

4.2.5 Benmore

Benmore is a critical electricity hub for the South Island, as discussed in more detail in Section 2.2.2. It is vulnerable to (which hazards?).

4.2.6 Dunedin's Northern Motorway

Dunedin's Northern Motorway is a critical transport route and is vulnerable to landslides and snow/ice. There are alternate routes via the Mount Cargill route, but these may be unsuitable for larger vehicles. Kilmog Hill, north of Waitati on SH1 is also vulnerable to landslides and snow/ice. Alternate routes via Coast Road (along the coast) is an alternate route for light vehicles, but also has a number of mapped, active landslides present.

Benmore

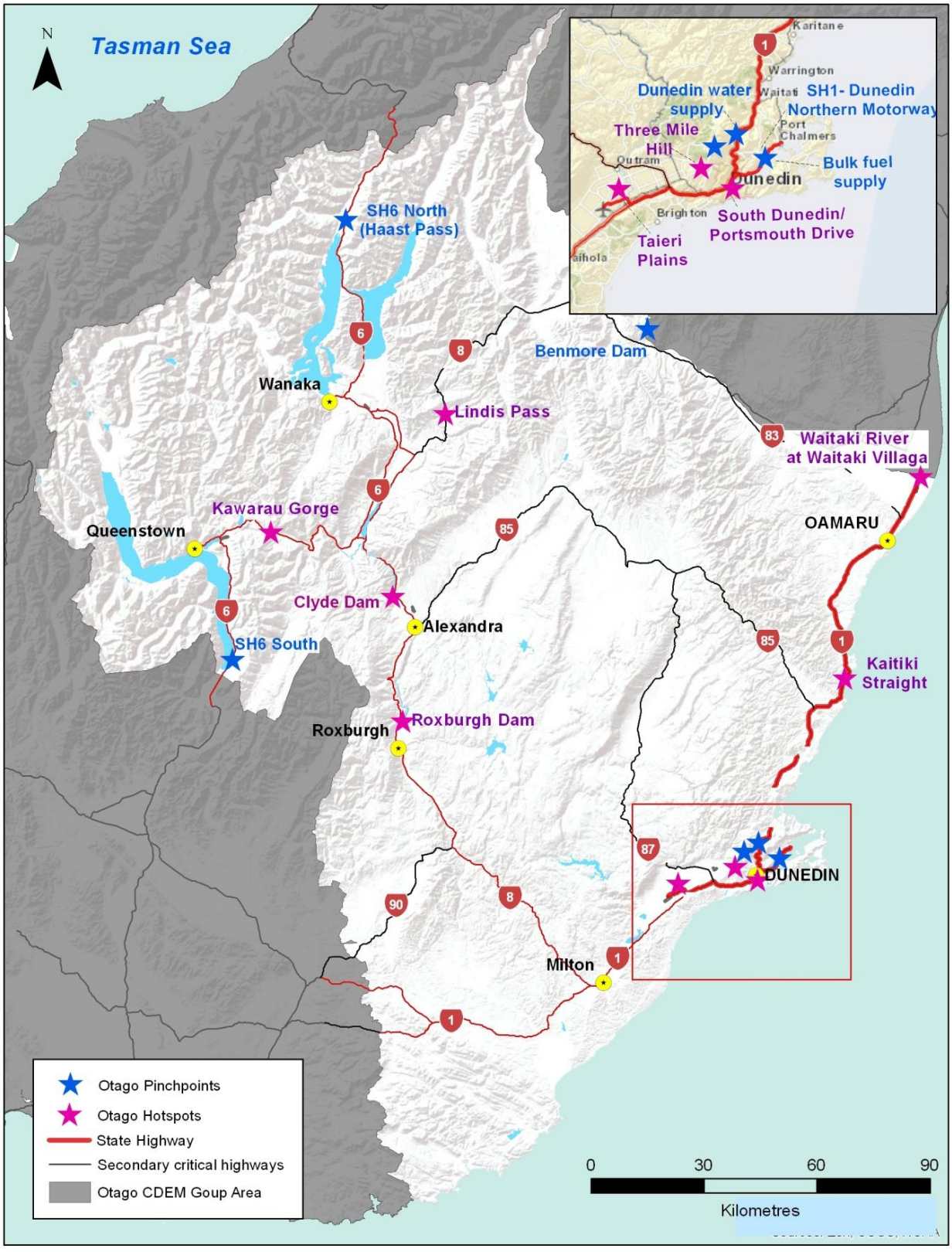


Figure 17: Otago Region's Infrastructure Hotspots

5. Infrastructure – Hazard Risk Assessment

This section summarises the natural hazards assessed for this project, drawn from information held by the ORC. Each hazard has been described separately but it is important to note that many have common triggers (such as heavy rainfall or seismic shaking) and that they interact, e.g. a landslide or debris flow from an alluvial fan may block a channel, exacerbating the effects of river flooding.

The assessment is 34 focused on assessing the impacts on the most critical assets. It is noted that for the Dunedin area, a more detailed asset by asset analysis was undertaken and presented in the Dunedin Lifelines Project Report, 1988.

5.1 Hazard Impacts on Lifelines Infrastructure Assets

Figure 18 illustrates the extent to which various asset types are vulnerable when the assets intersect with hazard areas (e.g.: tsunami inundation areas). It does not represent the probability or extent to which these assets intersect with hazards in the Otago region – that is discussed in the remainder of section 5.

	1	*Unlikely to cause damage post event*
	2	*Possible damage, short term repair (days)*
	3	*Possible damage, long term repair (weeks/months)*
	4	*Complete failure - full reconstruction required.*

	Flooding	Landslip	Winds	Equake	Tsunami	Snow
Electricity						
Electricity transmission lines - overhead	1	3	2	2	1	2
Electricity distribution lines - overhead	2	2	3	3	3	3
Electricity Substations / Switchyards	3	3	1	2	3	1
Underground electricity cables	1	3	1	3	1	1
Fuel						
Storage Tanks	2	1	1	3	2	1
Pipelines	1	1	1	3	2	1
Transport						
Roads	2	3	1	3	2	1
Bridges	2	4	1	4	3	1
Wharves	1	1	1	3	3	1
Airport	3	1	1	3	2	1
Rail lines	3	4	1	3	3	2
Water Supply						
Pipelines	1	4	1	3	1	1
Pump stations	1	4	1	3	3	1
Water treatment plant	1	1	1	3	4	1
Wastewater						
Pipelines	2	4	1	3	1	1
Pump stations	3	4	1	3	3	1
Water treatment plant	3	1	1	3	4	1
Gas						
Pipelines	1	2	1	2	1	1
Storage Tanks	2	1	1	3	2	1
Telecommunications						
Transmission tower	2	3	3	3	3	3
Cell sites	2	2	2	2	2	2
Roadside cabinets	2	2	2	2	2	1
Exchanges	2	2	3	3	2	3
Fibre cable	2	2	1	2	2	1

Figure 18: Potential for asset damage by various hazards

5.2 Storm / Flood

5.2.1 An Overview of the Hazard

The term flooding describes spilling of water from a stream, river or lake onto the surrounding land or surface runoff associated with heavy rainfall events. Both shallow, high-velocity and deeper, slow-moving floodwaters can cause significant damage to buildings, roads and infrastructure in Otago. Sediment and debris often become entrained in floodwaters and can exacerbate the effects of flooding by blocking flow paths and further damaging bridges, roads and structures.

Figure 18 shows some of the major river systems in the Otago region and significant historical flooding events.

The flooding of November 1999 is an example of a large flood event originating in the headwaters of Otago. Lakes Wakatipu and Wanaka inundated the low-lying parts of their townships for over two weeks.

The flood hazard areas mapped by the ORC and used in this study show land which is at risk of inundation due to flood events in rivers and lakes and does not include flooding due to overloading of the urban storm water network, or inundation associated with coastal processes such as storm surge or tsunami. Although not mapped in detail, surface runoff during heavy rainfall events can present a serious hazard, especially when it is concentrated into natural drainage features (swales).

The source document for the flood hazard areas varies across the region but uses observations from past events, flood modelling, geomorphic characteristics (e.g. identification of the flood plain using geology and topography) and a number of other investigations.

5.2.2 Electricity

Distribution lines are unlikely to suffer damage from floodwaters. The biggest potential for damage is at substations or switchyards where control rooms are inundated with the potential for days to weeks for full restoration of services for larger substations. Critical sites in flood risk areas include:

- South Dunedin (loss of supply to South Dunedin)
- Clyde (loss of supply to Alexandra) and surrounding areas.
- Mosgiel Zone substations (has been threatened in the past but the risk was mitigated using temporary barriers.
- Aurora's underground substations in the CBD, though systems are in place to manage this.
- Oamaru-Transpower lines, Lower Waitaki.

All large dams are operated to minimise the risk of floodwaters overtopping dams and are designed to withstand the probable maximum flood (PMF). Damage to the switchyard and power house are possible if overtopping does occur.

Corner of Helwick and Ardmore streets, Wanaka, November 1999.

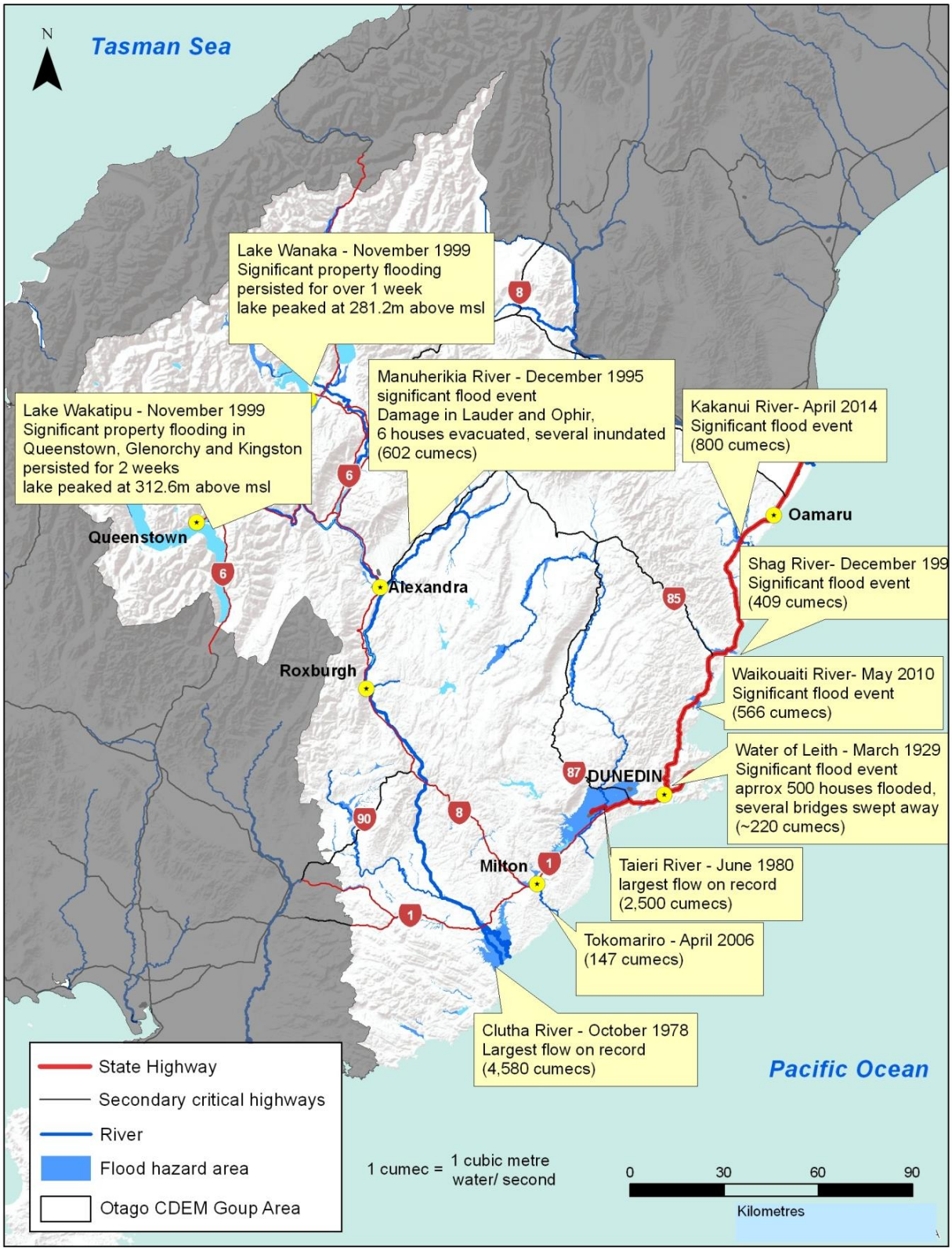


Figure 19: Significant River Systems in the Otago Region

5.2.3 Fuel and Gas

The fuel and gas terminals in Dunedin are in a flood prone area and exposed to slow-moving floodwaters if the Water of Leith were to overtop its banks during a large super-design event, as was the case in 1923). However it is expected that water on the fuel terminal sites would be ponding rather than fast flowing and therefore unlikely to cause damage or wash away the tanks. If the tanks are empty, the main risk would be the possibility of the tanks lifting off their bases.

The assets considered most at risk are the pipelines from the fuel wharf to the fuel terminal tanks, which cross the Water of Leith on a Kiwirail bridge.

5.2.4 Water Supply

Water supplies sourced from rivers are likely to have water intakes disrupted during floods on those rivers. However the local authorities that own these supplies note that supply can be quickly restored once flood water recede and major damage to assets is unlikely.

Some water treatment plants are also in flood prone areas, including Balclutha, the Mosgiel and Taieri bores (Dunedin). These are typically bunded to protect against 100 year events. Larger flood events have the potential to inundate the treatment plant areas and may cause service disruption and damage to plant.

5.2.5 Wastewater

Wastewater pump stations are often in low lying or coastal areas as they typically receive gravity fed wastewater and pump this to treatment plants. The impact of flooding of pump stations is that flood waters will be contaminated with wastewater, however whether asset damage occurs depends on the pump station design. All areas have some pump stations in flood prone areas, the larger pump stations likely to be impacted include:

- Musselburgh pump station (Dunedin)
- Mosgiel Wastewater treatment plant and transfer station (Dunedin)

There are also a number of treatment plants in flood prone areas – again, by their nature, these sites are often close to waterways. However other than temporary disruption to treatment capacity and contamination of flood waters, major damage from flood waters is not expected and, if there is some minor damage, service can expect to be restored within a few days.

5.2.6 Telecommunications and Broadcasting

Buried cables are at risk where there is a need to cross waterways. Failures occur typically at bridge abutments and from river channel scouring. There are also a number of key nodes that are vulnerable to flood events, including Oamaru (Oamaru Creek flooding), Alexandra (Manuherekia River flooding) and Balclutha (Clutha River flooding).

The main exchange in South Dunedin is also in a flood prone area, and this site hosts a number of smaller sites supplying outside the South Dunedin area as well.

5.2.7 Transport – Roads

Almost all State Highways have sections of road within flood risk areas. Historic events have shown that the most vulnerable roads include:

- five sections of SH1 - Hilderthorpe area, North of Maheno, north of Hampden, Karitane Straight & south of Milton township
- three sections of SH8 – Lawrence to Raes Junction, Alexandra and Omarama Stream.

Flooding would typically result in localised impacts only with minimal damage expected after flood waters have receded. Worst impacted areas are typically where the road crosses a waterway so bridges tend to be more vulnerable. Storm events often cause landslides; these are covered in Section 5.8.

5.2.8 Transport – Other

A flood in the 1980s closed the Dunedin Airport for 6 weeks. However flood protection works have improved since then and all operational facilities are located on the second floor. The Taieri flood protection scheme and the associated west Taieri drainage scheme are designed to provide protection against a flood with a 1:100 year return period (approximately 2,500 cumecs at Outram). Larger super-design events beyond this can potentially affect large parts of the Taieri Plains. The ORC is currently

implementing plans to install backup generation at all pump stations on the Taieri.

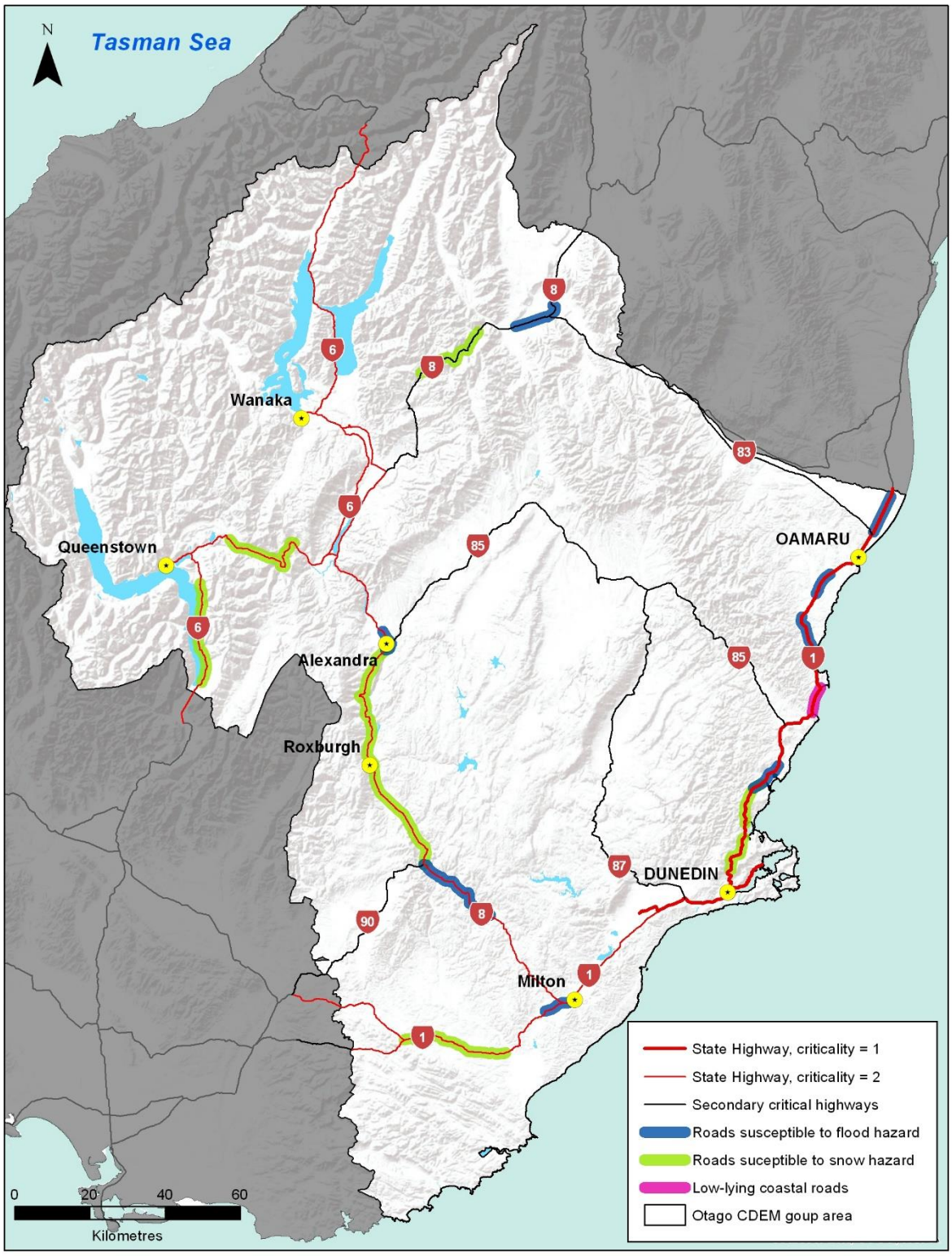


Figure 20: State Highways Vulnerability to Snow and Flood Hazards

5.3 Storm / High Winds

5.3.1 An Overview of the Hazard

Strong winds can occur under a number of different atmospheric conditions, including strong north-west winds lasting from 6-10 hours generated from a deep trough advancing across the Tasman Sea squeezing against an intense blocking anticyclone to the east of the South Island. Another high wind scenario is short (less than one hour) but extreme southerly wind gusts associated with a rapid progression of cold air up the eastern coast of the South Island.

