

NEILLY GROUP

CATCHMENT SOLUTIONS

BANNOCKBURN STATION REEF TRUST IV GULLY REPAIR DESIGN ADDENDUM

MAY 2020

Document Control

Details and distribution

	Details		
Document Title	Bannockburn Station Reef Trust IV Gully Repair Design Addendum		
Revision Number	1		
Project Reference	20023		
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Distribution	Phil Jeston (Catchment Solutions)		
Citation	Neilly Group Engineering, 2020. Bannockburn Station Reef Trust IV Gully Repair		
	Design Addendum, prepared by Neilly Group Engineering for Catchment Solutions		

Revision History

Revision	Date	Ву	Nature of change	Checked By	Approved By
1	29/05/2020	Elle Searston	Final	Adam Neilly	Adam Neilly

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1 Introduction

Neilly Group Engineering was commissioned by Catchment Solutions to undertake detail design of remediation measures for gully erosion located on Bannockburn Station, approximately 62 km north-west of Rockhampton, Queensland. Neilly Group Engineering has previously undertaken a detail design for the gully remediation located on Bannockburn Station in 2018. The detail design developed in 2018 is reported in *Bannockburn Station Reef Trust IV Gully Repair Design* (Neilly Group Engineering, 2018). In the time between 2018 and 2020 the two gully head cuts have migrated further upstream, resulting in the requirement to reassess the previous detail design and redesign where appropriate.

This report forms an addendum to the previous detail design report and only changes from the previous design are outlined.

1.1 Scope of work

The scope of work was to:

- Undertake an assessment of the suitability of the gully remediation measures previously designed for Bannockburn Station.
- Redesign where appropriate the gully remediation measures using drone photogrammetry data captured in April 2020.
- Prepare updated For Construction Drawings, schedule of quantities and technical specification.
- Prepare an addendum report to the existing detail design report.

This addendum report presents the updated design of the proposed remediation measures for the gully erosion located on Bannockburn Station.

2 Existing Conditions

Existing conditions for Gully 1 and 2 have been previously reported in *Bannockburn Station Reef Trust IV Gully Repair Design* (Neilly Group Engineering, 2018).

Both gullies have migrated further upstream over the period from 2018 to 2020. The primary head cut of the gully erosion inspected for remediation is now located approximately 293m upstream of Ten Mile Creek. Figure 1 provides an overview of the site layout with a comparison of the gully head cut locations from 2018 to 2020.



Figure 1. Site overview

2.1 Hydrology and 2D modelling

Hydrology and 2D hydraulic modelling were not repeated for the design update of the two rock chutes and bunds at Bannockburn Station.

Bund heights were not altered to be any lower than previously modelled as part of the original design. The bund lengths have been checked against the original 5% AEP flood modelling extents which indicated that they extend far enough to contain the flood extents.

3 Rock chute drop structure design

The previously design rock chute drop structures and associated bunds have been reviewed and updated to account for the migration of the gully head cuts. The rock chute drop structures have been designed for Gully 1 and Gully 2 utilising:

- The Technical Guidelines for Waterway Management (DSE, 2007).
- Software package CHUTE using inputs obtained from the hydrologic modelling.

Rock chutes have been designed to the 5% AEP peak flow rate, as derived by the hydrologic modelling previously undertaken and reported in *Bannockburn Station Reef Trust IV Gully Repair Design* (Neilly Group Engineering, 2018). An overview of the rock chute drop structures and their accompanying overland flow bunds is shown in Figure 2 below, with a summary of the rock chute drop structure design details shown in Table 1. Full details are contained in the drawings as Attachment A and in the schedule of quantities in Section 4. Details for constructing the works are included in *Technical Specification: Bannockburn Station Reef Trust IV Gully Repair Design* (Neilly Group Engineering, 2020).



Figure 2. Overview of proposed design

Table 1. Rock chute drop structure design summary

Characteristic	Units	Rock Chute 1	Rock Chute 2
Design flow rate	m³/s	18.9	2.7
Chute length	m	32	21
Chute drop	m	1.5	2.1
Chute width	m	5	2
Crest length	m	3	13
Apron length	m	15	19
Apron rise	m	0	0.7
Vertical height of abutment protection	m	1	1
Rock beaching size (D ₅₀)	mm	500	500

4 Schedule of quantities

Table 2 below outlines the schedule of quantities and estimated costs for the implementation of the proposed rock chute drop structures and overland flow bunds.

Table 2. Schedule of quantities and estimated cost for implementation of works

Material/Equipment	Uni <u>ts</u>	Quantity
Gully 1 Rock Chute Drop Structure		
Clear and grub rock chute footprint	m²	584
Topsoil strip (nom. 150mm thickness) and cart to stockpile	m³	88
Excavation to foundation level	m ³	792
Supply of geotextile (length required, 4m wide roll)	m	44
Placement of geotextile	m	44
Supply of granular filter rock (D50 = 25mm)	m ³	50
Placement of granular filter rock	m ³	50
Supply of rock for rock beaching (D_{50} = 500mm)	m ³	474
Placement of rock for rock beaching	m ³	474
Placement of topsoil (nom. 150mm thickness)	m ³	17
Gully 1 Overland flow bunds		
Clear and grub bund footprint	m²	502
Topsoil strip (nom. 150mm thickness) and cart to stockpile	m ³	75
Fill to design level	m ³	406
Placement of topsoil (nom. 150mm thickness)	m³	79
Gully 1 Fill At Tie In Of Apron		
Clear and grub fill footprint	m²	48
Topsoil strip (nom. 150mm thickness) and cart to stockpile	m ³	7
Fill to design level	m ³	84
Placement of topsoil (nom. 150mm thickness)	m ³	7

Gully 2 Rock Chute Drop Structure		
Clear and grub rock chute footprint	m²	549
Topsoil strip (nom. 150mm thickness) and cart to stockpile	m ³	82
Excavation to foundation level	m ³	575
Supply of geotextile (length required, 4m wide roll)	m	34
Placement of geotextile	m	34
Supply of granular filter rock (D ₅₀ =25mm)	m ³	35
Placement of granular filter rock	m ³	35
Supply of rock for rock beaching (D_{50} = 500mm)	m ³	328
Placement of rock for rock beaching	m ³	328
Placement of topsoil (nom.150mm thickness)	m ³	36

Gully 2 Overland flow bunds		
Clear and grub bund footprint	m²	548
Topsoil strip (nom. 150mm thickness) and cart to stockpile	m ³	82
Fill to design level	m ³	297
Placement of topsoil (nom. 150mm thickness)	m ³	86

5 References

Department of Sustainability and Environment (DSE) (2007). *Technical Guidelines for Waterway Management,* Department of Sustainability and Environment, Victoria.

Neilly Group Engineering, 2018, *Bannockburn Station Reef Trust IV Gully Repair Design*, prepared by Neilly Group Engineering for Catchment Solutions.

Neilly Group Engineering, 2020, *Technical Specification: Bannockburn Station Reef Trust IV Gully Repair Design*, prepared by Neilly Group Engineering for Catchment Solutions.

Attachment A: Drawings