

BURDEKIN MAJOR INTEGRATED PROJECT GULLY MAINTENANCE AND MONITORING PROJECT



EXEVALE STATION

SITE FEATURES AND RESTORATION EFFORTS

Exevale grazier Buster O'Loughlin's motivation for undertaking restoration work comes from his commitment to protecting the catchment and improving the health of the land. His goal is to boost pasture performance and increase the catchment's resilience to drought, ensuring it can continue to support livestock during dry spells.

Erosion repair efforts focused on stopping the progression of a two-metre deep gully at the base of a small hill, where head cuts were slowly advancing upslope. The soil was a sodic duplex, with 20cm of grey topsoil overlying a deep, dispersive mottled red and yellow clay subsoil formed from decomposing granite.

Given the landholder's previous success in managing other gullies on the property, the same remediation method was employed. Rock was sourced from around the property to fill and line the gully heads. These gully heads were reshaped to a minimum 1:3 slope and seeded. Topsoil and organic matter were added to assist with revegetation.

To manage water flow further, three stick rake lines were constructed upslope of the gully. These lines were designed to distribute water evenly across the landscape and reduce the volume reaching the repaired gully heads. It was graded at 0.5 per cent (a 12cm fall every 25 metres) to divert water from the gully. The area was fenced to exclude stock.

Monitoring reports from 2022 and 2023 showed the remediated area was in excellent condition, with healthy ground cover and no maintenance required. However, in 2024, tunnels were identified at one of the gully head fills, which will require maintenance.

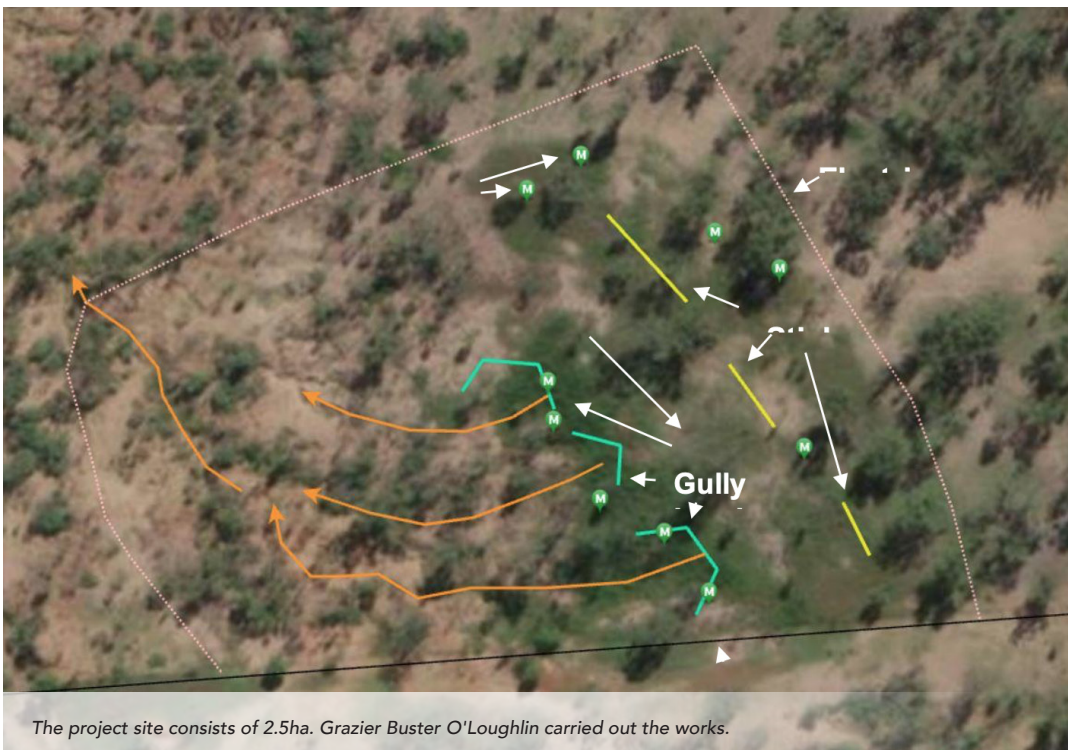
Six years after this site was remediated, it is classed as 'mostly stable', meaning it is on the trajectory to achieving stability. This is a substantial achievement for a lower-cost gully intervention in such erodible soils. Excluding cattle from the site has been a key factor in the success of the project.