The ORC wind hazard data consist of average annual maximum wind speed (km/hr) at 10 m above the ground over tussock or rough grass for the period 1970-2001. Average annual wind speed maps identify areas more likely to experience high winds, such as higher altitude and coastal areas. Wind speeds may be significantly larger than average values during a storm or period of high winds.

5.3.2 Electricity

Transpower's transmission towers, poles and lines are designed to 200km/hr winds, and can typically withstand even higher. It is more common for damage to occur to conductors, but this is generally not widespread and, if there is access, a fix can usually occur within 24 hours.

The local networks are typically designed to AS/NZS 7000, designed for around 900-1200Pa or 160km/hr. There is expected to be widespread impacts in a significant wind event, with events in the last few years illustrating days to weeks restoration time can be expected (typically the lines servicing individual properties in isolated areas are the last to be restored). Inadequate tree regulations are widely considered by the industry to be a major issue in that respect, in that landowners are required to maintain tree drip lines away from the lines but the trees may still provide a fall hazard. However lines companies do actively manage this through pole and vegetation management practices.

5.3.3 Telecommunications

Chorus operates a number of elevated radio sites. These do suffer damage due to high winds but typically damage is does not affect services. Repairs can be made once conditions allow. The major effect on Chorus services will result from loss of power.

5.3.4 Roads

Roading assets are not likely to be damaged by high winds (other than perhaps large signs, street lights and signal poles, however they may be blocked by falling trees and other debris and some vehicles may be unable to operate safety (motorcycles, large sided vehicles).

5.3.5 Other Infrastructure Impacts

High winds are unlikely to directly damage assets in the fuel, water, gas and transport sector. Any impacts will arise from knock on impacts of failure of other lifelines sectors described above.

Some facilities may be temporarily unable to operate safely (e.g.: port and airport) which in turn may impact on other sectors such as gas and fuel.

5.4 Tsunami / Storm Surge

5.4.1 An overview of the hazard

Tsunami

A tsunami is a natural phenomenon consisting of a series of waves generated when a large volume of water in the sea, or in a lake, is rapidly displaced (Power, 2013). Low-lying land near the coast is most vulnerable to the effects of tsunami, although harbours, offshore islands and headlands do afford a degree of protection.

Local tsunami sources such as landslides into lakes or embayments or the displacement of the sea floor due to earthquakes on nearby faults may arrive at the shoreline within minutes and have the potential to cause significant destruction and loss of life. Local tsunami sources in Otago include a landslide into any of the major lakes in the region, cliff collapse or landslide along the coastal cliffs or rupture of nearby faults including the Akatore Fault or the Puysegur and Hikurangi Subduction Zones (ORC, 2012).
Modelling of selected communities along the Otago coastline indicates that a tsunami on the Puysegur Subduction Zone (local source) would take

approximately 1 hour 45 minutes to reach the southern part of the coast and produce wave heights of up to 2.75m above msl for a 1:600 year event (NIWA, 2007). Wave heights of up to 6 m are also possible along the Otago coastline, however the modeling used to derive these figures is far coarser than that used by NIWA (2007).

A number of faults capable of producing tsunami are located in subduction zones at the edges of the Pacific Ocean (Powell, 2013). The exposure and orientation of Otago's coastline make it most vulnerable to tsunami originating from the coast of South America (Powell, 2013) with expected travel time of over around 15 hours for a 1:500 yr event (NIWA, 2007).

In 2013 GNS Science reviewed New Zealand's tsunami hazard. The national scale of the modelling means that tsunami hazard was reported as wave height at the coast, not inundation depths and extents as with the earlier, more detailed modelling completed by NIWA.

Storm Surge

The term storm surge describes a state of elevated sea level due to a combination of tides, wind-stress, atmospheric pressure and waves and as the name suggests, are associated with storms (NIWA, 2007).

Detailed modeling of selected communities along the Otago coastline by NIWA (2008) considered a range of storm surge return periods between 20 and 500 years. This modeling suggests that for storm surge events with return periods as low as 20 years the sea may reach a level of up to 2.37m above msl on the Otago coastline (NIWA, 2008). Storm surge can inundate land, often for prolonged periods resulting in damage to buildings, roads and submerged infrastructure. Storm surge waters may also entrain debris which can cause additional damage.

Hazard information used in this Study

The storm surge and both the NIWA and GNS Science tsunami studies were used in conjunction with LiDAR data collected in 2006 to establish hazard areas along the entire coastline. For each part of the coastline the 1:100 year storm surge elevation, wave height of the Puysegur Trench tsunami scenario and the wave height of the most likely tsunami source determined by the GNS Science were selected from the nearest modelled community or coastal section and projected over the surrounding area using the LiDAR data. Therefore, the landward extent of the storm surge/tsunami hazard zones varies slightly along the coastline.

5.4.2 Infrastructure Impacts

One area where there are a number of critical assets in coastal / low lying area is South Dunedin, with assets potentially in inundation zones including electricity substations. Port, fuel and gas terminals are also in low lying coastal areas.

However detailed modelling has not been undertaken in many areas making the likely extent of inundation unknown. Current estimations by ORC are that tsunami waves are unlikely to damage these sites.

5.4.3 Road Transport

State Highway 1 passes through low lying coastal areas in a number of places, notably around Waitati and north of Palmerston (Katiki Straight and the Karitane Straight).

Brighton Road, a key arterial road in Dunedin, also runs along the coast.

Impacts are likely to be similar to that with flooding, though damage post event may be higher considering the force of the waves on above ground structures.

Coastal Erosion

5.4.4 Fuel and gas

While local fuel supply assets (wharf, pipelines and terminals) are considered unlikely to be damaged by a tsunami, a tsunami impacting the Marsden Refinery (south of Whangarei) has the potential to cause fuel disruptions in Otago as this supplies 75% of New

Zealand's fuel and the time to source alternatives is estimated at weeks.

The fuel and gas terminals at Dunedin may become very important in the South Island following a tsunami impacting New Zealand's south-eastern coast line as it is less vulnerable to tsunami than many other ports and there are no oil wharves on the west coast of the south island.

5.5 Earthquake

5.5.1 An Overview of the Hazard

For this project, the seismic hazard is defined as the hazard associated with ground shaking during earthquakes, fault surface rupture and the liquefaction and lateral spread of soils due to ground shaking:

- Surface rupture involves land movement either side of a fault, generally confined to a relatively narrow corridor along the fault trace.
- While the intensity of ground shaking decreases with increasing distance from the source, the complex interaction of seismic waves means that certain topography and soil types are more susceptible to strong ground shaking.
- Liquefaction and Lateral Spread occurs when saturated fine grained sediments (such as sand and silt) are subjected to high intensity shaking and lose their ability to stay cohesive, causing deformation, settlement, and sometimes lateral spread towards rivers or lakes. Areas with fine-grained and unconsolidated sediments, soils, and high groundwater tables are susceptible to liquefaction and settlement.

A large number of active faults lie within Otago and many more outside the region are capable of affecting the region (in New Zealand a fault is generally considered active if it has ruptured in the last 120,000 years (MfE, 2003)).

While ground shaking will almost always be felt during large earthquakes, the occurrences of liquefaction, lateral spread and surface rupture are largely dependent on the size and style of earthquake.

Areas susceptible to liquefaction in Otago include alluvium-filled river basins such as the Taieri, the margins of lakes such as Wakatipu and Wanaka and the embayments of coastal Otago. Variability in the nature and extent of fine grained materials susceptible to liquefaction means that more detailed site-specific investigations are usually needed to properly characterise liquefaction hazard at any one site.

Hazard Information Used in this Study

Active fault traces for the region were sourced from GNS in 2012 and were drawn from the national active faults database, also maintained by GNS. Land deemed to be potentially susceptible to liquefaction (based on the factors described above) was identified in a regional level seismic hazard assessment completed by Opus in 2005.

Ground shaking was not used as the duration and intensity of shaking is highly dependent on the magnitude of the earthquake, the distance between any site and the earthquake epicentre and the underlying soil conditions.

5.5.2 Electricity

Generation

In general, all the region's larger infrastructure assets (dams, substations, transmission towers) are structurally designed to withstand ground shaking and large scale hydropower dams and substations/ switchyards are subject to regular seismic surveys to identify potential risks and mitigations.

For example, the Clyde Dam is built on a secondary fault (the major active fault in the area is the Dunstan Fault) but a slip joint within the dam is designed to allow ground movement without serious damage to the dam. The joint can accommodate up to 2 metres of movement – 10 times the amount of any movement considered possible on this fault.

Earth Dams such as Hawea are considered more vulnerable to ground shaking, but are considered highly unlikely to suffer significant damage resulting in dam breaks - in the unlikely event, dam break procedures are in place for all dams.

Hawea Dam

There are processes in place to deal with the specific risk of silt behind Roxburgh Dam liquefying.

Transpower

The February 2011 Christchurch earthquake demonstrated Transpower's network resilience with restoration of supply occurring within 4 hours[4].

Local Distribution Networks

Most of the local network is overhead and not too susceptible to seismic loads – engineering design checks are regularly undertaken for line structures to support heavy equipment. An earthquake is most likely to break underground cables and damage older substations (possibly designed to lower standards) in soils prone to liquefaction.

Restoration times are longer for underground cables as the breaks are less easy to find. With pockets of liquefaction across most areas of the region, the impacts of a major earthquake on local networks are likely to be similar to that experienced in Christchurch, with most supplies restored within a week and the remainder within 1-2 months except in the most badly damaged areas. Aurora's relatively urban network is around 30% underground with OtagoNet and Waitaki having only 1.2% and 5% of their cables underground respectively.

Aurora has identified the Neville Street Zone substation as being subject to liquefaction risk, and this site is programmed for re-location in 2014/15 with earthquake mitigation measures in place.

5.5.3 Fuel and Gas

The tanks in the Lyttleton Terminal suffered only minor damage in the February 2011 Christchurch event, indicating that the (similarly designed) fuel and gas terminals in Dunedin may also withstand liquefaction and shaking. However it is very difficult to predict exact impacts as much depends on the type of soils and construction methods used in the reclamation. The tanks are more likely to be at risk from lateral spreading (i.e. the ground slipping towards the coast) and if sufficient ground displacement were to occur, tank damage from this scenario is possible.

5.5.4 Telecommunications

Copper cables in liquefaction-prone soils are considered to be at highest risk of damage. Equipment in buildings continued to process and handle traffic following the Christchurch earthquake despite some building damage and localized deformation of equipment cabinets. Access constraints hindered network reconfiguration to some extent.

Chorus has an ongoing process for reviewing buildings for seismic resistance and none in the Otago region are considered at risk of major damage from an earthquake.

5.5.5 Water Supply and Wastewater

In a major earthquake, widespread damage can be expected to local reticulation networks, particularly in liquefaction prone areas, as was observed in the February 2011 Canterbury earthquake. Service restoration times are likely to be weeks to months and full recovery to take years. Modern, major assets providing bulk supply services such as treatment plants, storage reservoirs and larger pump stations have generally been designed to withstand seismic events and have controls to shut off supply following a seismic even, however there are still a number of older critical assets that are at risk in liquefaction prone soils, including:

- Musselburgh wastewater pumpstation (servicing most of central Dunedin)
- Somerville Street water pump station (servicing the peninsula, Dunedin).

[4] they have since changed their protocols to ensure that staff and contractors do not put themselves at risk with rapid response to large earthquake events.

- Tainui and Portobello Stormwater Pump Stations (servicing South Dunedin)

Dunedin City Council has undergone a seismic strengthening programme on major water storage tanks but this does not yet cover all the City's water storage facilities.

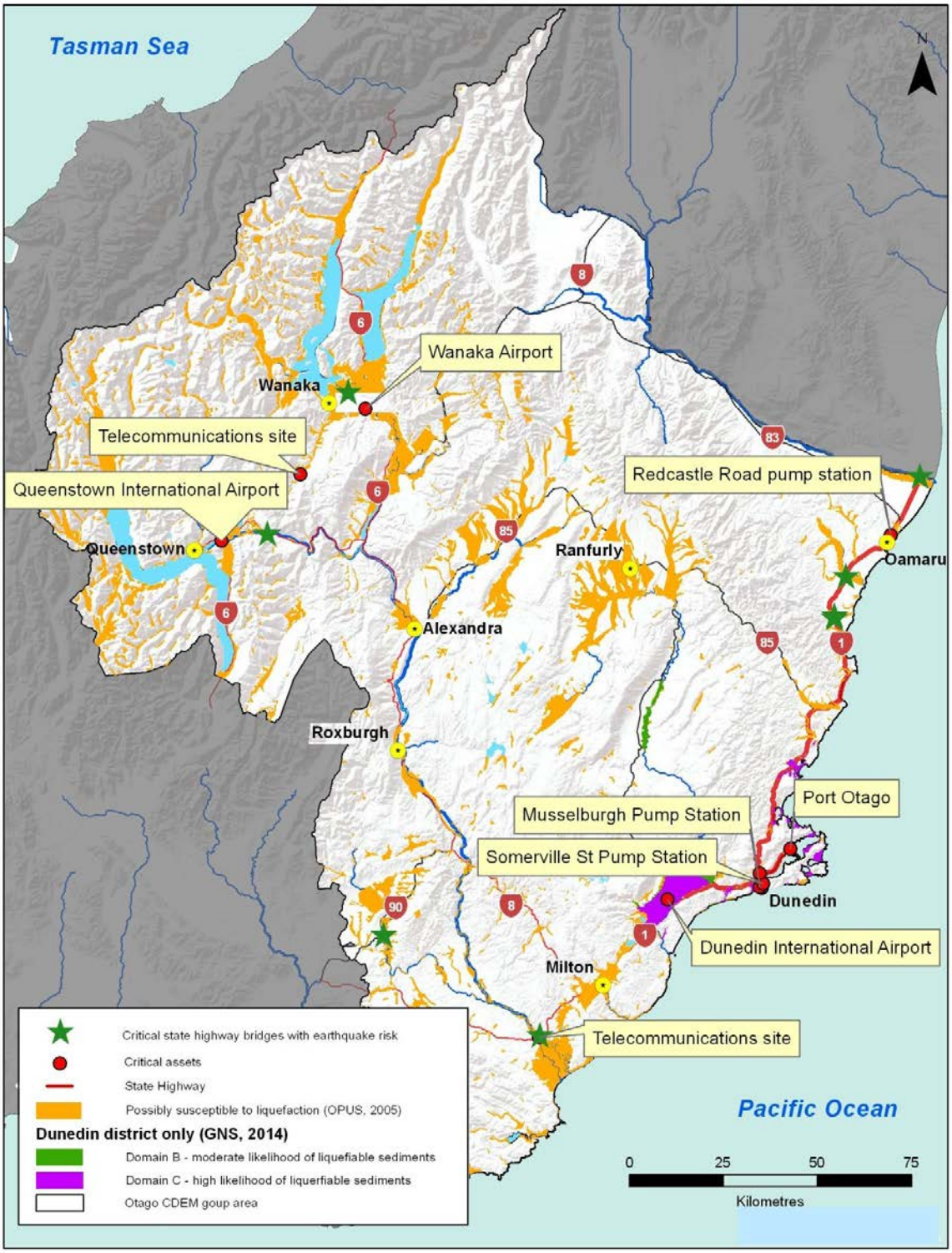


Figure 21: Critical Assets in Areas Potentially Susceptible to Liquefaction

Note the map only lists single sites in liquefaction prone areas, not lines or roads.

5.5.6 Roads

Road pavement failures can occur, more so in liquefaction prone areas, but roads can also be impacted indirectly where underground utilities need to be replaced or the traffic demand changes (such as in Christchurch with the movement of CBD activity to outer suburbs).

All significant state highway bridges meet seismic strengthening standards. The following are those listed within 'Critical State Highways' risk tables for earthquakes:

- SH1 - Waitaki bridge, Waiareka Creek bridge, Kakanui bridge, Waianakarua North River bridge, Waianakarua South River bridge, Pleasant Valley bridges (two) & Balclutha bridge.
- SH6 - Victoria bridge(Kawarau Gorge) & Albert Town bridge
- SH90 – Pomahaka bridge.
- SH 8 – Alexandra bridge, Beaumont bridge & Luggate bridge (SH8A)

Dunedin CC is currently carrying out an assessment of all bridges and significant retaining structures.

5.5.7 Airports

Dunedin Airport is located in soils considered at risk of liquefaction, though the runway and terminal design takes this into consideration and damage due to earthquake is considered very low probability.

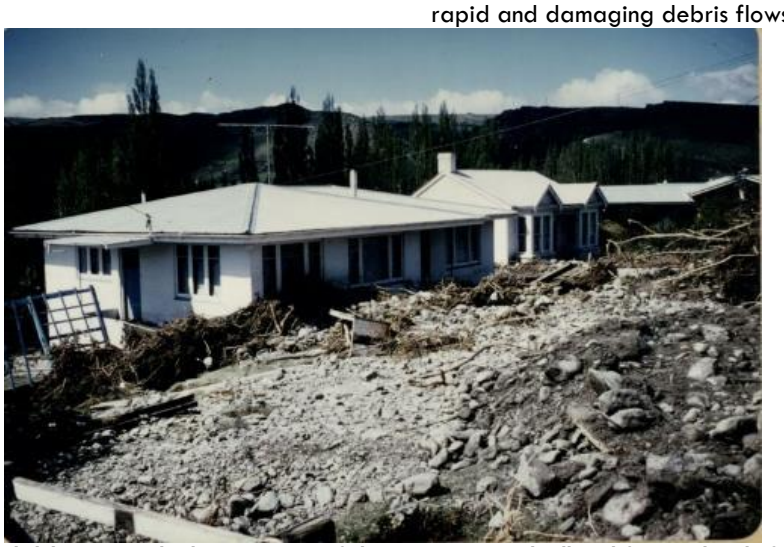
5.6 Alluvial Fans

5.6.1 An Overview of the Hazard

An alluvial fan is an accumulation of river or stream (alluvial) sediments which form a sloping landform, shaped like an open fan or a segment of a cone. They typically occur near the boundary between hill slopes and valleys where well incised spread out and deposit entrained material. Many are only active during times of heavy rainfall. The episodic nature of alluvial fan activity means that large volumes of sediment and debris can be deposited across the fan in a relatively short period of time.

The size, activity level and hazard associated with alluvial fans in Otago are highly variable. Steep mountains and high precipitation in the west of Otago mean that erosion rates and fan-building activity are also high. Further inland in the ranges and basins of Central Otago a more humid to semi-arid climate means rates of erosion and fan building are lower than in northwest Otago, though there are historical examples of intense rainstorm events causing fan flooding and extensive sedimentation (see example below).

Subdued topography, a humid climate and variable geology mean both 'floodwater dominated' and 'debris style' alluvial fans are have formed on the margins of hills and valleys in coastal Otago. Although many of the fans consist of fine grained silt and clay, small to moderate landslides in the catchments of these fans are still capable of causing rapid and damaging debris flows.



Sediment and debris cover the lower portion of the Reservoir Creek alluvial fan, Roxburgh, following heavy rain on 16 October 1978

5.6.2 Impacts on Infrastructure Assets

A number of critical sites intersect with the alluvial fan hazards mapped by ORC. These include:

- 5 Aurora Substations (Cranston St, Quarry Rd, Crawford St, Great King St and North Road, Dunedin.
- A number of pump station and bore sites, including Roxburgh Pump Station, Somerville St Pump Station, Bayview Road Wastewater Pump Station, Marine Parade Wastewater Pump Station, Glenorchy Water Bores and Redcastle Road Raw Water pump station.

