

## 2. CRACROFT CAVERNS RESERVE – ADDITIONAL RING LASER



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The purpose of this report is to seek approval for a proposed new ring laser to be constructed in the Cracroft Caverns situated below Cracroft Caverns Reserve.

The University of Canterbury (Physics and Astronomy Department) has made an application for a Resource Consent to construct a new ring laser in the Cracroft Caverns. A Resource Consent is needed for this activity, because it is situated on a reserve area owned by Christchurch City Council that is a Class 4 Historic Site.

### A BRIEF HISTORY TO DATE

In 1995 the Parks Unit acquired, through subdivision of the Cracroft Estate, a 7111m<sup>2</sup> recreation reserve to the south of Princess Margaret Hospital (PMH), which includes part of the historic World War II Caverns by strata title.

Thirty metres below this reserve, but on the same certificate of title as the reserve, are the underground World War II caverns, designed to be the South Island's defence headquarters for 'Southern Group', a combined Air Force, Navy and Army intelligence unit during the war.

In 1987, the Physics and Astronomy Department of the University of Canterbury sought and received the permission of the owners to conduct experiments in the caverns. The University required a stable environment for their ring laser gyroscope experiments and the underground caverns, with an almost constant temperature and humidity, so close to the University's Ilam campus, were ideally located. Although extremely precise, the experiments use low power lasers similar to supermarket barcode reading lasers and have no military applications. The first ring laser experiment ('C-I') was housed in a building constructed inside the caverns before they came into Council ownership.

After the success of the first model, the University installed two more ring lasers in the caverns. 'C-II' was installed in an extension to the building which houses C-I and more recently a 4 metre square laser ('G-O') was installed on a vertical wall near the entrance to the caverns, this one being the prototype of a ring laser to be installed in Germany after trials and refinement at Cashmere.

## **NEW RING LASER ULTRA – G**

The proposal is to bond the device to the floor. No new building, nor any work affecting the cavern walls, is proposed. Nineteen concrete piles for mirror and gain tube support near the corners of the cavern (plus a few intermediate points), together with smaller supports for a connecting pipe, will be placed on the cavern floor.

The concrete pillars need to be placed solidly in contact with the basalt rock at or below the floor of the cavern. Some minimal removal of loose material is needed to obtain solid bearing. The concrete would not be bonded to the rock, but laid upon and in contact with it.

As far as the University of Canterbury is concerned, this is the ultimate project for Cashmere. The University of Canterbury has discussed this project for a year with their German partners, who are extremely keen to see this machine become a reality. Its possibility was not envisaged when the ring laser project was started, but the various successes in each stage so far have exceeded expectations. This work at Cashmere has been a vital testbed for the Grossring (a well-engineered 16 square metres), which has clearly been justified by this research and is currently being built in Germany.

## **PUBLIC TOURS**

The project will have little or no impact on the Council's tour programme. The ramps allow access for the public into the main area, whilst the positioning of the pipeline relatively close to the walls puts it away from the public tour path, which deliberately avoids the walls.

## **RESTORATION WORK**

When the project is completed, the cavern can readily be returned essentially to its former state; the concrete can be removed from the rock cleanly, and the present loose floor material restored.

The University propose a 15-year life for this project, and before or on completing it they undertake to return the cavern to its present state.

The proposal was considered and supported by the Spreydon/Heathcote Community Board at its meeting on 30 May 2000.

**Recommendation:** That the Council grant the University of Canterbury permission to construct the proposed ring laser, subject to the following conditions:

1. The University of Canterbury obtaining all necessary Resource and Building Consents before any development commences upon the site.
2. The leased/construction area being maintained by the University of Canterbury in a safe and tidy condition at all times.
3. All costs associated with the development, and subsequent maintenance of the associated buildings and structures upon the site, being paid for by the University of Canterbury.
4. The University of Canterbury showing proof of having an Occupational Safety and Health Hazard Plan in place, before commencing operations upon the site to the Area Parks Officer (Consents).
5. Before any tenders are let or work commences upon the site, discussions being held with the Parks Manager's designate, the Area Parks Officer – Sockburn, to ascertain the Council's requirement through the development phase of the construction of the facility.
6. A bond of \$2,000 being paid by the University of Canterbury or successful principal contractor to the Christchurch City Council/Area Parks Officer - Sockburn before work commences upon the site. The bond less any expenses incurred by the Council will be refunded to the payee upon the completion of the work.
7. All rock excavated for the foundation of the piles being stored behind the Laboratory, to be used to restore the site when the piles are removed at the end of the project in approximately 15 years' time.
8. A steel frame protection tent for personnel use being used within the small areas during construction and maintenance work in the three corners that are not under the existing concrete roof, and that this be written into the University's Health and Safety Plan.