

30 March 2022

Gayan Wickramasinghe
PO Box 906
Moama, NSW 2731

Our Reference: 21091 Riverbank Rehabilitation approval and design
Via: Email & NSW planning portal

Request for Additional Information

DA Online Reference Number: PAN-193944

Environmental protection works – proposed rock rip rap and associated revegetation works along the Murray Riverbank

Lot 4&5 of DP560393, 131 Merool Road Moama NSW 2731

Dear Gayan,

Thank you for your request for additional information regarding the proposed riverbank rehabilitation for Merool on the Murray (131 Merool Rd, Moama NSW 2731). Our response to each request is included below.

1. Proposed site plan
 - Amended proposed site plans are required
 - Site 1- Plan and Cross Section; Drawing No 21091-02; Sheet 02 of 07 – total length of the proposed rock rip rap has been added. Please refer to updated drawing attached.
 - Site2- Plan; Drawing No 21091-03; Sheet 03 of 07 – total length of the proposed rock rip rap and the scale has been added. Please refer to updated drawing attached.
2. A Biodiversity Offsets Scheme Entry Threshold Tool (BOSET) Report
 - As no vegetation will be removed to make way for the proposed works, a BOSET is not required. We have updated Section 3.3.7 *Biodiversity Conservation Regulations 2017* of the Statement of Environmental Effects to address this (v2 attached).
3. Additional information is required in relation to the earthworks proposed
 - The works do not include export of in-situ material and are generally above the existing natural surface level as shown in the drawings. Minor embankment shaping is required, limited to that which provides a working surface for the placement of the erosion protection works. Accordingly, depths of cut / fill shaping

earthworks are minor and are generally less than 300 mm. No fill is required to be imported to site, with rock beaching to be imported and placed as described in the drawings.

4. Site rehabilitation/environmental management plan
 - Site preparation, revegetation and maintenance details have been addressed within the attached Site Rehabilitation Management Plan.
5. Erosion and sedimentation control plan
 - Erosion and sediment control details have been included within the attached Site Rehabilitation Management Plan.

Yours Sincerely,

Nathan Heinrich

DIRECTOR / PRINCIPAL ENGINEER

0427 328 010

Nathan.Heinrich@fifteen50.com.au

1. PROPOSED WORK INCLUDE:
 - 1.1. RE-GRADING THE BANK INFILLING ERODED AREAS
 - 1.2. ROCK ARMORING OF RIVERBANK FOR SITE 1 AND SITE 2
 - 1.3. RE-VEGETATION OF DISTURBED LANDS

4. ALL OH&S REQUIREMENTS ARE TO BE MET AS PER AS2865 (2009).
3. SITE ACCESS IS TO BE DETERMINED BY THE SUPERINTENDENT AND IS TO BE AGREED UPON WITH COUNCIL.
4. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH THESE DRAWINGS AND RELEVANT AUSTRALIAN STANDARDS
5. THE CROSS SECTIONS SHOWN SHALL REFERRED AS INDICATOR OF EXTENT OF WORK AND THE AREAS IN-BETWEEN CROSS SECTIONS NEED SIMILAR OR FLATTER ROCK ARMOR BATTER. IDEALLY BATTER SHALL NOT BE LESS THAN 1H:1V AND MORE THAN 1H:2V. ANY DEVIATION BETWEEN DRAWINGS NOTES AND TECHNICAL SPECIFICATION IS TO BE RAISED WITH THE SUPERINTENDENT PRIOR TO CONSTRUCTION.
6. MINIMUM THICKNESS OF ROCK ARMORING SHALL 400mm AND NOT TO BE MEASURED FROM CROSS SECTIONS.
7. SITE TO BE EXCAVATED ONLY TO ESTABLISH FIRM BASE FOR ROCK PLACEMENT AND PRIOR APPROVAL FROM SUPERINTENDENT SHALL BE TAKEN BEFORE EXCAVATION.
8. TOPSOIL TO BE KEPT SEPARATE AND SPREAD OVER DISTURBED AREAS AT COMPLETION OF WORKS.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONFIRM THE LOCATION AND DEPTH OF ALL OBSTRUCTIONS AND UNDERGROUND SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE COMMENCEMENT OF ANY WORKS.
7. ALL SURFACES TO BE COMPLETED TO FINISHED SURFACE LEVEL.
8. ALL TRUCKS TRANSPORTING DEBRIS FROM THE SITE MUST BE COVERED.
9. CONSTRUCTION WORK IS PERMITTED ON THE SITE BETWEEN THE HOURS OF 7am-5pm MONDAY TO SATURDAY INCLUSIVE. NO WORK IS PERMITTED ON SUNDAYS OR PUBLIC HOLIDAYS. NOISE CONTROLS SET OUT IN COUNCIL CONSENT MUST BE ADHERED TO. WORK OUTSIDE OF THE HOURS SPECIFIED SHALL NOT BE UNDERTAKEN WITHOUT THE WRITTEN APPROVAL OF COUNCIL'S SUPERINTENDENT.
10. ALL CONSTRUCTION MATERIALS AND MACHINERY MUST BE KEPT WITHIN WORKSITE.
11. ALL ASSETS MODIFIED OR DAMAGED BY THE PROPOSED WORKS SHALL BE REINSTATED TO THE SATISFACTION OF THE SUPERINTENDENT.

12. ROCK SHOULD NOT BE ADVERSELY AFFECTED BY REPEATED WETTING AND DRYING AND SHALL HAVE A CRUSHING STRENGTH OF NOT LESS THAN 25 MPa
13. GRANULAR FILTER TO BE CRUSHED ROCK NDCR 20 mm
14. D50 ROCK MUST MEET THE FOLLOWING SPECIFICATION:

Equivalent Spherical Diameter	Percent (By weight) of rock of smaller size
1.5 - 2.0 D ₅₀	100%
D ₅₀	50%
0.3 - 0.4 D ₅₀	10-20%
0.1 - D ₅₀	< 5 %

11. SUPPLY AND PLACEMENT OF ROCK TO BE IN ACCORDANCE WITH THESE DRAWINGS AND ONSITE DIRECTION BY DESIGN ENGINEER OR SITE SUPERINTENDENT.
12. ROCK SHALL BE CAREFULLY PLACED BY BUCKET FROM A LOADER OR EXCAVATOR FROM NO GREATER THAN 1.0 m ABOVE THE MATERIAL ONTO WHICH IT IS TO BE PLACED.
13. ROCK SHALL BE WORKED INTO PLACE SO AS TO PRODUCE A BLANKET OF INTERLOCKING ROCK THAT HAS NO SIGNIFICANT VOIDS.
14. BIDIM A44 SHALL BE USED AS GEOFABRIC.
15. GEOFABRIC TO BE LAYERED IN SECTIONS PERPENDICULAR TO FLOW DIRECTION FROM DOWNSTREAM TO UPSTREAM WITH 500mm OVERLAP.
16. GRADING SHALL PRODUCE A CONSISTENT MIX OF ROCK SIZES.
17. FINISHED SURFACE OF ROCK IS TO BE ROUGH AND ON DESIGN GRADE.
18. EXCESS SOIL FROM EARTHWORKS SHOULD BE SPREAD OVER ROCK PROTECTION WORKS FOLLOWING FINAL ROCK PLACEMENT.

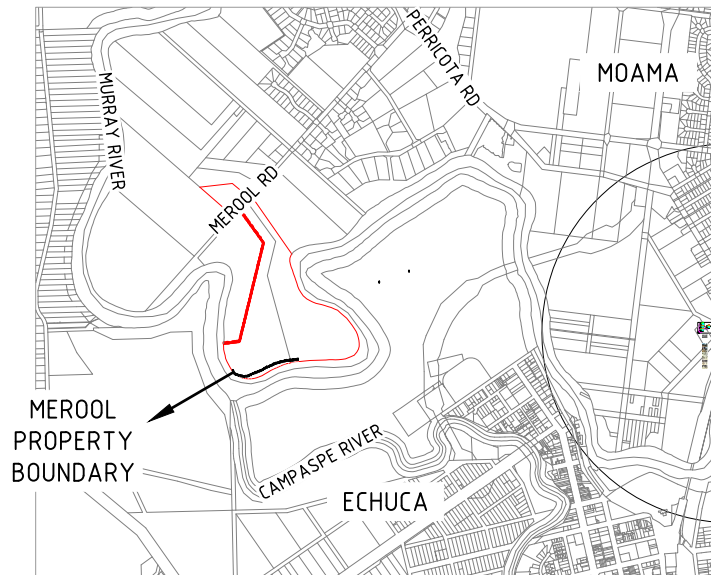
19. ALL EARTHWORKS SHALL COMPLY AS3798 – GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS.
20. ALL FILL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 200mm WHEN MEASURED LOOSE. EACH LAYER SHALL BE COMPACTED TO A OPTIMUM MOISTURE CONTENTS (-1% TO +3%) TO ACHIEVE A DRY DENSITY IN ACCORDINACE WITH AS 1289.5.1.1 AT THE SURFACE LEVEL AND AT 200mm BELOW SURFACE LEVEL.
21. ALL DISTURBED SURFACES ARE TO BE TOP SOILED AND RE-VEGETATED WITH COUNCIL APPROVED SPECIES.
22. EXCAVATION SHALL BE UNDERTAKEN IN A MANNER THAT MINIMIZES DISTURBANCE TO MATERIAL OUTSIDE THE LIMITS OF THE BATTERS.

23. REHABILITATION OF DISTURBED AREAS SHALL NOT BE UNDERTAKEN UNTIL THE PREPARED AREA HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE DESIGN AND BEEN APPROVED BY THE SUPERINTENDENT.
24. ALL STRUCTURES INCLUDING PONTOONS TO BE REINSTATED AFTER COMPLETION OF CONSTRUCTION
25. RE-VEGETATION AREA IS GENERALLY IN VICINITY OF 5m ABOVE STAR PICKET EXPECT RETAINING WALLS. IN CASE OF RETAINING WALLS VEGETATION AREA IS UP-TO TOE OF THE WALL.