5.7 Snow Storms

5.7.1 An Overview of the Hazard

Snowstorms can represent a severe hazard for people in Otago, particularly when deep snow accumulates in densely-populated coastal areas which are not regularly affected by snow. Snow may fall to sea level for one to three days and form into drifts. When such an event is followed by an advancing anticyclone, clear skies and cold temperatures may mean that the snow persists for several days, with resulting in frosts and widespread ice.

ORC does not currently hold a snow hazard map covering the entire Otago region. In general, high altitude areas, especially in western and central Otago are most susceptible to large snowfall events.

5.7.2 Electricity

Snow and ice can break overhead electricity lines (rarely), typically impacting on the older distribution lines in local networks – though usually the biggest issue is trees and branches falling across the line. While the extent of failure in past events has not been huge, the issue is the ability to gain road access to repair lines. Following the Canterbury snow event in 2005, electricity lines companies took a month to restore supplies to all customers.

In general, Transpower's transmission system is more resilient than the more extensive and fragile distribution system.

In past events, Aurora's Omakau zone substation and Ettrick / Roxburgh substations have been affected.

5.7.3 Transport – Roads

Snow disrupts the passage of traffic but does not damage the road structure. The following critical state highways are most susceptible to snow:

- SH1 – Kilmog, Northern Motorway and Balclutha to Clinton area.
- SH6 – Kawarau Gorge & Remarkable Range section.
- SH8 – Manuka Gorge, Raes Junction to Alexandra & Lindis Pass/Lindis Valley area.

5.7.4 Other

Snow is unlikely to directly impact or damage assets in the fuel, gas, telecommunications, water and wastewater areas, however restricted road access may cause longer service response times. Snow could potentially disrupt operations at ports and airports during the event, but is unlikely to cause damage once the event is over. Snow and ice buildup on antenna plant at high sites can affect radio services.

5.8 Landslides

5.8.1 Hazard Overview

The term "landslide" describes a variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these. Landslides can vary in size from a single boulder in a rock fall to tens of millions of cubic metres of material in a debris avalanche.

Landslide information held by the ORC is derived from a number of sources including geological maps, technical reports and unpublished reports such as university thesis. This information was compiled for the ORC in 2006 by the institute for International Development (IID). A subset of this data, for the Dunedin District, was further refined by GNS Science in 2012 and again in early 2014. Landslides are represented as either mapped areas or point data. Many landslides were mapped by identifying landforms in aerial photography and as a result there is uncertainty in the age, type and activity level of many of the landslides. Not all of the landslides identified in the ORC database represent a current and credible hazard.

Landslides are particularly numerous on the steep slopes of the Southern Alps in the west of Otago and the coastal hills that border much of the eastern coastline. Landslides in Otago generally fall into two broad categories; shallow, surficial slides typically in the mantle of soils that overlay slopes and more deep-seated slides in the underlying bedrock. Although landslides can occur at any time without any obvious trigger, heavy or prolonged rainfall, seismic shaking and site excavation are the most common causes of instability.

One of the most notable examples of a large, damaging landslide in the Otago region is the 1979 East Abbotsford landslide, located in the south-western suburb of Abbotsford, Dunedin. The large, 'first time' slide occurred in moderately steep (7°) weak clay layers and destroyed 69 houses at an estimated to be $10–13 million (Hancox, 2009). Unfavourable geology, sand excavation at the slide toe and a leaking water main all contributed to the initiation of movement.

5.8.2 Impacts on Infrastructure Assets

Major landslides are typically highly damaging to all assets in the direct area and may be one isolated event or a series of landslides triggered by another disaster such as a cyclone or earthquake.

Landslides in a river can cause an inland tsunami. All larger dams in the region have undergone studies of the risk associated with potential wave surges arising from upstream landslides, and all dams are considered able to withstand the impacts without major damage.

There is a risk of landslides causing partial / complete blockage of the Roxburgh Gorge resulting in a large, high velocity flood wave travelling downstream either as an immediate consequence of the landslide or following a delayed 'dam-break' scenario sometime after the initial impoundment of the river water.

View across the chasm of the Abbotsford landslide, 1979. Photo supplied by GNS science (IC McKellar).

6. Emergency Response Principles and Priorities

6.1 Key Response Agencies

This section aims to support a common understanding amongst all key response agencies of regional priorities following a major disaster. This in turn will enable:

- key agencies to prioritise their own response to support other critical agencies service restoration.
- resources that are being coordinated by lead agencies to support those regional priorities.

While the priorities will vary according to the specific nature of the disaster, resource priority should be given to the following services to ensure the community disruption is minimised (Guide to the National CDEM Plan, 2009):

- critical health services (hospitals, ambulance, public health)
- emergency management (Police, Fire, EOCs, welfare centres)
- lifelines infrastructure
- vulnerable sectors (e.g.: immobile or vulnerable groups of people such as rest homes or prisons)
- isolated communities
- key areas (e.g.: CBDs)
- commercial producers
- residential zones.

The top three priority sectors are further discussed below.

Emergency / Health Services

Particularly immediately after an event (or prior to, if there is warning), Police, Fire, St Johns and Hospital services are obviously key to rescue operations and focussing on the protection of life and property. Armed Services resources may be brought into support in major emergencies.

CDEM Agencies

Depending on the scale of the event, local, regional and national CDEM operations may be activated to support and coordinate the response to the emergency across all agencies and the wider community.

Welfare Agencies

Welfare agencies have an important role in supporting people that require assistance such as food and shelter, as well as supporting the longer term recovery.

Lifelines Organisations

The ability for lifelines organisations to function following an emergency is critical to the ability of the community to recover from it. Medium to long term failures can trigger evacuation of people from the area (either by choice or by direction) and prolong the community's recovery.

- As highlighted in Section 3, electricity is critical for other most other lifelines organisations to be able to function. Electricity restoration is a commonly reported indicator of the extent to which the community's 'business as usual' has been restored.
- Transport is important for moving response resources (such as support personnel) into the area, evacuating people from hazardous areas and enabling lifelines (and other organisations) to access sites to restore services.
- Communications is critical for coordinating and deploying resources.
- Water and wastewater services are fundamental for maintaining public health. While temporary alternatives such as bottled water and portaloos can provide temporary response, in a large scale event they can take time to source and deploy.

6.2 Critical Response and Recovery Resources

The resources that are generally critical for the above agencies during a major response (as well as for other agencies and the wider community) are summarised below.

Demand for any of these resources is likely to exceed immediate supply in a major disaster. There are a number of improvement actions noted in section 7 that are aimed at ensuring these resources are efficiently used and processes are in place to prioritise supply to key response agencies.

1. **Fuel (petrol/diesel):** is required to fuel vehicles and, if there are power failures, generators. Fuel needs to be available at service stations and by tanker deliveries to key sites. There are issues in the Otago Region such as a number of remote areas with significant distances between fuel stations. Work needs to be done to better understand service station capacity and locations, availability of other stocks that could potentially be used (such as on large farms) and regional processes to ensure fuel is available to key response agencies. A regional fuel contingency plan is included as a future action in Section 7.

2. **Helicopters:** are important both for rescue operations and impact assessments. There are currently limited plans for coordination of impact assessments and individual organisations would be looking to source and deploy helicopters. There is potential benefit from a reconnaissance plan that would see helicopters deployed along pre-determined critical sites and routes recording visual images for all key response agencies. This may include an agreement that some sectors have specialist personnel on the helicopter. A helicopter reconnaissance plan is included as a future action in Section 7.

3. **People:** Operating a 24/7 response can stretch staff and contracting resources considerably. A range of formal arrangements (contracts, mutual aid agreements with other organisations) are in place in some sectors. There is also a less formal understanding that support will be available from others where needed – and this was evidenced in many ways following the Canterbury and Christchurch earthquakes 2010/11. There are many issues that need to be dealt with such as use of different equipment, standards, safety procedures, etc. Sector mutual aid agreements would be useful in all sectors (though practical only in non-competitive sectors) including protocols for managing resources from other organisations.

Chevron's Fuel Terminal

4. **Spares**: Again, the scale of an event has the potential for the immediate need to exceed the initial response phase, though there is some anecdotal evidence from Christchurch that in fact the need for large quantities of spares in the first few days is limited by the availability of crews to effect repairs. The electricity sector identified the need to better understand the collective need for and availability of spares (such as electricity poles) and consideration of the benefit of moving to a more standardized approach to equipment, parts, etc.

5. **Other critical resources** – in no order of priority – mentioned include:
   a) Communications equipment – RT.
   b) Social media
   c) Generators
   d) Food and water
   e) Vehicles
   f) Contractors
   g) Specialist equipment
   h) Plant – diggers etc.
   i) Portable heating
   j) Mobile catering
   k) Portaloos showers (ablutions)
   l) Accommodation
   m) Bottled water / tanker water
   n) Temporary traffic signs, cones and barriers

The development of a regional plan for management of portable generator resources was identified as a high priority and is included in Section 7.

6.3 Response and Restoration Processes

6.3.1 Lifelines Response Prioritisation Arrangements

Electricity Sector

Electricity Sector priorities are covered in Participant Outage Plans. Where a major shortage requires planned, rolling outages, customers on higher priority feeders are less likely to be cut off.

Under these arrangements, residential consumers are typically on the lowest priority feeders. However in an emergency, priorities may change and the sector would expect to take direction from CDEM agencies as to whether their normal prioritisation protocols need to be modified.

Telco Sector

Prioritisation is based on the criticality of the node and trunk.

Water Sector

Prioritisation is typically asset based – trunk supplies restored first (from treatment plants to reservoirs), then would consider prioritisation of supply to critical customers.

Road Sector

The One Network Road Classification is used to prioritise restoration / response. Other factors to be considered would be availability of alternate routes and traffic volumes (triage phase).

6.3.2 Response and Restoration Principles

To support a coordinated and effective regional response, lifelines agencies will, unless otherwise directed by the lead agency:

- Give priority to restoring services to key response agencies that rely on their service (Section 6.1), where practical.
- Be able to quickly mobilise and prioritise restoration of services in the absence of direction from the lead agency.
- Implement plans and arrangements that are aligned with local, regional and national CDEM processes.
- Operate in accordance with national, regional and local response arrangements such as fuel contingency plans, sector coordination plans, where they are in place.

7. Future Actions

7.1 Improvement Projects

7.1.1 Regional CDEM / Lifelines Sector Projects

At the final project workshop in July 2014, the projects detailed in Table 1 were agreed as a high priority for Otago's lifelines sector. These projects could either be led by the lifelines sector or CDEM sector but, regardless, will need significant input from both.

All of these projects have already been completed by at least one region in New Zealand, some by several, and it is intended that these can be used to inform the Otago projects.

7.1.2 Lifelines Organisations Mitigation Projects

Over time infrastructure networks are improving in resilience as organisations install more resilient assets as renewals are required. All organisations also have asset inspection and safety programmes targeted at critical assets. Seismic screening programmes are in place for dams, bridges and other critical structures. As well as these ongoing programmes, the following specific mitigation projects were identified in the Otago Region (Table 2).

Project	Description and scope
Regional Fuel Contingency Plan	This plan would outline how fuel would be managed in a significant shortage to ensure critical lifelines and community organisations can be supplied. It will support the National CDEM Fuel Plan and identify, at a regional level, bulk fuel stocks (type and location), fuel stations, organisations to be prioritised with fuel supply and their likely fuel demand requirements, plans to extract fuel in power outages, and communication processes to implement the plan.
Regional Reconnaissance Plan	This plan aims to optimise the use of limited helicopter resources for rapid damage impact assessment. It would include the types of helicopter resources likely to be available (including drones), how/who will decide on allocation of helicopter resources, how information would be captured (e.g.: video versus on board experts) and disseminated, and route maps taking in critical infrastructure sites and routes. Consideration will be given to multi-purpose trips (e.g.: reconnaissance and supplies). Recommendations will also be made such as the need for Mutual Aid agreements with agencies owning helicopters (media, police, etc.).
Regional Emergency Generator Management Plan	This plan would outline how electricity generator stocks would be managed in a significant electricity outage. It would include an assessment of electricity generators (numbers and capacity) likely to be available such as from hire depots, Defence Forces, etc., critical infrastructure sites likely to need them and their plug in capability.
Lifelines – CDEM Sector Communication Protocols	These protocols would outline how lifeline utilities coordinate with the CDEM sector, and each other, in an emergency. It would look at local, group and national CDEM communication lines with lifeline utilities and the type of information to be exchanged.
Lifelines – CDEM Sector Communication Systems	This project would look at alternative communication methods (such as radio channels, satellite phones) to be used when normal communication channels (telephone/fax/email) fail. It would assess the current use of these other communication methods by lifelines and CDEM and make recommendations to ensure alternate channels are available.

Table 1: Regional CDEM / Lifelines Sector Projects

Organisation	Future Mitigation Programmes and Projects Identified (10 years)
Electricity	
Aurora/Delta	Upgrades to SCADA to improve communications links to key sites. Relocation of Neville Street Zone Substation outside of liquefaction risk area.
Contact Energy	Upgrades to SCADA to improve communications links to key sites.
Meridian Energy	5 yearly critical safety review programme and undertake actions arising.
Network Waitaki	Linking isolated GXPs to provide loop redundancy.
OtagoNet Ltd	
Pioneer Generation	
Transpower	Preparation of a Kawarau Gorge contingency plan. Feasibility study on linking Hawea Bush / South Dunedin substations to provide loop redundancy.
Trustpower	
Fuel / Gas	
Allied Petroleum	
BP	
Caltex	
Liquigas	SCADA upgrades.
Mobil	
Nova Energy	
Z	
Telecommunications / Broadcasting	
Chorus	
Kordia	
Vodafone	
Local Authorities (Water/Transport/Flood Protection)	
All	Development and measurement of resilience indicators (ONRC).
Central Otago District Council	Submitting case for backup generation at key water/wastewater sites. Developing plans for management of isolated communities.
Clutha District Council	
Dunedin City Council	Develop and implement mitigation programme arising from recent climate change studies. Water Supply upgrades to provide redundancy for Deep Creek Pipelines – connects two supply zones (2014), repair Ross Creek Dam (2015), new pump / pipe from Ross Creek Dam to Mt Grand WTP (2016)
Queenstown Lakes District Council	Assessment of rock fall susceptible areas (roads).
Otago Regional Council	Installation of backup generators on pumps in the Taiere Plains flood protection system.
Waitaki District Council	Reviewing options to alleviate flooding at key pinchpoints (which ones?).
Transport	
Dunedin Airport	Reviewing case for backup generation for infrastructure such as wastewater treatment plant.
Kiwi Rail	
New Zealand Transport Agency	Review capacity of detour routes and develop upgrade programme.
Port Otago	
Queenstown Airport	

Table 2: Future Lifelines Organisations Mitigation Programmes

7.2 Lifelines Sector – Future Working Model

This report is the output from the first regional level lifelines project in New Zealand. In most regions, on completion of the project, the lifelines sector has established a Lifelines Group to progress the improvements identified and maintain relationships within the lifelines sector.

Lifelines Groups vary in their approach, ranging from:

- Group chaired and led by the lifelines sector with support and administration from the CDEM sector to CDEM-led.
- Project managers engaged under contract versus CDEM office staff members acting as project manager.
- Funding from lifelines sector versus CDEM sector or a combination of the two.
- Meeting frequencies range from quarterly to annually (depending on the level of the work programme).
- Different levels of formality – some Groups operate under a business plan and charter.

At this stage, the business model for an Otago Lifelines Group has not been established. However it is noted that there are a number of expectations of both lifeline utilities and the CDEM section in Appendix C of the Director's Guidelines for Lifeline Utilities (2014). Specifically, that lifeline utilities are responsible for providing advice to CDEM Groups and MCDEM and participating in Lifelines Group activities.

The Guidelines do not explicitly state who is responsible for initially convening the Lifelines Group, however in all other regions in New Zealand the initial establishment has been facilitated by the CDEM Group.

The Guidelines also outline recommended operational arrangements for engagement between the lifelines sector and CDEM sector during response and recovery.

At the final project meeting in July 2014, lifelines organisations generally agreed that ongoing arrangements should be established for lifelines sector and CDEM sector both in terms of maintaining readiness (through Lifelines Group initiatives) and having agreed coordination protocols during response and recovery (Lifeline Utility Coordination Protocols).

However the lifelines representatives sought clarity on expectations on lifelines at a local, regional and national level prior to the establishment of any lifelines group or operational procedures. It was noted that the potential for any duplication of effort should be carefully managed.

7.3 Recommendations

It is recommended that:

1. Lifelines organisations representatives present the findings and recommendations from this project to their Executive Teams and seek endorsement for ongoing participation in a regional Lifelines Group.

2. The Otago CDEM Group convene a working group of local and regional CDEM and lifelines representatives to recommend an appropriate model for lifelines sector and CDEM sector engagement (Lifelines Group and Lifelines Utility Coordination). This should include consideration of appropriate ways to progress the projects identified in Section 7.1.

Attachment 1: Glossary

CDEM	Civil Defence Emergency Management.
Interdependency	In the lifeline utility sector context, interdependency relates to the dependence by all lifeline utilities on at least some of the other lifeline utilities. For example, electricity operators depend on telecommunications for coordinating response and recovery, telecommunications operators need electricity for plant to operate and the fuel refinery depends on water supply for cooling.
Emergency	Means a situation that: ▪ Is the result of a happening, whether natural or otherwise, including without limitation, any explosion, earthquake, eruption, tsunami, land movement, flood, storm, tornado, cyclone, serious fire, leakage or spillage of any dangerous gas or substance, technological failure, infestation, plague, epidemic, failure of or disruption to an emergency service or lifeline utility, or actual or imminent attack or warlike act; and ▪ Causes or may cause loss of life or injury or illness or distress or in any way endangers the safety of the public or property in New Zealand or any part of New Zealand; and ▪ Cannot be dealt with by emergency services, or otherwise requires a significant and coordinated response under the Act. *National CDEM Act 2002.*
Hazard	Has the same meaning as in section 4 of the CDEM Act and means something that may cause, or contribute substantially to the cause of, an emergency.
Hotspot	Hotspots are defined as areas where there are: ▪ a number of critical infrastructure assets from different sectors converge in a single area. ▪ significant single points of failure for a network or organisation (also called 'pinchpoints').
Lifeline Utility (Lifeline Organisation)	A lifeline utility is an organisation that provides an essential service and is defined in Schedule 1 of the CDEM Act 2002, including water, wastewater, ports, airports, roads, rail, electricity, gas, petroleum, telecommunications, and broadcast media organisations.
Lifelines Groups	Lifelines Groups (sometimes referred to as Lifelines Engineering Groups or Lifeline Utility Groups) operate regionally and: ▪ undertake reduction and readiness planning (the lifelines group itself does not have an operational role in response and recovery) ▪ have members including lifeline utilities, scientists, emergency managers and other professionals.
Pinchpoint	*See hotspot*
Super-Design Event	A hazard event that exceeds the design event (for example, a storm of greater than a 1:100 year return event where flood protection is designed to a 1:100 year event).
Vulnerability	Potential for loss of service caused by a hazard.

Attachment 2: Classifying Critical Infrastructure

Nationally Significant Assets (Criticality 1):

Impact of failure is:

- Loss of supply to most of the region, and/or significant impact on other regions, and/or reduction in service across the country.
- Loss of supply to a nationally significant customer that relies on the organisation's service (e.g.: Dunedin hospital, other lifeline utility infrastructure rated Criticality 1).

Regionally Significant Assets (Criticality 2):

Impact of failure is:

- Loss of supply to more than 20,000 customers or reduction in service to majority of region's customers.
- Loss of supply to a regionally critical customer that relies on the organisation's service.

Locally Significant Assets (Criticality 3):

Impact of failure is:

- Loss of supply to more than 2,000 customers or reduction in service across part the region.
- Loss of supply to a locally significant customer.

