



# NEILLY GROUP

## ENGINEERING

CATCHMENT SOLUTIONS

TECHNICAL SPECIFICATION: TEN MILE CREEK  
EROSION REMEDIATION DETAIL DESIGN

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# Document Control

## Details and distribution

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## Revision History

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# 1 Introduction

This Technical Specification sets out the requirements for the construction of works for the Ten Mile Creek Erosion Remediation project. The project site is located on Ten Mile Creek, which is approximately 62 km north-west of Rockhampton, Queensland.

This Technical Specification sets out the requirements for the construction of the following works:

- Three in-channel grade control rock chutes with pools incorporated for fish passage.

This Specification should be read in conjunction with the *Ten Mile Creek Erosion Remediation Detail Design* report (Neilly Group Engineering, 2019).

## 1.1 General requirements

This Specification is to be read in conjunction with the conditions of the contract, and all other specifications and drawings.

Where works are directed to be performed by the Contractor but are not specified in the Specification, the Contractor shall carry them out with full diligence and expedience as are expected for works of this nature under the obligations of the Contractor.

## 1.2 Standards and guidelines

Unless stated otherwise in the Specification, the approved drawings, or elsewhere in the construction documents, work shall comply with the current and relevant Australian Standards. Any variations or ambiguity between the Specification, other construction documents and Australian Standards shall be referred to the Catchment Solutions (the Owner) representative for direction before proceeding with the work.

## 1.3 Drawings

The Drawings referred to in this Specification are those endorsed by the Designer (Neilly Group Engineering). The Drawings must not be varied without the written approval of the Designer. The Drawings for the in-channel grade control rock chutes are listed in Table 1.

**Table 1. Rock Chute Spillway Drawings**

Drawing Number	Revision	Drawing Title
18060-001	C1	OVERALL PLAN VIEW, SHEET LAYOUT & NOTES
18060-002	C1	ROCK CHUTE 1 - SETOUT
18060-003	C1	ROCK CHUTE 1 – LONGITUDINAL SECTION
18060-004	C1	ROCK CHUTE 2 - SETOUT
18060-005	C1	ROCK CHUTE 2 – LONGITUDINAL SECTION
18060-006	C1	ROCK CHUTE 3 - SETOUT
18060-007	C1	ROCK CHUTE 3 – LONGITUDINAL SECTION
18060-008	C1	TYPICAL SECTIONS
18060-009	C1	TYPICAL SECTIONS

## 1.4 Timing of works

Works shall be undertaken during the dry season to reduce the risk of erosion by rainfall and runoff during construction and on freshly exposed surfaces post construction.

## 1.5 Sequence of works and hold points

Staging of works shall be undertaken as follows for the in-channel grade control rock chutes:

1. Site preparation;
2. Construction of in-channel grade control rock chutes; and
3. Site reinstatement.

Hold points that require approval by the Catchment Solutions representative before proceeding are detailed in Table 2.

**Table 2. Schedule of hold points for the in-channel grade control rock chutes**

Hold Point	Details	Inspection by
Foundation preparation	Foundation preparation in accordance with this Specification prior to the placement of geotextile, granular filter material or rock.	Catchment Solutions Representative
Placement of geotextile	Placement of geotextile in accordance with this Specification prior to the placement of granular filter material and rock	Catchment Solutions Representative
Placement of granular filter material	Placement of granular filter material in accordance with this Specification prior to the placement of rock	Catchment Solutions Representative

Revegetation works have not been included in this Specification. They are to be undertaken at the direction of the Catchment Solutions Representative in accordance with relevant specifications.

## **2 Site preparation**

### **2.1 Set-out**

The Contractor is responsible for setting out alignments and levels from the Drawings and shall establish sufficient set-out pegs to ensure smooth changes in both vertical and horizontal alignment. Bench marks, survey pegs, level pegs or supplementary reference marks must not be adjusted or moved without written approval of the Catchment Solutions Representative. The contractor must transfer any pegs affected by the earthworks to side positions clear of operations and must note the extent of the movement in distance and level.