26. THE CONTRACTOR SHALL ENSURE THAT NOISE AND AIR EMISSIONS DURING CONSTRUCTION ARE WITHIN EPA AND LOCAL GOVERNMENT LIMITS.
27. CONTRACTOR TO COMPLETE WORKS IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN. ADEQUATE EROSION AND SEDIMENT CONTROLS MUST BE IN PLACE FOR THE DURATION OF CONSTRUCTION AND BE MAINTAINED BY THE CONTRACTOR.
28. NO FIRES ARE TO BE LIT OR WASTE MATERIALS BURNT ON THE SITE.
29. CONTRACTOR TO MINIMISE DUST GENERATION AT ALL TIMES THROUGHOUT CONSTRUCTION BY WATER APPLICATION ON AS-NEEDS BASIS.
30. ALL MACHINERY AND MATERIALS TO BE LOADED/UNLOADED WITHIN WORKSITE.
31. CONTRACTOR TO DEMONSTRATE ADHERENCE TO 'COME CLEAN, GO CLEAN' PRINCIPLE BY PROVIDING EVIDENCE OF PLANT WASHDOWN RECORDS TO THE SUPERINTENDENT, PRIOR TO PLANT MOVEMENT ON/OFF SITE. THE 'SITE' INCLUDES THE LOCATION OF THE BORROW PIT EXCAVATION.

32. ALL LEVELS ARE TO A.H.D.

33. ALL CHAINAGES AND LEVELS ARE IN METRES, DIMENSIONS FOR DETAILS AS SHOWN.



SHEET 1	COVER SHEET
SHEET 2	SITE 1 - PLAN AND CROSS-SECTION
SHEET 3	SITE 2 - PLAN
SHEET 4	SITE 2 - CROSS-SECTIONS SHEET 1 OF 3
SHEET 5	SITE 2 - CROSS-SECTIONS SHEET 2 OF 3
SHEET 6	SITE 2 - CROSS-SECTIONS SHEET 3 OF 3

WARNING
BEWARE OF UNSTABLE BANK
THE STATE OF BANK AT SOME LOCATIONS ARE HIGHLY UNSTABLE AND HIGHLY UNSUITABLE FOR CONSTRUCTION EQUIPMENT. CONSTRUCTION EQUIPMENT MOVEMENT PATHS FOR WORK PURPOSE SHALL BE REVIEWED FOR SUITABILITY BY SUPERINTENDENT BEFORE MOBILIZATION

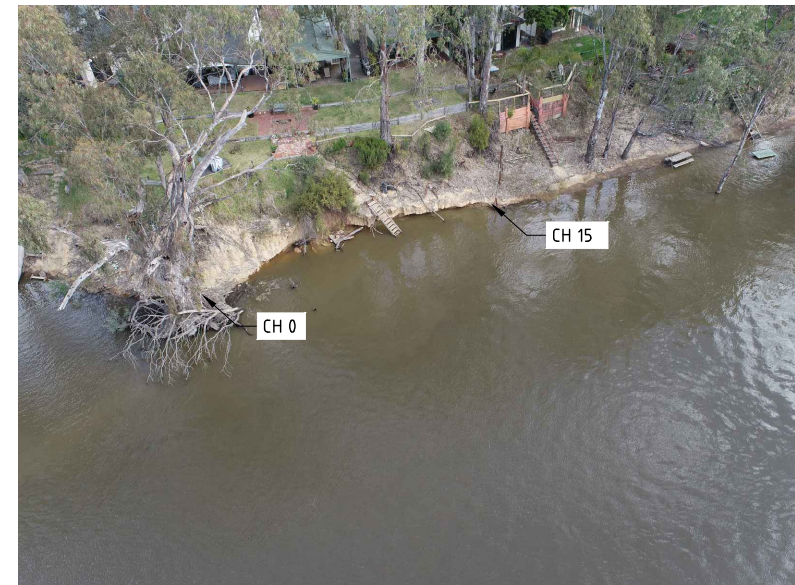
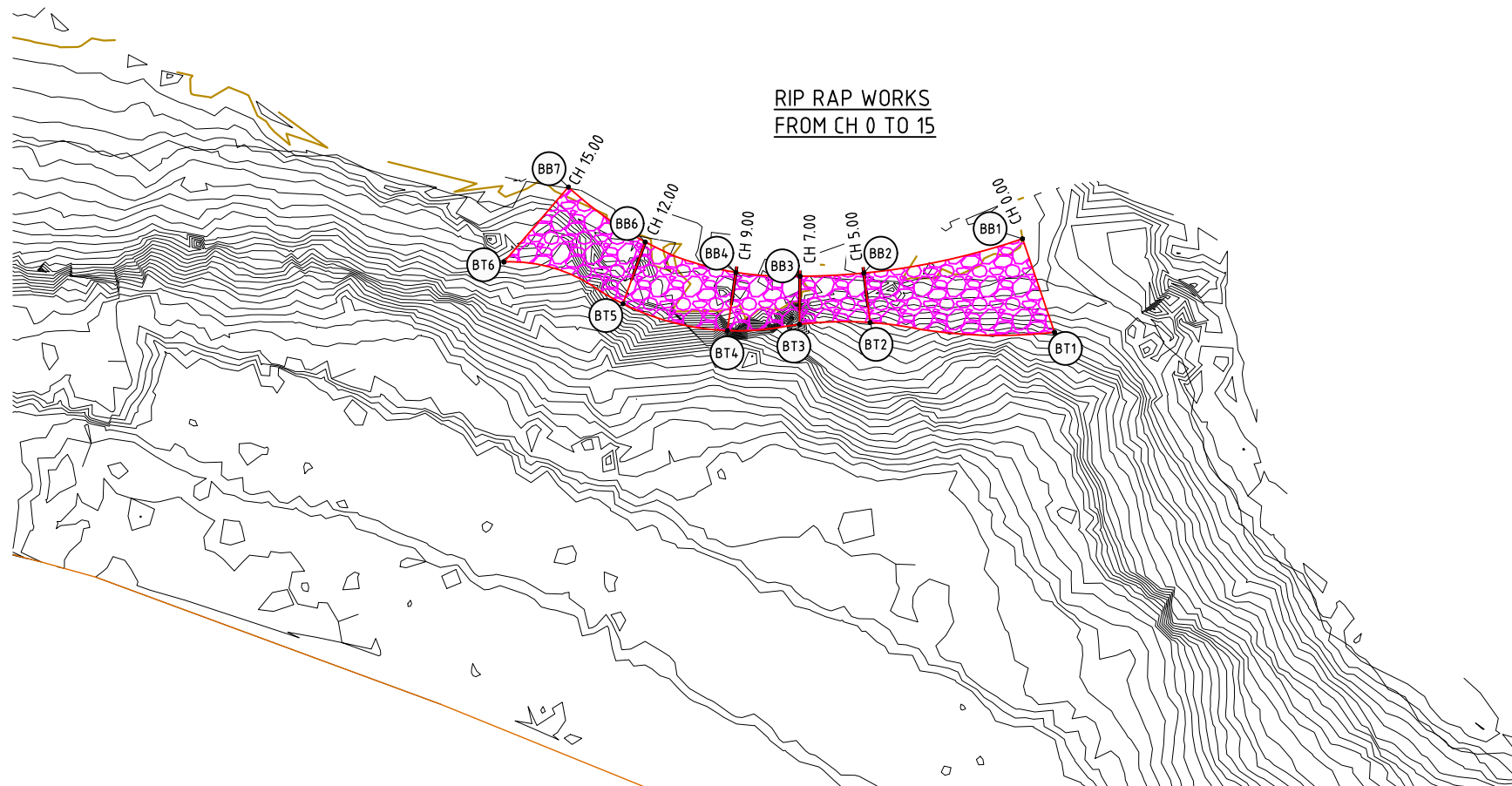
						DOCUMENTS ISSUED DO NOT BEAR ORIGINAL SIGNATURES. EVIDENCE OF VERIFICATION AND APPROVAL MAY BE OBTAINED FROM THE COMPANY.	Name		Date	Client:			Project: MEROOL RIVER BANK REHABILITATION	Drawing Status: FOR REVIEW			
							Drawn	H. SINGH	28/10/21								
							Design	H. SINGH	28/10/21								
B	ISSUED FOR CLIENT REVIEW	H.S	H.S	N.H	29/03/2022		Checked	S. WALES	28/10/21					Title: COVER SHEET	Drawing No. 21091-01	Sheet. 01/06	Rev. B
A	ISSUED FOR CLIENT REVIEW	H.S	S.W	N.H	18/11/2021		Discipline Head	N. HEINRICH	29/10/21								
Rev.	Description	Dwn	Ckd	App	Date		Scale VARIES	Sheet A1	Job Manager S. WALES								



LEGEND:

-  D₅₀ 450 mm ANGULAR ROCK ON 2H:1V
-  D₅₀ 450 mm ANGULAR ROCK ON 2H:1V TO 1H:1V
-  D₅₀ 450 mm ANGULAR ROCK ON 1H:1V
-  ROCK BEACHING TOP SET OUT POINTS
-  ROCK BEACHING BOTTOM SET OUT POINTS

