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Tailcon Projects
Consulting

13 Dec 2024

Synergy Generation Business Unit

Muja Power Station

Fly Ash Dam Cell 2 – Raise 2C Construction Technical Specification

Rev. A

Document Status

Project:	Muja Power Station
Report Title:	Fly Ash Dam Cell 2 – Raise 2C Construction Technical Specification
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The opinions, conclusions and any recommendations in this Report are based on information supplied by Synergy Generation Business Unit. Tailcon has compared key supplied data with expected values, the accuracy of the results and conclusions in this Report are reliant on the accuracy and completeness of the supplied data. Tailcon expressly disclaims responsibility for any errors or omissions in the supplied information and any consequential liability arising from commercial decisions or actions resulting from them. Opinions, conclusions, and any recommendations presented in this Report apply to the site conditions as they existed at the time of the Report writing and those reasonably foreseeable.

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[redacted]

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1 Introduction

1.1 Scope

This Specification covers the minimum technical requirements for the construction of the Fly Ash Dam (FAD) Cell 2 Raise 2C and associated civil works, including the following proposed areas:

- Embankment raise.
- Embankment buttressing.
- Decant causeway.
- Emergency spillway.

The civil works include the following:

- Clearing.
- Topsoil stripping, stockpiling, respreading and/or disposal.
- Foundation preparation and detailed earthworks.
- Supply and installation of erosion control matting.

The Bill of Quantities (BoQ) is included in Appendix A while the Drawings are included in Appendix B.

1.2 Project Location

The Fly Ash Dam (FAD) is located within the Muja Power Station (MPS), located approximately 220 km south of Perth and approximately 17 km southeast of the town of Collie, Western Australia.

2 Definitions and Abbreviations

The following abbreviations shall apply to this Technical Specification:

Table 2-1: List of Abbreviations

Abbreviation	Definition
AS	Australin Standard
ITP	Inspection Test Plans
LL	Liquid Limit
MDR	Manufacturer's Data Report
MMP	Materials Management Plan
MPS	Muja Power Station
NATA	National Association of Testing Authority
OMC	Optimum Moisture Content
PI	Plasticity Index
PL	Plastic Limits
PSD	Particle Size Distribution
SMDD	Standard Maximum Dry Density
TMP	Traffic Management Plan

Table 2-2: List of Terms

Terms	Definition
Atterberg Limits	Consist of liquid limit, plastic limit and shrinkage limit tests for measurement of critical water content of fine-grained soils.
Contractor	The party responsible for the governance of the Work under the Contract including budget, scope and schedule
Dry Density Ratio	The percentage ratio of the field dry density of a material to the modified maximum dry density of that material as measured in accordance with AS 1289, 5.2.1. This property is also termed Relative Compaction.
Principal	Synergy
Principal's Representative (or Superintendent)	A person to whom Principal may delegate from time to time the powers, duties, and authority vested in it as it may think fit and shall give notice in writing to the Contractor of the name of such person and the extent of the powers, duties and authority so delegated.
Site	As described in Section 1.
Works	As defined in the Contract.

3 Codes and Standards

Unless otherwise specified, or shown on the drawings, the Contractor is to provide all materials and conduct the work in accordance with the latest revisions of the relevant Australian Standard Codes.

All work under this Contract shall be performed strictly in accordance with the following specifications, drawings, and other documents, which by this reference forms part of the Contract, unless expressly noted otherwise.

- AS 1289 – Methods of testing soils for engineering purposes.
- AS 3798 – Guidelines on earthworks for commercial and residential developments.

The Works shall be conducted to comply with the latest revision of the Drawings, Codes and Standards specified, or where no standards are specified, to Australian Standards, or to the appropriate recognised Standards.

Before making any changes to any work under the Contract, to comply with any revisions to the relevant Codes and Standards, the Contractor shall give to the Principal written notice specifying the reason therefore and requesting his direction thereon. The Principal shall decide whether a change is necessary and issue an order accordingly, under the provisions of the General Conditions of Contract.

4 General

4.1 Contractor Supply of Materials

The Contractor shall provide adequate protection against damage during transport, storage and handling of the goods.

4.2 Survey and Setting Out

Unless otherwise approved by the Principal, the Contractor shall obtain the metadata of the Principal's Supplied datum points to be used in the Works to confirm that datum points used will satisfy the quality and accuracy of the finished works.

The Contractor shall:

- Set out the Works to the lines and levels shown on the Drawings or specified from established control stations or as directed by the Principal's Representative.
- Take all reasonable and practical measures to avoid impact on Restricted Areas (if defined).
- Establish and maintain datum and level for all works from the Principal's supplied datum points.
- Perform as-built survey of buried works before backfilling and restoration of surfaces.

4.3 Material Testing

All testing shall be carried out in accordance with this Specification using an independent National Association of Testing Authority (NATA) certified laboratory and personnel. Evidence of the accreditation of the laboratory and the personnel shall be provided to the Principal's Representative prior to the commencement of sampling and testing. All tests shall be carried out in accordance with the Australian Standards test methods specified.

A register of NATA endorsed test reports shall be compiled on site and maintained in unison with the progress of construction, for review by the Principal's Representative. All reports shall be provided in the Manufacturer's Data Report (MDR).

All earthworks samples and test holes shall be immediately backfilled with material complying with this Specification.

4.4 Materials Management Plan

Prior to commencing works the Contractor shall prepare and submit a Materials Management Plan (MMP) for approval by the Principal's Representative. The aim of the MMP is to ensure that the geomaterial resources available to the project are used economically and efficiently. The MMP shall include:

- Mass haul plan.
- Sources of general / select fill, pavement materials and riprap (borrow pits, cuttings, etc).
- Location, size and expected yield of borrow pits (if any).
- Areas to stockpile spoil, topsoil and cleared vegetation.
- Identify potential areas of unsuitable or hazardous material.

The Contractor may be required to stockpile materials for later use. Where shown on the Drawings or directed by the Principal's Representative, stockpiling areas are to be prepared to ensure that it remains free draining at all times. The MMP shall include proposed stockpiling areas, access tracks, material sources, material quantities, stockpile heights and operating procedures. If required, differing material types shall be stockpiled separately and sign-posted accordingly. Material stockpiles shall be placed such that each material type remains accessible at all times and are clear of topsoil and vegetation from clearing and grubbing. Material stockpiles shall be pushed and formed such that the material does not become saturated.

The MMP shall be initially prepared using assumed quantities and locations of materials based on geotechnical reports for the Project area, and shall be updated by the Contractor as the Works progress and material types and quantities become more defined.

4.5 Construction Water

Construction water to be provided by Principal from designated source. The rate of delivery to be confirmed by the Principal.

The Contractor will supply a storage tank and associated standpipe infrastructure for construction water. The Contractor must ensure that there is adequate supply and storage to facilitate construction requirements.

4.6 Existing Services

The Contractor shall locate all services and structures in the vicinity of the Works. The Contractor shall take every precaution to ensure that existing services are not damaged due to construction. Before commencing any work near existing services, the Contractor shall obtain the Principal's Representative's approval for the proposed construction method.

The Contractor shall assume there is no certainty Principal's records are complete or entirely accurate. All buried services within the vicinity of the works shall be identified and marked prior to commencing excavation. The Contractor shall establish work methods to locate buried services, and support and protect these services if exposed during construction. The work methods shall include, but are not limited to, field checks (using radar, metal detectors and cable locating devices as appropriate) and hand digging and/or vacuum excavation as necessary.

