

Repairing Cherry Tree Creek from Impacts of Flood Water

A Case Study

Introduction

Cherry Tree Creek, is located approximately 52km south of Mackay and 4km west of the township of Koumala. Two sites, CT1 and CT2 were identified as a priority site for remediation under the Natural Disaster Relief and Recovery Arrangements (NDRRA) Category D Environmental Recovery Package to assist with environmental recovery and repair from the impacts of Severe Tropical Cyclone Debbie and its associated rainfall and flooding.

Cyclone Debbie Impact

In March 2017, Severe Tropical Cyclone Debbie and associated floodwaters caused major erosion along Cherry Tree Creek;

- There has been past investment in the restoration of Cherry Tree Creek. Rock toe revetment works were undertaken by Reef Catchments at CT1 in 2015 conjunction with revegetation works on a meander over a bank length of approximately 70m. This rock toe revetment has been outflanked (Fig 1) at the downstream extents of the works. It is likely that this outflanking occurred due to the floodplain being composed of historical fill material, as evidenced by the exposed vehicle tyres present in the eroded bank.
- Approximately 380m of revegetation works (left bank of Cherry Tree Creek) was undertaken by Reef Catchments in 2015. The revegetation had been successful pre STC Debbie however the site was threatened by active deepening and widening of Cherry Tree Creek, which has already resulted in significant bank erosion and loss of revegetation works in places (Fig 2).
- Bank erosion on the right bank was also observed which is threatening the adjacent productive cane land.



Figure 1 Looking downstream from bed at left bank where Reef Catchments rock toe protection works have been outflanked.



Figure 2 Looking upstream from bed at left bank where Reef Catchments revegetation works have been lost to erosion.



Figure 3 Looking downstream from bed at CT2

Over a 12 year assessment period the sites have loss of approximately 4,100m² of productive sugarcane land. The estimated total fine sediment lost during assessment period was 6,308 tonnes equating to an anticipated ongoing fine sediment loss rate of 526 tonnes per annum if bank stabilisations works are not implemented.

Funded Remediation

Initial assessment of Cherry Tree Creek in the Mackay Whitsundays Cyclone Debbie post flood assessments report (Alluvium, 2017) identified channel incision, resulting in deepening and widening of the channel as the process through which bank erosion was occurring. This led to the selection of rock chute grade control structures as remediation measures to address this incision. Sites CT1 and CT2 were funded in March 2018 under NDRRA as priority sites for remediation.

An options assessment was commissioned including additional LiDAR imagery, modelling and hydrological analysis was conducted by Neilly Group Engineering (2018) to confirm the best remediation option. The Options Assessment found that just prior to the confluence with the tributary to Cherry Tree Creek the bed grade is approximately 1%. Soon after the confluence with the tributary, Cherry Tree Creek flattens out to a bed grade of approximately 0.2%. A bed grade of 0.2% is not a cause for concern and does not require re-grading to a flatter bed grade.

Shear stress and velocity values for both the 39% AEP (2 year ARI) and 2% AEP (50 year ARI) flood events were found in the Options Assessment to exceed the corresponding threshold limits for the reach between CT1 and CT2. This indicates that without in-situ controls such as toe of bank

armouring (natural or otherwise) or well-established woody vegetation, the banks within the reach are at risk of being susceptible to ongoing bank erosion.

Site surveys for the Options Assessment identified a considerable bed load in places within Cherry Tree Creek and no distinct knick points or head cuts. Site surveys found that the locations that have undergone bank erosion because of STC Debbie are those that either had little to no riparian vegetation or had riparian vegetation that was much less established compared to surrounding areas, despite the revegetation efforts undertaken by Reef Catchments. It will take many years before the revegetation has reached a point where it will offer protection to the banks of Cherry Tree Creek and all revegetation was largely confined to the top of vertical banks where significant bank erosion had already occurred. Subsequently, remediation measures to stabilise these eroded banks were recommended together with a complementary revegetation program.

The options assessment determined that the application of timber pile fields, rock groynes or engineered log jams was not suitable for stabilisation of the banks along Cherry Tree Creek and recommended traditional rock toe revetment with the banks battered back. Works were recommended at six sites (Fig 4). Site naming was extended to have CT1 – CT6. Works at sites CT1-4 included reprofiling, rock protection and revegetation however sites CT5 and CT6 were reprofiled and revegetated only.