Erosion repair efforts focused on stopping the progression of a two-metre-deep gully at the base of a small hill, where head cuts were slowly advancing upslope. These photos capture the site before remediation and two years later, showcasing the impact of the restoration work.



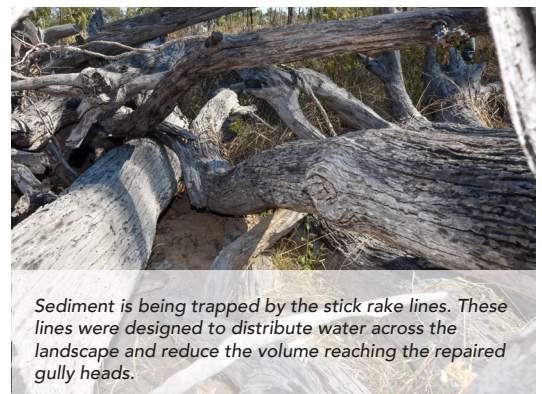
REHABILITATION BENEFITS

- The design and construction have been successful, halting the progression of the gully head and protecting upslope grazing land. Past remediation experience on the property provided valuable input into the design. Using existing knowledge, skills and machinery, and on-site resources such as rocks and organic matter all helped to reduce costs. Access to on-site resources such as rocks and organic matter helped reduce costs.
- Following a well-structured plan, topsoil was removed and stockpiled before earthworks, and then replaced. The sharp gully edges were battered, with the floor lined with large rocks, followed by smaller ones, and covered with a mixture of topsoil and organic matter from cattle yards, along with a seed mix. Fencing off the flowline has enabled vegetation to establish itself on the gully walls and floor, minimising soil loss.
- Improved pasture species and plant health are evident, including Seca stylo, buffel, Indian couch, Black speargrass (*Heteropogon contortus*), and Kangaroo grass (*Themeda triandra*). Siratro (*Macroptilium atropurpureum*) now covers the gully head rock fills, acting like a protective blanket. Within the stock exclusion fence area, there is a significant increase in Kangaroo grass and Black speargrass tussocks, along with greater overall biomass.
- Sediment is being trapped effectively by the stick rake lines and gully head works, preventing it from entering watercourses.
- Additionally, there has been an observable increase in wildlife, including birds and butterflies, in the rehabilitated area.



GRAZING LAND MANAGEMENT

- Stock exclusion fencing is an effective management tool that supports the restoration and maintenance of native vegetation, boosting species diversity. The area has been excluded from grazing for four years since the completion of the works, with no plans to graze it in the near future. This decision is partly because the paddock is not essential to the property's current grazing management plan.
- Stock exclusion is crucial to allow vegetation to establish on the gully walls and floor within the contributing catchment area, helping to improve ground cover and reduce soil erosion.
- The long-term aim is to regain grazing land and restore land function.



LANDHOLDER OBSERVATIONS

Buster O'Loughlin Grazier, Nebo

"This gully needed fixing because we'd been losing soil from the catchment for ages.

If we didn't step in, we knew we'd be facing a much bigger issue down the track.

You want your country to have good ground cover for two main reasons: enough feed for the stock during the dry, and to stop erosion.

Everything we used was sourced right here. There's plenty of rock nearby, close to the gully, so it was easy to access. Plus, we had the right machinery for the job, which kept costs down.

Once the earthworks were done, we spread a layer of organic matter, about three to four inches (7–10 cm), straight from the cattle yards, and threw out a seed mix. The manure made a huge difference. The plants took off after the first bit of rain, and since it's local manure, it's a good seed bank, full of species that are well-adapted to this country.