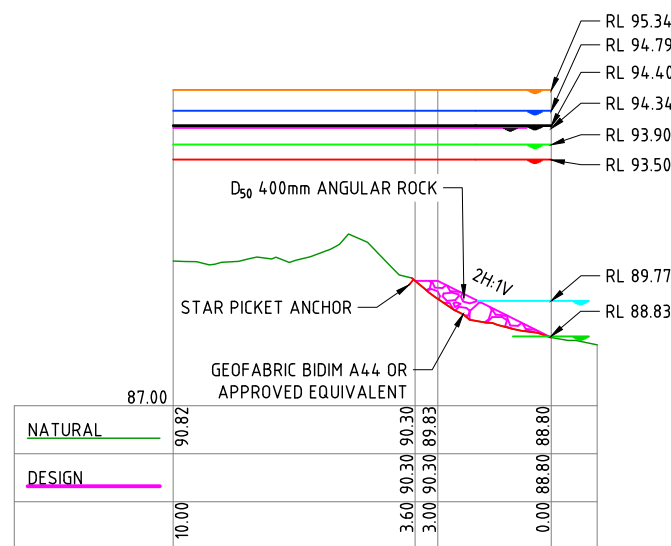
RIP RAP WORKS
FROM CH 0 TO 15



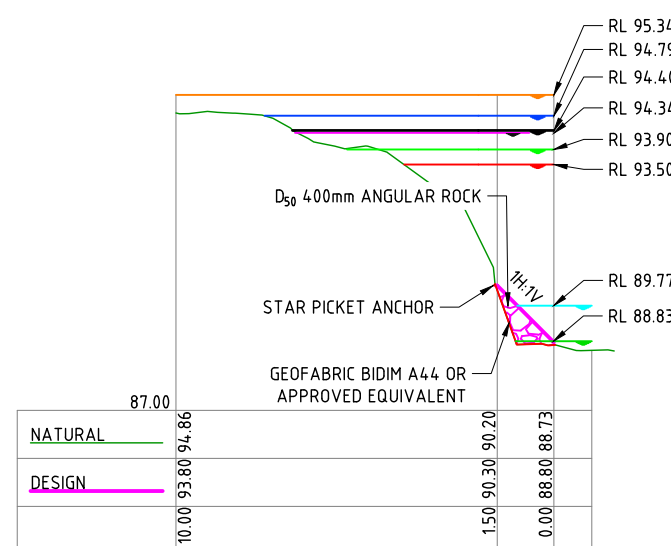
SITE 1 - PHOTO

SITE 1
SCALE 1:200

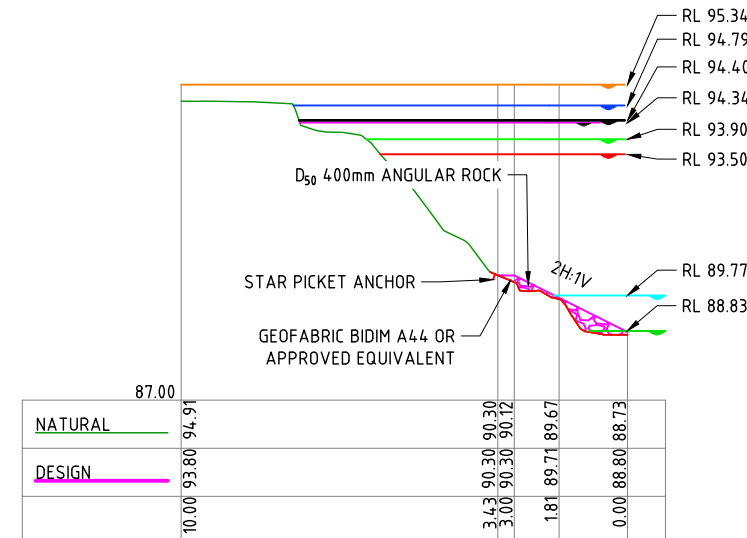
QUANTITIES			
ROCK COMPOSITION	ROCK SIZE	VOLUME	WEIGHT
	(mm)	(m ³)	TONNES
D ₅₀	400.0	50.0	130.0
GEOTEXTILE AREA = 50 m ²			



SECTION AT CH. 0.00
SCALE 1:100

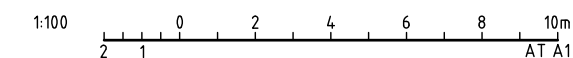


SECTION AT CH. 12.00
SCALE 1:100



SECTION AT CH. 15.00
SCALE 1:100

FLOOD LEVELS	
FLOOD TYPE	RL mAHd
DESIGN FLOOD (1 in 100 YEAR)	95.34
DESIGN FLOOD (1 in 20 YEAR)	94.79
BOM MAJOR FLOOD EVENT	94.40
DESIGN FLOOD (1 in 10 YEAR)	94.34
BOM MODERATE FLOOD EVENT	93.90
BOM MINOR FLOOD EVENT	93.50
PEAK WATER LEVEL (18/10/2021)	89.77
SURVEY WATER LEVEL (27/09/2021)	88.83



Rev.	Description	Drn	Ckd	App	Date
B	ISSUED FOR CLIENT REVIEW	H.S	H.S	N.H	29/03/2022
A	ISSUED FOR CLIENT REVIEW	H.S	S.W	N.H	18/11/2021

DOCUMENTS ISSUED		Name	Date
DO NOT BEAR ORIGINAL SIGNATURES. EVIDENCE OF VERIFICATION AND APPROVAL MAY BE OBTAINED FROM THE COMPANY.	Drawn	H. SINGH	28/10/21
	Design	H. SINGH	28/10/21
	Checked	S. WALES	28/10/21
	Discipline Head	N. HEINRICH	29/10/21
Scale	Sheet	Discipline Head	S. WALES
VARIES	A1	Job Manager	29/10/21

Client:		Project:		Drawing Status:	
		MEROOL RIVER BANK REHABILITATION		FOR REVIEW	
FIFTEEN 50		Title:			
		SITE 1 - PLAN AND CROSS-SECTION		Drawing No.	Rev.
				21091-02	B
				Sheet.	
				02/06	



CH60 START OF WORKS



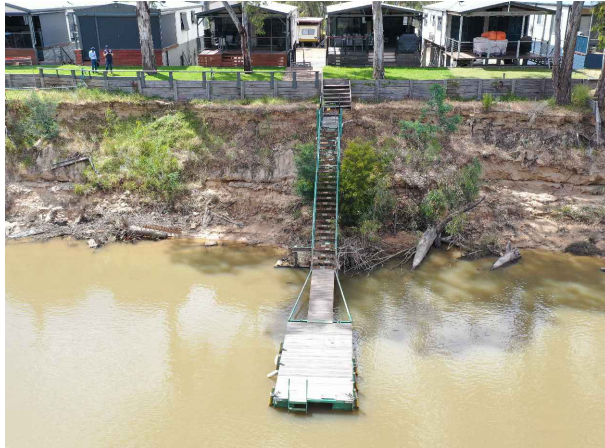
CH110 TO 130



CH185 TO CH 195



CH195 TO 210



CH228 TO CH 240 END OF WORKS

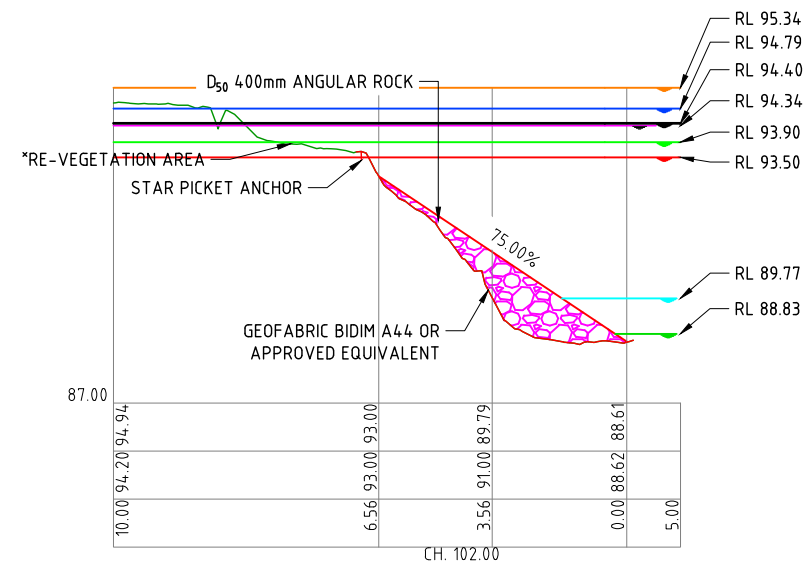
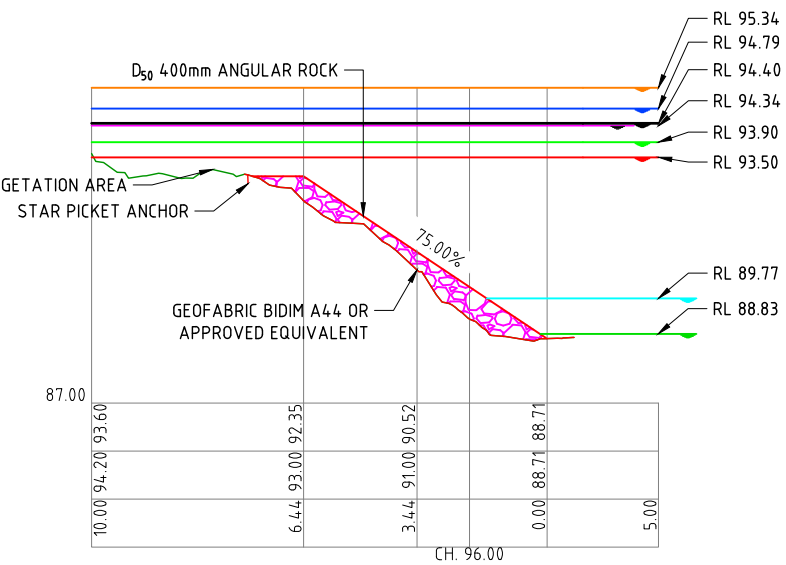
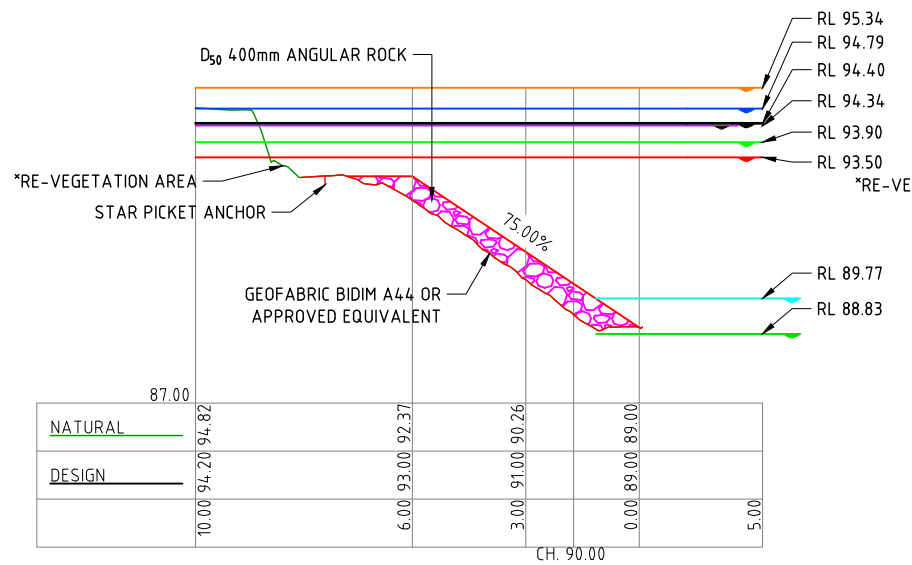
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DOCUMENTS ISSUED	Name	Date
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EVIDENCE OF VERIFICATION AND APPROVAL MAY BE OBTAINED FROM THE COMPANY.	Design H. SINGH	28/10/21
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Sheet	Discipline Head N. HEINRICH	29/10/21
VARIES	Job Manager S. WALES	29/10/21