The Contractor may be required to carry out this work at times that minimise the disruption of Principal's Operations.

Where embankment foundation preparation or embankment construction occurs over services within 700 mm of the foundation, vibratory rollers shall not operate in dynamic mode within 3 meters of the services.

4.7 Control of Water During Construction

The Contractor shall control all water, flowing from any source, during construction and prevent such water entering the Works. The Contractor shall provide temporary water courses, ditches, drains, pumping and other infrastructure as required to maintain the works area free from standing water. This shall include the provision of adequate drainage for borrow areas under the control of the Contractor.

The Contractor shall carry out the forming of cuttings, embankments and material stockpiles in such a manner to ensure that surfaces have sufficient gradient to disperse standing water and prevent

ponding at all times. Materials that are softened as a result of the Contractor's inability to suitably control water shall be removed or processed to be suitable for reuse. The Contractor shall provide measures to prevent soil erosion or damage to any nearby infrastructure or off-lease property, including roads and/or access ways, arising from the run-off or disposal of water from the work area.

4.8 Dewatering

Where required, excavations shall be dewatered by methods approved by the Principal's Representative during excavation and subsequent phases of the Works. Prior to commencement of dewatering activities, approval shall be obtained from the Principal's Representative, which will include the disposal method of water to ensure all necessary regulatory requirements have been met.

The dewatering method and procedures shall not result in damage to adjacent structures and services. The Contractor shall ensure that structures and excavations remain stable during dewatering. Dewatering shall be maintained continuously under all conditions and at all times until the Work is accepted by the Principal and:

- The components placed in the excavation are able to withstand the effects of water.
- Until backfilling and its compaction has been completed.

4.9 Dust Suppression

The Contractor shall keep airborne dust and fibrous materials to a minimum on site and shall take all necessary measures to ensure dust from construction operations does not constitute a hazard or nuisance to the Works or adjacent areas.

To minimise airborne dust, the Contractor shall as a minimum undertake the following:

- Unsealed site access roads and/or tracks are watered regularly to minimise dust.
- All areas to be excavated are to be watered down prior to work commencing.
- Apply water during excavations as required by conditions.

4.10 Equipment Hygiene

On-site hygiene shall be undertaken and approved by the Principal's Representative. No vehicle or equipment shall be washed on site unless cleaning activities are contained in an approved and designated wash down bay.

4.11 Contaminated or Fibrous Material

Contaminated or fibrous materials are a significant environmental, health and safety issue if encountered during site investigation or construction. When contaminated or fibrous material is suspected, works in the affected areas shall be stopped until samples can be analysed to confirm the type and extent of contamination discovered. Disposal or use of contaminated or fibrous materials will be determined by the Principal's Representative.

4.12 Traffic Management and Traffic Control

The Contractor shall prepare and submit for approval by the Principal's Representative a Traffic Management Plan (TMP). The Contractor shall ensure that safe access is maintained at all times along site access roads, public roads and haul road for all operations, construction, maintenance and

public traffic. If it is necessary for an access road to be closed for the completion of the Works, the closure plan shall be approved by the Principal's Representative prior to construction.

Traffic shall be protected at all times by the provision of traffic control measures and signage in accordance with AS1742.3.

4.13 As-Built Documentation

The Contractor shall be responsible for maintaining and submitting "As-Built" drawings and data for the whole works in accordance with Synergy requirements.

The Contractor shall provide marked-up drawings showing any deviations in design, outside of construction tolerances.

Practical completion will not be granted until "As-Built" drawings and the MDR have been approved by the Principal's Representative.

4.14 Site Restoration and Rehabilitation

4.14.1 Disposal of Surplus Materials

Any excess material resulting from earthwork operations, which is surplus or unsuitable for use under sections of this specification, shall be removed from the site or shall be disposed of by hauling and spreading in spoil areas, as approved by the Principal's Representative. Material deposited in the spoil areas shall be graded to a uniform surface to drain.

4.14.2 Restoring Disturbed Areas

All fences, paths, roadways and other areas disturbed by the Contractor in carrying out the Works shall be restored to a condition at least as good as their former state. Rehabilitation works shall be protected via the construction of windrows or fences to prevent vehicular damage to newly rehabilitated sites. Principal's approved rehabilitation signs shall also be installed to further protect the area.

5 Site Preparation

5.1 Site Clearance and Grubbing

All trees and roots, tree stumps, scrub, organic matter, other vegetation, rubbish and building rubble shall be completely removed from the site of the Works to a location indicated by the Principal.

The Contractor shall not clear any area outside of the approved area. Unless stated otherwise by the Principal, clearing shall be undertaken to the extent of the works area plus 3 m.

All clearing activities and vegetation disturbance shall be approved by the Principal's Representative prior to site disturbance and commencing clearing activities.

Grubbing shall consist of the removal and disposal of all stumps, roots larger than 100 mm in diameter, matted roots, and other objectionable vegetation or debris to a minimum depth of 600 mm below original ground surface.

Grubbing shall be carried out over the full extent of the areas for clearing, except where prohibited by rock. Grubbed holes deeper than bulk excavation levels shall be filled with competent material and compacted prior to commencing any further site preparation.

Any resulting holes shall be filled and compacted in accordance with the requirements of Section 8 of this Specification.

5.2 Topsoil and Subsoil Management

Following site clearance, the top layer of organic topsoil shall be removed from the site of the Works and stored for reuse or disposed of off-site as directed by the Principal.

The areas for storage and disposal shall be as approved by the Principal, or as shown on the drawings or in the specification if defined. If any chosen site is likely to be inundated during periods of rain, the Principal shall be informed and a new site selected.

Extent of footprint requiring topsoil removal may be varied to suit in-situ ground conditions as approved by the Principal's Representative.

5.2.1 Permanent Work Areas

Topsoil (where topsoil exists) to a nominal depth of 100 mm and subsoil (where subsoil exists and is practical to remove) to the next 100 mm to 300 mm shall be stripped and stockpiled separately in accordance with the MMP, as detailed on the drawings and/or as directed by the Principal's Representative.

5.2.2 Temporary Work Areas

Where topsoil and subsoil are present, they shall be stripped and graded to one side of the site access road, or outer edge of the laydown/spoil area, and stockpiled in accordance with the MMP. Rehabilitation work shall follow promptly once the temporary area is no longer required.

5.2.3 Respreading of Topsoil

Where topsoil is to be respread in cuts and in fill, the topsoil shall be respread evenly from the limit of clearing to the toe of the batter or as directed by the Principal's Representative. Respreading and rehabilitation works shall be managed in accordance with Section 4.14.

6 Borrow Area Management

6.1 General

The Contractor shall be responsible for the detailed investigation, planning, material assessment, testing, establishment, management and rehabilitation of borrow pits in accordance with this Specification.

6.2 Design and Location of Borrow Pits

The Contractor shall define the limits and depth of the borrow pits after sampling and testing of borrow area materials and shall provide a detailed Borrow Plan to the Principal's Representative. The Contractor shall submit details of all proposed borrow pit, establishments and operating procedures to the Principal's Representative for approval at least fourteen days prior to accessing borrow pits. The Borrow Plan shall include location of access tracks, arrangement and size of the borrow area, excavation faces, laydown areas and stockpiled areas.

