

# **BETWEEN A ROCK AND A HARD PLACE: SUMNER ROAD STORMWATER REBUILD**

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## **ABSTRACT**

Sumner Road is a 2.5 km road in Christchurch's Port Hills connecting Sumner and Lyttelton. This important transport link and popular scenic route for drivers and cyclists was damaged in the Canterbury Earthquakes and has been closed since 2011. Perched on a narrow ledge above Lyttelton Harbour, much of the road was damaged by rockfall from the steep cliffs above. The loess soils are also highly erodible, as demonstrated in the 2014 floods which mobilised a number of debris flows, causing further damage to the road.

Scheduled for a much-anticipated re-opening in March 2019, the repair of Sumner Road has been a complex multidisciplinary project, in a unique and challenging environment. Sumner Road is a Christchurch City Council project jointly funded by NZTA and the works have been carried out by McConnell Dowell and its specialist sub-contractors, with Beca as the contractor's designer.

The project includes rockfall risk mitigation works, repair and rebuild of over 25 retaining walls, road pavement repairs and stormwater drainage; all within a tight existing road corridor. This required a collaborative multi-disciplinary approach and innovative design.

This paper details some of the key challenges and successes for the stormwater design, working as part of a wider multi-disciplinary team. The stormwater challenges included large concentrated flows, requirements to mimic the pre-earthquake flow patterns, steep slopes, highly erodible soils, as well as ensuring all new drainage assets within the road corridor are cycle safe and trafficable. Stormwater assets, especially those in rockfall risk areas, were required to need no or minimal maintenance.

A key success of the project was the design and implementation of a high capacity, narrow, trafficable pipe inlet structure. This was designed due to the range of inlet structures (catchpits/sumps) on the current market not meeting all of the particular constraints of the site. Other successes included the design of four open flumes to convey flows down erodible slopes and two types of energy dissipation structure to mitigate the high discharge velocities.

## **KEYWORDS**

Drainage, multi-disciplinary, complex, collaboration, erosion, rockfall.