Works were completed by the end of October 2018 (Fig 5). Works were conducted as per detailed designs completed by Neilly Group Engineering (2018). Works at these sites have seen banks reprofiled, over 250 linear meters of bank stabilised with over 2,900 tonnes of rock, finished sites have seeded and over 2,400 native plants have been planted.

The landholders have contributed to the project by assisting with access, irrigation and will continue to maintain sites post June 2019. Sarina Catchment Landcare revegetated and are maintaining the sites until the end of June 2019.

See post works aerial pictures along majority of the stretch (showing sites 1-4) in Fig 6 and 7. Detailed designs available on request.

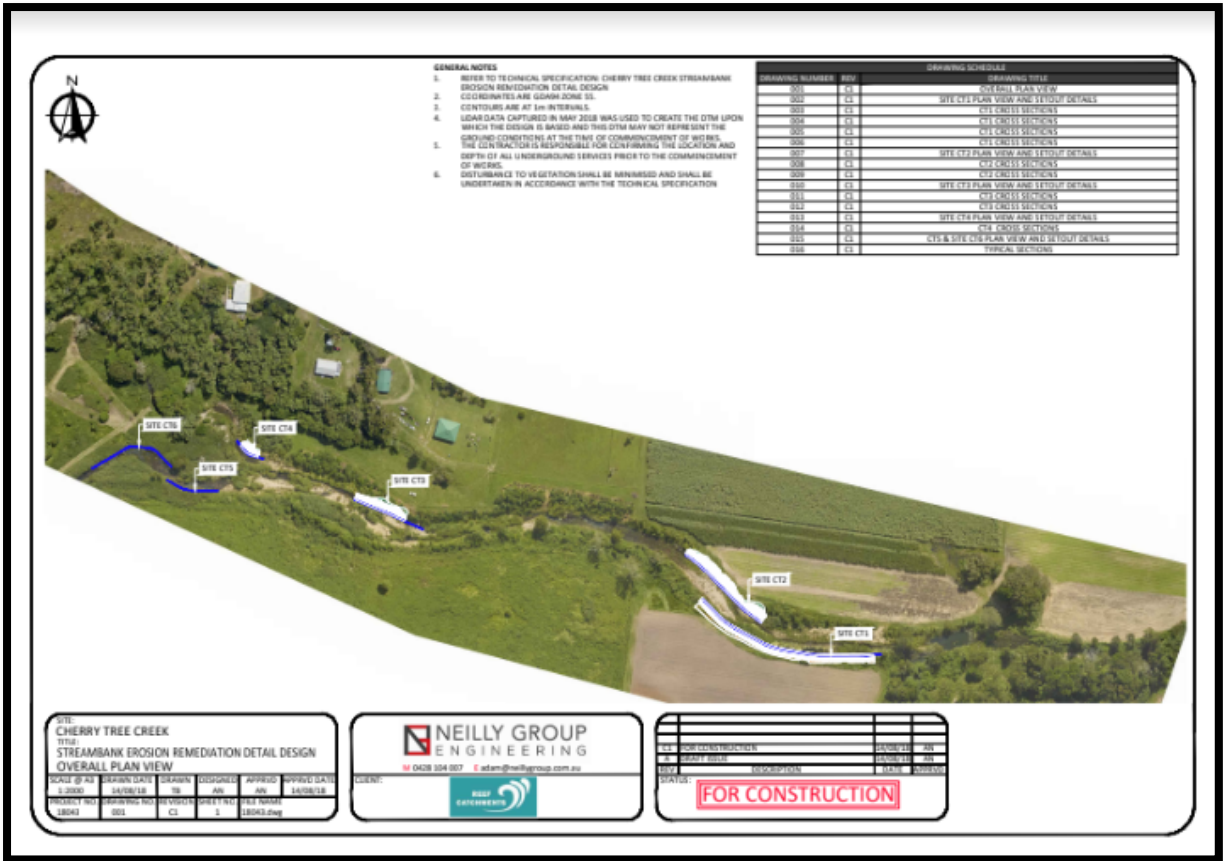


Figure 4 Cherry Tree Creek Bank Stabilisation Works Sites



Figure 5 CT1 & CT2 Post Earthworks (Pre Planting)