I'm really happy with how everything's established. It's thriving – we've got Seca, buffel, Indian couch, Black speargrass, Kangaroo grass, Siatro, and Green Panic. They'll keep multiplying and spreading, how quickly will depend on the seasons.

We've locked up this paddock. We don't need it for cattle, it's not impacting our carrying capacity, so we're happy to leave it. It's all about improving the landscape for the long term, getting rid of these gullies that are just ugly scars.

You can't just fix the gully itself. You've got to manage the whole catchment. We built a stick rake line upslope, on the contour, with a slight 12cm fall every 25 metres to direct water away from the gully.

Over the last four years, those stacks have caught about half a metre of sand, coming down from sandy soil in bulloak country, beyond the stock exclusion zone. We expect the stacks to fill up with sand. If we see a pour forming at the bottom of the stacks, we might need to burn the sticks. If needed, we'll build more stacks elsewhere in the catchment.

This is a long-term job. We're constantly watching how things change and making adjustments or repairs as needed. We're also planning to work on other gully heads across the property. If you're going to fix one, you might as well fix the whole cluster.

Erosion has to be tackled as a whole. Why stop at just one gully when others nearby are still eroding? That's a waste of effort. Plus, we know we'll have to come back to these sites for maintenance, to deal with any breakthroughs or rills that show up. If you're going to treat gullies, you're committing to ongoing maintenance and that comes with a cost. We're in it for the long term."



Excluding stock from the site has led to the recovery of grass and ground cover vegetation, with an increase in species diversity. NQ Dry Tropics Soil Conservation Officer Bernie Claussen, right, met with grazier Buster O'Loughlin, left, during her monitoring visits to gather his insights on the changes he observed at the sites during this period.

LESSONS LEARNT

- It's important to reduce the risk of exacerbating erosion during construction works, particularly when working in erodible soils such as this site. The gully head fills result in minimal disturbance of topsoil or vegetation, which promotes accelerated growth post-earthworks.
- Cattle manure is an excellent organic fertiliser. Manure was added to the top dressing at the gully head fills. This led to lush, healthy vegetation, which created biodiverse ecosystems around the plant roots. Root secretions and the waste and remains of tiny soil organisms that lived around the roots helped hold soil particles together and reduce erosion.
- Excluding stock from the site has resulted in the recovery of grass and ground cover vegetation, including an increase in species.
- Excluding (or reducing) livestock grazing pressure within and around gullies in hillslope drainage lines is a method of gully erosion control that could deliver substantial reductions in sediment yield.
- Stick rake lines placed across the slope help improve water infiltration by slowing down runoff and enabling more water to seep into the soil. This enhances vegetation growth. They're also a low-cost intervention, making them an affordable solution for land rehabilitation and erosion control.



Within the stock exclusion fence area, there is a significant increase in Kangaroo grass and Black speargrass tussocks, along with greater overall biomass.

MONITORING TOOLBOX AND FINDINGS

The site was monitored each year after the wet season to evaluate the effectiveness of treatment.

Site monitoring applies industry standard tools Land Condition Assessment Tool advanced (LCAT) and Gully Maintenance Tool (GMT). These tools enable finer-scale changes to be measured.

1. Land Condition Assessment Tool advanced (LCAT).
A minimum of two LCATS are carried out immediately upslope of the gully, in the base of the rehabilitated gully, and opportunistically depending on local conditions. LCATs indicate many biophysical aspects demonstrating the process of gully stabilisation.
2. Gully Maintenance Tool (GMT).
GMT surveys take into account a range of biophysical elements including gully head movement, treatment type, treatment stability, ground cover and composition, species, rainfall, and photo-points targeting key gully and erosion features.

Landholder feedback about stocking data and environmental influences such as rainfall was also collected.

