Erosion and Sediment Control Plan

for a Development Application for Environmental Protection Works on the Murray River near Bamah NSW

March 2022

Progressive Rural Solutions 0408 577 248

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Related Documents

Type	Author	Name	Date
Statement of Environmental Effects	Progressive Rural Solutions	J122.2-SEE-V1R4	20/03/2022
Project Design Plans	Rich River Irrigation Developments	J000508	03/02/2022
Supporting Plans	Progressive Rural Solutions	J122.2-Plan-V1R4	20/03/2022
Biodiversity Test of Significance	Progressive Rural Solutions	J122.2-BTOS-V1R4	20/03/2022
Due Diligence Assessment	Progressive Rural Solutions	J122.2-DDA-V1R4	20/03/2022
Vegetation Management Plan	Progressive Rural Solutions	J122.2-VMP-V1R4	20/03/2022

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CONTENTS

1. Introduction 5
1.1. Organisation 5
1.2. Purpose 5
1.3. Report Format 5
1.4. Objectives 5
1.5. Background 6
1.6. Engagement 7
2. Site Description and Works 8
2.1. Location 8
2.2. Existing Site Description 9
2.3. Surrounding Area 10
2.4. Project Description 11
2.4.1. Proposed Works 11
2.4.2. Infrastructure 12
2.5. Project Methodology 12
2.6. Project Stages and Timing 12
2.7. Ground Disturbance Activities 13
3. Impact Assessment Criteria 14
3.1. Principles 14
3.2. Timeline of events 14
3.3. Design Criteria 14
4. Control Measures 15
4.1. Control Methods 15
4.1.1. Silt Fences 15
4.1.2. Silt Curtin 15
4.1.3. Straw Bale Filter 15
4.2. General Principles 15
All project works: 15
For works adjoining the River 16
4.3. Flood Management 16
4.4. The Site Plan 17
Timing 17
Site disturbance 18
Surrounding Site 18
Stockpiles 18
Specific Control Measures. 18
Rehabilitation 18
5. Maintenance and Monitoring 19
6. Review and Revision 19
7. References 20
8. Appendices 21
8.1. Plans 21
8.2. Landcom Standard Drawings 22
8.2.1. Earth Bank – Low Flow 22
8.2.2. Straw Bale Filter 23
8.2.3. Turbidity Barrier 24
8.2.4. Sediment Fence 25
8.2.5. Alternative Sediment Fence 26

1. INTRODUCTION

1.1. ORGANISATION

This report has been prepared to accompany a development application made by Ms Carolyn S Muir ATF the CSM Family Trust being the property owner. Progressive Rural Solutions – Clare Fitzpatrick will be the contact person throughout the application process. The main contractor and project manager has not yet been determined however will be subject to all measures identified in the following reports and the related conditions of consent.

1.2. PURPOSE

This Erosion and Sediment Control Plan (ESCP) forms part of a Development Application and subsequent Controlled Activity Approval application. Activities that have the potential to cause or increase erosion or generate sediment relating to this project, include the exposure of soils during construction of the project (i.e. soil stripping and earthworks activities). The following components have the potential to generate sediment:

- Excavation activities,
- Flooding, and
- General construction works on site.

This ESCP has been prepared to detail the relevant water quality impact assessment criteria and erosion and sediment control procedures for subsequent reporting in accordance with Natural Resource Access Regulator (NRAR), WaterNSW and NSW DPI – Fisheries conditions and the potential conditions from the Environment Protection Authority and the Department of Environment, Planning and Industry (DEPI) requirements.

1.3. REPORT FORMAT

This report is set out in the following format:

Table 1 - Report format

Section	Address
1	Objectives, documentation and background.
2	Site description and Analysis.
3	Impact assessment.
4	Control measures.
5	Maintenance and monitoring.
6	Review and revision.
7	Conclusion.
Appendices	Plans and supporting reports.

1.4. OBJECTIVES

The objective of this ESCP is to set out strategies to control soil erosion and sediment generation close to the source and thereby minimise the potential for project activities to adversely affect downstream water quality. A secondary objective is to ensure that measures are in place to adequately manage flood risks.