6.3 Borrow Pit Testing

The Contractor is to carry out their own sampling and testing of borrow sources to confirm borrow quality and quantity in accordance with the testing frequency requirements. Historical testing undertaken by the Principal's Representative may be used at the Contractor's own risk.

The following testing requirements apply to material sourced from borrow pits. Tests undertaken for borrow pit verification can be used to supplement the fill placement verification test frequency provided that the material movement from the borrow pit to the point of placement is traced and documented.

Table 6-1: Borrow Material Testing Frequency

Location of Testing	Test	Minimum Frequency
Bottom Ash as Fill	Particle Size Distribution	1 per 1,000 m3 for the first 4,000 m3 and 1 per 2,500 m3 thereafter
	Atterberg Limits	1 per 1,000 m3 for the first 4,000 m3 and 1 per 2,500 m3 thereafter
Zone 1 Clay	Particle Size Distribution	1 per 1,000 m3
	Atterberg Limits	1 per 1,000 m3

6.4 Working of Borrow Area

The Contractor shall maximise the volume of compliant materials within the borrow pit limits and to the planned depth of the borrow pit. Where a borrow pit contains the required borrow materials, the Contractor shall ensure these materials are utilised to maximise the yield of such materials. Where the Contractor does not manage the borrow pit such that material is used economically and efficiently in accordance with the Material Management Plan (Section 4.4), any additional cost incurred shall be the Contractor's. The Contractor shall schedule their operations so as to minimise haulage distances and obtain borrow from the closest available source. Upon completion of borrowing activities, the pit shall be surveyed to confirm and record the quantity of material removed. Rehabilitation of borrow pits and areas shall be programmed to keep pace with the construction program.

6.5 Material Stockpile Areas

The Contractor may be required to stockpile materials for later use. Where shown on the Drawings, or directed by the Principal's Representative, stockpiling areas are to be developed in accordance with Section 7. The area shall be prepared to ensure that it remains free draining at all times.

The Contractor shall provide a Stockpiling Plan to the Principal's Representative for approval at least seven days prior to stockpiling materials. The Stockpiling Plan may form part of the Material Management Plan (Section 4.4) and shall include proposed stockpiling areas, access tracks, material sources, material quantities, stockpile heights and operating procedures. Differing material types shall be stockpiled separately and sign-posted accordingly. Stockpiles shall be placed such that each material type remains accessible at all times and are clear of topsoil and vegetation from clearing and grubbing. Material stockpiles shall be pushed and formed such that the material does not become saturated.

Paddock dumping of material is not permitted. On completion of stockpiling, the stockpiles are to be surveyed to confirm and record the quantities of materials placed.

7 Excavation

7.1 General

The Contractor shall request an Excavation Permit from the Principal's Representative at least 7 days in advance of undertaking any excavation work.

The Contractor shall excavate every type of material encountered regardless of character to the lines, grades and dimensions shown on the Drawings. The Principal's Representative may vary the size of the excavations, during the execution of the works, in order to produce more economical or stable excavations.

Activities are to be monitored during excavation of materials in areas potentially contaminated with chemicals, hydrocarbons or known to contain fibrous material. When contaminated or fibrous material is suspected, management of the materials shall be in accordance with Section 4.11. It is the Contractor's responsibility to manage the excavation to maximise the volume of material suitable for use elsewhere in the works in accordance with the MMP (refer Section 4.4).

Excavation shall be carried out with due regard to the safety of personnel and any structure which may be adjacent to the Works. Excavated material shall be placed in such a position as to cause the least inconvenience to the Principal, other Contractors or vehicular traffic.

To avoid entrapment of native or feral animals or stray stock and to provide safe entry for personnel for inspection, monitoring and cleaning, all excavations shall have battered ingress an/or egress points. The base of all excavations shall be inspected, and the Principal's Representative informed of the presence of any potentially unsuitable material. The extent of the excavations shall be safely barricaded as required.

7.2 Excavations for Foundations

7.2.1 General

The base of the foundation shall be compacted prior to any placement of material. Excavations shall be kept free of loose material and water until culverts have been backfilled sufficiently to be unaffected by falling material, water ingress or other works within the area.

Unless specified otherwise, all excavations shall be secured by necessary means including timbering, planking and strutting, shoring and bracing, sheet piling, battering the sides to safe slopes or any other methods required to keep the excavation stable.

All temporary supports, batters or benches for excavations deeper than 1.2 m shall be reviewed by a competent Engineer and the assessment, surcharge assumptions and design (if required) shall be provided to the Principal's Representative before excavation commences.

7.2.2 Dimensions

The width of excavations shall extend only the minimum distance determined in accordance with the drawings and as required for stability of batters or benches or for the installation and removal of shoring etc. as required.

The excavation depth shall be determined in accordance with the drawings and with regards to all aspects including soil condition, bedding and testing.

8 Filling

8.1 Fill Characteristics

8.1.1 Embankment and Buttress Fill

Embankment and buttress fill shall be material approved by the Principal's Representative and sourced from the excavations / cuttings or designated stockpile, free from any clods, stumps, roots, sticks, organic matter and other deleterious material, The Contractor shall submit representative samples, material gradings, plasticity indices, liquid limits and linear shrinkage values (where applicable) to the Principal's Representative for approval in accordance with the MMP prior to importing or placing any such materials.

The embankment and buttress have been zoned with the following fill types:

8.1.1.1 Bottom Ash

This material is expected to be silty SAND material with particle size as defined in Section 8.5.

8.1.1.2 Zone 1 Clay

This material shall be approved CLAY material with particle size and plasticity as defined in Section 8.5.

8.1.2 Rip Rap

Riprap for Drop Structure and Spillway Rock Pitching shall be rock rubble comprising hard, clean stones of a uniform type and colour that conforms to the particle size as defined in Section 8.5.

The greatest external dimension of any stone used shall not exceed approximately 1.5 its smallest dimension.

8.1.3 Rock Fill

Rock fill for decant causeway shall be fresh rock, particle density greater than or equal to 2.5 t/m^3, geotechnically inert (i.e. igneous rock), and conforming to the particle size defined in Section 8.5.

8.2 Placing of Embankment and Buttress Fill

Construction water shall be added to facilitate compaction and for dust suppression. Material shall be placed in loose layers 150-300mm thickness, to the line levels shown on the Drawing, and compacted to the requirements as defined in Section 8.5.

8.3 Deposition of Rip Rap and Rock Fill Material

In general, the final compacted thickness of each layer of rock fill material shall exceed 1.5 times and shall not exceed twice the nominal grade size of the rock fill material.

8.4 Geotextile Fabric Underlay

Where a geotextile fabric underlay is indicated on the Drawings, the material shall be non-woven 100% polyester fabric such as Bidim, Terrafix, or and equivalent product approved by the Principal's Representative, and with sufficient strength and suitably overlapped to withstand the initial placement of rock.

8.5 Construction Testing

Test results shall be issued to the Principal's Representative within 24 hours of testing. The testing requirements for installations are detailed below.