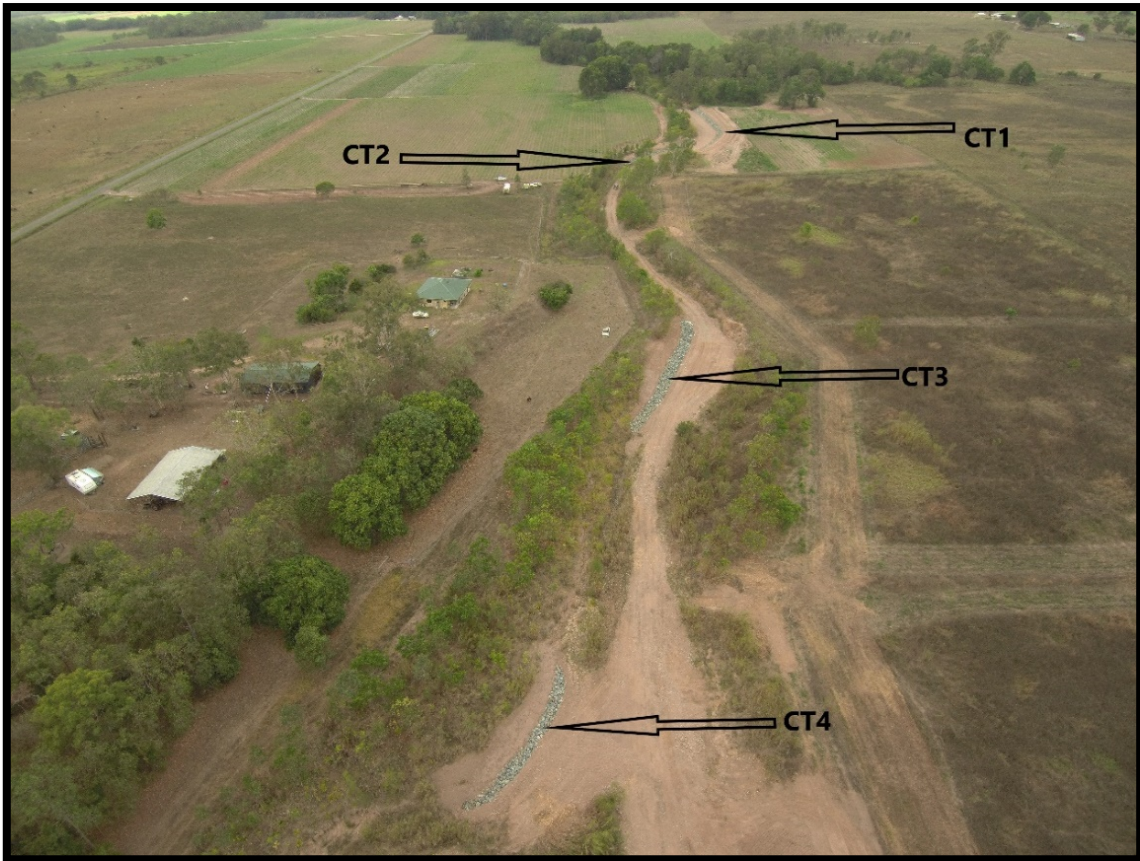


Figure 6 CT 4-1 Looking Downstream Post Earthworks (pre planting)

For drone footage of Cherry Tree Creek post earthworks see
https://drive.google.com/open?id=1EYAKIMbKOB4_khuBX2CHs03N-fAg4AJQ



Figure 7 CT1 Post Planting



Figure 8 CT2 Post Planting



Figure 9 CT3 Planted



Figure 10 CT4 Planted



Figure 11 CT5 Planted



Figure 9 CT6 Planted

Cherry Tree Creek Project Outcomes

- Preventing approximately 526 tonnes/year of fine sediment being exported to the Great Barrier Reef Lagoon;
- Protecting productive agricultural land from further loss through erosion; and

- Protecting the existing Reef Catchments revegetation and rock beaching works from further damage.

This program is funded by the Australian and Queensland Government's Natural Disaster Relief and Recovery Arrangements. Obtaining this funding was only made possible due to initial investment from Reef Catchments, Canegrowers Mackay and the Whitsunday River Improvements Trust to undertake the rapid assessment of the impacts of Cyclone Debbie and quantify works required.