Background

The 2013 Ex-tropical Cyclone Oswald dumped torrential rain on the catchments throughout the Wide Bay Burnett. This event produced run off rates which were estimated to be in excess of a one in one hundred year flood. This event followed on the heels of similar but slightly smaller events in 2010 and 2011.

The South Burnett had been in the grip of an extended dry period prior to these flood years so many catchments were in a state of reduced vegetation cover. The resulting erosion across the region was the worst seen for decades and affected cropping and grazing land alike. Particularly hard hit were contour banks and waterways, many of which had not been maintained adequately due to the extended years of low run off. The damage to these structures was worst at the bank outlets and in the waterways where bare and eroded areas had gradually developed.

This Case Study

This case study follows the work of one family in the Haly Creek district of the South Burnett who was faced with the prospect of damage to their 30 mega litre dam through an actively eroding waterway exacerbated by a high water table and saline seepage. The catchment supplying the dam and the waterway has an estimated area of 249 hectares. Much of this catchment is farmed and contoured red soil with average slopes of approximately 3%. The waterway is constructed on the main water course which has been estimated to carry approximately 11 cubic metres of water per second at the peak flow during a one in ten year run off event.
This is a significant water flow through the system and is much less than would be flowing in a one in one hundred year event such as the recent record floods. The waterway is 23 meters wide and Mr Ziebarth estimated there was water 700mm deep flowing through the full width of the waterway in the 2013 flood event.

The erosion in the waterway has been gradual up until the recent extreme events when it increased dramatically and quickly. The wet years also raised a saline water table which has kept the very erosive subsoil layers saturated and primed to slump and wash easily.

During the aftermath of the floods Mr and Mrs Ziebarth sought the advice of the Burnett Mary Regional Group's Soil Conservation officer to help develop a rehabilitation strategy to hopefully stop the advancing erosion in the waterway. The project developed with inputs from a combination of technical soil conservation experience, local landholder experience and the knowledge and skills of the earth moving contractor and gravel and rock supplier. This combination along with many hours of hard work and planning by the Ziebarth family has produced a very strong and functional rock chute structure which should stand the test of time and secure the integrity of the main farm water supply into the future.

**Method**

After discussion on the possible options to repair the erosion site the planning team decided on a rock chute design with the added strength of a netting mat construction method. This method was favoured to ensure that the rock placed on the chute could not be easily moved regardless of the velocity that could naturally occur with the flows expected from the catchment. This method also favoured the cost structure of the work as there is a suitable rock quarry business within relatively close proximity of the property.

The rock available was a good mix ranging from 200mm to 700mm which aligns with the design velocities for the structure. The catchment peak flow for a one in ten year flood event was designed. From this peak flow a weir crest length was also
designed which reaffirmed the original design of the waterway width. The rock chute was designed to deliver the expected flows from ground level above the erosion to the modified much flatter sloping ground level below the erosion a depth of approximately 1.5 metres with a slope no less than 3:1. Total chute length is approximately 12 metres (See Diagram 1).

The rock chute crest length was built to the width of the waterway at 23 metres with a 300mm level lip above waterway ground level to encourage silt drop at the top of the chute. The waterway banks were retained at approximately 850mm. The area below the rock chute has been levelled to the full width of the waterway and has been planted with a mix of winter active and summer pasture grasses.

A sub surface Ag drainage pipe was installed from the bottom of the rock chute to a depth of 300mm to drain the saline seepage away from beneath the structure. Mulch was added to the chute area. The slope of the waterway below the chute is very flat now which will reduce the recurrence of erosion.

The construction consisted of the following steps:

- Top soil removed and stored.
- Excavation, shaping and compacting the chute slope and surrounding waterway.
- Cut off trenches excavated at top and bottom.
- Texel Geofabric placed over the compacted soil on the chute slope and into the cut off trenches.
- Netting strips placed in the cut off trenches attached to netting over the rock fill.
- Mixed rock fill and granite gravel placed to a depth of approximately 700mm on the chute and in the cut of trenches securing the Texel Geofabric and netting strips.
- More netting was secured over the rock and attached with strong plain wire and tensioned to ensure a complete mat with firm contact to hold the rock in place.
- Top soil was replaced over the area and
- Grass seeded and mulch spread over the waterway and structure.
Results

Perversely the 2014 winter season has been a continuation of dry conditions with the whole shire still drought declared. Construction is finished and grasses have been planted however there is yet to be a useful fall of rain to germinate the grass planting. The area has been fenced and can be managed to maximise the grass vigour when it emerges. The project will be monitored and regular maintenance will be carried out to ensure the structure performs and provides the ongoing protection for the farm dam and enterprise viability.

Authors

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The Queensland Government is committed to the productive and responsible use of the State’s natural resources and has supported these projects as part of BMRG’s Sustainable grazing management and on-ground works: conserving soils in the Burnett Mary Region project.