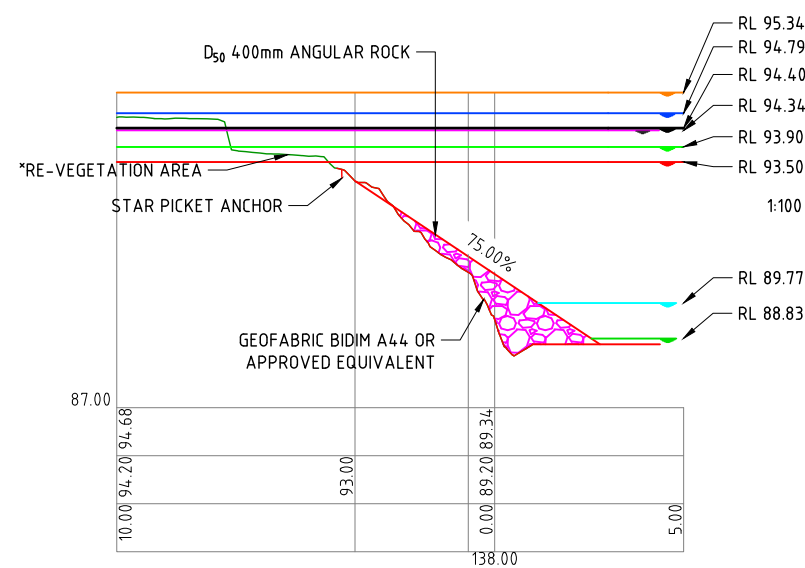
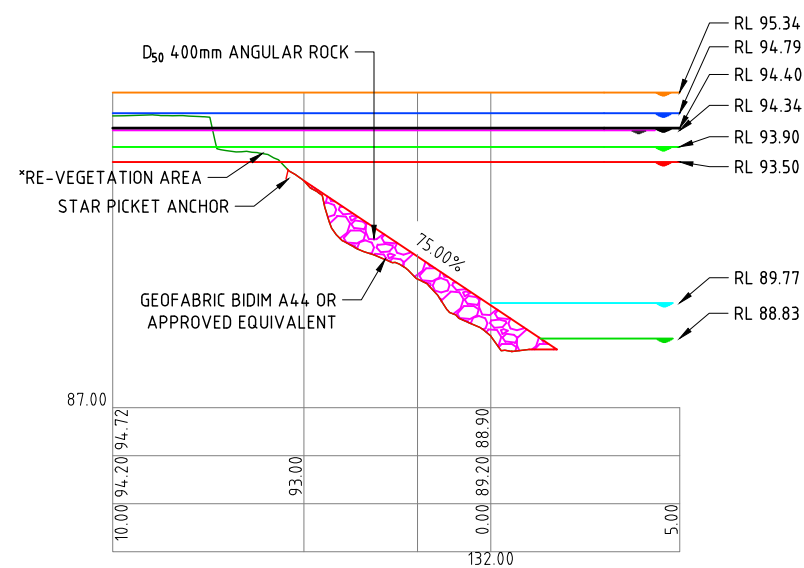
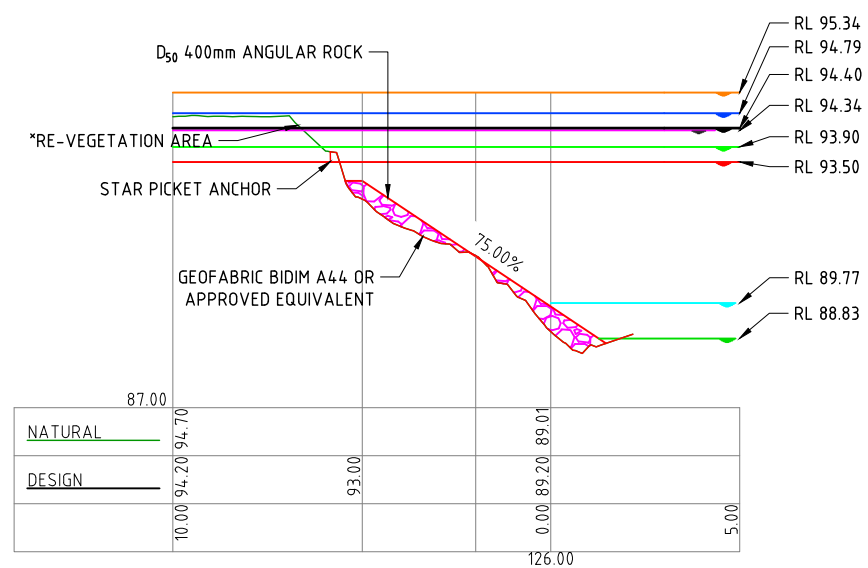
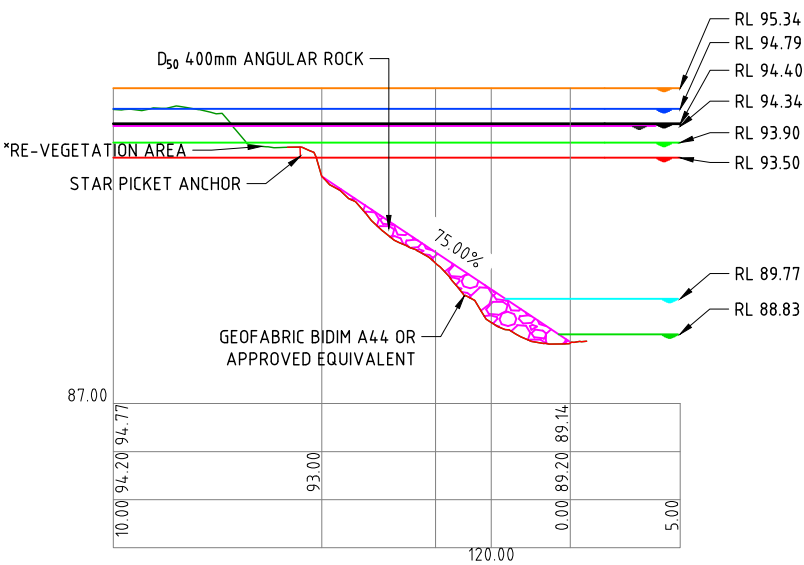
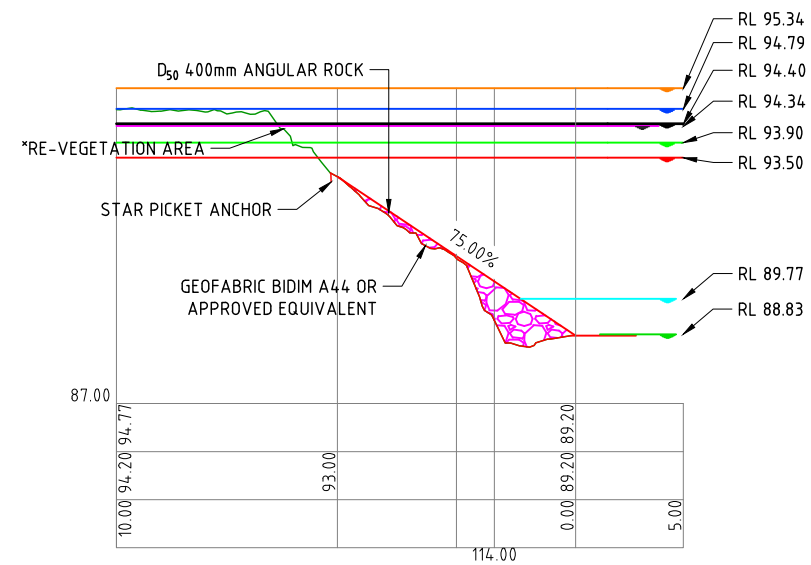
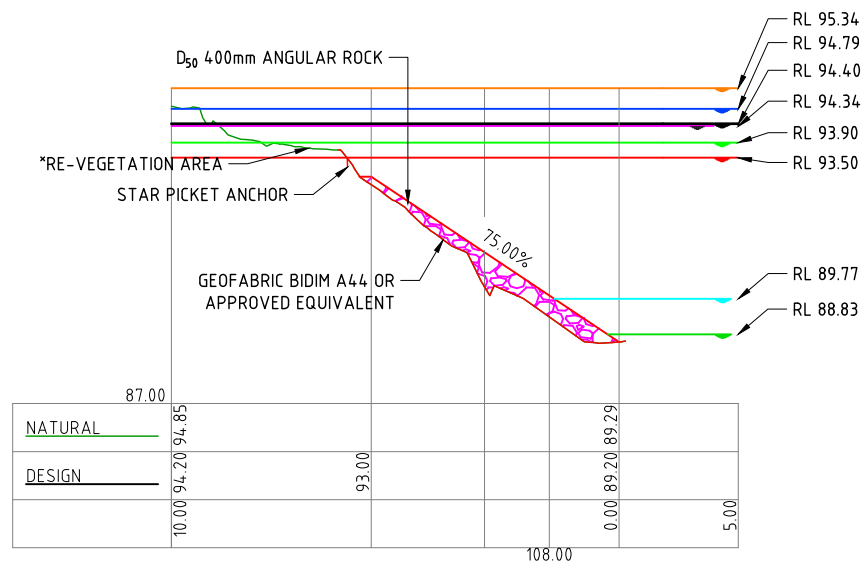
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Title:	SITE 2- PLAN