Findings from the monitoring

Some tunnels have occurred at one of the three gully head fills. Runoff has channeled through the topsoil and between the rocks below, which were placed at the base of the gully head. Gully head fills are likely to be more stable when only clay based soil is used, compacted in layers to create the ramp-like shape at the gully head. Sourcing enough suitable soil material may be a problem.



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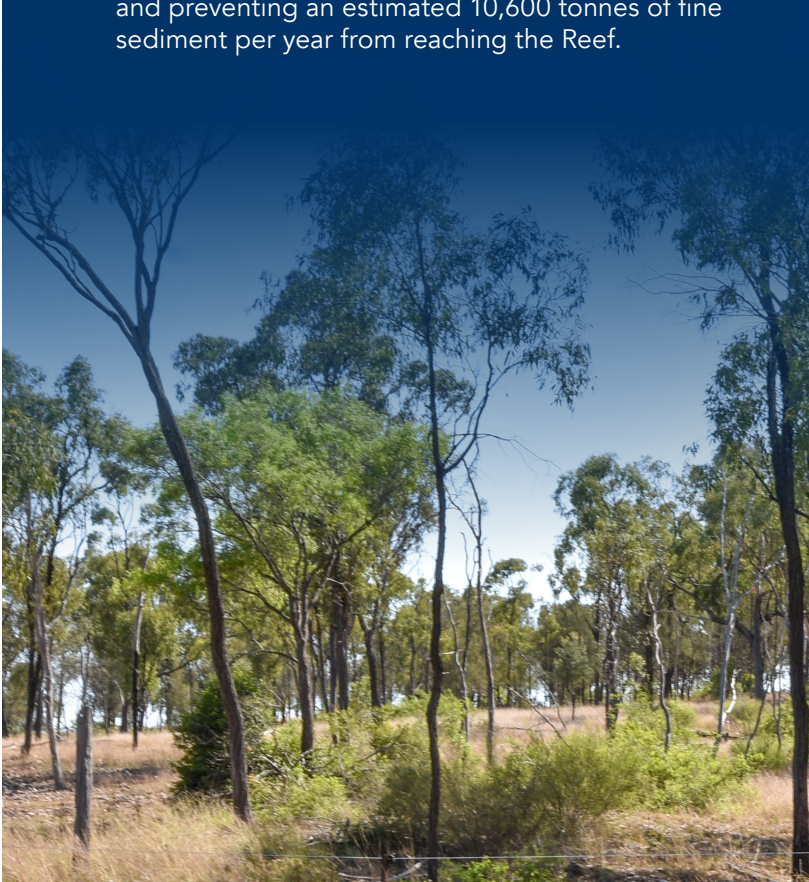
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In response to the 2016 recommendations of the Great Barrier Reef Water Science Taskforce, the Queensland Government, in partnership with NQ Dry Tropics, implemented the Burdekin Major Integrated Project (BMIP), also known as Landholders Driving Change (LDC), from 2017 to 2021. The project focused on the Bowen, Broken, Bogie (BBB) catchment, and worked with graziers to reduce sediment and nutrient runoff affecting the Great Barrier Reef.

Key achievements included 25 gully remediation projects – five large-scale and 20 small-scale – treating more than 11,000 linear metres of eroding gullies and preventing an estimated 10,600 tonnes of fine sediment per year from reaching the Reef.

Following the completion of the BMIP, the Queensland Government reinvested in the monitoring and maintenance of the remediated gullies through the Burdekin Major Integrated Project Gully Maintenance and Monitoring project.

Running across three wet seasons from June 2022 to April 2025, this project evaluated erosion control strategies, cost-effectiveness, and sediment reduction. The results will inform future gully remediation efforts, with a focus on treatment durability and ongoing maintenance needs.



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Erosion repair efforts focused on stopping the progression of a two-metre-deep gully at the base of a small hill, where head cuts were slowly advancing upslope.

The Burdekin Major Integrated Project Gully Maintenance and Monitoring project is part of the Landholders Driving Change project funded by the Queensland Government through the Queensland Reef Water Quality Program.