All other assets (Criticality 0).

General principles in applying the methodology:

a) Criticality is defined only in terms of the consequence of failure such as the numbers and types of customers affected. The likelihood of failure is not relevant (e.g.: just because it is in a flood prone area does not make it critical) nor is the duration of failure considered at this step.

b) If alternative arrangements can be put in place before serious financial and/or social problems emerge (e.g.: within 4 – 8 hours), either:
   - by the utility themselves, through network reconfiguration, or
   - by critical customers with alternative supplies on-site such as generators or water tanks then reduce the criticality rating down one rank. As part of this step, make a broad assessment of how long users can function using their own alternative supplies (if it is less than 2 days, that should not be considered to provide sufficient redundancy).

c) In determining the criticality level, assume that general demand is sustained (i.e. at this stage we are only considering failure of that asset alone rather than the broader consequences of a larger disaster).

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OTAGO
CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP

REPORT

Document ID: A693503

To: **Otago CDEM Group**
From: **Chief Executive, Otago Regional Council**
Date: **14 November 2014**

Subject: **Review of Otago CDEM Arrangements**

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1. Precis

The purpose of this report is to present to the Group Joint Committee the Report on the review of the Otago CDEM arrangements.

2. The Report

The report includes an independent review of the Otago Group arrangements undertaken by Caldwall Strategic as well as a review of progress against the Group work plan and the recommendations from the last capability assessment undertaken by MCDEM in 2010.

The conclusion of the independent review and report is that the Group is providing a low level of service for CDEM in Otago in respect to working collaboratively in an integrated, coordinated way as intended by the CDEM legislation.

It has been recommended that the Group adopt a new set of principles for the setup and operation of the Group and that the Group arrangements be changed to provide the Group Office with the authority and resources to manage the delivery of CDEM across Otago. It is proposed that a Group Manager/ Controller be employed to manage the Group Office and the TLA EMOs who will however remain employed and based with their respective TLAs. It is also recommended that the Group Office employ an additional EMO whose focus will be training and welfare. The estimated cost of the extra resource for the Group Office is $120,000.

The recommendations include provision for preparing memoranda of understanding between the Group Office and TLAs and between the CEG and the Otago Regional Council for the provision and resourcing of the Group Office which will include a business plan for the next two years.

3. Consultation

The Group when agreeing to undertake the review asked that MCDEM preferences for a particular approach be sought. The draft of the report was forwarded to MCDEM who have responded as follows:-

Having read both the Cornwall Strategic report and the draft Review report, MCDEM agrees in principle with the recommendations outlined in the Draft review.

MCDEM supports the Cornwall Strategic view that the Emergency Management Officers should remain locally domiciled in their respective TLAs but contributing to a co-ordinated consistent delivery of a CDEM Group work programme through the management of a well resourced and funded Group office.

The one area that is very weak in the Cornwall Strategic report and is not canvassed exclusively in the review report is the funding arrangements for the Otago CDEM Group. MCDEM disagrees with the Cornwall Strategic report in its assertion that the funding model is irrelevant at this stage of the review process. Historically this has been an issue for Otago as there has never been a transparent budget for the CDEM work programme or Group office functions as the Otago Regional Council provided these through the Administrating Authority role. Costs were deemed "to lie where they fall" which has contributed to the under resourcing of much of the CDEM work programme and has presented a challenge to progress across the CDEM Group. This issue was raised as a corrective action as part of the last Capability Assessment undertaken by MCDEM in 2010.

A draft for the report was also sent to Council Chief Executives for comment.

Both the QLDC and the CODC disagree with the comment in the Cornwall report regarding there needing to be another EMO between them. They contend that resourcing has been thoroughly considered and was based on workload, shared efficiencies and ensuring both Council's meet their statutory obligations under the Act.

While Cornwall's comments are noted they are not necessarily supported or recommended in the report as their suggestion that there should be three EMOs in the Group Office is not supported.

There is also not full support for the proposal that TLA EMOs be "managed" by the Group Office. One view being that the EMO relationship must align closely with individual Councils and its communities and that removing these individuals from the Council hierarchy is likely to lead to strained relationships, particularly in a crisis and that the Emergency Management is quite different to the ORFA model in this respect. The other view is that Emergency Management is not vastly different from rural fire given the fundamentals of both around the 4Rs and that overall performance and coordination would benefit from a centralised management structure and that this doesn't have to be at the expense of community alignment.

It is however agreed that there needs to be better collaboration and integration to ensure consistent approach and efficiencies. The report recommends that further discussions be held with TLAs and that a memorandum of understanding be developed between them and Group Office as to how any oversight or management may work.

4. Conclusions

The Otago Group is not providing a high level collaborative, integrated, coordinated CDEM service to the Otago communities.

To achieve a better level of CDEM in Otago more emphasis needs to be placed on working together and monitoring and reporting to ensure that CDEM is being delivered across Otago.

It is being recommended that the Group adopt a new set of principles for the setup and operation of the Group and that the Group arrangements be changed to provide the Group Office with the authority and resources to manage the delivery of CDEM across Otago.

5. Recommendations

That:

1. The report be received.
2. The recommendations within the report “Review of Otago CDEM Arrangements” be adopted.

Peter Bodeker
Chief Executive
Otago Regional Council

CORNWALL STRATEGIC

Otago CDEM Group Review

Authors: Taryn Muir and Steve McCrone

OCTOBER 2014

Contents

Glossary

Term	Definition
CDC	Clutha District Council
CDEM	Civil Defence and Emergency Management
CEG	Coordinating Executive Group. Governance group for CDEM Group.
CODC	Central Otago District Council
DCC	Dunedin City Council
EMO	Emergency Management Officer. Staff member employed for CDEM delivery
GECC	Group Emergency Co-ordination Centre. Used for the coordination of one or more local events.
Group Office	The function delivered at Group
Lifelines	Refers to utilities in place in the Region
MCDEM	Ministry of Civil Defence and Emergency Management
Monitoring and Evaluation	Capability Assessment conducted by the Ministry of Civil Defence and Emergency Management that produces an overall capability score (%).
QLDC	Queenstown Lakes District Council
TLA	Territorial/Local Authority
WDC	Waitaki District Council

1. Introduction

The New Zealand Civil Defence and Emergency Management Sector (CDEM) is rapidly maturing. Lessons from the Canterbury Earthquake have begun to emerge, and CDEM Groups around New Zealand are presented with the opportunity to use these lessons to ensure their communities are more resilient.

In July 2014, Otago Regional Council engaged Cornwall Strategic to conduct a review of the Otago CDEM Group's current structure and resource allocation to determine a) whether the existing structure and budget is sufficient for ensuring the desired level of readiness for the Otago Region, and b) what changes could be put in place to increase community readiness.

This report is reflects the observations of Cornwall Strategic as the final stage of that review.

The terms of reference for this review are as follows:

- Options for delivering an effective CDEM response in the Otago Region,
- Options for ensuring an appropriate level of readiness is maintained in the Otago Region,
- Options for partnering Otago CDEM activity with neighbouring regions (particularly Southland and possibly Canterbury),
- The Ministry of Civil Defence and Emergency Management's (MCDEM) opinion or preference for a particular approach or outcome,
- A proposed structure and budget to achieve the various options being proposed.

1.1 The Otago CDEM Group

The Otago Civil Defence Emergency Management Plan 2012-2017 states its Vision as: "Working together to build resilient communities in the Otago". The four goals of the Group are:

Goal 1
Increasing community readiness by ensuring awareness, understanding, preparedness and participation in Civil Defence Emergency Management through public education initiatives and community led CDEM planning.

Goal 2
Reducing the risks from hazards in the Group area by improving the Group's understanding of hazards and by developing and monitoring a Group wide risk reduction programme which demonstrates how individual agency initiatives contribute to overall regional risk reduction.

Goal 3
Enhancing the Group area's ability to respond to Civil Defence emergencies through developing sufficient numbers and capability of CDEM staff and by having effective plans, systems and procedures in place to respond to emergencies.

The Otago CDEM Group members are as follows:

- 5 x TLAs (Dunedin City Council, Waitaki District Council, Clutha District Council, Central Otago District Council and Queenstown Lakes District Council).
- Otago Regional Council
- NZ Police (Otago Region)
- NZ Fire (Otago Region)
- St John (Otago Region)
- Lifelines
- Welfare Agencies
- MSD (Otago Region), and
- DHB (Otago Region)
- MCDEM, and
- The Group Controller.

1.2 Review Process

Cornwall Strategic completed a three phase process in development of this report.

i. Discovery Phase – Document Review and interviews with select CDEM Group members (See Annex A for a full list)
ii. Consolidation – In which we extracted themes and began to seek further information from the Group
iii. Report development – This document.

1.3 Rationale for observations and recommendations

This review has been conducted using a qualitative basis for understanding options as per the Terms of Reference. This differs to the MCDEM Monitoring and Evaluation reporting that uses a quantitative basis for comparison of performance against pre-determined criteria. Our qualitative understanding was gained through a documentation review, comparing the Otago CDEM Group with other groups we have engaged with and direct consultation with stakeholders.

Figure 1 (below) provides an indication of how a CDEM Group can work together under the direction of the CDEM Act (2002).[1]

[1] Section 12 of the CDEM Act (2002): **Local authorities to establish Civil Defence Emergency Management Groups:** (a) **Every regional council and every territorial authority within that region must unite to establish a Civil Defence Emergency Management Group** for the purposes of this Act as a joint standing committee under clause 30(1)(b) of Schedule 7 of the Local Government Act 2002

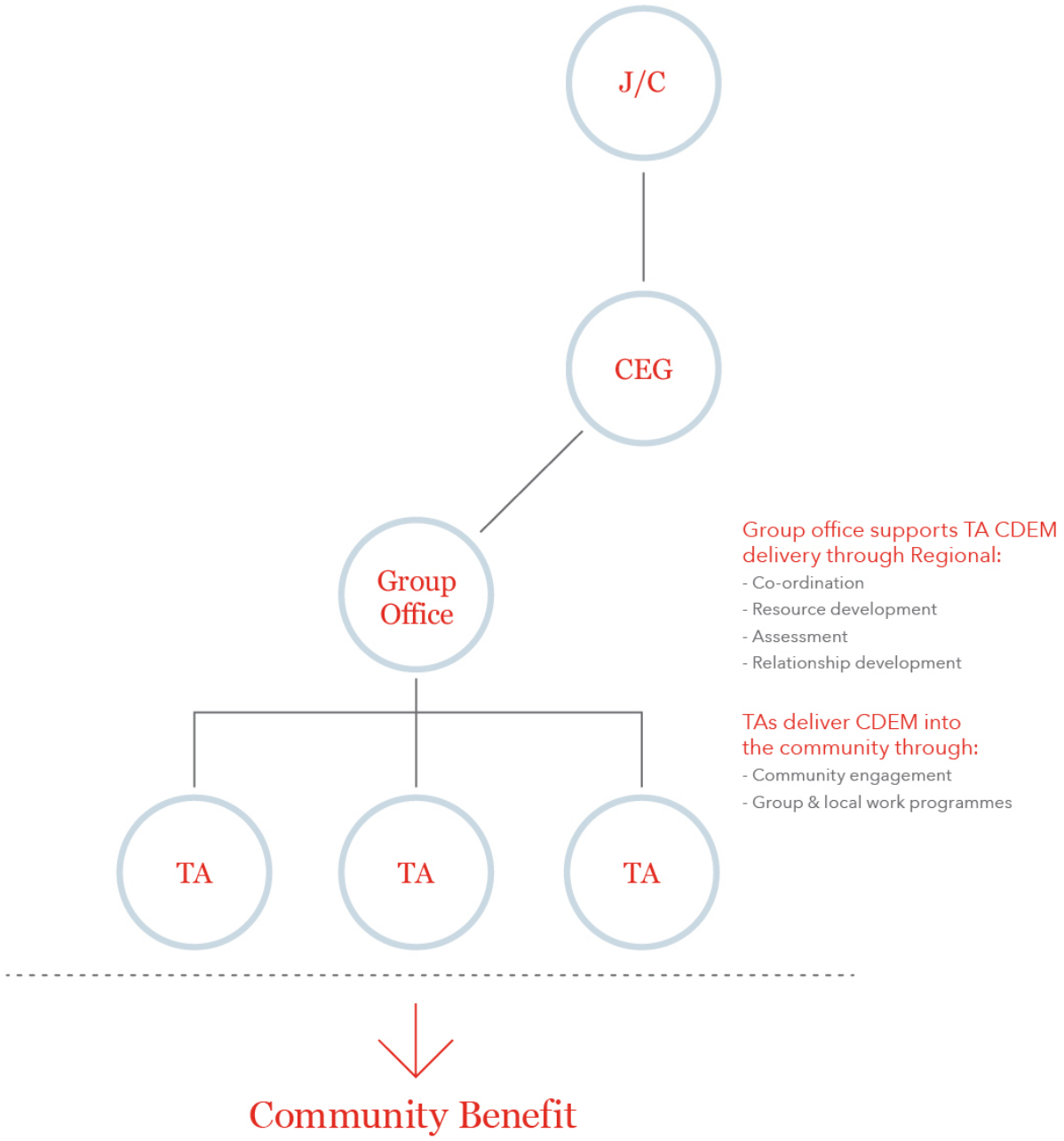


Figure 1

Note: The intention of this diagram is to show how agents can work together to deliver a benefit (e.g. enabling preparedness) *into the commnity*. This is a) not a full representation of all CDEM Group members or b) a reflection of the current Otago structure).

There are many facets of CDEM delivery, and they all contribute to a Group's efficacy in different ways (and in different measures, depending in the needs of the Group). This is due to the unique nature of the CDEM Group.

Each component can be delivered or supported by entities and TLAs in a variety of ways.

At the TLA level, delivery is a result of the combined activity of many persons. For example:

- Dedicated professional staff (Emergency Management Officers)
- Local Controllers
- Recovery Manager and recovery agencies
- Technical support staff such as Engineers, Planners, Hazard Analysts
- Community engagement supprt staff such as communications persons.

As with any review and potential change process, it is important to anchor decision making on a shared objective that each decision maker understands in the same way.

We use the concept of service levels when discussion efficacy and options for change in the CDEM context, i.e. – "What level of service is the Group providing to the Otago Region, and how can we improve this." (See Figure 2)

This question is used because it:

a) Allows us to establish a baseline for understanding current performance,
b) Allows us to establish a shared goal to reach a basis of understanding,
c) Can encompass all relevant areas of CDEM delivery (including readiness as stipulated in the terms of reference).

The major components of CDEM delivery that affect a Group's level of service are:

- Culture (leadership, engagement and collaboration)
- Structure and reporting lines (these can be the same or different things in the CDEM context)
- Resourcing (FTE allocation at Group and TLA level / skill sets of incumbents / time dedicated to activities and $ allocated) (Note – funding model is a red herring here in terms of level of service, and we discuss why in section 4)
- Delivery – what is the Group actually delivering (the major focus of the Monitoring and Evaluation results).

1.4 Structure of this report

The remainder of this report is sectioned by components of CDEM delivery, and ends with overall recommendations in a suggested order of priority. To best position our observations and recommendations regarding the CDEM Group, we believe it is important to include the theory regarding CDEM concepts, so that observations and recommendations are contextualised for the reader.

Therefore this report will contain the following structure in each section:

a) Decisions to make or consider in each component
b) Cornwall Strategic observations regarding this component
c) Recommendations to move the CDEM Group to a high level of service over two years.[2]

[2] Rationale for service level and proposed timing explained in section 1.

2. Level of Service

i. Decisions to make or consider in regards to Level of Service

We use the level of service concept only to enable decision makers to conceptualise current and potential performance in the same way. It is not intended to be a quantitative or analytical exercise (as the Monitoring and Evaluation exercise does).

The questions that a CDEM Group should ask when considering what level of service they want to provide their community are (figure 2):

- What is our current level of service?
- What level of service do we want to provide?
- How long do we want to give ourselves to get to this objective?
- What changes do we need to make over this time period achieve our goal?

Figure 2

ii. Cornwall Strategic comments and observations regarding this component

The most important concept for a CDEM Group to understand is that there will be no effective, authentic or sustainable change to a level of service unless the whole CEG (and particularly CDEM TLAs) make a commitment to work together for the best interests of the Group. As will be made clear in section 3, there are effective CDEM Groups throughout New Zealand who all operate within different structures and resourcing.

There are combinations of structures / resourcing and funding models that make more sense than others for each Group, but the fact remains that unless all CDEM Group members make the commitment to work together, any isolated change will be only partially effective.

The caveat to that statement is in regards to resourcing. Despite how committed CDEM Group members are to working together for the best interests of the Group, if there are insufficient resources in place then that commitment does become severely constrained in providing a suitable level of service to the community. Therefore it is our opinion that an effective and sustainable high level of service is determined by a Group's degree of collaboration (reporting lines) *and* the resources that are provided.

The Group's structure and funding model are ways to increase a base level of effective delivery that is established through appropriate reporting lines and resourcing. Our assessment is that overall the Group is providing a low level of service.

It is important to note that this assessment *is* a reflection of:

- How the Group works together to provide this level of service
- 'Working together' refers to coordination and collaboration across the region and between agencies/TLAs.

This assessment is *not* a reflection of:

- Any one individual TLA's service delivery. (It is common to have differing levels of service across a region).[3]

It is possible for TLAs to provide a good service levels to their communities, but for the Group to provide an overall low level of service. This is because of the critical role of the CDEM Group Office has in coordinating consistent TLA activity in business as usual, developing resource for the TLAs to use, and coordinating an effective response in times of crises.

Each component of CDEM delivery comes together to provide the picture of overall CDEM delivery. The following component sections will provide more information on why Cornwall Strategic made the determination of a low level of service. It is our experience and observation that CDEM Groups who seek to move from a low level of service often choose:

- To make a "high level of service" the end goal
- To allow two years between implementing change and assessing the result

[3] This report does not comment on TLA specific levels of service, as that level of detail was outside of the scope of this review.

We have seen demonstrable change in CDEM Groups with this goal over this time period, and believe it is a reasonable period of time for the Otago CDEM group to also aim for.

iii. Recommendations to move the CDEM Group to a high level of service over two years

Each of the following sections will detail our recommendation for changes within each component, and the final section details these recommendations in order of priority. The final recommendations will be ordered for those that we believe will assist the Group to get to a high level of service over 2 years, and then a second set of recommendations which will either get the Group to a high level of service over two years OR a medium level of service over two years.

3. Culture

i. Decisions to make or consider in each component

Culture is intangible and pivotal in the effective functioning of any organisation or group of people, and the CDEM Group is no different. The most influential components of CDEM culture are leadership and collaboration. If leadership and collaboration are ineffective or poor, the Group will struggle to function as a Group at all.

Collaboration in a CDEM context can be encouraged through structure and reporting lines, but unless there is an appetite for participation, structure and reporting lines will only go so far to supporting the Group's efficacy.

In seeking change regarding a CDEM Group's culture of leadership, the questions to ask are:

- What leadership does CEG provide the Group?
- What leadership does the Group Office provide to the TLAs and supporting agencies? (e.g. Lifelines and Emergency Services)
- What relationship does the CEG chair have with the Group Office lead EMO? (This is the most crucial dynamic in the efficacy of the CDEM Group).

In seeking change regarding collaboration, the questions to ask are:

- Does our culture promote or hinder collaboration?
- Does our structure and/or reporting lines promote or hinder collaboration?
- Are we collaborating formally and/or informally?
- Do we work as a Group or as individuals?

The CEG Chair is the single most influential position within the CDEM Group. If the CEG Chair provides the appropriate leadership at CEG level, this sets the scene for cohesive direction and activity throughout the entire Group.