Table 8-1: Specification Requirement and Testing Frequency

Zone	Specification Requirement	Test	Sample Location	Test Frequency
Bottom Ash	PSD: Fines (<75 micron) ranging 10% - 30% by mass	Grading to AS1289.3.6.1	In stockpile	1 test per 1,000 m3
	Compaction to >= 95% SMDD at OMC -3% to +3%			
Zone 1 Clay	PSD: Fines (<75 micron) ranging 40% - 65% by mass	Grading to AS1289.3.6.1	In stockpile	1 test per 1,000 m3
	LL <=60% PI >15%	Atterberg Limits to AS1289.3.1.1, 3.2.1, 3.3.1	In stockpile	1 test per 1,000 m3
	Compaction to >= 95% SMDD at OMC -2% to +3%	Dry Density Ratio and Moisture Variation to AS1289.5.1.1 and 5.4.1	In-situ	1 test per 1,000 m3 or per 200 liner meters of each layer whichever occurs more often
Rip Rap	PSD: Maximum particle 100 mm, D_{50} = 75 mm	Grading to AS1289.3.6.1	In stockpile	1 test per 250 m3
Rock Fill	PSD: Maximum particle 500 mm, preferably 70% passing 200 mm, 20% passing 75 mm, non-plastic fines (<75 micron) <3% by mass	Grading to AS1289.3.6.1	In stockpile	1 test per 500 m3

8.6 Construction Test Plan

The Principal's Representative inspection requirements that are to be included into the Contractor's Inspection Test Plans (ITP) for the work stages are detailed below. The Principal's Representative may request for additional inspection points as required during the Works. The Contractor shall give the Principal's Representative 24 hours' notice that any of the following stages of the works will be ready for inspection.

Table 8-2: Inspection Plan

Zone	Inspection	Approval	Inspection Status – Category*
Embankment and Buttress Set-out	Location of embankment and buttress	Approve alignment and set-out	**H**
Foundation	Excavation of unsuitable material	Approve limit of excavation	**W**
		Approve foundation material	**H**
	Foundation preparation	Approve foundation preparation	**H**
Rip Rap	Preparation of underlying area	Approve founding condition	**H**

Note: *H = Hold Point, W = Witness

9 Completion of Earthworks Surfaces

9.1 Completion of Earthworks Final Surfaces

Earthworks final surfaces shall be completed to a stable condition as soon as practicable after excavation or deposition and compaction of fill material has been completed. The subsequent permanent work or surface protection shall be carried out as soon as practicable after the earthworks final surface has been completed.

Earthworks final surfaces shall be completed to smooth alignments without abrupt irregularities.

9.2 Protection of Earthworks Final Surfaces

Earthworks final surfaces shall be maintained in a stable condition and shall be protected from damage due to water or other causes and from exposure to conditions which may adversely affect the surface.

9.3 Tolerances for Earthworks Final Surfaces

The Contractor shall aim to achieve to construct the Works with dimensions not of the earthwork final surfaces being lesser, nor the slopes steeper, than those specified on the Drawings. Earthworks final surface tolerances shall be as set out in Table 9-1 unless specifically otherwise noted.

Table 9-1: Earthworks Final Surface Tolerances

Item	Dimension Tolerance
Perimeter embankment and buttress fill	• Vertical tolerance: - 0mm to + 100mm; and • Horizontal tolerance: - 0mm to + 200mm where positive dimension is measured away from the axis of the dam except minimum widths shall be maintained.
Internal embankment and access ramp	• Vertical tolerance: - 50mm to + 100mm; and • Horizontal tolerance: - 50mm to + 200mm where positive dimension is measured away from the axis of the dam except minimum widths shall be maintained.
Decant causeway	• Vertical tolerance: - 100mm to + 100mm; and • Horizontal tolerance: - 100mm to + 300mm where positive dimension is measured away from the axis of the dam except minimum widths shall be maintained.

9.4 Drainage

All drains shall be finally trimmed, graded and cleared of all debris in a manner that will result in effective drainage. Where necessary such work shall be executed by hand.

Deviations in the finished surfaces in excess of their limits shall be corrected by loosening to a minimum depth of 100 mm adding or removing material, reshaping adapting moisture content and re-compacting to specification.

Appendix A Bill of Quantities

PROJECT: **MPS FAD Cell 2 Raise 2C** Rev: 0B

Bill of Quantities

Item	Description	Unit	Quantity	Unit Rate AUD	Total AUD
1.0	**SITE ESTABLISHMENT**				
1.1	Including all preliminaries, insurances etc., mobilisation, demobilisation, borrow management, management and supervision, survey and as-built information, maintenance of existing tracks, site clean up, provide operate and maintain Contractors vehicles.	Item	1		
	ITEM 1.0 TOTAL				**$ -**
2.0	**CIVIL**				
2.1	Embankment (South, East & North Walls)				
2.1.1	Foundation - Prepare embankment foundation area (clear, remove unsuitable material, scarify and moisture condition), including existing embankment crest area that falls within the works area, and tailings beach area forming embankment raise foundation.	m^2	26,000		
2.1.2	Key Trench Cut - Excavate key trench (minimum 3m base width) and expose 1m face of the upstream batter of the existing embankment.	m^3	7,000		
2.1.3	Zone 1 (Clay Fill for Key Trench) - Borrow (from designated source within 3km), load, transport, place, moisture condition and compact fill materials for key trench.	m^3	7,000		
2.1.4	Bottom Ash - Borrow (from designated source within 3km), load, transport, place, moisture condition and compact fill materials for embankment. Includes final batter trim to designed profile.	m^3	22,000		
2.1.5	Zone 1 (Clay Fill) - Borrow (from designated source within 3km), load, transport, place, moisture condition and compact fill materials for embankment. Includes final batter trim to designed profile.	m^3	20,500		
2.1.6	Zone 1 (Clay Fill) - import from approved source off site.	m^3	Rate only		
2.1.7	Windrow - Construct safety windrows (minimum 500mm height, 1v:1h side slopes) along outer side of embankment crest (estimated length 1250m).	m^3	550		
2.1.8	Road gravel sheeting - Borrow (from designated source within 3km), load, transport, place and compact wearing course (100mm thick, 4m wide) on embankment crest (estimated length 1250m).	m^3	900		
2.1.9	Erosion control matting - Supply and install Jute woven mesh or similar erosion control matting to the extent as shown in the drawings including anchor trench and pins as defined in the manufacturer's installation guide. (area indicated is finished coverage area - excluded overlaping area)	m^2	11,000		
2.2	Buttress (East & Northeast)				
2.2.1	Foundation - Prepare buttress foundation area (clear, remove unsuitable material, scarify and moisture condition).	m^2	6,300		
2.2.2	Zone 1 (Clay Fill) - Borrow (from designated source within 3km), load, transport, place, moisture condition and compact fill materials for embankment. Includes final batter trim to designed profile.	m^3	5,900		
2.2.3	Zone 1 (Clay Fill) - import from approved source off site.	m^3	Rate only		
2.2.4	Erosion control matting - Supply and install Jute woven mesh or similar erosion control matting to the extent as shown in the drawings including anchor trench and pins as defined in the manufacturer's installation guide. (area indicated is finished coverage area - excluded overlaping area)	m^2	3,500		
2.2.5	Drop Structure Rock Fill - Supply and install rip rap to design profile as shown in Drawings.	m^3	20		
2.3	Ramps (Southeast & North)				
2.3.1	Foundation - Prepare foundation area (clear, remove unsuitable material, scarify and moisture condition).	m^2	3,500		
2.3.2	Fill - Borrow (from designated source within 3km), load, transport, place and compact to construct access ramps as shown in drawings and as directed.	m^3	2,000		
2.3.3	Windrow - Construct safety windrows (minimum 500mm height, 1v:1h side slopes) along outer edge of ramp crest (estimated length 290m).	m^3	250		
2.3.4	Road gravel sheeting - Borrow (from designated source within 3km), load, transport, place and compact wearing course (100mm thick, 4m wide) on embankment crest (estimated length 220m).	m^3	150		
2.4	Decant				
2.4.1	Rock Ring Decant Fill - Borrow rockfill (from designated source within 3km), load, transport, place, and compact fil materials for decant access causeway. (typical 5m crest width, 1v:1h side slopes)	m^3	1,700		
2.4.2	Decant Basin Floor Cut - Excavate tailings to the design level, remove and spread excavated material to the surrounding area outside of the decant structure in a manner that does not obstruct water return to the decant structure.	m^3	350		
2.4.3	Decant Basin Floor Fill - Borrow rockfill (from designated source within 3km), load, transport, place, and compact fil materials for decant access causeway. (typical 5m crest width, 1v:1h side slopes)	m^3	350		
2.4.4	Road gravel sheeting - Borrow (from designated source within 3km), load, transport, place and compact wearing course (100mm thick, 4m wide) on decant access causeway.	m^3	120		