### **2.2 Clearing and grubbing**

Clearing must be carried out in advance of any earthwork operations and is to include the removal of all foreign material and vegetation, except trees and plants required to be preserved as identified by the Catchment Solutions Representative, from within the boundaries of areas affected by earthworks or other areas to be cleared as designated on the Drawings.

All stumps and roots must be grubbed to a depth of at least 150mm below the finished surface level or foundation level, whichever is the lowest elevation. Grub holes are to be backfilled and well compacted with approved select material. All foreign material and vegetation cleared except topsoil must be removed from the site and is to be deposited at the appropriate disposal site.

### **2.3 Stripping and stockpiling of topsoil**

All topsoil is to be stripped from areas to be excavated or filled and from other areas as shown on the Drawings. Topsoil is to be stored in approved stockpiles for use in re-instatement of the work by the Contractor. Stripping topsoil shall consist of the removal of topsoil to a minimum depth of 100mm below ground level.

### **2.4 Backfill**

Holes or cavities that are found within the site after excavation to the design foundations shall be backfilled with materials similar to the adjacent ground, and such fill shall be compacted to a dry density similar to that of the surrounding material.

## **3 Construction of in-channel grade control rock chute**

### **3.1 Excavation to foundation level**

No excavation shall be commenced until the Contractor has undertaken a Dial Before You Dig (DBYD) search and obtained current underground location plans which provide an indication of the presence, location and depth of underground plant in the area of the works.

Excavation shall be carried out to the depths and dimensions shown on the Drawings, or to such greater depths and dimensions as will ensure sound, permanent foundations. All excavation carried out shall be approved by the Catchment Solutions Representative before any materials are placed on the excavated surfaces (**hold point**).

Excavations shall be conducted by machine and/or by hand as necessary to produce profiles to the accuracy required by this Specification and the Drawings. In carrying out excavation work, all reasonable precautions against mishap or accident, whether arising from insufficient strength of supports, bad workmanship, breakage of machinery or plant, inefficient caulking or packing of open joints or spaces, flood, or any other cause whatsoever shall be taken.

#### **3.1.1 Excavated material**

All materials cleared and excavated shall be removed from site and recycled appropriately or disposed of legally. If an appropriate area exists on the site, suitable material may be stockpiled and used for backfilling, provided that excess stockpiled material is disposed of when all backfilling is completed. Special care is to be taken to ensure that the proposed stockpile does not impact on any existing trees or structures.

#### **3.1.2 Unsuitable material**

Unsuitable material such as silt, mud, roots, organic matter, rubbish, areas of very soft clay or high moisture content and any other deleterious substances shall be disposed and replaced with select material.

The Contractor shall rework or replace any material that has become unsuitable because of inappropriate construction activities. Inappropriate construction activities include poor surface drainage, restricted or inoperative subsurface drains, contamination, excessive sized plant where the imposed local load exceeds the material strength, poorly maintained plant allowing leakage of oils and water onto the formation and leaving the surface open to wet weather allowing moisture ingress.

#### **3.1.3 Fill**

Fill shall be carried out to the depths and dimensions shown on the Drawings with select fill cut from the excavation. Prior to placing fill material, the Contractor shall prepare any areas upon which the fill is to be placed to be free of organic material. The surface shall be compacted to a dry density of not less than 95% maximum dry density at optimum moisture content (OMC) for the upper 150mm, in accordance with AS1289.

All fill material shall be free of organic material and shall be placed in uniform, near horizontal layers not exceeding 300mm in loose thickness. Each layer shall be moisture conditioned and compacted to not less than 95% maximum dry density at OMC in accordance with AS1289.

Each layer of fill material shall be thoroughly compacted before additional fill is added. Compaction of the fill material shall be carried out to moisture content appropriate to the compaction equipment being used.

