

Klondyke Irrigation Canal • South Canterbury - New Zealand



Lining in Action™

An effective lining solution to conserve water



Background

In 2013, New Zealand farmers had just come out of one of the worst droughts in over 70 years. Banking water was, and still is, a necessity for survival. A local Canterbury farmer's existing irrigation canal was leaking precious water, so investigations to rebuild it started in 2014. This decision was reinforced by the drought of 2015 when Canterbury had its lowest January rainfall in 43 years and the Opuha dam in South Canterbury risked running out of water for the first time since it was built in 1998.

A key design consideration during the feasibility stage was the preferred method of seepage reduction. Three options were investigated: EPDM geomembrane, high-density polyethylene (HDPE) geomembrane and piping. Piping proved to be too expensive and did not deliver to the core design issues. A highly flexible EPDM geomembrane was more desirable than other membrane options due to the subgrade irregularities, angle changes in the narrow ditch and elongation properties given the possible seismic activity in the region.

Firestone GeoGard™ EPDM was selected as the membrane of choice due to its durability, flexibility, high level of puncture resistance and cost-effectiveness compared to piping. It was also capable of delivering a higher volume of water in the new canal than the piping option.

Quick Facts

Project scope :

- Build and line a new 1000 m long irrigation canal with a waterproof geomembrane to replace the old canal, which was leaking
- Deliver a low maintenance water infrastructure solution for farming location
- Increase available water storage by delivering water savings through improved design
- Deliver the project to a tight budget despite the remote location, harsh weather and demanding topography

Challenges :

- Extreme weather conditions, isolated location and protruding rock subgrade
- Possible ground movement due to the new positioning of the canal and the risk of seismic shifts in the region
- Restricted work area (adjacent embankment and drop off to old irrigation canal)
- Narrow ditch creating abrupt angle changes dictated that a flexible liner was more desirable, easier and quicker to install than rigid alternatives
- Tight construction window (12 days) due to adverse weather conditions

Solutions :

- The Firestone GeoGard EPDM membrane conforms to subgrade irregularities and delivers superior puncture resistance
- GeoGard EPDM is highly flexible and its ability to elongate over 300% provides a highly durable watertight solution, which suits the seismic nature of the Canterbury region
- Long term durability and UV resistance, relevant for the harsh environment of the project
- Large panels, combined with Firestone's QuickSeam™ products, deliver a fast and easy installation
- Wide range of panel sizes enables minimal wastage of liner and very little additional seaming is required



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Onsite construction

Due to the remoteness of the location and the narrowness of the ditch, five laborers and one technician worked alongside the contractor to ensure the job was completed in 12 days. There were large rounded boulders in the new ditch which could not be completely removed. Thanks to the GeoGard membrane ability to conform over these subgrade protrusions and its superior puncture resistance, this was not an issue for the contractor. A 250 g/m² non-woven Bidim A29 geotextile underliner fabric was used to further improve the puncture resistance of the EPDM geomembrane.

The irrigation ditch was relatively small, approximately 0.5 m deep x 2.5 m wide (at the top). The flexibility of the GeoGard membrane adapted effortlessly into the angle changes from floor to batter to anchor trench, thereby providing the recommended intimate contact with the support surface, which would have been very challenging if rigid membranes had been used.

Safety and Sustainability

One challenge faced by the contractor was ground movement due to the new construction, as well as the seismic risk of the region. The GeoGard membrane's ability to elongate over 300% reduces the risk associated with ground movement and its high puncture resistance provides additional safety.

The harshness of the South Canterbury climate and the remote location of the project made it essential that the GeoGard EPDM membrane delivered on sustainability and quality assurance. In order to ensure this, seams were air lance pressure tested according to the ASTM standard D4437.

Water Savings

Post installation – the farmer reported approximately 30% more water being available for irrigation as a direct result of lining. This is an excellent result not only for the farmer, but also for all the teams involved in the project.

Who to Contact

If your irrigation canal is in need of an update or needs to be replaced, please contact Firestone Building Products or its local distributor. They will be happy to discuss your project and provide you with a detailed proposal.



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