PROJECT: **MPS FAD Cell 2 Raise 2C** Rev: 0B

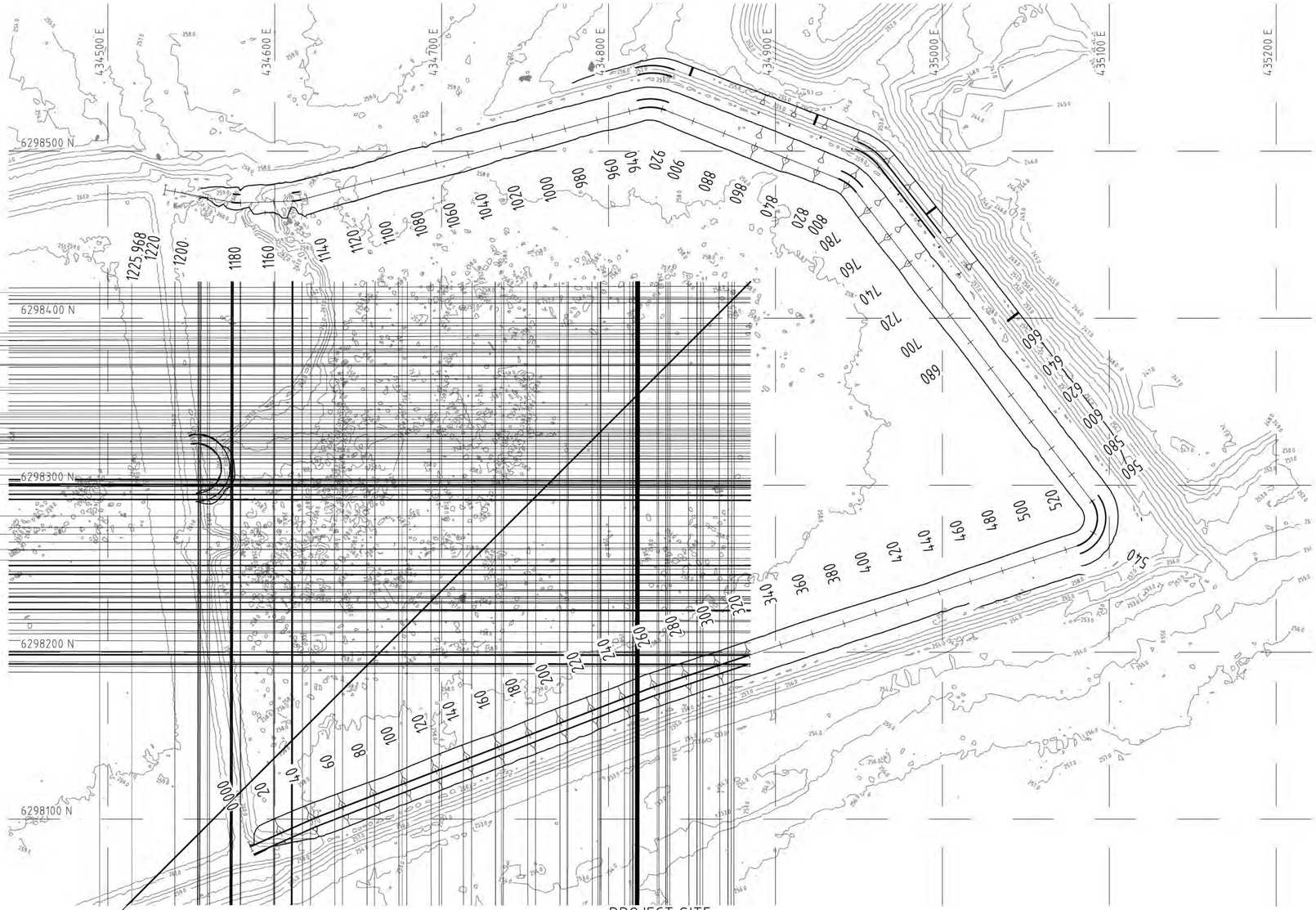
Bill of Quantities

Item	Description	Unit	Quantity	Unit Rate AUD	Total AUD
2.4.5	Windrow - Construct safety windrows (minimum 500mm height, 1v:1h side slopes) along both sides of rock ring decant crest.	m^3	60		
2.5	Bottom Ash Borrow Area				
2.5.1	Reshape completed borrow area basin includes grading and trenching where required so that decant water drains towards the decant structure.	m^2	13,000		
2.6	Emergency Spillway				
2.6.1	Supply and install geotextile (Bidim A44 or similar approved) as specified.	m^2	250		
2.6.2	Rock armouring - Supply and install rip rap to design profile as shown in Drawings.	m^3	35		
	ITEM 2.0 TOTAL				$ -
3	**MECHANICAL**				
3.1	Pipework				
3.1.1	Remove existing tailings distribution pipeline along existing embankment crest and stockpile at designated area for re-use as directed.	Item	1		
3.1.2	Supply and install new tailings distribution pipeline of the same pipe dimensions and configuration as per Cell 1.	m	1,300		
3.1.3	Supply and install new tailings discharge spigots. Size to match existing configuration in Cell 1. Estimated length is 6m per spigot. Spigot spacing at +/-25m. Including valve, tee-piece, and fittings.	Item	52		
	TOTAL COST				$ -
	10% CONTINGENCY				$ -
	TOTAL BUDGET COST				$ -