The overall aims and objectives of this plan are to:

- Review the site features and related limitations identified in the Statement of Environmental Effects (SEE),
- Implement the mitigation measures identified in the SEE,
- Manage environmental risks associated with the project activities,
- Identify the site disturbance areas of the project,
- Plan to control water from the top of the site through to the bottom of the site, and
- Identify measures to prevent or minimise sediment leaving the site.

1.5. BACKGROUND

The property known as 'Pine View' was purchased by the applicant in 2019 which allowed the consolidation of multiple properties into the C.M. Pastoral Co Moama aggregation and a direct connection to the Murray River. There are multiple pump sites located within the riparian area of this property including the Bama Irrigation Trust, syndicated stock and domestic pump and pipeline and a separate irrigation pump system that supplies water to multiple properties within the C.M Pastoral enterprise. There are no works proposed in connection with the community and trust supplied pump sites although the project works will assist with the protection of the area upstream of the pump sites and improve the water quality within the area.

As has been experienced throughout the broader region the lower sections of the Murray Riverbanks have suffered increased erosion and bank undercutting through the highly variable river operating levels and increased river traffic. This is specifically a concern within the area proposed for works on 'Pine View'.

The single tier, low level, retaining wall is proposed to be constructed with redgum sleepers supported by steel columns and tied back with steel rods and beams. There will be a total length of up to 141.5m with a return section both upstream and downstream of the existing earthen boat ramp. No works are proposed to the existing boat ramp located within the site.