Drawing Status:	FOR REVIEW
Drawing No.	21091-03
Sheet.	03/06
Rev.	B



*REFER NOTE 25 SHEET 1 FOR
RE-VEGETATION AREA DETAILS

FLOOD LEVELS	
FLOOD TYPE	RL mAHd
DESIGN FLOOD (1 in 100 YEAR)	95.34
DESIGN FLOOD (1 in 20 YEAR)	94.79
BOM MAJOR FLOOD EVENT	94.40
DESIGN FLOOD (1 in 10 YEAR)	94.34
BOM MODERATE FLOOD EVENT	93.90
BOM MINOR FLOOD EVENT	93.50
PEAK WATER LEVEL (18/10/2021)	89.77
SURVEY WATER LEVEL (27/09/2021)	88.83



1:100
2 0 2 4 6 8 10m
AT A1

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE
APPROXIMATE ONLY AND THEIR EXACT POSITION
SHOULD BE PROVEN ON SITE. NO GUARANTEE IS
GIVEN THAT ALL SERVICES ARE SHOWN.



Rev.	Description	Drn	Ckd	App	Date
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A	ISSUED FOR CLIENT REVIEW	H.S	S.W	N.H	18/11/2021

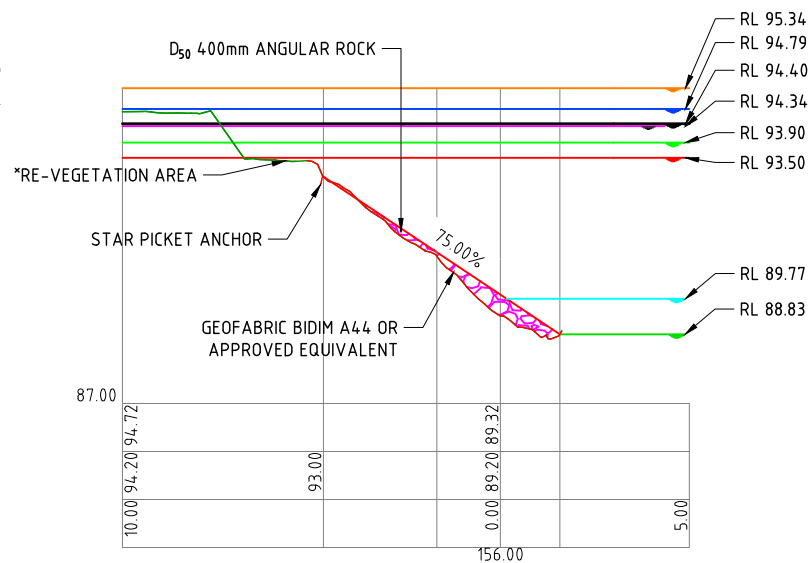
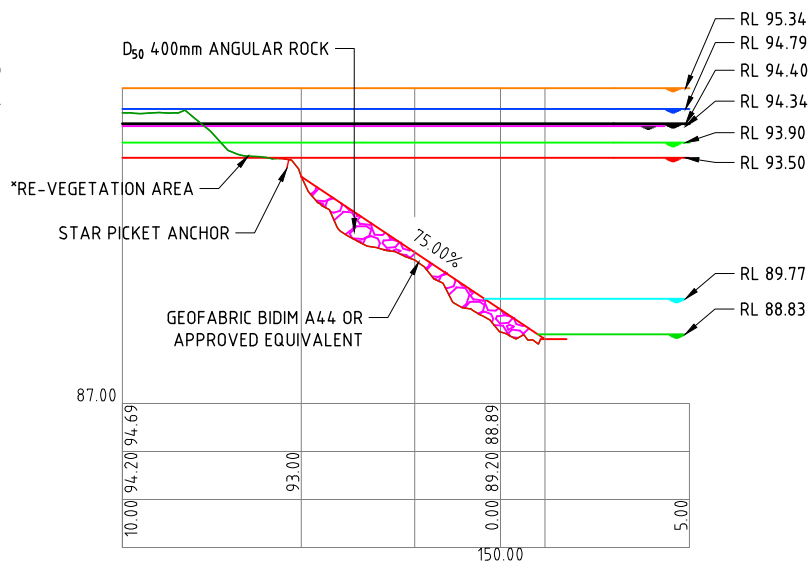
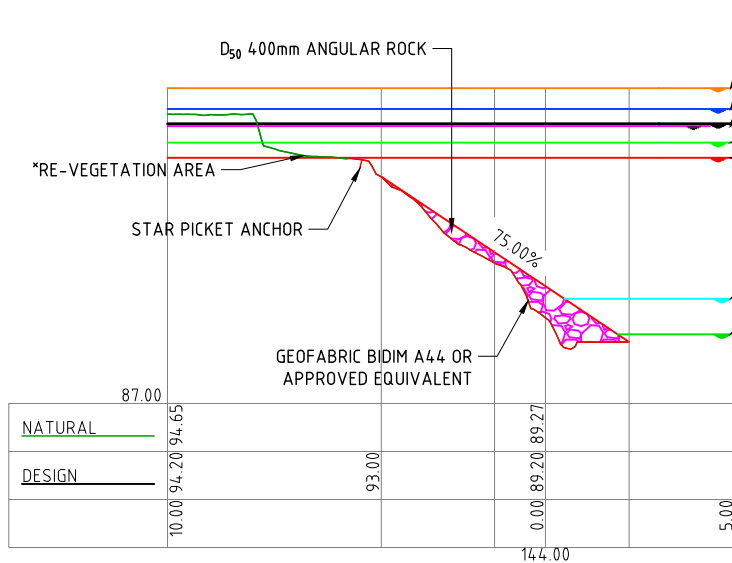
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DO NOT BEAR ORIGINAL SIGNATURES EVIDENCE OF VERIFICATION AND APPROVAL MAY BE OBTAINED FROM THE COMPANY.	Drawn	H. SINGH	28/10/21
	Design	H. SINGH	28/10/21
	Checked	S. WALES	28/10/21
	Discipline Head	N. HEINRICH	29/10/21
Scale	Sheet	Discipline Head	Job Manager
VARIES	A1	S. WALES	29/10/21