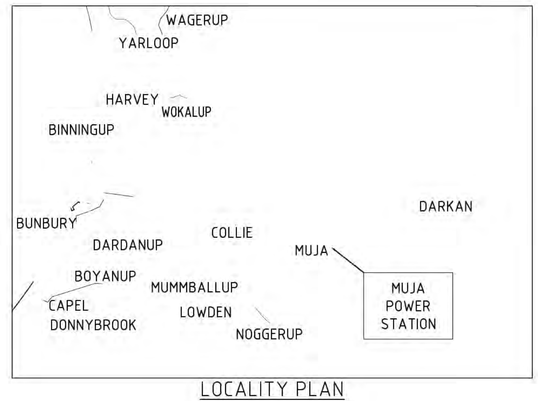
Appendix B Drawings

SYNERGY
MUJA POWER STATION - FLY ASH DAM
CELL 2C EMBANKMENT RAISE

DRAWING NO.	DRAWING TITLE
156-01-3117C-3-DG001	EMBANKMENT RAISE LOCATION PLAN & DRAWING LIST
156-01-3117C-3-DG002	GENERAL ARRANGEMENT LAYOUT PLAN
156-01-3117C-3-DG101	EMBANKMENT RAISE LAYOUT PLAN AND NOTES
156-01-3117C-3-DG201	EMBANKMENT RAISE SECTIONS AND DETAILS (SHEET 1 OF 2)
156-01-3117C-3-DG211	EMERGENCY SPILLWAY PLAN AND SECTIONS



PROJECT SITE
SCALE: 1:1500



LOCALITY PLAN
NTS

REV	DATE	DRWN	CHK'D	APP'D	DESCRIPTION
					DRAWING REVISIONS

DRAWING No	TITLE
	DRAWING REFERENCES

MUJA POWER STATION

FLY ASH DAM CELL 2C RAISE
EMBANKMENT RAISE
LOCATION PLAN & DRAWING LIST

DRAWN			
CHECKED			
APPROVED			

SCALE 1: 1500 U.O.N. (0 30 60)

TailCon Projects

DRAWING NUMBER
156-01-3117C-3-DG001

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PROJECT SITE
SCALE: 1:2000

NOTES:

1. CO-ORDINATE SYSTEM IS GDA2020/MGA ZONE 50.
2. ALL GRID CO-ORDINATES ARE IN METRES (m).
3. ALL DIMENSIONS ARE IN METRES (m) UNLESS OTHERWISE NOTED.
4. ALL ELEVATIONS ARE AUSTRALIAN HEIGHT DATUM (m AHD) UNLESS OTHERWISE NOTED.
5. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SCOPE OF WORKS AND TECHNICAL SPECIFICATION.
6. ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE LATEST EDITION OF CURRENT STANDARDS, SPECIFICATIONS AND DRAWINGS AS SPECIFIED.
7. DRAWINGS SHALL NOT BE SCALED. ANY DISCREPANCIES BETWEEN DRAWINGS SHALL BE REFERRED TO THE SUPERINTENDENT FOR CLARIFICATION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION, IDENTIFICATION AND PROTECTION OF ALL EXISTING SERVICES AS REQUIRED.
9. THE CONTRACTOR SHALL ESTABLISH ITS SITE FACILITIES WITHIN THE CLEARED AREA. THE CONTRACTOR SHALL NOT CLEAR OR DAMAGE VEGETATION OUTSIDE OF THE CLEARING LIMITS WITHOUT WRITTEN PERMISSION FROM THE SUPERINTENDENT.
10. THE CLEARING AREA SHOWN ON THE DRAWING IS INDICATIVE. REFER TO THE CLEARING PERMIT FOR CLEARING LIMITS.

REV	DATE	DRWN	CHK'D	APP'D	DESCRIPTION

DRAWING REVISIONS

DRAWING No	TITLE

DRAWING REFERENCES

MUJA POWER STATION

FLY ASH DAM CELL 2C RAISE
GENERAL ARRANGEMENT
LAYOUT PLAN

DRAWN		
CHECKED		
APPROVED		

0 40 80
SCALE 1: 1500 U.O.N.

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DRAWING NUMBER
156-01-3117C-3-DG201

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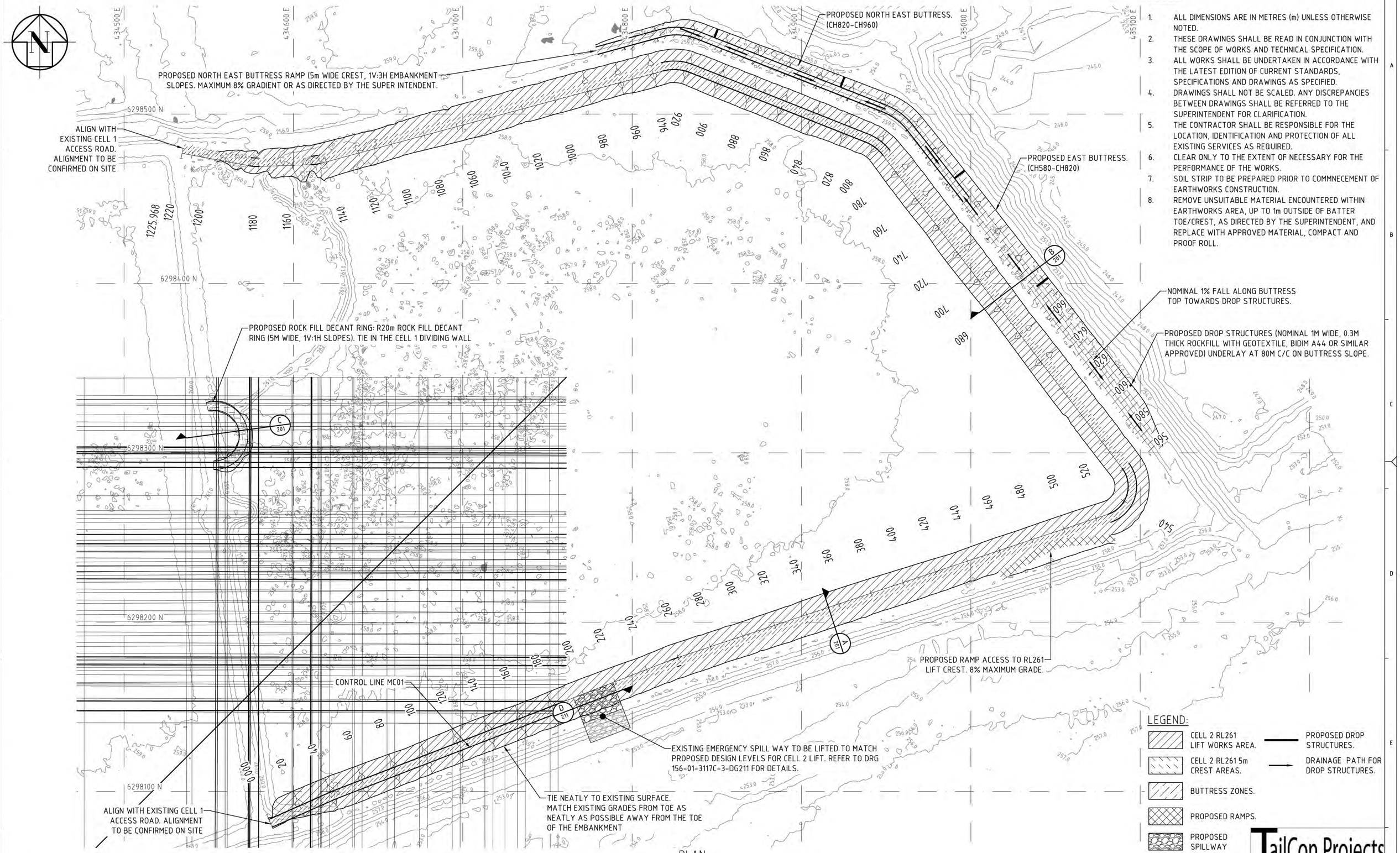

PLAN
SCALE: 1:1000

NOTES:

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4. DRAWINGS SHALL NOT BE SCALED. ANY DISCREPANCIES BETWEEN DRAWINGS SHALL BE REFERRED TO THE SUPERINTENDENT FOR CLARIFICATION.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION, IDENTIFICATION AND PROTECTION OF ALL EXISTING SERVICES AS REQUIRED.
6. CLEAR ONLY TO THE EXTENT OF NECESSARY FOR THE PERFORMANCE OF THE WORKS.
7. SOIL STRIP TO BE PREPARED PRIOR TO COMMNECEMENT OF EARTHWORKS CONSTRUCTION.
8. REMOVE UNSUITABLE MATERIAL ENCOUNTERED WITHIN EARTHWORKS AREA, UP TO 1m OUTSIDE OF BATTER TOE/CREST, AS DIRECTED BY THE SUPERINTENDENT, AND REPLACE WITH APPROVED MATERIAL, COMPACT AND PROOF ROLL.