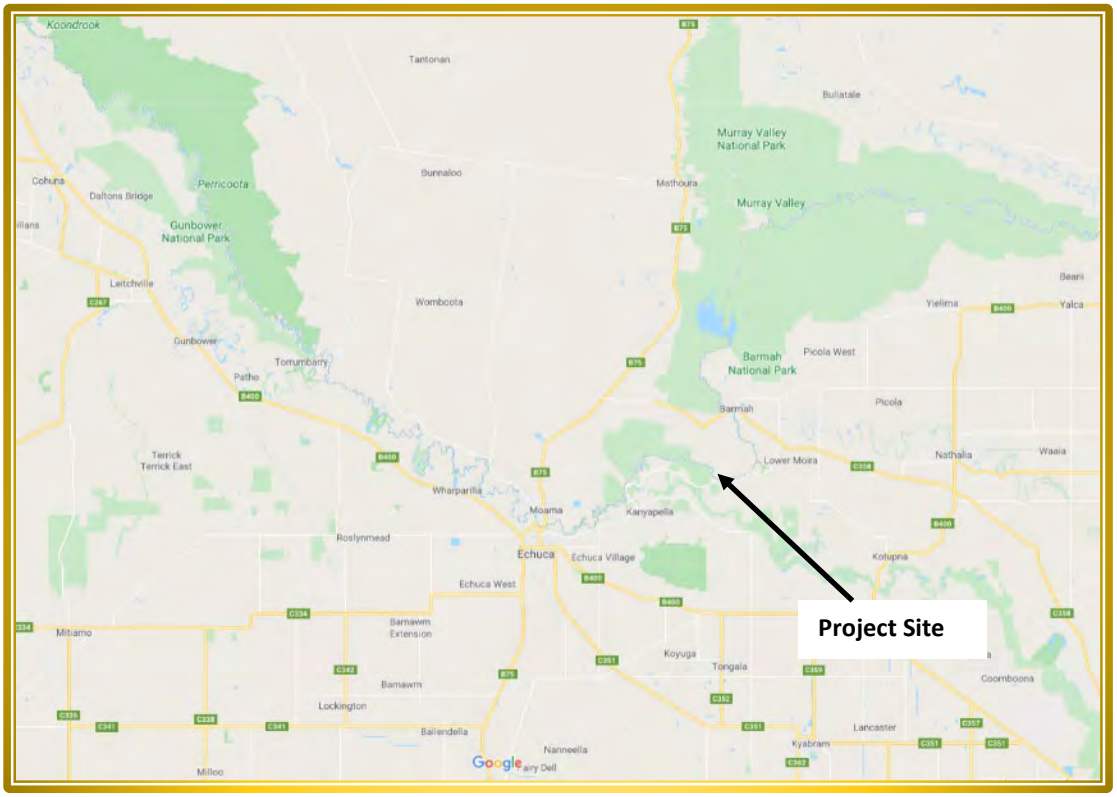


Figure 1-1 - Project Location

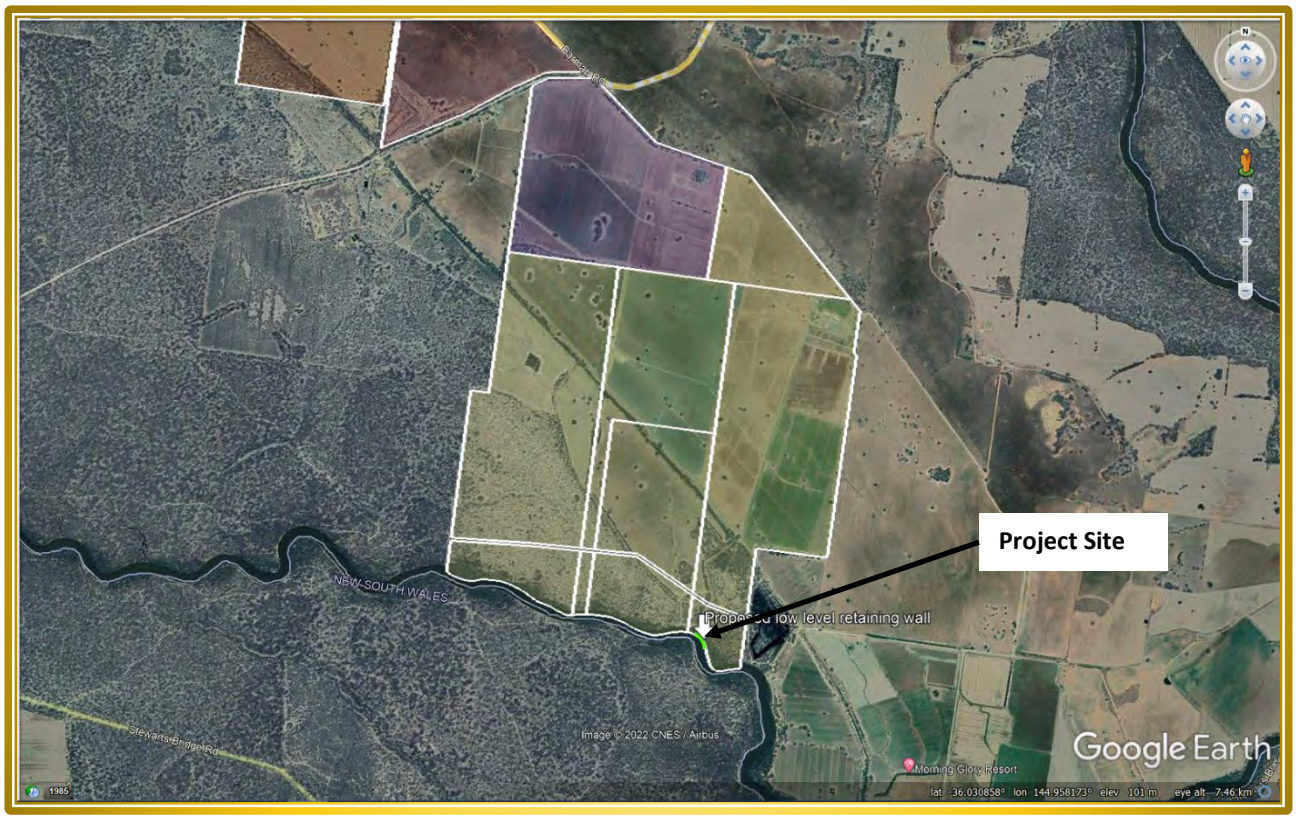


Figure 1-2 - Image showing overview of the location proposed works and properties

In consultation with the relevant authorities the following process has been identified:

1. Undertake pre-consultation with relevant authorities to confirm any requirements,
2. Lodge a Development Application to the Murray River Council for the project works through the NSW Planning Portal,
3. Receive and meet any relevant consent conditions of the approval including lodging further required applications (Controlled Activity, Construction Certificate as required),
4. Install approved temporary erosion control works,
5. Complete construction works in accordance with approved plans,
6. Remove temporary erosion control measures at the appropriate timeframe, and
7. Meet all ongoing requirements as identified through the application and approval process.

