

Safety upgrade of a hazardous weir with Terefil™



INDUSTRY

Infrastructure

STRUCTURE

Weir Apron

PROBLEM

Void Fill

LOCATION

South Dubbo, NSW,
Australia

DURATION / YEAR

3 days / May 2016

TECHNOLOGY

Terefil™

BUSINESS UNIT

Mainmark Australia

Summary

In response to increasingly hazardous conditions at the South Dubbo weir in Dubbo, New South Wales, the council undertook to upgrade the weir, including the infilling of a large cavity that had developed under the weir apron that was compromising public safety and weir stability. There have been nine fatalities at the weir since its construction in 1942*. Turbulent conditions and the increasing under-apron cavity had accelerated the dangerous conditions at the site.

An inspection by divers in 2014 found the void measured nearly 60m³, and extended across more than 20% of the weir's apron. By 2016, the void had expanded substantially.

To achieve the remediation works, the apron needed to be stabilised by infilling the cavity – a difficult task to perform without further destabilising the weir. The weir apron had to be isolated and dewatered to allow access. The cavity then had to be infilled by displacement of the existing water under the apron with a suitable low viscosity material that would set with adequate strength to support the weir apron.

Mainmark was appointed by David Payne Constructions to fill the cavity using its highly flowable, lightweight fill material, Terefil™.

However, on arriving at the site, the Mainmark team observed that water was still flowing through the cavity, complicating the displacement approach with the Terefil™.

Tackling this challenge head on, the Mainmark team developed a new method to fill the void with Terefil™ without having to eliminate the water flow, while keeping the project timeline on track.

Mainmark successfully completed the project in just two days, with a third day for equipment pack-up and removal.

Safety upgrade of a hazardous weir with Terefil™ continued



Objectives

The objective was to fill the void using a fast and cost-effective solution. The site complications ultimately dictated that the solution had to be placed in flowing water.

Because the depth of the void varied significantly, from 1mm to 500mm deep, a highly flowable solution was required to fill these spaces. It was also important that the placement was able to be controlled so that there would be no escape of material into the Macquarie River, and no environmental consequences if some leakage did occur.

As such, the project required a strong and environmentally-inert fill material that could be placed in flowing water.

Solution

Alluvium Consulting, which specialises in water resources, rivers and catchments, specified Terefil™ because it is extremely flowable, easily placed and slippery, making it highly suitable for filling the void's varied depths and penetrating its narrow gaps. Terefil™'s specialised material performance properties also support safe and sustainable construction practices.

On discovering that water flow through the void had not been eliminated, the Mainmark team assessed the site to develop an alternative injection method. They

established that the water was flowing into the void from downstream, which would allow Terefil™ to be injected from the top end of the void without having to stop the water.

The Terefil™ flowed under the apron, until it reached the edge of the coffer dam. This helped to manage the water in the void space, minimised the risk of environmental outflows and maintained the integrity of the Terefil™.

As the void filled, Terefil™ displaced the water and excess material was pushed out of narrow cracks at the junction of the apron and the weir wall, and out of the ground alongside the apron toe where water had previously been bubbling up. This demonstrated that the Terefil™ had been successful in completely filling the void and re-supporting the weir apron.

The project was completed in just three days, which included one day for trouble-shooting and planning, one day of Terefil™ filling and a final few hours for pack-up. Mainmark successfully helped to return the weir to safety and achieved important environmental objectives laid out by the local council.

Whilst the completion of the weir upgrade has been postponed due to the recent flood levels in the Macquarie River, the underpinning has been a timely reinstatement of the integrity of the structure.

**<http://www.dailyliberal.com.au/story/3790378/weir-improvements-aimed-at-saving-lives/>*