LEGEND:

- CELL 2 RL261 LIFT WORKS AREA.
- CELL 2 RL261 5m CREST AREAS.
- BUTTRESS ZONES.
- PROPOSED RAMPS.
- PROPOSED SPILLWAY
- PROPOSED DROP STRUCTURES.
- DRAINAGE PATH FOR DROP STRUCTURES.

TailCon Projects

REV	DATE	DRWN	CHK'D	APP'D	DESCRIPTION	DRAWING No	TITLE
DRAWING REVISIONS						DRAWING REFERENCES	

MUJA POWER STATION

FLY ASH DAM CELL 2C RAISE
EMBANKMENT RAISE
LAYOUT PLAN & NOTES

DRAWN			
CHECKED			
APPROVED			

SCALE 1: 0 20 40 1000 U.O.N.

DRAWING NUMBER
156-01-3117C-3-DG101

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NOTES:

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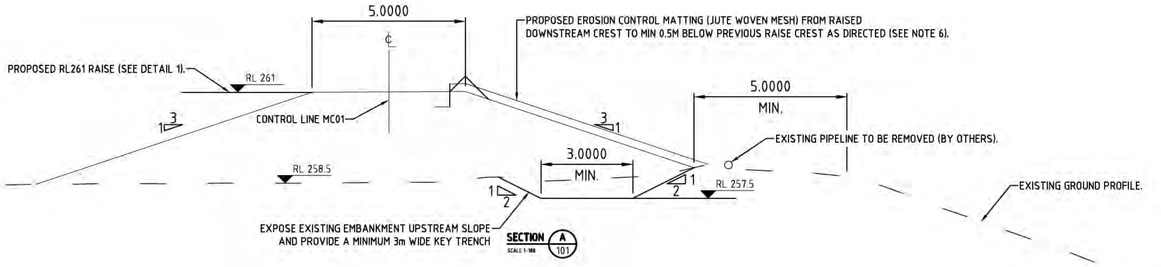
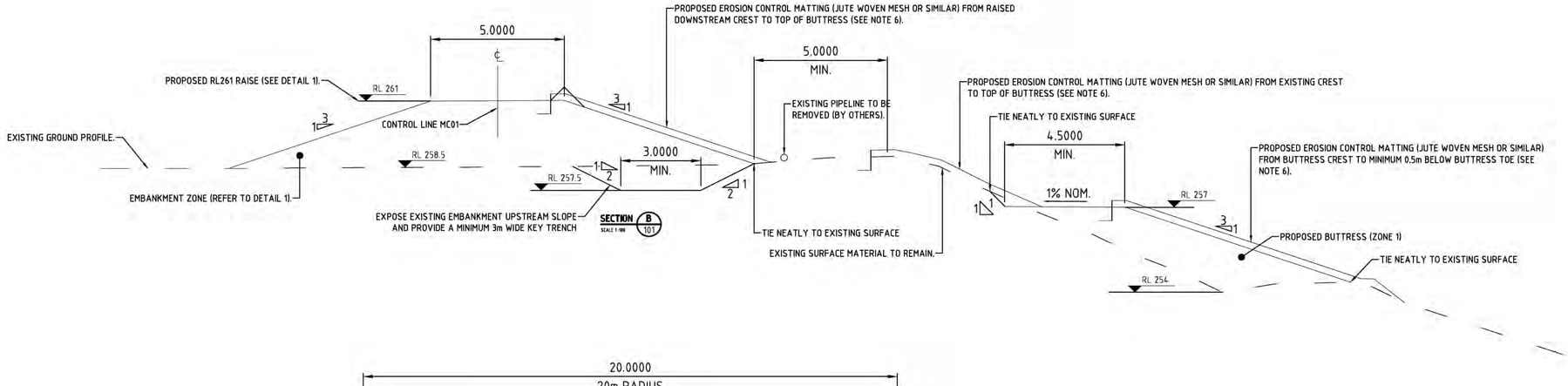
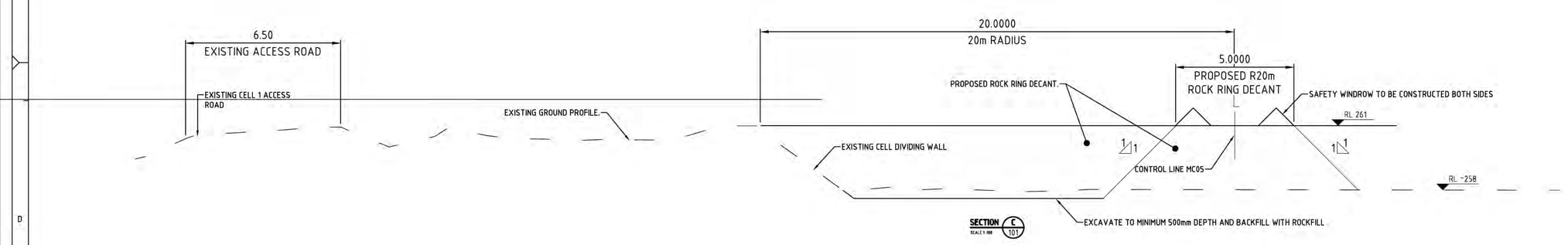
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION, IDENTIFICATION AND PROTECTION OF ALL EXISTING SERVICES AS REQUIRED.
6. LAY JUTE MATTING INTO A TRENCH OF A MINIMUM 150MM WIDE AND DEEP, PIN AND BACKFILL. INSTALL JUTE MATTING BY UNROLLING DOWN WITH MIN. 150MM OVERLAP SEAMS, 2 TO 3 PINS PER M2, AS PER THE MANUFACTURER'S INSTALLATION GUIDE.