This report aims to provide the required information to support the local development application.

1.6. ENGAGEMENT

No consultation with authorities has occurred as part of the preparation of this plan however the plan is included in the application process and as such provided for comment by relevant authorities. The plan may be amended to meet additional requirements as part of conditions of consent.

2. SITE DESCRIPTION AND WORKS

2.1. LOCATION

The project is located in New South Wales in the Riverina region. Specifically, the site is in the Barmah area, 16.7kms north-east of the township of Moama. The closest township is the Cummeragunja village located 4.5kms to the north east and Barmah is located 6kms to the north north-east.

The property address of the project site is "Pine View" Gilmour Rd, Moama. The project site is located on the north side of the Murray River, 14.5kms downstream of the Barmah Bridge. The property access is 2.3kms by Gilmour Road from the Barmah Rd turn off.

The specific location of the project site is shown below **Figure 2-1** - Location of project site in relation to the region**Figure 2-2** and **Table 2** - Land details of the project

Figure 2-1 - Location of project site in relation to the region

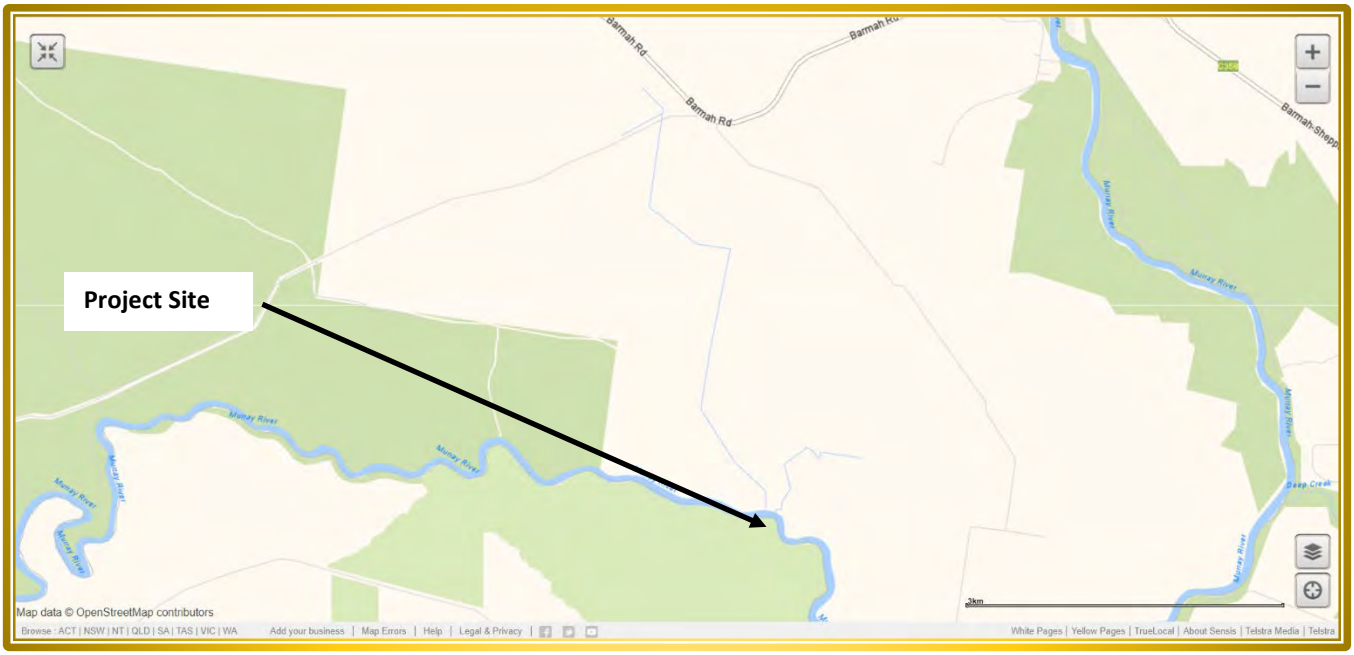


Figure 2-2 - Location of projects in relation to the local area

The land details of the project are summarised as follows:

Table 2 - Land details of the project

Details	Specific related to project site
Lot number	53
Deposited Plan	751140
Parish	Bama
County	Cadell
Local Shire	Murray River Council
LEP Zone	Zone RU1 – Primary Production Zone W2 – Recreational Waterways
Catchment Area	Murray
IBRA Sub-region	Riverina – Murray Fans
Mitchell Landscapes	Murray Channels and Floodplains
Local Aboriginal Land Council	Cummeragunja Local Aboriginal Land Council
Floodplain Management Plan	Nil
Land Stature	Freehold
Area of project	1,056m^2
GPS Reference	MGA Zone 55 E:313849 N:6006677

2.2. EXISTING SITE DESCRIPTION

The project works are located in New South Wales on Lot 53 DP751140 within the Murray River Council area. The property enjoys presumptive rights whereby the title extends to the centre thread of the River channel.

The site has been used extensively for livestock grazing for a long period prior to purchase by the applicant. The site as one of the only locations in this stretch of River with its sloping banks would have been a major location for livestock access to water creating ongoing disturbance. The Bama Irrigation Trust supply pump infrastructure and associated channel and levee banks have been at this site for over 100 years. Many pumps have been installed and removed from this location – nearly all requiring some form of excavation activities. Previous property owners have used this location for River boat access to launch small boats and retrieve pumps from the adjoining pump stations.

The project area stretches almost 150m along the river bank where ongoing erosion of the lower banks has led to degradation of the bank. The existing earthen boat ramp will be retained and as such the proposed wall with be spilt into two spans either side of the boat ramp.

The image below shows the existing site with an impression of the proposed wall shown in red.

Figure 2-3 - Image showing proposed retaining wall

Figure 2-4 - Areal View of project site showing project area (Source SixMaps)

2.3. SURROUNDING AREA

The project is located within the Riverina area of NSW. This region broadly covers 9,576,964ha (7,090,008ha in NSW). The Murray and the Murrumbidgee Rivers together with the Lachlan and the Goulburn Rivers are the major tributaries which flow from the highlands in the east west across the plains. (NSW National Parks and Wildlife Service, 2003)

The Mitchell Landscape for the area is classified as Murray Channels and Floodplains which are defined as: Active channels and seasonally inundated floodplains of the Murray streams in Quaternary alluvium with associated billabongs, swamps, channels, levees and source bordering dunes, relief to 10m. Includes scalded alluvial flats, broad elevated floodplains and associated relict channels; isolated sandy rises, relief to 5m. (Eco Logical Australia, 2008).

The area is serviced by local roads, mobile phone service, electricity, internet and river water access.

The project site is surrounded on three sides by floodplain areas of regrowth including River Red Gum and Black Box and is interspersed with some dwarf cherry with a predominantly non-native grass layer. The remaining side is the Murray River. The site has been subject to ongoing long-term grazing of livestock which is evident in the quality of the vegetation and degraded habitat on and adjoining the site.

Figure 2-5 – Project site looking towards the River

Figure 2-6 – Project site looking upstream

Figure 2-7 – Project site looking downstream

2.4. PROJECT DESCRIPTION

2.4.1. PROPOSED WORKS

The works proposed relate to the installation of environmental protection works in the form of a redgum sleeper retaining wall. The low-level wall is proposed to follow the existing lower eroded bank of the Murray River and will extend up to 141.5m in total length with a maximum height of 1.3m. The wall is proposed to be separated by an existing earthen boat ramp with two wall returns tied into the bank at the location for added security. Each end of the retaining wall is to be tied into the existing bank by a return and additional rock erosion control. Excavation works will be required but will be minimised.

The project will also include ongoing revegetation works up to a 2 year period after installation.

2.4.2. INFRASTRUCTURE

The project infrastructure when complete is proposed to include the following:

- Existing earthen boat ramp with no change to ramp proposed, and
- Up to 51.5m long redgum sleeper retaining wall downstream of ramp, and
- Up to 90m long redgum sleeper retaining wall downstream of ramp.

Details of the proposed wall are shown below.