Furthermore, the most senior role in the Group Office (in this case the 1 x FTE) is the second most critical position within the Group, in terms of effecting collaborative, consistent and cohesive CDEM delivery[4] on a region wide basis. This position is the back bone to the coordinated and consistent CDEM delivery and response. The skill sets of this role are very specific and are discussed further in section 4.

If the CEG Chair provides strong leadership and there is an ineffective resource at Group level, Group efficacy will be compromised. Vice versa, if there Group level EMO

[4] With the exception of the response phase of a CDEM event. In that case, the Group Controller role is critical. However, the ease with which the Group Controller can manage a region wide response will be highly dependent on the relationships that the Group Office has been able to develop in reduction and readiness activities.

demonstrates excellent competency but receives inadequate direction from CEG, Group efficacy is compromised.[5]

Therefore one of the most important relationships to maintain and develop in a CDEM Group is a strong relationship between the CEG Chair and the Group Office EMO.

ii. Cornwall Strategic observations regarding Culture (leadership and collaboration)

It is our observation that overall there is a poor culture of leadership and collaboration within the CDEM Group. This is based on the following observations:

- The CEG does not meet regularly, and when they do not all members attend.[6]
- The CEG can be a powerful governance vehicle when used to its full potential, and the CEG does not seem to be being used to promote change or a make decisions with gravitas at this point
- Decisions made at CEG do not seem to be consistently communicated back through to TLA line managers and respective EMOs. This creates tension for the EMOs between directions given from the Group level EMO and line managers.
- TLA line managers seem to be 'caught between' managing EMOs and assuming what CEG decision making has been.
- TLAs collaborate informally in some projects[7], but this only seems to succeed and remain in place based on the attitudes of the respective EMOs.
- The Clutha DC CEG representative, line manager and EMO meet monthly to discuss CDEM activity. This ensures CEG representative is informed, line managers can manage and EMO received contextualised instructions. This is a good model that other TLAs should consider.
- The CDEM Group seems to have links to lifelines organisation at the local level, and these relationships differ in strength and representation (meaning there are different lifelines engaged in various manners). There seems to be a weaker relationship with Lifelines at the Group level. This is based on the observation that there is limited (if any) lifelines group feedback to the CEG.
- TLAs seem to be focussed on their own local work prgorammes, with input to the Group work programme as and when they are able to contribute.
- There seems to be a disconnect in some places between the knowledge of the EMO at the operational level, and the decisions made by the CEG (which affect the EMOs activity).
- There seems to be some tension in regards to the "CDEM Delivery" approach across TLAs. For example, each TLA undertakes activities at different times and in a different manner. There is a different approach in each area for engaging lifelines companies, managing volunteers, and supporting the group work programme. This is not in itself a bad practice, however there may be opportunities for efficiencies with a consistent, coordinated approach. (I.e. EMOs with particular skill sets can specialise more, and better engender regional relationships, such as with agencies).

[5] This is because the CEG Chair drives CEG engagement. If the Group level EMO is trying to drive programmes within TLAs from decision making made at CEG *without* CEG engagement, the TLAs will resist the attempted coordination (for a variety of reasons and often unknowingly), but the end result is stifled progress.
[6] This information was provided to Cornwall Strategic anecdotally by several CEG members (including but not limited to those which represent TLAs).
[7] Such as the adoption of the training and exercising programme for the Group.

iii. Recommendations to move the CDEM Group to a high level of service over two years

- Focus on increasing the value of the CEG forum
- Focus on CEG leadership
- Ensure CEG decisions are fed down to line managers within TLAs post CEG, and EMOs have an opportunity to brief CEG members or line managers before CEG meetings
- Enable the Group level EMO to coordinate activity by providing the TLAs and Group Office with consistent messaging.

4. Structure and Reporting Lines

i. Decisions to make or consider in regards to structure and reporting lines

- By whom are our EMOs employed?
- Where are our EMOs located?
- Who do our EMOs report to?
- To whom/where does the Group Office report?
- What are the reporting lines within the Group Office?
- What is the best combination of the above for our group?

For the purposes of this report, we will discuss structure and reporting lines as separate topics and therefore separate decisions to be made. It is important to do this because in CDEM Groups the concept can be used interchangeably, which clouds the nuances of options available to CDEM Groups. When we speak about:

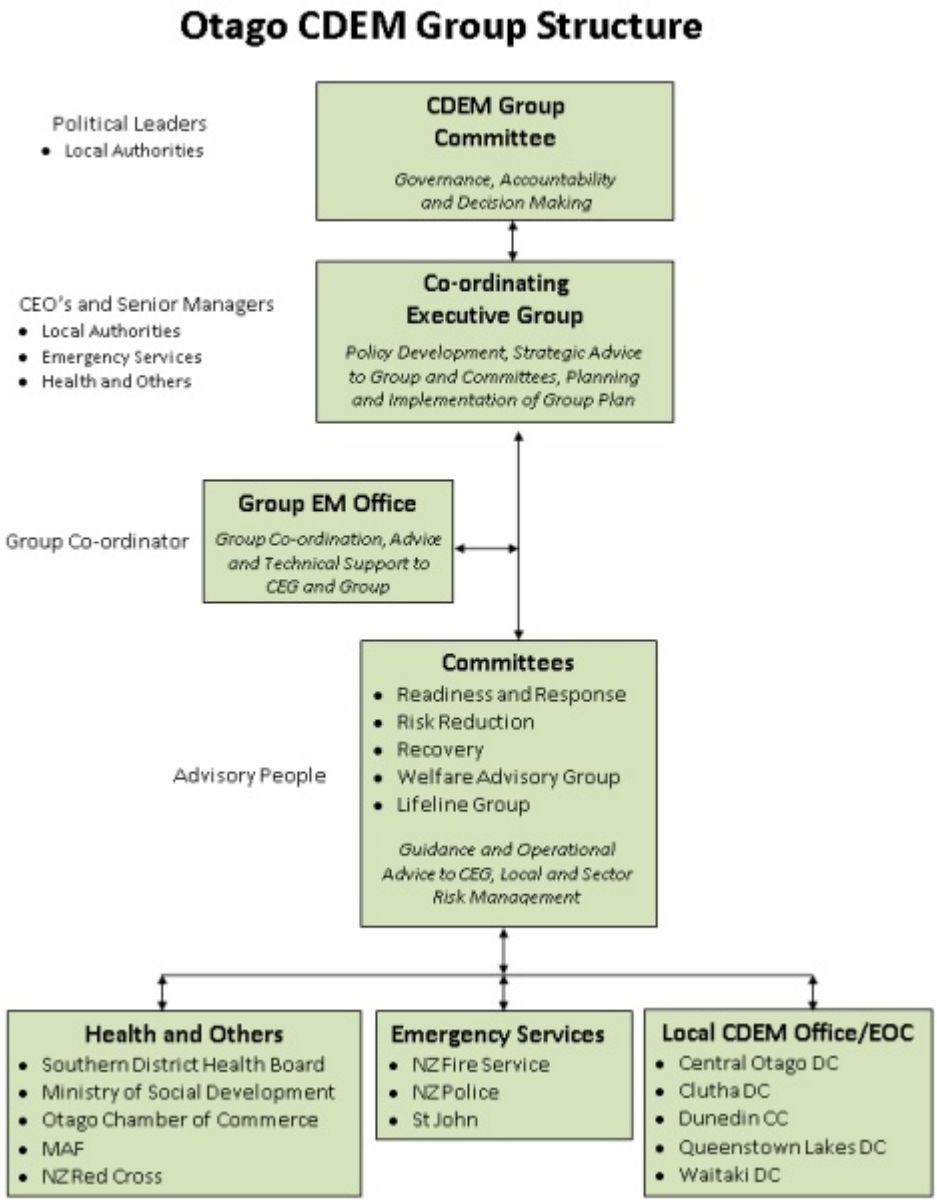
- Structure we are referring to employment lines and location (i.e. who employs the TLA EMOs and where they are physically domiciled).
- Reporting lines it refers to who the TLA EMO takes direction from and is ultimately accountable to (which may be a different entity to their employer or that in which they are domiciled).

Where TLA EMOs are domiciled is very important in effective CDEM delivery. In some Groups it is appropriate for TLA EMOs to be located in one office (even if they have different employers) because of the size and geography of the region. This is not an appropriate option for the Otago Group and centralised domiciling is not an option we present for Otago CDEM in this report.

It is imperative that there are EMOs based within the communities they represent, or there is at least an EMO presence in TLAs most of the time (e.g. different EMOs on different days). The primary focus of an EMO is to develop resilience and preparedness in a community, and to be present to co-ordinate an event. This cannot be done effectively from a remote location because they require interaction with the community in peace time and knowledge of the community in war time. Considering Otago's geographic spread, TLA EMOs should remain in their respective TLAs, however *who* they report to is an area we believe the Otago CDEM group should consider.

The current Otago CDEM structure of Group collaboration and decision making is shown below. This diagram shows where the strategic direction of the Group is set, how implementation is co-ordinated, and how operational activity is supported. This structure *does not* show employmer/employee realtionships.

The collaboratve and decision making structure specific to the Otago CDEM Group is as follows:



The structure which shows the employer/employee relatinships of the professional staff within TLA in the Otago CDEM Group is shown in Figure 3 below:

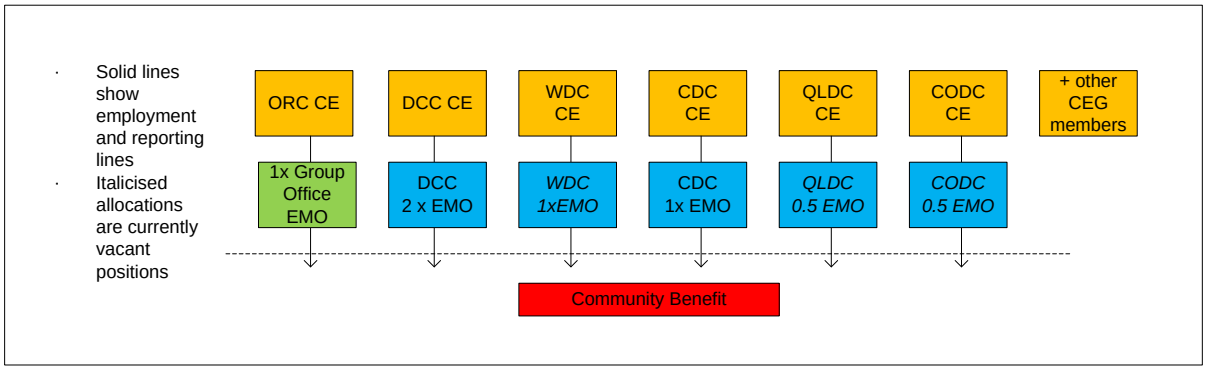


Figure 3

A depiction of how a TLA provides support and time in kind to CDEM delivery is shown in Figure 4 below.

> The yellow circle shows examples of the *functions* that TLAs or the Regional Council undertake which supports/feeds into CDEM activity
> The green circle shows the *roles* that TLA staff fill when there is an EOC activation and a CDEM declared event (TLA staff assume these roles in place of their 'day job' in a event.

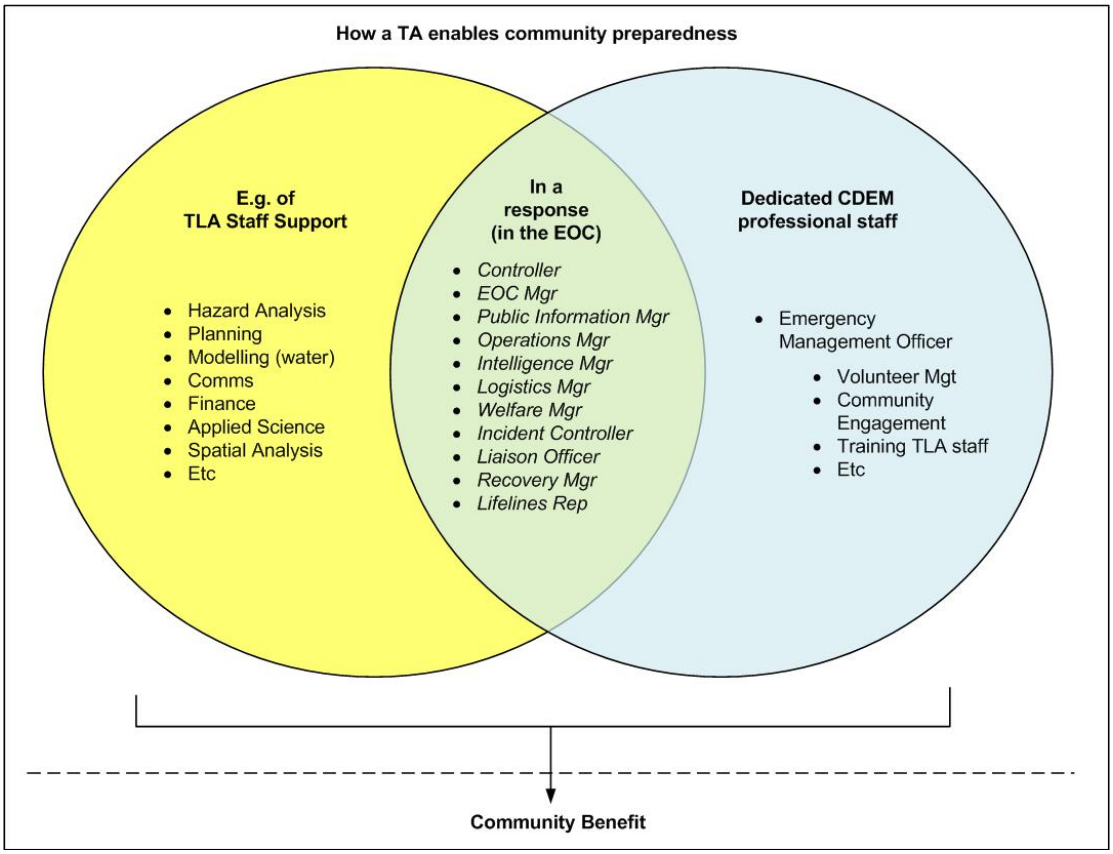
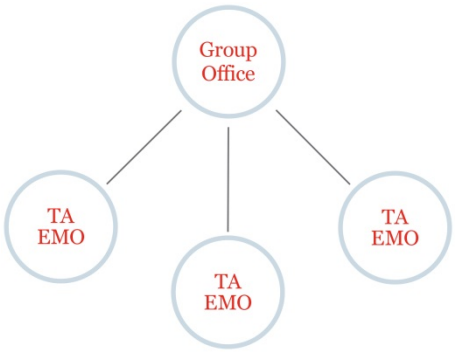
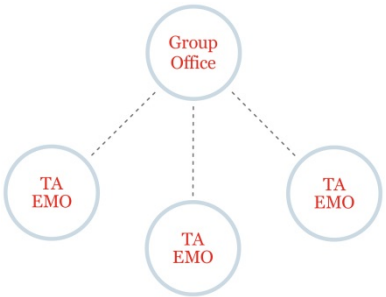


Figure 4

In terms of structure and reporting lines, the Otago Group's options are:

A. To move to an entity where all EMOs are employed by and report to one Manager (figure 5),
B. For all EMOs to remain employed by their respective TLAs but line managed by the Group Office (figure 6), or
C. To remain as is, which in practical terms is all TLA EMOs employed by and line managed by their TLAs.

	Structure/Reporting Lines	Implications of this option	Used by
A	 Figure 5	> Group Office directly employs the TA EMO's. All TLAs must have trust and confidence in the Group Office and the CEG Chair for this to work effectively > Generally involves HR/employment transfers if selected > Regardless of employee lines, TLAs have a legislative responsibility to ensure the readiness of their communities.[8] No structure will allow TLAs to abdicate this; in fact it should be designed to assist it.	Wellington, Southland (located centrally)
B	 Figure 6	> TA EMO's report to group but remain contracted to their TA. > All TLAs must have trust and confidence in the Group Office and the CEG Chair for this to work effectively.	West Coast (located in their TLAs)
C	*This is the current structure. See Figure 3.	> TA EMO's are directly employed by their TA and report to their TA. They collaborate with the group office as and when it allows.	Bay of Plenty, Waikato, Canterbury, Otago (all located within their TLAs)

[8] Section 64 of the CDEM Act (2002): Duties of local authorities
- (1) A local authority must plan and provide for civil defence emergency management within its district.

Note: All of these options reflect the employment and/or line management of dedicated CDEM staff. These options do not include a description of what those staff are responsible for, as the point of this table is to demonstrate that the required activity related to CDEM delivery can still be undertaken through different structures and/or reporting lines.

ii. Cornwall Strategic observations regarding structure and reporting lines

> TLA EMOs are domiciled locally and this makes sense for the Group
> TLA EMOs seem to choose "whether or not" they will take any direction from the Group Office and opt in and out of participation with Group lead initiatives.[9]
> The Group Office finds it difficult to coordinate consistent delivery across TLAs.
> Group co-ordinator is co-ordinating through persuasion

iii. Recommendations to move the CDEM Group to a high level of service over two years

> TLA EMOs report first to the Group Office while remaining employees of their respective TLAs
> The CEG Chair and the Group Office EMO develop a strong relationship and the CEG Chair takes the time to understand the issues facing the CDEM Group
> TLA EMOs remain domiciled locally, reporting in the first instance to the Group Office and employed by the TLA they represent.[10]

Figure 7 below is the structure proposed for full time dedicated professional staff, as proposed in the recommendations.

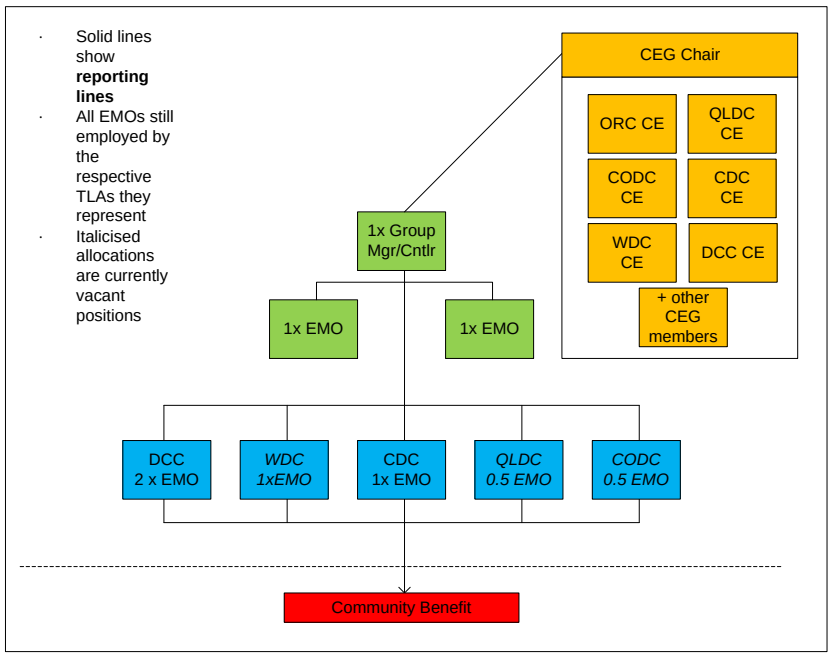


Figure 7

[9] It is important to remember here that the Group Office cannot issue any directive without the CEG approving it, so there should be no conflict of interest here.
[10] Reporting only without being employed by the Group means that the Group Office EMO does not have to manage several different employee conditions. This also ensures the TLA EMO will receive messaging from one point that makes sense *both* regionally and locally, and the EMO is able to retain and build relationships within the TLA, of which are important for event response and organisational readiness. Note: this option will only work if the culture of collaboration is prioritised.

5. Resourcing

Resourcing in the CDEM context, at this stage of a Group's maturation, should consider the following:

i. Decisions to make or consider in each component

- Do we have the right leadership structure in the Group Office?
- Is the Group Office sufficiently resourced in terms of FTEs?
- Do the Group Office incumbents have the right skill sets?
- Is the TLA EMO FTE allocation sufficient?