FIFTEEN 50

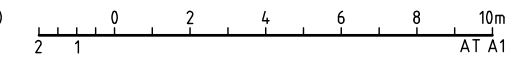
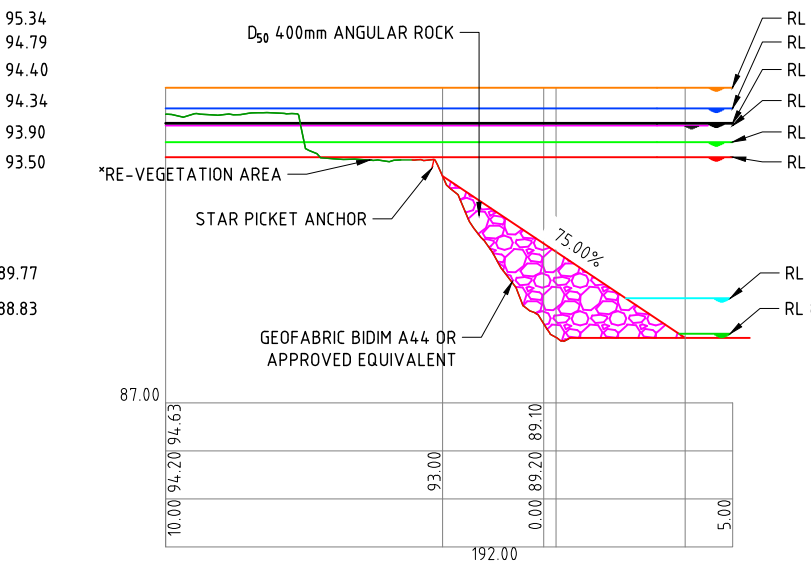
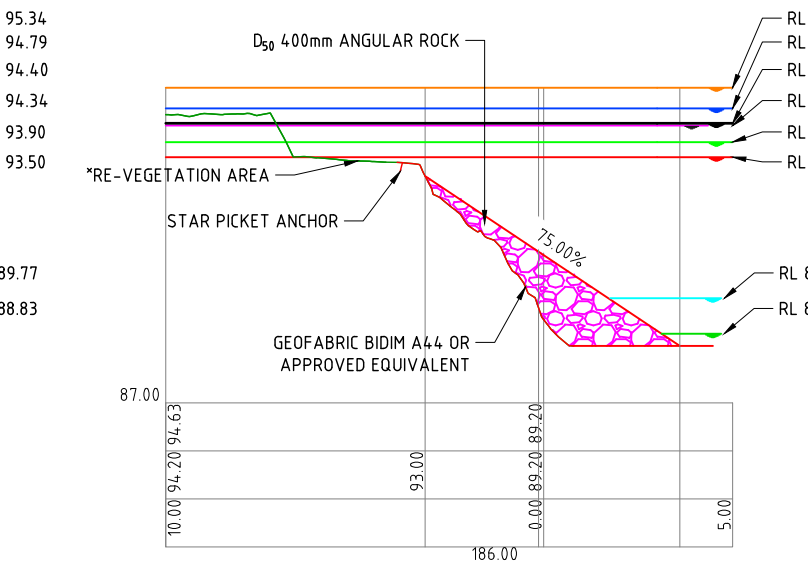
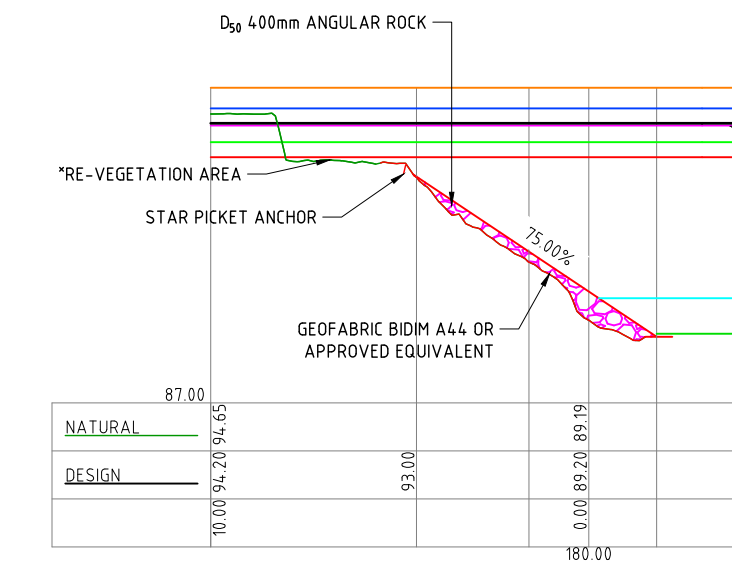
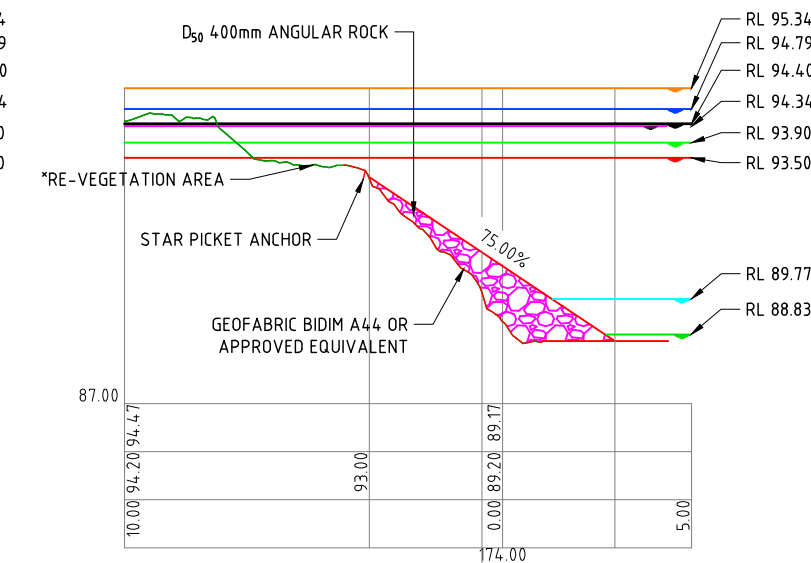
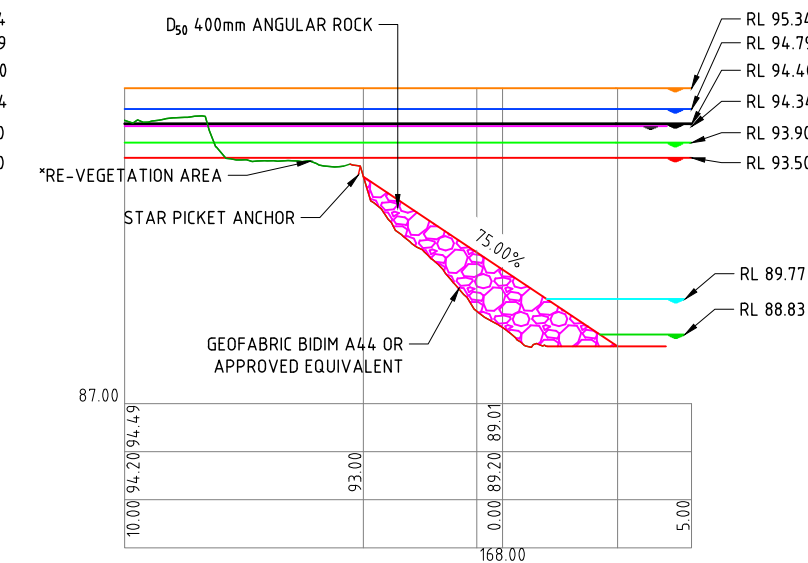
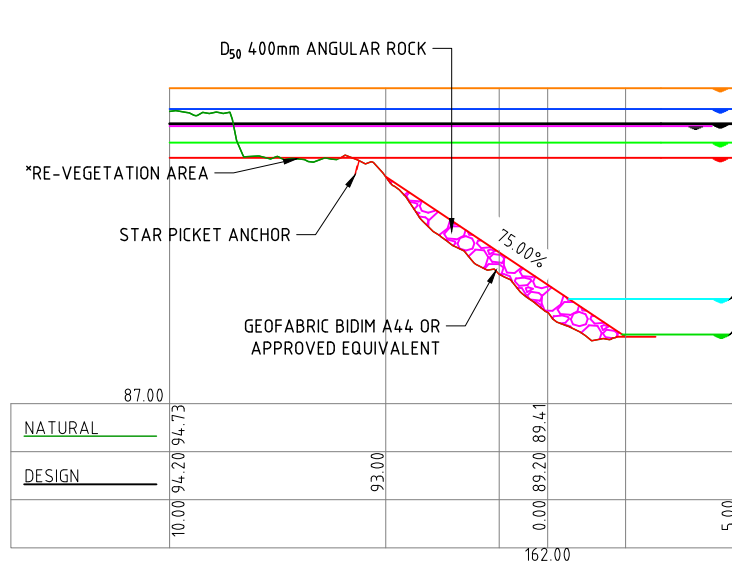
Project:
MEROOL RIVER BANK REHABILITATION
Title:
SITE 2- CROSS-SECTIONS SHEET 1 OF 3

Drawing Status: FOR REVIEW		
Drawing No. 21091-04	Sheet. 04/06	Rev. B



*REFER NOTE 25 SHEET 1 FOR
RE-VEGETATION AREA DETAILS

FLOOD LEVELS	
FLOOD TYPE	RL mAHd
DESIGN FLOOD (1 in 100 YEAR)	95.34
DESIGN FLOOD (1 in 20 YEAR)	94.79
BOM MAJOR FLOOD EVENT	94.40
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B	ISSUED FOR CLIENT REVIEW	H.S	H.S	N.H	29/03/2022
A	ISSUED FOR CLIENT REVIEW	H.S	S.W	N.H	18/11/2021

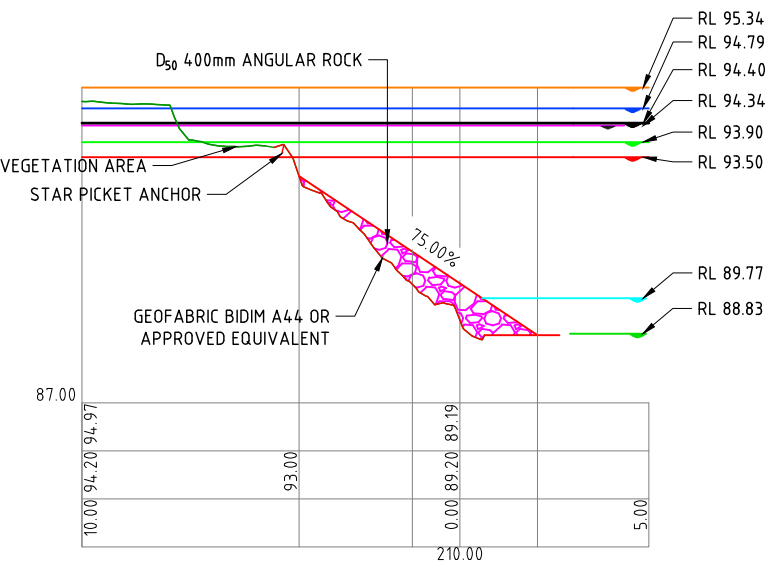
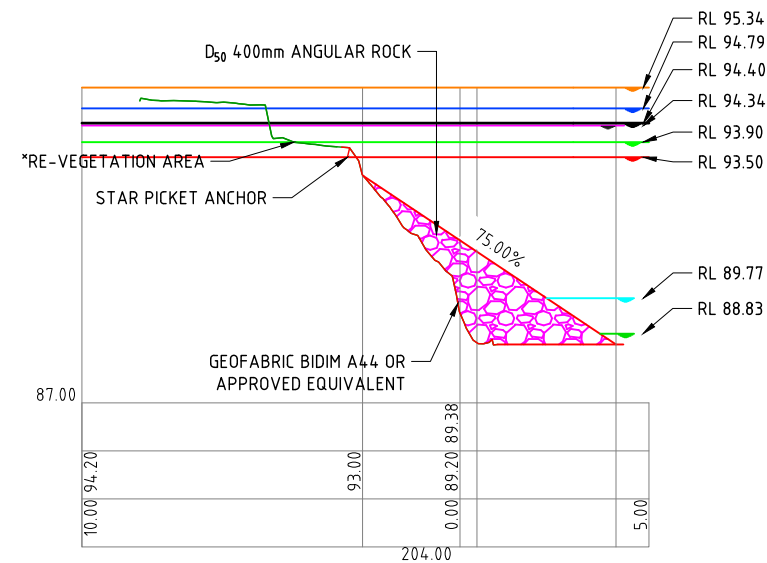
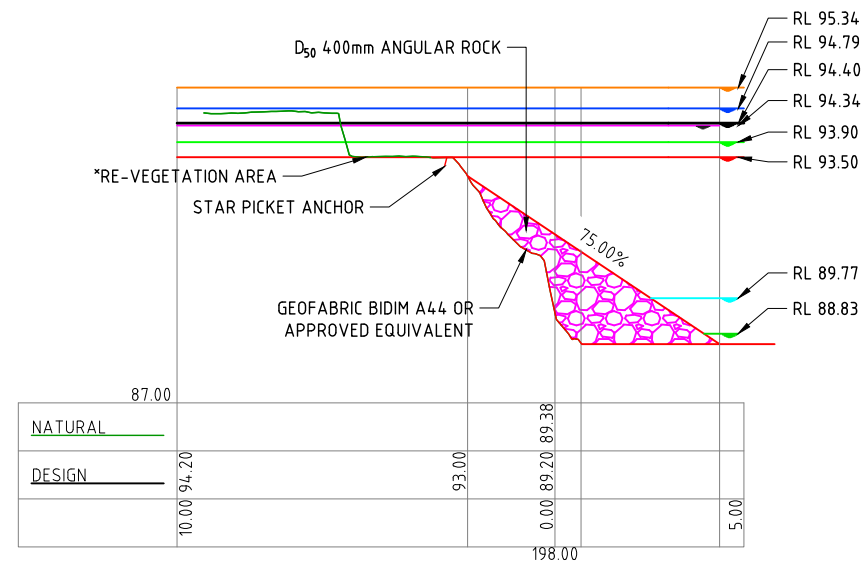
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DO NOT BEAR ORIGINAL SIGNATURES. EVIDENCE OF VERIFICATION AND APPROVAL MAY BE OBTAINED FROM THE COMPANY.	Drawn	H. SINGH	28/10/21
	Design	H. SINGH	28/10/21
	Checked	S. WALES	28/10/21
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Scale	Sheet	Job Manager	S. WALES
VARIES	A1		29/10/21