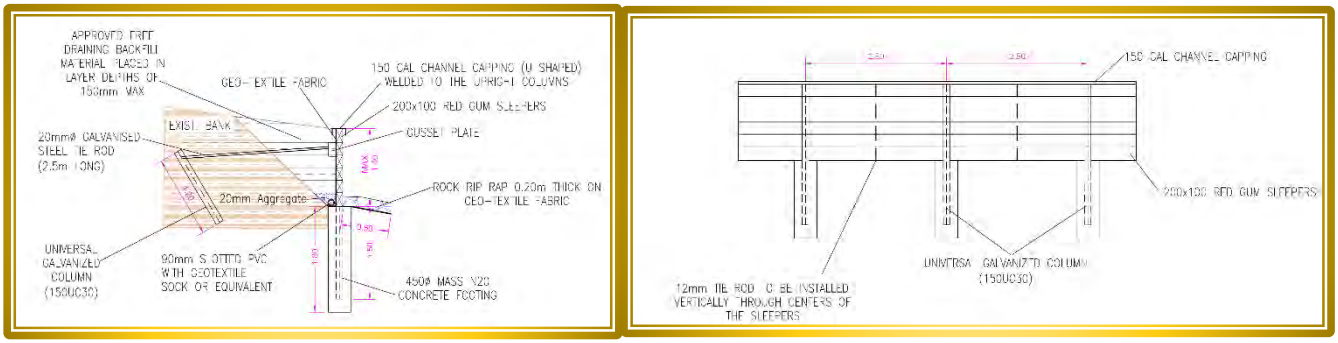


Figure 2-8 Typical Retaining Wall Detail

2.5. PROJECT METHODOLOGY

The proposed methodology relating to the project works following the obtaining of all approvals is as follows:

1. Development Application Approval received,
2. Controlled Activity Approval received,
3. Relevant notifications are given to authorities,
4. Erosion and sediment controls are reviewed and installed,
5. Beams and columns installed progressively,
6. Sleepers installed along bank and tieback rods connected to beams progressively,
7. Geotextile fabric installed and site backfilled with previously excavated fill progressively,
8. Revegetation work,
9. Erosion and sediment control measures removed/checked,
10. Project site monitored for ongoing erosion and rehabilitation.

No Native Vegetation (dead or alive) is to be removed and excavation and ground disturbance activities are only to occur in approved locations.

2.6. PROJECT STAGES AND TIMING

Project works are proposed to commence as soon as possible. It is estimated that major construction activities will be undertaken over four weeks and the whole project complete in five weeks.

The timing of the works is dependent on the approval process however works will not be undertaken during flood or known major rainfall events. River levels will be monitored, and works are proposed to occur during low river level events only.

Where works commence and river levels unexpectedly rise, works will be completed and will recommence at a suitable time to safely undertaken them. This may require that the wall is tied into the bank with erosion control temporarily installed as an interim measure.

Ongoing rehabilitation works as identified in the Vegetation Management Plan will be monitored and reviewed over a 2 year period.

2.7. GROUND DISTURBANCE ACTIVITIES

The ground disturbance activities relate to access for machinery, storage of materials and equipment, trenching for tie back rods and anchors and installation of columns. A small area will also require backfill with earth sourced from within the adjoining farming area. The works within the site will encompass an area of approx. 1,056m^2. Access to and within the site is proposed on existing access tracks currently utilised at the site.

The site parking storage and lay-down area is proposed to occur approx. 30m to the north of the site within the existing irrigation infrastructure area. No excavation activities relating to this project are proposed in this area or on the existing levee banks at the site.

3. IMPACT ASSESSMENT CRITERIA

The Managing Urban Stormwater: Soils and construction guidelines (Landcom guidelines) contain requirements for erosion control and water management which are detailed in the subsections below

3.1. PRINCIPLES

The following principles, which have been taken from the Landcom guidelines, underpin the approach to erosion and sediment control for the project site:

- Minimising surface disturbance and restricting access to undisturbed areas.
- Progressive rehabilitation/stabilisation of project infrastructure areas.
- Separation of runoff from disturbed and undisturbed areas where practicable.

3.2. TIMELINE OF EVENTS

Project works are proposed to commence as soon as possible. It is estimated that major construction activities will be undertaken over four weeks and the whole project complete in five weeks.

The timing of the works is dependent on the approval process however works will not be undertaken during flood or known major rainfall events. River levels will be monitored, and works are proposed to occur during low river level events only.

