

6. CHRISTCHURCH LIQUEFACTION STUDY

PURPOSE OF REPORT

To inform the Christchurch City Council of:

- (a) Environment Canterbury's proposed liquefaction hazard study of Christchurch.
- (b) Issues arising from the Waimakariri District liquefaction study.

BACKGROUND

In recognition of the earthquake threat to Canterbury, and Environment Canterbury's statutory responsibilities, a project to identify and assess the earthquake hazard and risk commenced in 1996. The main aim of the project is to make available information that will lead to an increased awareness of the earthquake vulnerability and risk in the Canterbury region. The desired outcome is better decision making by the community and local authorities, thereby reducing exposure to earthquake risk.

The following work has been completed as part of the earthquake hazard and risk assessment project:

- (a) A detailed study of earthquake sources in Canterbury and their characteristics, and a probabilistic hazard assessment.
- (b) Development of earthquake scenarios.
- (c) A study of historic earthquakes affecting Christchurch.
- (d) A liquefaction study for the eastern part of Waimakariri District (joint project with Waimakariri District Council).

There are currently two other earthquake hazard studies underway as part of the Hurunui and Timaru engineering lifeline projects.

PROPOSED CHRISTCHURCH LIQUEFACTION STUDY

Background

The purpose of the proposed study is to provide better definition of the areas susceptible to liquefaction in the Christchurch City area. As part of the Christchurch Engineering Lifelines Group project, liquefaction was identified as a significant potential cause of damage and disruption. Since the completion of the engineering lifelines report (*Risks and Realities*, 1997) Christchurch City Council has completed a number of detailed liquefaction studies in parts of Christchurch and has carried out some engineering mitigation works. Other liquefaction investigations have been completed in Christchurch by various consultants for private developments.

Study Programme

The Christchurch liquefaction study will be completed in two stages. Stage 1 will involve a compilation of all "new" technical investigation information from liquefaction studies completed in Christchurch since 1994. Once this information has been collated and assessed a decision will be made, in consultation with Christchurch City Council, as to the nature and location of further investigations. Environment Canterbury staff have met with Christchurch City Council staff to discuss the liquefaction studies completed to date and where future effort should be directed.

The project is timetable to commence late 2000 and to be completed by 30 June 2001. The project is funded by Environment Canterbury general rate. Depending on the outcome of Stage 1 and future discussions with Christchurch City Council staff, additional funding may be sought from Christchurch City Council. The completion of the project is not contingent on additional funding, however, the scope of the study will be determined by the available resources.

Environment Canterbury acknowledges and fully supports the earthquake hazard/risk assessment and mitigation work completed by Christchurch City Council, and looks forward to the opportunity to work with Christchurch City Council on the liquefaction study.

Benefits of Study

The benefits of completing the liquefaction study include:

- (a) Providing a sound basis for assessing further detailed site investigations for future works (both private and public).
- (b) Providing additional hazard information for engineering lifeline risk assessment.
- (c) Providing information for land information memorandums (LIMs) and project information memorandums (PIMs).
- (d) An increase in public awareness and understanding.
- (e) Providing technical information for plan reviews, plan variations, subdivision consents, building consents and resource consent applications.

ISSUES ARISING FROM THE WAIMAKARIRI DISTRICT LIQUEFACTION STUDY

General

The recently completed study on liquefaction in Waimakariri District raises some important issues on the use of hazards information for "planning" and "development". Hazard mitigation needs to be approached on as many fronts as possible and should include education and public awareness, statutory planning, engineering and emergency management initiatives. These initiatives have as their objective the *awareness of, avoidance of, accommodation of or response to*, the effect of earthquakes on people, their land uses, structures and socio-economic activities. The general aim is to reduce human casualties, property damage and socio-economic disruption.

Report Recommendations and Issues Arising

The Waimakariri District liquefaction report provided a series of actions for Waimakariri District Council and Environment Canterbury to implement. However, given the significance and complexity of some of the recommendations further work is required to fully understand the implications of the study and its recommendations, and to develop appropriate policy. There are still unanswered questions that need to be addressed in a collaborative and measured manner.

Three main areas of concern have been identified by Waimakariri District Council in relation to the liquefaction hazard information and its use. These are:

- (a) The legal status of the report generally and its recommendations in particular.
- (b) The appropriate response by Waimakariri District Council to comply with its statutory obligations relating to LIMs and PIMs.
- (c) The appropriate response by Waimakariri District Council to comply with its obligations under the Resource Management Act 1991 (subdivision consents) and the Building Act 1991 (building consents).

Waimakariri District Council has sought legal advice on these matters and further work is now underway to develop robust and defensible policy and guidelines.

Environment Canterbury's Role

Environment Canterbury has an important role to play with respect to hazard mitigation in the region. To this end Environment Canterbury will continue to assist Waimakariri District Council with the development of policy and guidelines, and will promote and assist Waimakariri District Council with developing an engineering lifelines project. Furthermore, Environment Canterbury will assist Waimakariri District Council, where appropriate, with any further technical investigations. Public education and awareness is a critical and integral part of hazard mitigation and for this reason Environment Canterbury will develop appropriate initiatives as part of its hazards programme. Environment Canterbury will also continue to advocate earthquake risk mitigation through district plan reviews, plan variations and resource consent applications.

Report prepared by Peter Kingsbury (Hazard Analyst, Environment Canterbury).

Recommendation

That the information be received.