### **3.2 Placement of geotextile**

Bidim A44 or equivalent geotextile shall be placed within the perimeter of the apron and crest cut-off walls of the rock chutes as shown on the Drawings. Where a single width of geotextile is insufficient to provide full coverage, a minimum overlap of 500mm must be maintained where multiple widths of geotextile are required. The geotextile shall be placed to form a surface that is smooth, free of creases and depressions and shall be pinned into place. Geotextile shall be placed and approved by the Catchment Solutions Representative prior to the placement of granular filter material or rock beaching (**hold point**).

### **3.3 Placement of granular filter material**

Granular filter material shall be placed following excavation to foundation level and subsequent placement of geotextile in the crest and apron cut-off walls. The granular filter material shall be placed and compacted by machine bucket in accordance with this Specification and to the thicknesses and locations as shown on the Drawings. Granular filter material shall be placed and approved by the Catchment Solutions Representative prior to the placement of rock beaching (**hold point**).

#### **3.3.1 Granular filter material specification**

Granular filter material shall be hard and durable gravel and shall have a nominal size of  $D_{50} = 25\text{mm}$ . The granular filter material shall be approved by the Catchment Solutions Representative prior to placement.

### **3.4 Placement of rock beaching**

Rock beaching shall be placed following excavation to foundation level and subsequent placement of geotextile and granular filter material. The rock beaching shall be placed in accordance with this Specification and to the thicknesses and locations as shown on the Drawings.

The Contractor shall use appropriate methods for handling and placement of rock that will:

- Avoid tearing of geotextile material.
- Avoid segregation of the rock size fractions

The rock shall be placed to form an interlocking blanket of rock with low void spaces. Voids in the blanket of rock shall be reworked as required by the Catchment Solutions Representative. Rock beaching shall be placed and approved by the Catchment Solutions Representative prior to the placement of topsoil on the upper batters of the rock chutes.

#### **3.4.1 Rock beaching material specification**

The rock used to line the rock chutes must be durable, resistant to weathering and angular in shape. The  $D_{50}$  is used to describe the nominal rock size required for the rock chute spillway works, where  $D_{50}$  represents the nominal rock diameter, of which 50% of the rocks (by weight) are smaller. No rocks should be greater in diameter than twice the  $D_{50}$  and should be proportioned such that neither the breadth nor thickness of a single rock is less than one-third its length. The rock must also be well graded so that the rock can interlock with low void spaces. Poor grading of the rock will increase the potential for structural failure of the rock chute spillway works. The size specification is shown in Table 3. The rock must have a relative density greater than or equal to 2.40.

**Table 3. Rock beaching size specification**

<b>Sieve size (mm)</b>	<b>Percentage finer (by weight)</b>
1200	100
600	50
180	10

### **3.5 Placement of topsoil**

Topsoil shall be placed following excavation to foundation level and subsequent placement of geotextile, granular filter material, rock beaching and adjacent excavation and filling to form the upper batters of the rock chutes. Topsoil shall be placed in accordance with this Specification and to the thicknesses and locations as shown on the Drawings.

Topsoil shall be placed in loose layers of 100mm thickness, to the thickness as specified in the Drawings. The finished surface shall be left rough and free draining.

## 4 Site reinstatement

Upon the completion of works, the Contractor shall reinstate the works site and all other areas disturbed because of the works. This shall include:

- Disposal, or re-use where approved by the Catchment Solutions Representative, of all waste material resulting from the works.
- Filling or grading of disturbed areas to match adjacent undisturbed surface levels to ensure areas remain free draining.
- Topsoiling all disturbed areas not already specified in the Drawings to a minimum loose thickness of 100mm, seeding with a suitable grass seed mix supplied to the contractor, left rough and free draining.
- Reinstating any access tracks to a condition similar to that prior to the commencement of works.

## 5 References

Neilly Group Engineering, 2019. *Ten Mile Creek Erosion Remediation Detail Design*, report prepared by Neilly Group Engineering for Catchment Solutions.