And then

- Do we have an adequate budget to provide for the level of CDEM activity we have identified we need?

Many CDEM Groups have made the move to appoint a full time Manager Controller at the Group Office. This position is advantageous because it retains the competence and relationships base developed in readiness throughout a response. It also provides the leadership role in the region which gives more weight to executing the work programme that the CEG tasks the Group with executing.

An effective Group Manger/Controller must possess a very specific skill set, balanced between relationship development and technical CDEM skills. Figure 7 shows the critical role of the Group Office, and the Group Manager if that position is appointed.

In viewing Figure 8, the following should also be understood:

- There are many people working at the TLA level, in different capacities, to give effect to CDEM delivery. This includes (but is not limited to) any EMOs, TLA staff providing technical knowledge, TLA staff trained to respond in an event, local controllers, local welfare managers, local recovery manager, etc.
- There are also committees included in this picture of relationships. The type of relationship the Group Office must have with these committees is similar to the examples provided with Lifelines and Welfare.

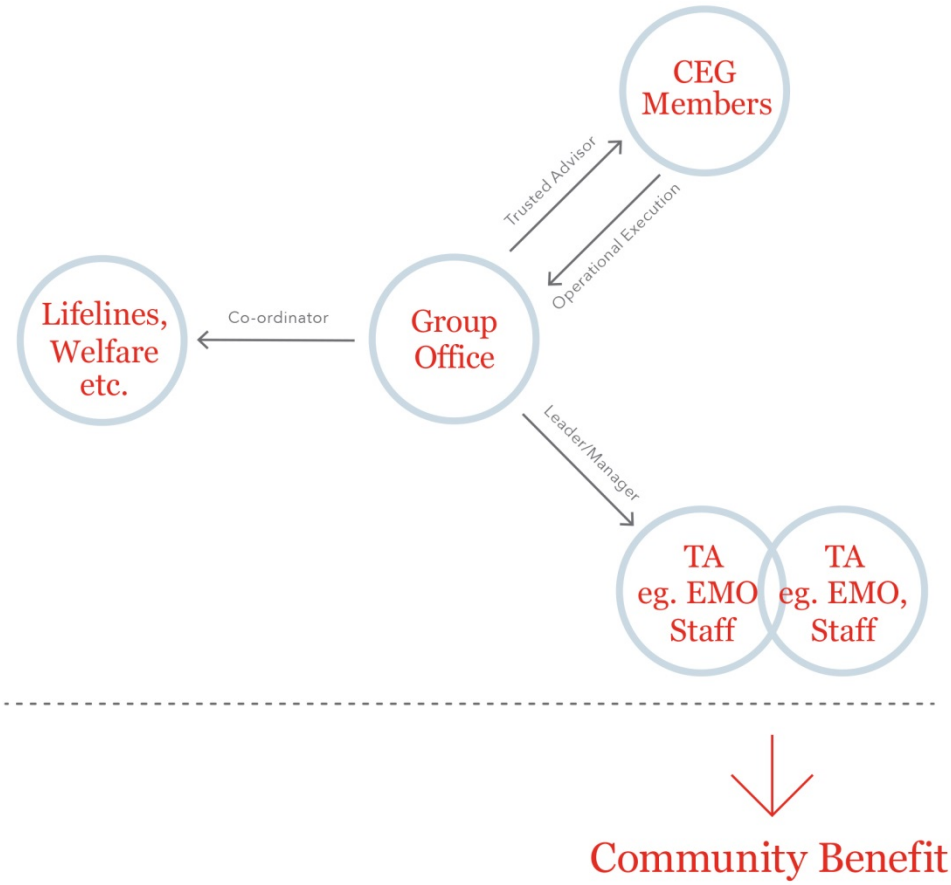


Figure 8

Furthermore, the Group Office is best placed to be responsible for ensuring the Group works as a whole to promote preparedness in the region (preparedness is a combination of the 4 R's; Reduction, Readiness, Response and Recovery). The activities within each of these 4 areas often overlap, meaning the Group Office's positioning is ideal to coordinate the diverse range of activities within the 4R's for the region.

Figure 9 shows how these activities contribute to each of the 4 R's, and why resourcing at the Group Office level should reflect which of the activities makes the most impact for the region.[11]

[11] Note: Learning from the Christchurch Earthquake has shown that the most critical areas to focus on in a resource and time poor readiness environment are community engagement and welfare. MCDEM advises this as a starting point for resourcing skill sets before other activities (although these functions need support from other activities (such as planning) so it is not immediately cut and dry.

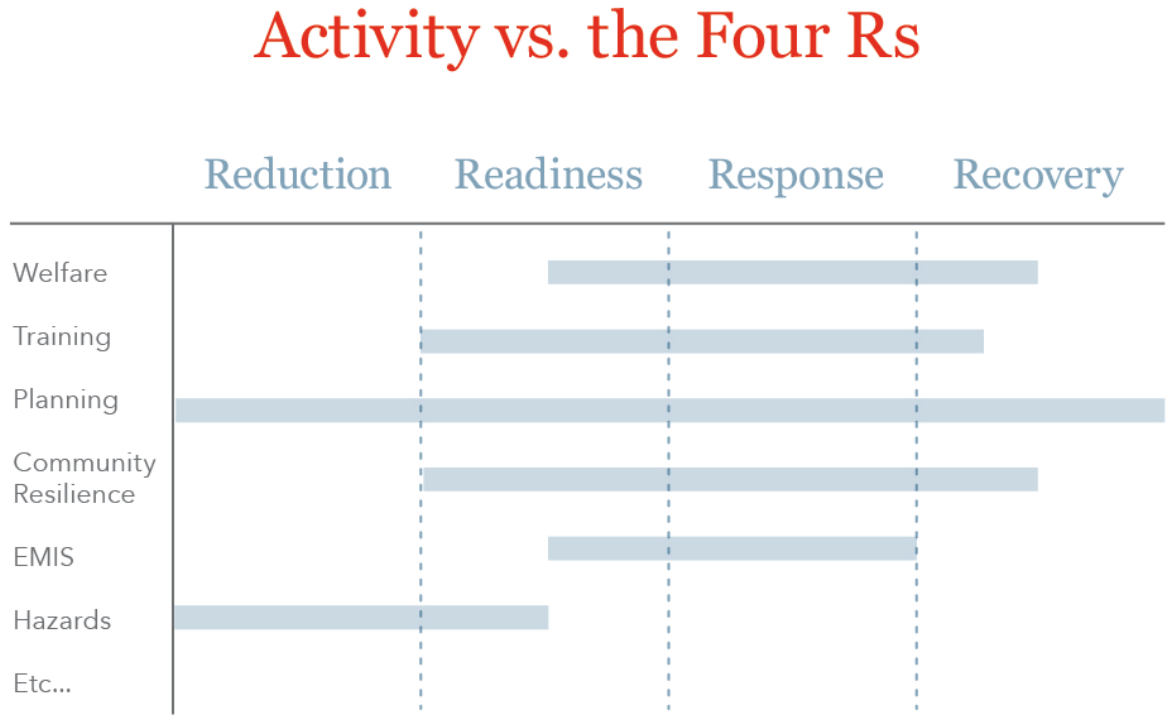


Figure 9

"CDEM Group" resourcing

Deciding resourcing at a Group level can be a 'how long is a piece of string' argument. This is why we suggest first what level of service your Group wants to provide, and how long you would like to take to reach that goal before you begin changing resourcing.

There is also a move in the CDEM sector to increase the TLA EMO allocation to at least 1xFTE in each TLA (although this is dependent on the size of the TLA and its proximity to the other TLAs). These decisions are in recognition of the value the EMO can have in enabling community preparedness, and the significant time commitment required for the EMO to do this job well.

For example; TLA EMOs should in the first instance be working on the two high priority areas of community engagement and organisational readiness, and then in addition a suite of other activities such as planning, volunteer management and training. All of these activities require specific skill sets and it is critical that an EMO has these skills in order to be effective in their role. Community engagement is in itself a time intensive activity, and one that also often occurs after hours. Most TLA EMOs of any TLA size find it difficult to complete community engagement to the standard that they would like, and find balancing time for other functions of preparedness difficult.

CDEM Group budget

The budget is then a reflection of the decisions your Group has made in regards to FTE resourcing. Any asset purchases are a result of a more in depth resource review and are not is not in the scope of this review.

As referenced earlier, the funding model is somewhat irrelevant at this stage of the Group's review process. The funding model should be considered only when:

- The structure is decided AND
- The Group FTE resourcing is decided.

We strongly recommended a funding model is not considered prior to either of these decisions being made.

For reference purposes, the funding model is similar to concept as that of the structure in CDEM Groups. There are many variations across the country and they are all work relatively well for the groups they are used in.

The funding model options used are:

Funding Model	Where this is suitable
Regional Council rates for all CDEM activity through targeted rates.[12]	> This makes best sense for Groups where all CDEM activity is delivered through one entity.
TLAs contribute some money to the regional council, who uses this to fund the Group Office and TLA coordination activity.	> This works well in groups where there is an appropriately resourced Group Office of a number of EMOs, and where the TLAs are engaged in a collaborative Group CDEM approach (structure and reporting lines do not actually affect the efficacy of those options). > The Bay of Plenty use this option and it works well for them.
TLAs fund only their own CDEM activity, and no money passes to other entities.	> This is the default model and it is best not to change this unless the Group function is well understood and there is an appetite for change in other areas.

Comment:

- Targeted Rate vs General Rates. If the Group makes a commitment to work together, a targeted rate at Regional level can be an advantageous decision. Even if there is no change to structure, a targeted rate formalises the current budget and spend. This positions the CDEM Group to a) better understand collaborative expenditure over time, and b) use this understanding and single funding mechanism to amplify any future change process.

[12] Targeted rates in this context refers to the amount collected from all rate payers specifically to fund CDEM delivery.

ii. Cornwall Strategic observations regarding resourcing in the Otago CDEM Group

The current spend per ratable property in the Otago Region, per TLA is shown in Figure 10 below.

We have included a depiction of spend across the region in order to provide a snapshot. The notes below the graphic explain the context within which this picture should be interpreted.

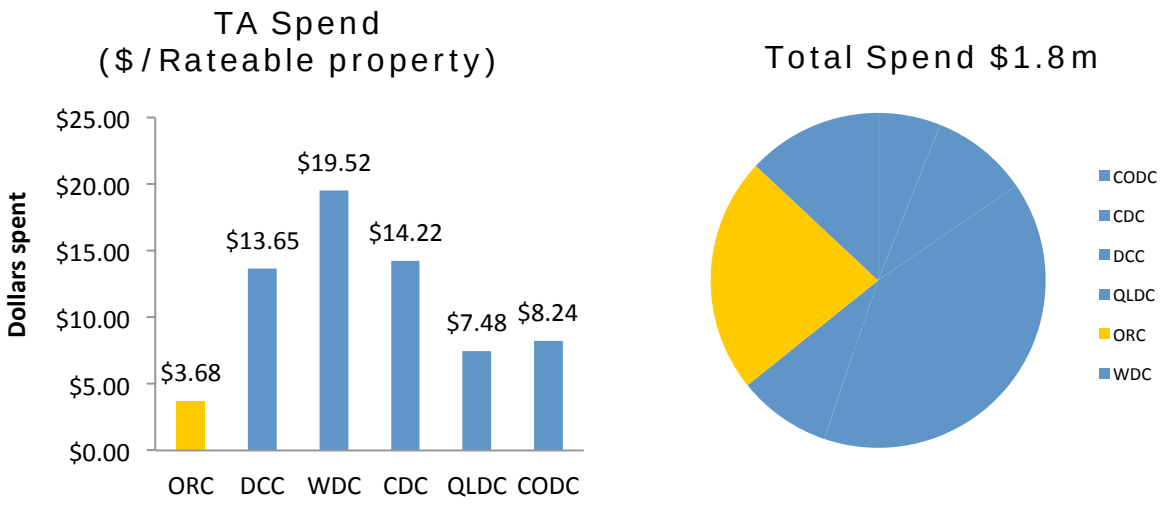


Figure 10

Notes:

- This graph is not intended to show who is 'spending more' and who is 'spending less.' Without additional information regarding hazard profiles and cost allocation, appropriate spend cannot be determined.
- The intention of including this picture in this version of the report it to convey a high level snap shot, and figures should be expected to have a high margin of error.
- Each TLA has provided these figures in good faith that they will:
  - Be perceived as a 'rough cut,'
  - Not commit the TLA to continue this spend as a result of any change process (i.e. they may adjust to reflect changed service levels),
- The total spend figures used to determine the per rateable property spend are, in some TLAs, comprised of different cost allocations. This is acceptable at this stage of the review process, as the intention of this graph is to provide a rough snapshot, not a judgement or analysis of spend.

Note: We have deliberately not included information regarding Otago's CDEM Group total spend as a comparison to other CDEM Groups' total spend for the following reasons:

- There is no 'one amount' for a CDEM Group to spend in CDEM delivery. The 'right amount' is one that enables the communities within the region to reach the Group's desired level of preparedness.
- Without understanding another Groups' efficacy or functionality, their spend is not contextualised. Many groups are not in the position to accompany a reflection of spend with a robust understanding of their current efficacy.

ii. Cornwall Strategic observations regarding resourcing in the Otago CDEM Group

- The Group Office is under resourced. Based on a) the Corrective Action Plan issued by MCDEM, and the scale of activity indicated in the Group Plan, and b) groups of comparative size we would expect the Group Office to have 3 FTEs. The Group Office should be able to oversee exercises, training, planning, welfare, natural hazard risk reduction for CDEM purposes, lifeline coordination for CDEM purposes, and timely governance support.
- Dunedin City Council employs 2x EMOs, which is an appropriate resource allocation for the City.
- QLDC and CODC will share an FTE, which does not seem like sufficient resource. This person will be required to travel, in addition to ensuring community preparedness, organisational readiness, and EOC readiness for 2 x TLAs. This will be difficult for one person to do comprehensively.
- CDC, WDC and DCC seem to be resourced adequately for the state of the Group as a whole (although the WDC EMO position is currently vacant).
- The current budget is insufficient to provide adequate resource for the Group.

iii. Recommendations to move the CDEM Group to a high level of service over two years

- Each TLA employs at least 1x FTE.
- The Group appoints a fulltime Manager / Controller position to oversee the Group Office and develop an appropriate work programme
- Once the work programme is complete and objectives are better understood; the Group Office employs 3x FTE in total (including the Group Manager), and the remaining skill sets at the Group Office focus on GECC maintenance, Welfare, Planning, Exercises and Training.
- This suggestion is based on 'like' groupings and incorporates specific CDEM functions, in addition to activities that would be undertaken in order to deliver these functions. The 'right' resource allocation will depend on the level of service the group wishes to reach, and the degree of collaboration all Group members are able to achieve. The focus of the EMOs at the Group Office should be different to TA EMOs. Group Office EMOs will focus on the development of material and/or relationships that strengthen CDEM delivery on a region wide basis, and supporting TLAs to deliver CDEM.[13]

[13] Note: This means the Group Office EMOs will have a much less community facing role, unless that interaction is done alongside TLA community engagement.

> A suggestion of the focus for the proposed roles is shown below.

	Group Manager/Controller	EMO 1	EMO 2
Portfolio ownership	- Lifelines - Recovery	- Welfare - Community Resilience - Volunteer Oversight (supporting TAs)	- Exercises - Training - EMIS - GECC Maintenance
Additional responsibilities	- Work Programme execution oversight - Governance Group and Committee administration/support - Staff Management	- Work programme execution	- Work programme execution

Note: The amount of dedicated CDEM resourcing at the Group Office and TLA level is directly realted to the level of servcie the Group wishes to provide, and over what period of time they wish to provide it.

The Group Office is currently overseeing all of these portfolios of work with the available time. If the Group is to increase it's level of service to the community, then each of these activity areas will require more focus (starting with the implementation of strategies/plans that have been developed thus far). The work programme should guide the activity that the group will undertake (and detail the associated objectives and milestones). The work programme should be developed with a clear understanding of the level of service it will enable the CDEM Group to provide, and a clear idea of what resources will be needed in order to give effect to it.

These three FTEs have been proposed as what we believe would be the minimum staffing required in order to bring the CDEM Group to a medium level of service in the neart future (1-2 years). We have not provided a breakdown of hours against each proposed portfolio, as again that is directly related to a) the level of service chosen, b) the span of thework programme, c) the objectives selected, and d) the involvement of TLA professional CDEM staff.

Note 2: For a CDEM Group of the relative size (number of TLAs), geographic spread and hazard profile, 3 x Group Office FTEs is comensurate with approximate resourcing in other Groups. The roles assigned to each Group Office EMO is also similar to what is proposed above. (See page 28 for detail).

6. Delivery

A CDEM Group's delivery is reviewed through the Monitoring and Evaluation process conducted by MCDEM. This section is not intended to replicate or replace that assessment, but instead to highlight any components of delivery that we perceive to be important in this stage of the Group's review, and which we believe it is beneficial to being to the Group's attention.

i. Decisions to make or consider regarding delivery

- Is there a Group Plan with appropriate strategic objectives?
- Is there a work programme in place and being followed in order to progress towards these objectives?
- Are there any barriers to delivery (that have not been identified in this report)?
- Are there ways to improve delivery (that have not been identified in previous components)?
- Can the group collaborate or partner with other groups?

ii. Cornwall Strategic observations regarding delivery

- There is a Group Plan, and an associated Group Work Programme. While the Group Plan/programme spans 2012-2017, there is little detailed to be achieved after 2014.
- There is a Corrective Action Plan issued by MCDEM as a result of the previous capability Assessment, which is also currently being used by the Group Office to guide activity.
- The Group Office is seeking to give effect to the work programme and corrective action plan through collaboration with TLA EMOs. Work streams (or parts therof) are delegated to TLA EMOs to own. This is a sound approach, however it may present ongoing challenges to progress (given the resourcing at the Group Office and at TLA EMO level).
- There is little collaboration between the Otago Group and other CDEM Groups. This is not unexpected, given that other Groups who are performing at a higher level still have not been able to align programmes for collaboration easily. The exception in Otago's case is that some TLAs in Otago cross into Canterbury. Also, some emergency services serve both Otago and Southland, so there is informal collaboration occurring, that can be amplified as the Otago Group moves to a more mature model. West Coast, Canterbury and Southland Group Managers support the idea of collaboration, and this can be a consideration for future planning. Collaboration could take many forms; from sharing hazard profiles and shared work programmes, to joint exercises (to prepare for a response where an event crosses CDEM Group boundaries).
- The following objectives (as outlined in the work programme) have been achieved:

- Welfare Plan
- Recovery Plan
- Public Education Strategy
- Lifelines Project

While these plans and strategies are in place, there do not appear to be any associated action plans to deliver the merit of the planning in to the community.

iii. Recommendations to move the CDEM Group to a high level of service over two years

> Continue to implement the corrective Action plan in the absence of a work programme or a currently useful group plan
> Make a Group Plan and a work programme the priority for the Group Office to develop once/if it is provided with an increased resource.
> Retain local TLA presence in order to ensure local delivery.

National Snapshot*

** We have provided a selection of other Groups in this section in order to establish a context for decision making. This is neither a comprehensive set of Groups, nor a comprehensive record of decisions they have made.*

The intention of including this table is to show that:

- CDEM Groups arrange and resource themselves differently in response to their unique set of needs, and
- There is no "one way" to operate as a Group.