FIFTEEN 50

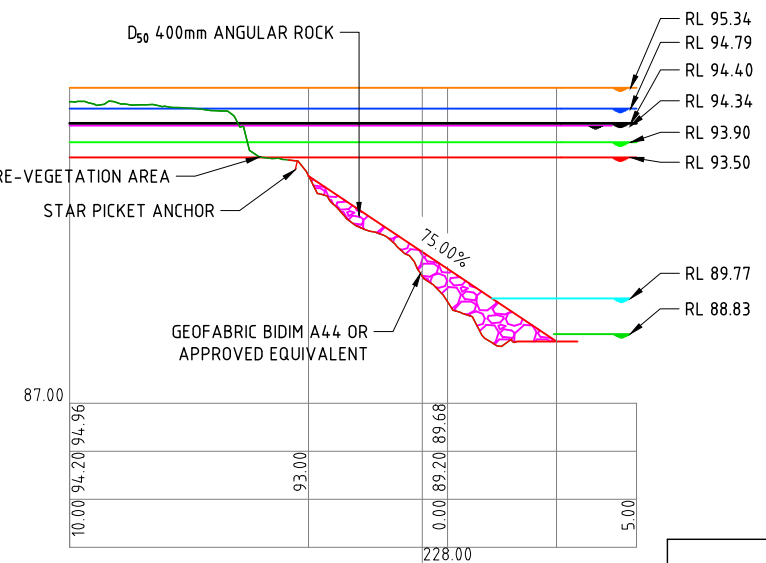
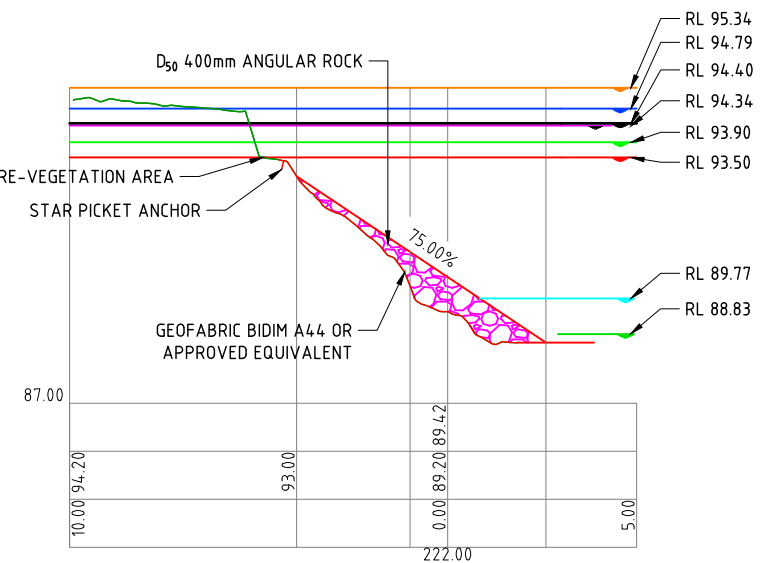
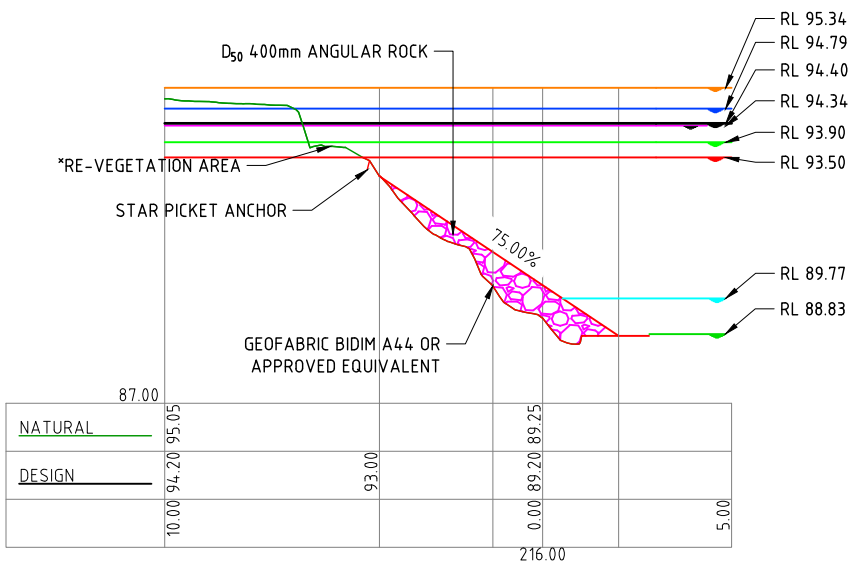
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MEROOL RIVER BANK REHABILITATION
Title:
SITE 2- CROSS-SECTIONS SHEET 2 OF 3

Drawing Status:		
FOR REVIEW		
Drawing No. 21091-05	Sheet. 05/06	Rev. B

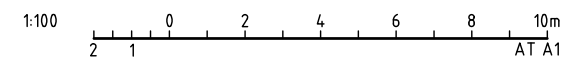
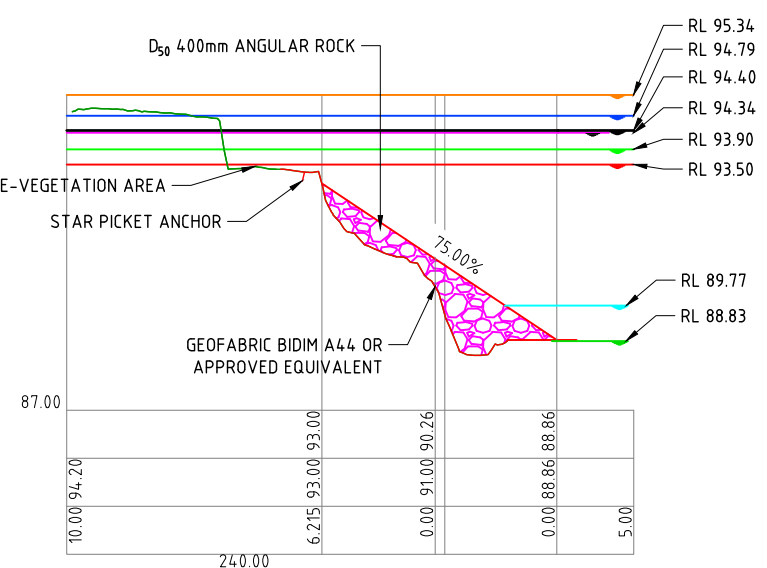
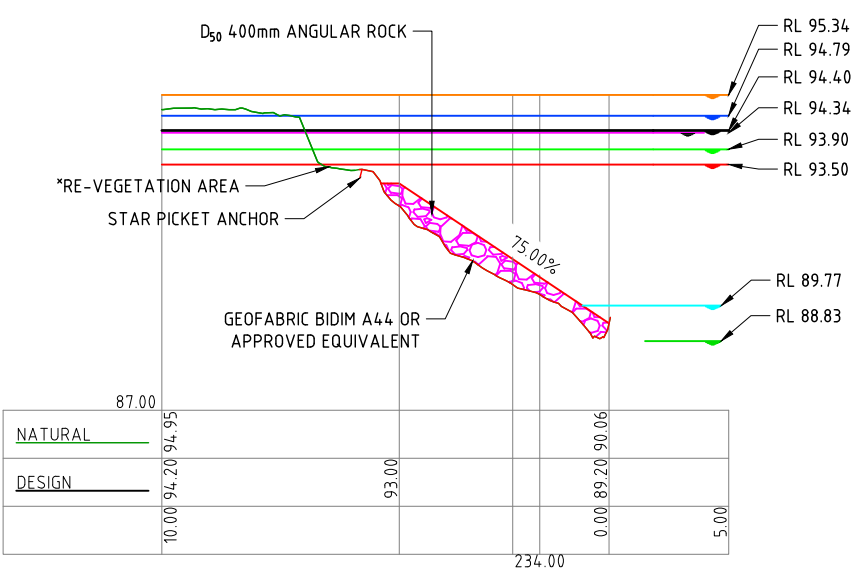


*REFER NOTE 25 SHEET 1 FOR
RE-VEGETATION AREA DETAILS

FLOOD LEVELS	
FLOOD TYPE	RL mAHd
DESIGN FLOOD (1 in 100 YEAR)	95.34
DESIGN FLOOD (1 in 20 YEAR)	94.79
BOM MAJOR FLOOD EVENT	94.40
DESIGN FLOOD (1 in 10 YEAR)	94.34
BOM MODERATE FLOOD EVENT	93.90
BOM MINOR FLOOD EVENT	93.50
PEAK WATER LEVEL (18/10/2021)	89.77
SURVEY WATER LEVEL (27/09/2021)	88.83



QUANTITIES			
ROCK COMPOSITION	ROCK SIZE	VOLUME	WEIGHT
	(mm)	(m³)	TONNES
D50	400.0	750.0	1950.0
GEOTEXTILE AREA = 1150 m²			



WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.