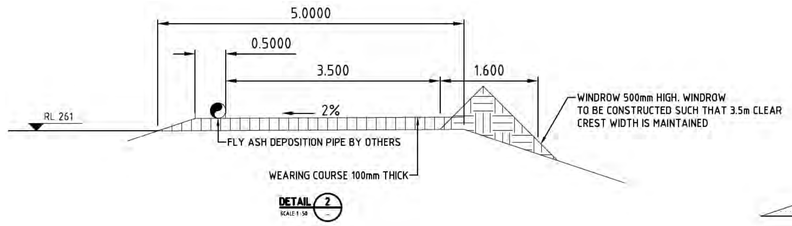
LEGEND:

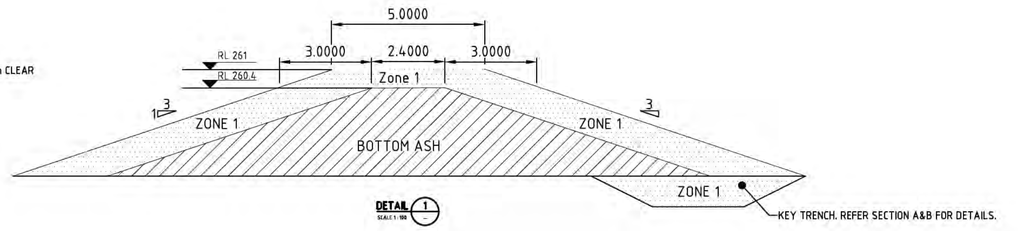
- ZONE 1 (CLAY)
- BOTTOM ASH
- WEARING COURSE
- GENERAL FILL











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TailCon Projects
156-01-3117C-3-DG201

REV	DATE	DRWN	CHK'D	APP'D	DESCRIPTION	DRAWING No	TITLE
					DRAWING REVISIONS		DRAWING REFERENCES

MUJA POWER STATION

FLY ASH DAM CELL 2C RAISE
EMBANKMENT RAISE
SECTIONS AND DETAILS

DRAWN			DRAWING NUMBER
CHECKED			XXXXXXX
APPROVED			

0 2 4
SCALE 1: 100 U.O.N.

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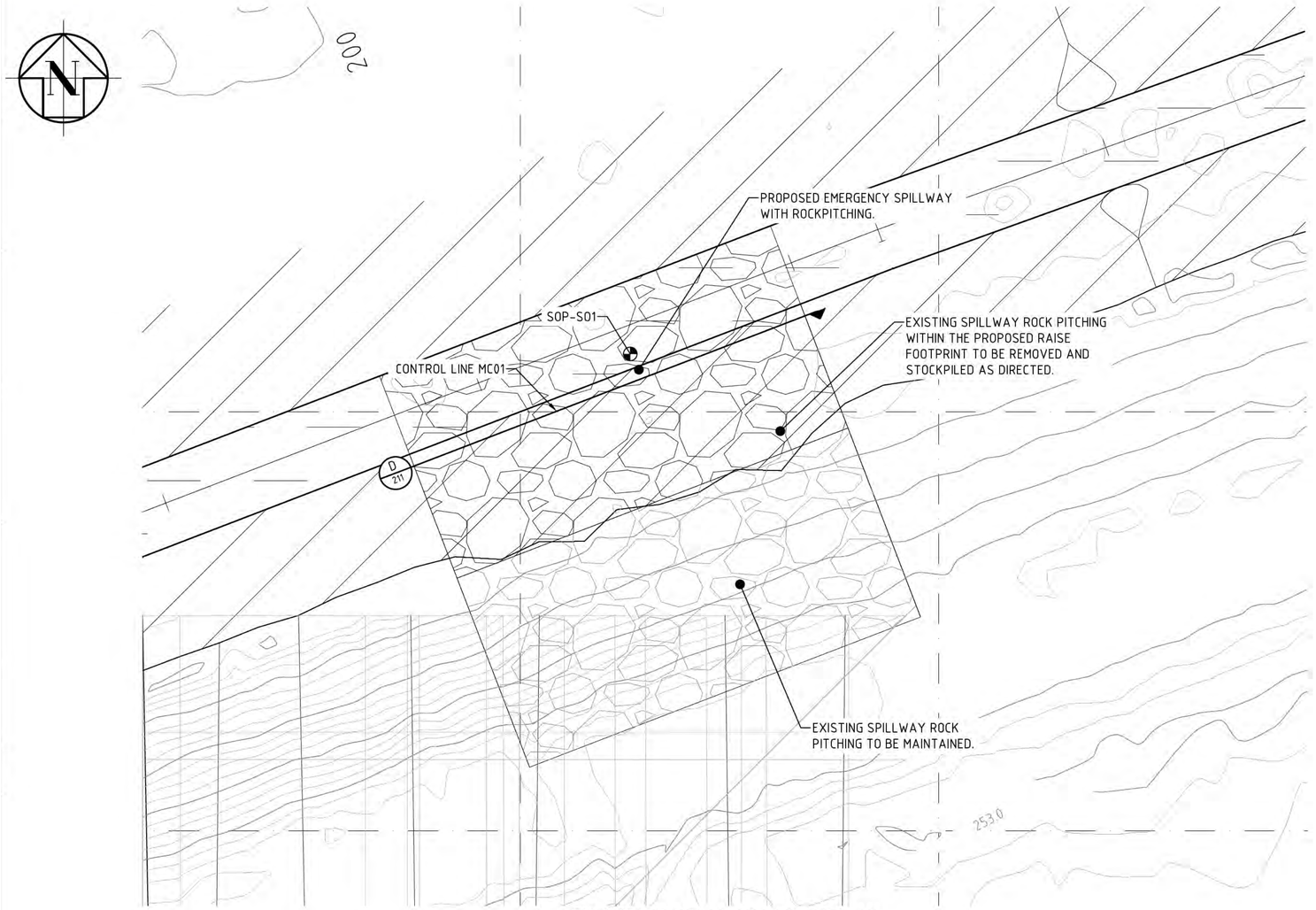

EMERGENCY SPILLWAY LAYOUT PLAN

SCALE: 1:250

NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS OTHERWISE NOTED.
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5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION, IDENTIFICATION AND PROTECTION OF ALL EXISTING SERVICES AS REQUIRED.

LEGEND:

- CELL 2 RL261 LIFT WORKS AREA.
- CELL 2 RL261 5m CREST AREAS.
- BUTTRESS ZONES.
- PROPOSED RAMPS.
- PROPOSED SPILLWAY ROCK PITCHING
- 100mm WEARING COURSE. REFER DRG. 201 FOR DETAILS.
- SETOUT POINT

SETOUT POINTS		
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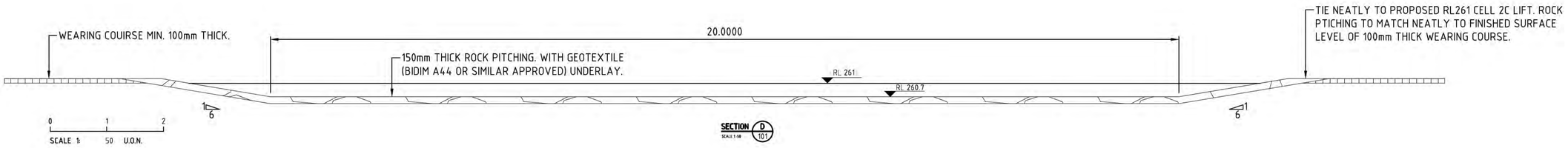

SECTION D 101
SCALE 1:50

REV	DATE	DRWN	CHK'D	APP'D	DESCRIPTION	DRAWING No	TITLE
					DRAWING REVISIONS		DRAWING REFERENCES

MUJA POWER STATION

FLY ASH DAM CELL 2C RAISE
EMERGENCY SPILLWAY
PLAN AND SECTIONS

DRAWN			
CHECKED			
APPROVED			

0 6 12
SCALE 1: 250 U.O.N.

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156-01-3117C-3-DG211

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