	EMOs employed by one entity Y/N	EMOs co-ordinated through one entity Y/N	EMO domiciled locally or centrally C/L	M&E score 2012 %	Group has a "CDEM Group Manager/ Controller" Y/N	Staff in Group Office #	At least 1x EMO FTE in TLA Y/N
Waikato	N	N	L	44.7% (2012) 71.3 % (2014)	Y	6 x FTE	N
Bay of Plenty	N	Y	L	47.5 % (2012)	Y	7 x FTE	Y
Hawke's Bay	Y & N (hybrid)	Y & N (hybrid)	L	51.3% (2012)	Y	2.6 x FTE	Y
Wellington	Y	Y	C	44.2%	Y	15 x FTE	n/a (centralized)
West Coast	Y	Y	L	59% (2012)	Y	4 x FTE	Y (employed by Group Office; domiciled in TLA)
Canterbury	N	Y	L	60.6% (2012)	Y	5 x FTE	Y
Otago	N	N	L	61.6% (2011)[14]	N	1 x FTE	N
EM Southland	Y	Y	C	70.8% (2012)	Y	4 x FTE	n/a (centralized)

[14] The MCDEM target for Otago CDEM's next Monitoring and Evaluation exercise is to reach a minimum of 71%. The M&E process begins with Group member interviews, which are planned for November 2014.

Comments regarding the Monitoring and Evaluation Process

- The Monitoring and Evaluation process was last conducted throughout New Zealand in 2012. The scores from that round are included in the table above.
- The next round of Monitoring and Evaluation is underway across New Zealand and the Otago Group review is scheduled to begin in November 2014.
- The most recent scores are included in the table above, however many groups have made structure and resource changes since the last scoring. snapshot of some of these changes are:

Group	Changes since 2012 (likely to affect 2015 scores)
Waikato	> Employed a Group Manager, > Increased resourcing at the Group Office.
Bay of Plenty	> Employed a Group Manager, > Increased resourcing at the Group Office.
Hawke's Bay	> Implemented Group Manager, > Moved GECC to more suitable location (Hastings), > Moved to (at least) 1x FTE allocation at each TLA.
Wellington	> Moved to centralized structure, > Increased FTE resourcing for the Group.
West Coast	> Employed a Group Manager, > Moved to structure where all EMOs are employed by one entity.
Canterbury	> Employed a Group Manager, > Increased Group Office FTE allocation.
EM Southland	> Moved to centralized structure, > Increased FTE resourcing for the Group.

Recommendations

Summary

A CDEM Group's efficacy and functionality is dependent on many components. If the Group wishes to increase its efficacy or functionality, the CEG must agree on the timeframe and objective, and consider all components before making changes.

The following recommendations have been written in order of priority, and we suggest them with the following provisos:

i. Each recommendation is provided in context. CEG should not "pick and choose" which recommendations to pursue without discussing the impact on the rest of the recommendations
ii. "High" is a moving goal post, so whichever structure is chosen should be done so with the understanding that it must be adaptive to change
iii. This report is written with the intention of it a) being reviewed by Otago Regional Council before the final is submitted, and b) the final report being discussed with Cornwall Strategic in attendance when tabled on the 14th October 2014.

To reach a high level of service over two years:	
Do immediately	1. The CEG acknowledges the level of service that the Group is currently able to provide 2. The CEG accepts and deals with past cultural issues impacting on Group collaboration 3. Approve a fulltime "CDEM Group Manager/Controller" who will be employed by the Group Office, but will report to the CEG (and ultimately CEG chair) 4. Approve at least 1x additional staff member at the Group Office (focus on welfare, training, and exercises) 5. Approve at least a 1x FTE allocation at each TLA 6. Retain current funding model until the Group Office is resourced and established 7. Increase the value and leadership of CEG decision making 8. Employ at least 1x EMO FTE in each TLA. 9. Develop a Service Level Agreement between Otago Regional Council and the Group Office 10. Develop a Service Level Agreement between the Group Office and the TLAs. 11. Ensure there is an agreed and understood Terms of Reference in place for the CEG. 12. QLDC and CODC increase EMO allocation to at least 1x FTE per district (2x FTE could share the responsibility).

Do within six months	13. Employ a Group Manager and other Group EMO 14. That Group Manager/Controller focusses on building a wok programme[15] that will raise the level of service across the region. 15. Employ the additional TLA FTEs (at least one in each TLA).
Do within one year	16. Group Manager/Controller communicates the resource needed to give effect to the work programme 17. Additional resourcing within the Group Office is re-evaluated in relation to the work programme needs. 18. Resourcing adjusted as required 19. Begin work programme 20. Complete corrective Action Plan
Do at the end of two years	21. Review the Otago CDEM Group's progress, including the funding model once the Group Office is established

[15] "Work Programme" is the term generally used in the sector to refer to the scope of work to complete, associated work streams, owners, milestones and objectives. Regardless of the terminology, this needs to *function* like a business plan with an associated project plan where applicable.

Communication Risks

The efficacy of any change to structure and resourcing is dependent on the CDEM Group members understanding how the change benefits the Group as a whole (e.g. the role of the Group Office). This table highlights where we believe there is a potential for misunderstanding to hinder efficacy, and our suggested mitigation activity.

Recommendation	Risk	Mitigation
1. The CEG acknowledges the low level of service that the CDEM Group is currently able to provide collaboratively.	-	-
2. The CEG accepts and puts aside past cultural issues impacting on Group collaboration	-	-
3. Approve a fulltime Group Manager/Controller who will be employed by the Regional Council but will report to the CEG (and ultimately CEG chair)	This is seen as taking the CDEM function and responsibility away from TLAs	Good and appropriate management of the process. Clear understanding of responsibilities in the Group
4. Approve at least 1x additional staff member at the Group Office (focus on welfare, training, and exercises)	Because of the culture in the Otago region, this decision is seen as a Regional Council 'takeover' – and not an added function for the benefit of the Group as a whole.	Good and appropriate management of the process
5. Approve at least a 1x FTE allocation at each TLA	-	-
6. Increase budget by $300k overall (breakdown per TLA in Annex B) to cover increased resource	-	-
7. Retain current funding model until the Group Office is resourced and established.	-	-
8. Increase the value and leadership of CEG decision making	-	-
9. Employ a Group Manager and other Group EMO	Because of the culture within the Group, this decision is seen as a Regional Council 'takeover' – and not an added function for the benefit of the Group	Good and appropriate management of the process
10. Employ additional TLA FTEs	-	-
11. Complete corrective Action Plan	-	-
12. Begin work programme	-	-
13. Review the Otago CDEM Group's progress, including the funding model *once* the Group Office is established	The review focusses only on structure or resources and does not also look at culture,	Clear terms of reference

	engagement and leadership	

Annex A

Otago CDEM Group Interview List.

Name	Position
Meagan Miller	CEG member Director Chief Executives Office Queenstown Lakes District Council
Neil Cruickshank	CEG member Manager, Emergency Management Southland
Michael Ross	CEG member Waikaki District Council
Dr Sue Bidrose	CEG member Dunedin City Council
Chris Ingle	CEG member CEO West Coast Regional Council
Neville Reilly	CEG member Canterbury Group Manager
Phil Melhopt	CEG member Central Otago District Council
Paul McNamara	CEG member Southern DHB
Steven Hill	CEG member Clutha District Council
Peter Bodeker	CEG member Chief Executive Otago Regional Council
Alastair Dickie	CEG Police Operations Manager for Southern District
Doug Third	CEG St John
Chris Raine	EMO Waitaki District Council
Brendon Smith	EMO Clutha District Council
Neil Brown	EMO Dunedin City Council
Glenn Mitchell	EMO Dunedin City Council
Charles Hakkaart	EMO Otago Regional Council
Lisa Roberts	Lifelines Infrastructure Decisions Limited
Could not be available for interview	
John Allen	CEG member Ministry Social Development
David Guard	CEG NZ Fire Service

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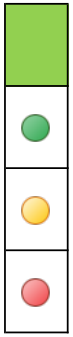
R&R	Readiness and Reduction Committee
GO	Group Office
RR	Risk Reduction Committee
R	Readiness Committee
WAG	Welfare Advisory Group



Year proposed action due

Action Completed

Action started but not completed

Action not started

Otago CDEM Group Objective : 1a Increase the level of business and community awareness through public education and consultation										
Who	j	Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
R&R	1a	Develop and implement a Public Education Strategy which identifies priority target groups (Businesses, Tourism etc.)							Strategy Developed and approved but not being implemented in coordinated way	1.1, 1.2 1.3
R&R	1b	Develop and implement a Public Education Strategy which identifies key public education messages in relation to hazards and business continuity planning							Part of implementation above and has not been completed at this point	1.1, 1.2 1.3
R&R	1c	Develop and implement a Public Education Strategy which identifies method of delivering messages to different target groups - through existing networks, appropriate media and other means.							Same as above	1.1, 1.2 1.3
R&R	1d	Develop and implement a Public Education Strategy which identifies methods for evaluating / monitoring public awareness and preparedness.							Same as above	1.1, 1.2 1.3
R&R	1e	Develop and implement a Public Education Strategy which identifies a detailed action plan to deliver the strategy (resources, materials, etc.)							Same as above	1.1, 1.2 1.3
GO CEG	2	Monitor and report on progress on the Public Education Strategy							No formal monitoring and reporting to CEG	1.1, 1.2 1.3
GO	3	Develop and regularly update a Group website with appropriate hazard and CDEM information							Being undertaken to some extent by Group PIM	1.1, 1.2 1.3

Otago CDEM Group Objective : 1b Improve community participation and preparedness through community based planning										
Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
EMO's	1	Territorial Authorities will work with their local communities to develop preparedness and planning as specifically relevant for those communities							Is happening but can't be certain about which communities	2.1, 4.9, 4.10

Otago CDEM Group Objective : 2a Improve understanding of Otago's hazardscape and associated risks.

Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
ORC CDC DCC WDC	1	An assessment of the vulnerability of coastal Otago communities to storm surge and tsunami hazard							ORC published report July 2012 - Now being used by TLAs when reviewing District Plans and in developing Tsunami Response Plan	
ORC CODC QLDC	2	An investigation into the hazard of eleven alluvial fans in the Queenstown-Lakes and Central Otago districts, where areas of existing development or zones with a high potential for development intersect active alluvial fan areas.								
ORC CDC	3	Investigative work to assess the hazard associated with flood events in the catchments to the east of Milton							Completed. A strategy has been developed and Councils are working towards its implementation	
ORC ALL	4	Development of the Otago Natural Hazards Database (NHDB)							Completed. To be updated and refined as information becomes available	2.6
ORC	5	Further investigation into the risk associated with Flood and debris flow hazard for Pipson Creek and the Young River and Buckler Burn rock fall dams								

Otago CDEM Group Objective : 2b Undertake long-term, strategic reduction of risks from hazards through collaborative work within the group and with other stakeholders

Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
GO CEG	1	Confirm and prepare Group Recovery Managers							Risk Reduction Managers confirmed however their preparation has been limited	5.1
CEG	2	Establish a Risk Reduction Committee							Committee Established.	5.2
GO RR	3	Coordinate and complete Lifelines Studies							Study has been completed and is to be reported to Group next meeting	2.4, 2.5
CEG RR	4	Develop Risk Reduction Strategy							Work started but hasn't made much progress	2.2
ALL	5	Implement Risk reduction Strategy							Strategy not completed to be implemented.	2.2

Otago CDEM Group Objective : 3a Enhance professional development for all emergency management personnel through training, exercises and learning from other CDEM Groups

Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
R&R	1	Undertake a training gap analysis to evaluate current levels of training in CDEM and stakeholder organisations and identify gaps in that training.							Some very basic work done, however this has not resulted in delivery of a strategy.	3.1, 3.2,
R&R	2	Develop a professional development strategy and training programme to address the gaps identified above							Same as above	3.1, 3.2, 3.3
R&R	3	Facilitate the provision of training in accordance with the programme, including organising joint training within the region and/or in conjunction with neighbouring regions where that is the most effective way of meeting a training need.							Some training provided but little linkage to targeted response at Group level. TLA's generally do their own thing and share informally	3.1, 3.2, 3.3
R&R	4	Maintain a calendar of relevant training opportunities (e.g. by MCDEM and other CDEM Groups) and make available to CDEM agencies/stakeholders								3.1, 3.2, 3.3
R&R	5	Develop and exercise programme which is consistent with National Exercise Programme (NEP) and which ensures that all CDEM Group Members and Strategic Partners are involved regularly. Seek opportunities for joint and multi-agency exercises led by other agencies.							Report on exercises adopted by CEG in 2012 but no real integrated cooperative planning/programming other than recognise that exercise s are required.	3.1, 3.2, 3.3

Otago CDEM Group Objective : 3b Strengthen the coordination and cooperation amongst all relevant sectors in planning for and responding to an emergency

Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
CEG	1	Review coordination and processes across CEG members and other CDEM agencies, and develop a strategy for improving coordination and collaboration							Review of Otago CDEM underway. It will address coordination and collaboration	6.1, 6.2, 6.3
CEG	2	Communicate with CEG members and other CDEM agencies and encourage reporting to CEG on matters of interest							Main communication via CEG meetings. There were meetings between Coordinator and agencies but this has lapsed in 2014	6.7, 6.4
R&R	3	Work with stakeholder groups where relevant in the development of plans and procedures under the Group CDEM Plan							This is happening e.g. Welfare Plan, and Tsunami Plan	6.2

Otago CDEM Group Objective : 3c Develop and maintain appropriate documentation to describe key activities, functional responses and protocols in support of the CDEM Plan

Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
CEG	1	Review existing plans at the review frequency identified in each plan. Ensure relevant stakeholder groups are involved.							TLA CDEM Plans have been reviewed and 4 of 5 adopted by Group. New Public Education Strategy, Reduction and Welfare Plans have been adopted.	6.2, 6.8
RR	2a	Develop Lifelines Plan							Otago Lifelines Project Report contains recommendations for the establishment of a Lifelines Group and has recommendations for development of further plans by the Group.	2.4, 2.5, 4.3, 4.4, 4.5
R	2b	Develop Recovery Plan							Plan adopted	5.1, 5.2
R&R	2c	Develop Tsunami Plan							A Plan scope has been approved and a Working Party has been established which has met once.	4.11
R&R	2d	Develop Alpine Fault Earthquake Plan								4.13
RR	2e	Develop Dam Failure Plan								4.12
WAG	3	Review the current Welfare Plan for alignment with latest Guidelines							New Welfare Plan was approved ??. The revised National CDEM Plan will introduce changes to Welfare arrangements	7.2

Otago CDEM Group Objective : 3d Provide effective warning systems to enable agencies and the community to respond rapidly to a potential event

Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
R&R	1	Develop a regional Tsunami plan that identifies warning and notification arrangements, procedures, including links with national warning systems; at risk communities; public alerting process; media arrangements							A plan scope has been approved and a Working Party has been established which has met once.	4.11
R&R	2	Incorporate pre-scripted messages in the Public Information Plan							Public Education Strategy incorporates this principle but it has not been implemented	1.1, 1.2, 1.8
R&R	3	Test and exercise warning systems as part of the overall exercise programme								3.3
R&R	4	Provide signage, maps and education to support community based plans.							Work has been done with some communities and maps showing potential hazard areas have been provided at public meetings. Response plans have been developed for some communities.	4.9

Otago CDEM Group Objective : 3e Establish and maintain effective and resilient inter-agency communications systems

Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
R&R	1	Agree and implement region wide protocols for inter-agency reporting during an emergency event.								
R&R	2	When it becomes available, implement the Emergency Information Management System (EMIS) at the GECC and all EOCs							Product problems with implementation of EMIS. TLAs have adopted implemented EMIS at different levels. Not being integrated across group	4.1, 4.2

Otago CDEM Group Objective : 4a Strengthen recovery capability and capacity across all agencies and the wider community										
Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
R&R	1	Incorporate a recovery component in Group and local exercises in order that the recovery capability (particularly at local level) can be developed.								3.1,3.2,3.3
R	2	Investigate a programme for Recovery Managers to meet at least annually to discuss their work, impact of legislation and linkages to reduction activities.								5.2
R&R R	3	Develop mechanisms for incorporating lessons learnt from responding to and recovering from an emergency event back into risk reduction planning activities								3.1,3.2,3.3

Otago CDEM Group Objective : Enable										
Who		Proposed Action	2012	2013	2014	2015	2016	2017	Comments	WP Action
R&R	1	Establish new committees							Risk Reduction, Readiness and Response, Recovery, WAG Committees established	2.3, 5.2, 7.3
R&R	2	Confirm Group Office arrangements							An agreement for the provision of services from the ORC for Administration Services and Group Office functions has been put in place	6.6
ORC CEG	3	Implement Group Office arrangements							A full time Emergency Management Coordinator was employed but departed in Dec 2013 and the role is now on a part time basis.	6.6
ALL	4	All Group members confirm GECC/EOC and staff arrangements								4.6, 4.7,
CEG	5	Prepare Annual Work Programmes							Annual Work Plans were reported to CEG but this has lapsed with departure of Group Coordinator and some of the local EMOs	6.2, 6.3
CEG	6	Review Annual Work Programmes							Reports on progress against work plans have in the past been provided however this has lapsed.	6.4

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Goal	Subject	Recommendation	Progress	Progress	WP Actions
G1	Public Education	That the CEG ensures that the focus of the Communications Plan is widened to become a Group-wide Public Education Strategy which recognizes the multi-agency nature of the CDEM Group.	A Public Education Strategy has been approved by the Group however there is still work required to implement the Aims and Objectives and a collaborative approach across all agencies.		1.1, 1.2, 1.3
G1	Public Education	That the CEG ensures that the website being developed reflects the needs of the Otago community and promotes Otago CDEM.	A new Group website has been produced and ongoing maintenance is happening but possibly not to full extent possible.		1.5
G1	Public Education	That the CEG looks at ways to leverage off the national public education programmes and their ability to resource programmes across Otago,	Included as part of the Group Strategy. Individual TLAs choose whether to participate in national MCDEM programmes		1.1, 1.2
G1	Resilience	That the CEG examines the notion of acceptable risk and determines a range of mechanisms for the Group to use or leverage from to engage communities about their risk.	ORC has undertaken extensive work hazard work on hazard database. The engagement with local communities is done at TA level and the level of this engagement varies between councils.		2.1
G1	Resilience	That the CEG develops and adopts a community resilience strategy.	A Group Strategy has yet to be developed however work has started on Risk Reduction Strategy		2.1
G1	Public Information Management	That the territorial authorities and individual agency Public Information Managers meet regularly to undertake specific CDEM activities including joint training/professional development planning and preparedness.	Some meetings of TLA and agency PIMs held but not joint training/professional development has occurred.		1.7
G1	Public Information Management	That the Group Public Information Manager continues to take leadership in developing the role further and in developing the capability of local Public Information Managers to meet extended periods of operations and coordination and promotion and CDEM activities across the Group.	The Group PIM does take a leading role however until meetings are held between Group and TA PIM's the capability of local PIM's varies. Notwithstanding these comments there are some very capable and experienced PIM's and they set a high standard with their involvement in CDEM.		1.1, 1.7
G1	Public Information Management	That hazard-specific templates and key messages are developed for use across the Group.	No progress or discussion has taken place to identify areas where templates would be useful		1.1
G1	Integrated Planning	That the CEG reviews the level of coordination and adopted formal processes across CDEM agencies and support territorial authorities in the development of programmes to improve coordination and integration.	Only limited progress on specific programmes to improve coordination and integration.		11.1
G1	Integrated Planning	Identifies and develops strategies for the alignment between CDEM Group member planning documents, (e.g. CDEM Group Plan with community outcomes and Long term Council Community Plans, Resource Management Act plans, CDEM Welfare provision and community development and response plans, etc.).	Some progress was made in this area a few years ago when the Group provided comment on local councils LTP's. There has been work done to improve the coordination across annual work plans but this has lapsed in recent times. TA planning and building regulation staff are working collectively together on new RMA plans using the natural hazard data and included it in new RMA district plans. Not all TA CDEM Plans approved by Group.		11.2, 11.3
G2	Hazards and Risks	That the CEG coordinates and integrates planning and strategy development for hazard risk reduction across member functions.	The Risk Reduction committee has ensured greater uptake from each TA in respect to using and feeding more hazard data into the ORC natural hazard database.		
G2	Hazards and Risks	That the CEG coordinates hazard and risk research and monitoring so that information gathering is more effective and efficient.	Otago Natural Hazard database is now live on web and TA's have regular updated copies. Community vulnerability to elevated sea level and coastal tsunami events in Otago Report completed and discussed with communities		
G2	Hazards and Risks	That the CEG shares information among its Group members and partners (e.g. Lifelines utilities) in support of a collective approach to risk management.	All lifeline utilities have been provided with a natural hazard database disk and have been presented to by the ORC natural hazard team.		