Rev.	Description	Drn	Ckd	App	Date
B	ISSUED FOR CLIENT REVIEW	H.S	H.S	N.H	29/03/2022
A	ISSUED FOR CLIENT REVIEW	H.S	S.W	N.H	18/11/2021

DOCUMENTS ISSUED		Name	Date
DO NOT BEAR ORIGINAL SIGNATURES. EVIDENCE OF VERIFICATION AND APPROVAL MAY BE OBTAINED FROM THE COMPANY.	Drawn	H. SINGH	28/10/21
	Design	H. SINGH	28/10/21
	Checked	S. WALES	28/10/21
	Discipline Head	N. HEINRICH	29/10/21
Scale	Sheet	Discipline Head	Job Manager
VARIES	A1	S. WALES	29/10/21

Client:



FIFTEEN 50

Project:
MEROOL RIVER BANK REHABILITATION
Title:
SITE 2- CROSS-SECTIONS SHEET 3 OF 3

Drawing Status:

FOR REVIEW

Drawing No.	Sheet.	Rev.
21091-06	06/06	B

Site Rehabilitation Management Plan

Lot 4 DP560393 and Lot 5 DP560393, 131 Merool Road, Moama NSW, 2731.

Introduction

This site rehabilitation management plan has been developed to reduce impacts of the development and to stabilise the site.

The area in which the rock beaching is proposed is highly modified from its natural state with high levels of river traffic and high-water events within the Murray River with associated impacts. This has washed away a large portion of the riverbank causing river red gums (*Eucalyptus camaldulensis*) to lose their footing and fall into the river, and greater risk for embankment collapse. The proposed sites contain the species commonly found in riverine environments near landscaped residential areas, including river red gums and maintained grasses. Large river red gums are scattered both along the edge of the Murray River and at varying distances back from the river's edge throughout the proposed site. Closer to the cabin's, maintained lawns are found along with some other introduced common garden plants.

Other species located along the river's edge including silver wattle (*Acacia dealbata*), *Junctus* and *Elocharis* sp. Exotic species dominate, including box thorn (Weed of national significance), pepper tree, lilly pilly, wild oat, mallows and mown kikuyu grass.

Site stabilisation / topsoil management

The rehabilitation works will be undertaken during dry periods to minimise risk of rainfall and runoff erosion from exposed soils. Nevertheless, erosion and sediment controls are to be implemented as described in the site plans. Works will occur progressively, with minor embankment shaping and geotextile and rock beaching placement to occur in a way that minimises the exposure time.

The works do not include export of in-situ material, with minor embankment shaping limited to that which provides a working surface for the erosion protection works. Existing mid-storey and dominant canopy vegetation will be retained, with works to occur within and around these trees.

Plant Community Type

The plant community type (PCT) at the project is a modified *River Red Gum - Silver Wattle - grassy very tall open forest of the inner floodplains of the lower NSW Southwest Slopes and Riverina Bioregions* (Benson 5 or PCT MU582). The table below outlines the plant species that make up the PCT.

Dominant canopy spp	Landscape position	Characteristic mid-storey spp	Characteristic ground cover spp	Other diagnostic features
River Red Gum (<i>Eucalyptus camaldulensis</i>)	Occurs on silty-sandy loam-clay soils on levees or other raised landform elements adjacent to rivers and wetlands.	Silver Wattle (<i>Acacia dealbata</i>), <i>Exocarpos strictus</i> , <i>Amyema miquelii</i>	Tussock Grass or River Tussock (<i>Poa labillardierei</i> var. <i>labillardierei</i>), <i>Lachnagrostis filiformis</i> , <i>Hemarthria uncinata</i> var. <i>uncinata</i> , <i>Carex tereticaulis</i> , <i>Juncus amabilis</i> , <i>Juncus flavidus</i> , <i>Cynodon dactylon</i> , <i>Carex appressa</i> , <i>Carex inversa</i> , <i>Eleocharis acuta</i> , <i>Eleocharis pusilla</i>	Very tall open forest with a sparse shrublayer and mid-dense to dense ground cover. Distributed along the Murray and Murrumbidgee Rivers in the temperate (hot summer) and semiarid (warm) climate regions of southwestern NSW.

Planting vision

As mentioned above, the site has been highly disturbed through past land uses, with the dominant canopy and characteristic mid-storey species still being present. The rehabilitation works aim to work within and complement the existing vegetation and encourage further establishment by stabilising the embankment. Therefore, the aim of revegetation at the site is to maintain the view to the river by adding the groundcover species that are lacking and improve visual amenity. The species chosen should also add to the stability of the site, be located within and throughout the proposed rock beaching erosion controls, be low maintenance and not require watering after establishment.

Plant selection and numbers

The following table identifies the species that are proposed to be planted (or very similar if the local nurseries cannot provide). They will be planted at the optimum seasonal opportunity within 12 months of the completion of the erosion protection works, with the aim that they will set seed and additional individuals will infill between the original plants.

Species name	Common name	Numbers/density (%)
<i>Poa labillardierei</i> var. <i>labillardierei</i>	Common tussock grass	25
<i>Lachnagrostis filiformis</i>	Blown grass	25
<i>Hemarthria uncinata</i> var. <i>uncinata</i>	Mat grass	25
<i>Carex tereticaulis</i>	Rush sedge	25

Planting arrangement

The plants will be planted in a mixed clumping manner, within, below and above the proposed rock beaching works.

Maintenance

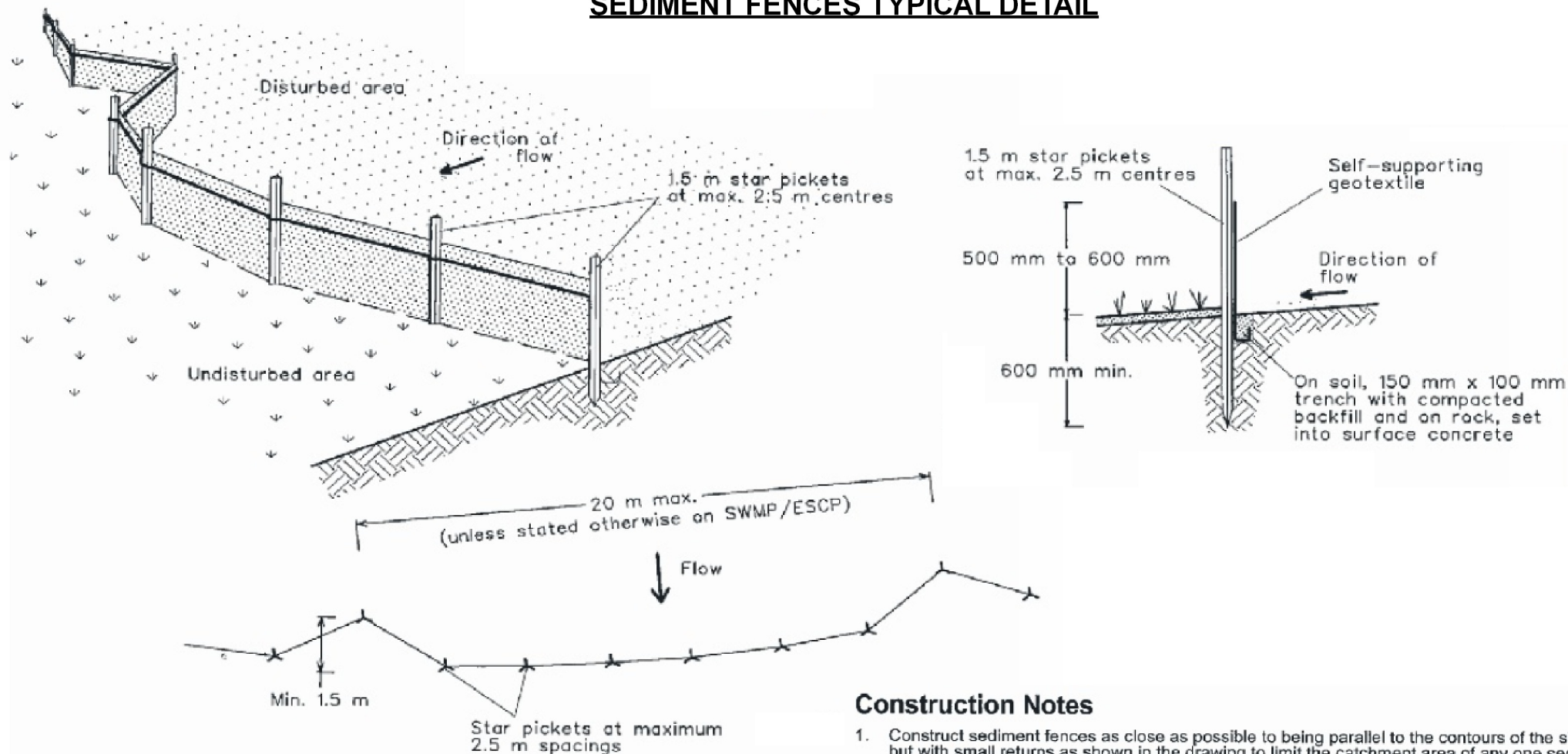
Plant survival is to be monitored with replacement as required to maintain density. The plants should be protected from herbivores (rabbits and kangaroos) to allow them to set seed. Weed control should be undertaken to reduce competition and watering in the first 12 months (as required) to maximise establishment.







SEDIMENT FENCES TYPICAL DETAIL



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.