Goal	Subject	Recommendation	Progress	Progress	WP Actions
G2	Hazards and Risks	That the CEG develops strategies for communicating risk to its partners and communities.	The public Education Strategy does contain objectives around the area of communicating risk to communities. However discussion with communities has mainly been at their request rather than based on strategy.		1.8
G2	Risk Assessment and Reduction	That the CEG establish a Reduction Working Group or Hazard Planning Group to develop strategy and to improve the linkages to CDEM.	Committee has been established and work is being fed back into the Group via the CEG		2.2
G2	Risk Assessment and Reduction	That the strategy addresses community understanding of risk and consequences.	Draft Risk Reduction Strategy considered by the Risk Reduction committee at their 5 July 2013 meeting. Further development of the strategy has been delayed		2.2
G3	Training and Professional Development	That the CEG develops, implements and funds a professional development strategy that will provide an oversight of capability development and related issues across the CDEM Group at a strategic level.	Some very Basic work was done however it has not resulted in the delivery of a strategy that allows necessary oversight. Opportunities for collaboration need to be taken between Councils.		3.1, 3.2
G3	Training and Professional Development	That the CEG leverages available capacity of staff from within the Group to deliver coordinated professional development programmes.	When necessary for a major exercise or some specific training there is some mutual support between the Councils however this is usually done on a one off basis.		3.1, 3.2
G3	Training and Professional Development	That the CEG carries out a needs analysis to inform the development of a professional development framework (including training, exercising, facilities, etc.) to inform targeted response delivery outcomes.	Some low level analysis has been done however this needs to be much wider, be more detailed and must include all agencies e.g. Emergency Services.		3.1. 3.2, 6.2, 6.3
G3	Training and Professional Development	That the CEG supports the maintenance of capability levels, by ensuring that staff are released for professional development and training activities, and that they understand the need to participate in these activities.	Some work has been done in this area however there is little formal linkage to targeted response delivery outcomes and councils in most cases doe their own thing in this area. All Councils generally support the release of their staff for training etc., senior management understand the need to do this, however again there is little consistency across the Group		3.1. 3.2, 6.2, 6.3
G3	Exercising	That the CEG develops a mechanism to provide oversight and coordination of exercises at a strategic level.	Report on forward planning of Exercises adopted by CEG in October 2012. There is no mechanism in place other than a recognition that exercise s are required.		6.2, 6.4
G3	Exercising	That the CEG develops a Group-wide exercise programme with links to training and professional development programmes across the Group.	No Progress. An exercise programme consistent with all partner agencies should be developed.		3.3
G3	Response	That the CEG determines a strategy and the resources required for the implementation and embedding of the Emergency Management Information Systems into their Emergency Operations Centre systems and procedures.	There has been some attempt by CEG to develop a unified approach to adopting EMIS. Training in primarily Planning and Intelligence aspects was undertaken in 2012 with an EMIS CDEM Region wide exercise in February 2013. Technical issues have limited ability and willingness to use system. Commitment to rollout of EMIS system varies between TLAs.		4.1, 4.2
G3	Response	That the CEG supports Waitaki District as they conduct a review of their Emergency Operation Centre arrangements.	Completed		
G3	Response	That the CEG clarifies the resources which are regional and define principles of management and allocation of these resources.	Further work needed.		4.3, 4.4, 4.5
G3	Response	Reviews Emergency Operations Centre facilities across the Otago Group.	A low level report back to ensure EOC's met minimum requirement was completed however a more in depth approach should be planned in the future.		4.6

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Goal	Subject	Recommendation	Progress	Progress	WP Actions
G3	Warning Systems	That the arrangements for provision of a 24/7 capability across CDEM in Otago are clarified, documented and widely promulgated to all agencies.	Although work has been done in this area there is still work required to document and to ensure consistency across the region		4.7
G3	Controllers	That the CEG supports the professional development of Controllers through their attendance at MCDEM courses and an annual Otago-wide controller forum.	At June 2013 95% of the Otago Controllers have attended MCDEM training. Since then there have been changes in Controllers and a more comprehensive training course developed. Not aware that any of Otago Controllers will be attending the course		3.1, 3.2, 3.3
G3	Controllers	That the CEG encourages those people appointed as Controllers to be actively involved in the 'peacetime' activities planning and readiness work of their organisation.	Level of involvement by Controllers varies.		4.8
G3	Controllers	That the CEG reviews the practicality of using local controllers as a Group Controller.			3.1, 3.2
G3	Welfare	That the CEG requires regular meetings of the Welfare Advisory Group and the development of a programme strengthening local and regional links and build capability for the local management of welfare.	Regular meeting schedule now established, and a Welfare Plan adopted by the Group		7.1
G3	Welfare	That the CEG reviews and updates the Group welfare plan/arrangements. (reference Director's Guidelines Welfare in an Emergency).	A new Welfare Plan that complied with Directors Guidelines adopted by Group		7.2
G3	Welfare	Instigates the development of a robust training programme for the Welfare Advisory Group and its member agencies.	Training programme yet to be developed.		3.1, 3.2, 3.3
G3	Lifelines	That the CEG continues to support the development of a Lifelines Group for Otago, the development of "Terms of Reference" and an implementation plan which includes resourcing and appropriate budget allocation.	With the completion of the Otago Lifelines Project the establishment of a Lifelines Utilities Group is being promoted but still needs to be approved by Group.		2.4
G3	Lifelines	That the Lifeline Utility Coordinator is appointed to the Group Emergency Operations Centre (and possibly the CEG).	No appointment. It is being proposed that the proposed Lifelines Utilities Group will appoint a coordinator out of their ranks that will be coordinator in the ECC and be a member of the CEG.		2.5
G4	Recovery	That the CEG recognizes the importance of the recovery process and develop recovery planning within councils, particularly the full extent of resourcing and funding which may be required for recovery.	A Group Recovery plan has been adopted however the implementation of a recovery structure has yet to occur.		5.1
G5	Recovery	That the CEG determines its ongoing relationship with the Group and local Recovery Managers with a view to establishing how the role will achieve input into decision making at Group level.	Covered within the new Group recovery Plan		5.1
G6	Recovery	That the CEG Investigates a programme for Recovery Managers to meet at least annually to discuss their work, impact of legislation and linkages to reduction activity.	Recovery Managers are part of Recovery Committee. It met regularly up to Nov 2013. No attendance at October meeting 2014		5.2
G7	Recovery	That the CEG actively requires mechanisms for incorporating lessons learnt from responding to and recovering from an emergency event back into risk reduction planning activities.	March 2013 Otago Recovery Managers workshop included a speaker on the lessons from the Christchurch and Canterbury earthquakes.		5.1, 5.2

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Goal	Subject	Recommendation	Progress	Progress	WP Actions
G8	Recovery	Ensuring that future exercises feature a recovery component in order that the recovery capability (particularly at local level)can be developed.	Recovery Managers were involved in Exercise Te Ripahapa however there is a need for a future more specific Recovery exercise. A workshop was planned but lapsed when Recovery Chair departed.		3.1, 3.2, 3.3
E1	Joint Committee	That the CEG provides induction training programmes for Joint Committee members to ensure that those new members are brought “up to speed” as to their role and expectations of their participation.	No formal induction process in place. A briefing report was provided at first Joint Committee meeting after elections in 2013		6.5
E1	Coordinating Executive Group	That the Coordinating Executive Group develops and implements an induction programme for new members to bring these new members “up to speed” as to their role and expectations of their contributions as soon as possible.	No formal induction process in place. Generally done through local EMO's MCDEM and others.		6.5
E1	Group Emergency Management Office	That the CEG resources the Group Emergency Management Office to ensure that the Coordinator’s capability and experience is best utilized and to reduce the risk of the reliance on one key individual.	Up to the departure of G Hall Group Office work was generally effective. At his departure coordination meetings etc. all but ceased		6.1, 6.2
E1	Group Emergency Management Office	That the CEG determines a mechanism to ensure that all Group participants understand the distinction between it and the Otago Regional Council.	Still work to be done in this area to ensure a good understanding of role of Group Office		6.1, 6.2
E1	Group Emergency Management Office	That the CEG develops a Services Level Agreement to define and establish the level of service expected from the Otago Regional Council in their role as Administrating Authority. This should also clarify differences between business management and performance management.	While an agreement for the provision services from the ORC for Administration Services and Group Office function has been put in place it does not cover many of the areas or levels of service required.		6.6
E1	Group Emergency Management Office	That the CEG identifies opportunities for the Group Office to take a greater role in regional wide CDEM activities in order to achieve consistency and stadardisation, e.g. training, public education, public information management, etc.	While this had improved with G Hall there is still much work to do in many areas. There is still a reluctance by some to adopt a true regional approach to the delivery of CDEM across Otago.		6.1, 6.2
E1	Sub Committees	That the CEG reviews, through the Group Emergency Management office, the structure necessary to ensure that the advice and recommendations to them is provided through a process involving the widest range of subject matter experts possible.	The establishment of committees along with wider and more appropriate representation since the new Group Plan was adopted has improved.		6.1, 6.2
E1	CDEM Work Programmes	That the CEG require a theme-based rather than task-oriented work programme for the five-year life of its second generation CDEM Group Plan.	The new Group Plan contained a Work Programme.		6.1, 6.2, 6.3
E1	CDEM Work Programmes	That the CEG encourages individual member authority commitment, understanding and resourcing to give effect to the stated work programme outcomes.	Generally understood, however further cooperation, integration and coordination is required		6.1, 6.2, 6.3
E1	CDEM Work Programmes	That the CEG determines how reporting on local work programmes will occur and what initial support required to achieve this.	Monitoring of local work programmes was occurring and being reported however this has lapsed in recent times with departure of Group EM Coordinator and some EMOs.		6.3, 6.4
E1	CDEM Group Funding	That the CEG re-visits the funding arrangements for the Group in order for it to achieve its stated Vision and Goals.	No progress on this. The CDEM Group does not have its own budget. The ORC manages the CDEM costs for administration and Group Office functions and activities.		6.1, 6.6
E1	CDEM Group Funding	That the CEG requires the implementation of a transparent budget reporting mechanism to be used by the Group Emergency Management office and the territorial authorities.	No progress on this.		6.6

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Goal	Subject	Recommendation	Progress	Progress	WP Actions
E1	CDEM Group Funding	That the CEG investigates ways in which efficiencies can be gained across the Group through improved coordination and sharing of services.	A review is underway in regard to how CDEM is delivered across Otago and what would be the best structure to do this in the future		6.3, 6.4
E1	Business Continuity Management	That the CEG collectively determines the priority for business continuity management and how this can best be achieved for the agencies of the Otago CDEM Group in the spirit of the CDEM Act 2002.	No progress		5.3

Summary

G1	To increase community awareness, understanding, preparedness and participation in civil defence emergency management	
G2	To reduce the risks from hazards to New Zealand	
G3	To enhance New Zealand's capability to manage civil defence emergencies	
G4	To enhance New Zealand's capability to recover from civil defence emergencies	
E1	To ensure all agencies have the structures and authorities to be able to reduce risks, be ready for, respond to and recover from civil defence emergencies.	

	Overall progress with recommendations from Monitoring and Evaluation Report 2011	

	Source	Group Objective	Activity	Actions	Who	Frequency	Accountability to	Measure		When											
										2015				2016				2017			
									4	1	2	3	4	1	2	3	4	1	2	3	4
1.1	GWP	1a	Public Education and Information	Develop an Implementation Plan for Public Education Strategy that aligns with national public education programmes.	Group PIM	3 yrs.	CEG	Report		✓											
1.2	CA 2010 GWP	1a	Public Education and Information	Produce an annual public education plan for each district that aligns with Public Education Strategy, and Implementation Plan.	Local CDEM	Annual	CEG	Report			✓			✓				✓			
1.3	CA 2010 GWP	1a	Public Education and Information	Report annually on what has been achieved during year	Local CDEM	Annual	CEG	Report				✓				✓				✓	
1.4	CA 2010 GWP	1a	Public Education and Information	Maintain up to date media contact database	All	Ongoing	Group M/C														
1.5	CA 2010	1a	Public Education and Information	Maintain up to date CDEM web-based information	Group PIM	Ongoing	Group M/C														
1.6	CA 2010	1a	Public Education and Information	Operate Social media to best practice guidelines identified in strategy	All	Ongoing	Group M/C														
1.7	CA 2010	1a	Public Education and Information	Local and agency PIMs meet at least twice per year	All	Annual	CEG	Minutes			✓		✓		✓		✓		✓		✓
1.8	CA 2010 GWP	1a	Public Education and Information	Develop hazard-specific templates and key messages for use across Group	Group PIM	Once	CEG	Report		✓											
2.1	CA 2010 GWP	1b	Risk Reduction	Develop Otago Community Resilience Strategy	Group M/C	5 yrs.	CEG	Strategy			✓										
2.2	GWP	2b	Risk Reduction	Develop Risk Reduction Strategy	CEG	5yrs	Group JC	Strategy		✓											
2.3	GWP	2b	Risk Reduction	Meetings of Risk Reduction Committee at least twice a year	Group M/C	Annual	CEG	Minutes	✓		✓		✓		✓		✓		✓		✓
2.4	CA 2010 OLP GWP	2b	Risk Reduction	Establishment of a Lifelines Utilities Group and agree Terms of Reference and budget	CEG	Once	Group JC	Report		✓											
2.5	CA 2010 GWP	2b	Risk Reduction	Lifelines Utilities Group appoints coordinator	LLG	Once	CEG	Report			✓										
2.6	GWP	2a	Risk Reduction	Report annually on updating of Natural Hazards Database	ORC	Annual	CEG	Report			✓				✓				✓		

	Source	Group Objective	Activity	Actions	Who	Frequency	Accountability to	Measure		When											
										2015				2016				2017			
									4	1	2	3	4	1	2	3	4	1	2	3	4
3.1	CA 2010	3a	Professional Development / Training	Develop Professional Development / Training Strategy	Group M/C	3yrs	CEG	Strategy				✓									
3.2	CA 2010 GWP	3a	Professional Development / Training	Implement Professional Development / Training Strategy	Group M/C	Annual	CEG	Report				✓				✓				✓	
3.3	CA 2010 GWP	3a	Professional Development / Training	Group wide exercise programme developed that links to Professional Development / Training Strategy	Group M/C	4 yrs.	CEG	Report					✓				✓				✓
4.1	CA 2010 GWP	3e	Readiness and Response	Develop a Plan for implementation and operation of EMIS	Group M/C	Once	CEG	Strategy			✓										
4.2	CA 2010 GWP	3e	Readiness and Response	Implementation and operation of EMIS according to Plan	All	Annual	CEG	Report				✓				✓				✓	
4.3	CA 2010 OLP GWP	3c	Readiness and Response	Develop a Regional Fuel Contingency Plan	LLG	3 yrs.	CEG	Report					✓								
4.4	CA 2010 OLP GWP	3c	Readiness and Response	Develop a Regional Reconnaissance (Helicopter) Plan	LLG	3 yrs.	CEG	Report									✓				
4.5	CA 2010 OLP GWP	3c	Readiness and Response	Develop a Regional Generator Management Plan	LLG	3 yrs.	CEG	Report													✓
4.6	CA 2010 GWP	5	Readiness and Response	Review ECC and EOC facilities across the group	Group M/C	2 yrs.	CEG	Report					✓								✓
4.7	CA 2010 GWP	5	Readiness and Response	Document 24/7 capability arrangements and promulgated to all agencies	All	Annual	Group M/C		✓				✓				✓				✓
4.8	CA 2010	5	Readiness and Response	Local CDEM Response Team meets at least annually	Local CDEM	Annual	CEG	Report	✓				✓				✓				✓
4.9	GWP	1b	Readiness and Response	With Community develop local Resilience / Response Plans	Local CDEM	Annual	CEG	Report							✓				✓		
4.10	GWP	1b	Readiness and Response	With Community review existing local Resilience / Response Plans	Local CDEM	Annual	CEG	Report							✓				✓		
4.11	GWP	3d	Readiness and Response	Develop Coastal Otago Tsunami Response Plan	Group M/C	Once	CEG	Report				✓									
4.12	GWP	3d	Readiness and Response	Develop Alpine Fault Earthquake Response Plan	Group M/C	Once	CEG	Report								✓					

	Source	Group Objective	Activity	Actions	Who	Frequency	Accountability to	Measure		When											
										2015				2016				2017			
									4	1	2	3	4	1	2	3	4	1	2	3	4
4.13	GWP	3d	Readiness and Response	Develop Inland Otago Tsunami Response Plan (Dam Failure Plan included)	Group M/C	Once	CEG	Report											✓		
5.1	CA 2010 GWP	2b	Recovery	The Group appoints and resources a Group Recovery Manager	CEG	Once	Group JC	Report				✓									
5.2	CA 2010	2b	Recovery	Group and Recovery Managers meet at least twice a year to discus their work and have input into CEG and Group decisions.	All	Annual	CEG	Minutes			✓		✓		✓		✓		✓		✓
5.3	CA 2010	4a	Recovery	Establish a priority for business continuity management and a how this can best be achieved	CEG	5 yrs.	Group JC	Report						✓							
6.1	CA 2010	5	Coordination and Integration	Undertake Review of Otago CDEM	CEG	Once	Group JC	Report	✓												
6.2	CA 2010	5	Coordination and Integration	Prepare and adopt an Annual Group CDEM Work Plan	CEG	Annual	Group JC	Report	✓				✓				✓				
6.3	CA 2010 GWP	5	Coordination and Integration	Prepare and submit an Annual Local CDEM Work Plan	Local CDEM	Annual	Group JC	Report		✓				✓				✓			
6.4	GWP	5	Coordination and Integration	Report twice per year on progress against work programmes	All	Annual	CEG	Report				✓		✓		✓		✓		✓	
6.5	CA 2010	5	Coordination and Integration	Induction programme for Group and CEG members	Group M/C	3 yrs.	Group JC	Report										✓			
6.6	CA 2010 GWP	5	Coordination and Integration	A Service Level Agreement is in Place	CEG	3 yrs.	Group JC	Report			✓										
6.7	GWP	3b	Coordination and Integration	CEG Meets at least four times per year	CEG	Annual	Group JC	Minutes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.8	GWP	3c	Coordination and Integration	Review Otago CDEM Group Plan inclusive of Local CDEM Plans.	CEG	Once	Group JC	Report												✓	
7.1	CA 2010	5	Welfare	Welfare Coordinating Group meets at least twice per year	WCG	Annual	CEG	Report		✓		✓		✓		✓		✓		✓	
7.2	CA 2010 GWP	3c	Welfare	Review Group Welfare Plan following National CDEM Plan changes	WCG	Once	CEG	Report			✓										
7.3	CA 2010	5	Welfare	Appoint and resource Group Welfare Manager	CEG	Once	Group JC	Report				✓									

	Source	Group Objective	Activity	Actions	Who	Frequency	Accountability to	Measure		When											
										2015				2016				2017			
									4	1	2	3	4	1	2	3	4	1	2	3	4
7.4	WAG	1b	Welfare	Preparation of the Welfare Centre Register	All	Once	CEG	Report						✓							
7.5	WAG	1b	Welfare	Maintenance of the Welfare Centre Register Database	All	Annual	Group M/C	Report										✓			