Where works commence and river levels unexpectedly rise, works will be completed and will recommence at a suitable time to safely undertaken them. This may require that the wall is tied into the bank with erosion control temporarily installed as an interim measure.

Ongoing rehabilitation works as identified in the Vegetation Management Plan will be monitored and reviewed over a 2 year period.

3.3. DESIGN CRITERIA

The design criteria for sediment control structures are summarised in **Table 3**.

Table 3 - Design Criteria for Sediment Control Structures

Sediment Control Structure	Function	Design Capacity
Silt Curtin	Prevention of silt and sediment spreading	NA
Sediment fences and/or straw bale filters	Retention/filtration of suspended sediments	Peak flow limited to less than 50L/sec in the design 1 in 10 year critical duration rainfall event (Landcom 2004)

* Assuming a duration of disturbance greater than 3 years with a standard, not sensitive, receiving environment.

4. CONTROL MEASURES

The project proposes control measures designed to minimise the impact of sediment on water sources. The primary management measure for erosion and sediment is the control of initial ground disturbance, and the timely land rehabilitation following disturbance. Where disturbance is unavoidable, erosion and sediment control structures will be employed.

4.1. CONTROL METHODS

The following control measures are available to be utilised where indicated on the provided ESCP.

4.1.1. SILT FENCES

Silt fences are to be designed in accordance with Landcom (2004) with typical dimensions shown in the attached standard plans. Where necessary, silt fences are to be installed immediately down slope of the areas to be disturbed to minimize the potential for sediment transport into receiving catchments and waterways. They are to be installed along site contours if practicable and the catchment is to have a maximum grade of 1V: 2H (vertical: horizontal).

Fences are to be constructed using geotextile filter fabric with structural posts to be spaced no more than 1.5m apart. Where practicable, the catchment areas of silt fences are to be limited by constructing the fences with small returns at 20m intervals to create smaller contributing sub catchments. This is necessary as silt fences are prone to failure in larger storm events and should be designed to ensure a maximum of 50 L/s passes through the silt fence during a storm event.

4.1.2. SILT CURTIN

Silt Curtains or Turbidity Curtain are floating marine barriers that sit in a body of water in aquatic systems to prevent silt and sediment from spreading.

Silt Curtains are used for dredging, excavation, piling operations, rock walling and other aquatic construction activities. They are designed to contain suspended silt and sediment so that it can settle to the marine floor. A Silt Curtain should restrict the migration of suspended sediment to areas where it would have a detrimental effect on flora and/or fauna. This may happen as a result of excavation works around waterways where dredging, rock wall construction, piling or excavation is happening.

4.1.3. STRAW BALE FILTER

Straw bales are suitable for low flows of water. It is only recommended that these are used in limited applications such as reducing the flow velocity. The return of straw bales every 20 metres is recommended to ensure some stability for this style of barrier. They need to be embedded in the ground and held firmly in place with star pickets. The minimum number of bales to be used is four. If only two bales are used during a storm event, the water will simply hit the bales and flow around, increasing erosion. The bales must dam the run off and allow the sediment to settle behind the bales – they do not filter sediment-laden waters and will only hold back water if installed correctly.

4.2. GENERAL PRINCIPLES

ALL PROJECT WORKS:

- Works must be timed to minimise the potential for exposure for flood events and must not commence before approval to do so has been granted.
- Approved runoff and erosion controls shall be installed before works occur within the site (other than that associated with the construction of the controls).
- Uncontaminated clean runoff shall be intercepted up-site and diverted around the project disturbed areas and other areas likely to be disturbed. Diversion works shall be adequately stabilised.
- The capacity and effectiveness of runoff and erosion control measures shall be maintained at all times to conform to the specifications and standards quoted and to any conditions of approval of those measures.
- Trenches shall be backfilled, capped with topsoil and compacted to a level at least 75 mm above adjoining ground level.
- All disturbed areas shall be progressively stabilised and/or revegetated so that no areas remain exposed to potential erosion damage for more than 14 days or other such period as may be approved after earthworks

cease. All driveways and parking areas shall be stabilised with compacted sub-grade as soon as possible after their formation.

- Measures required under the *Water Management Act* and *Fisheries Management* Act shall be implemented where required. This legislation requires that approval is gained for any proposed excavation or fill in or within 40m of a watercourse. Permits should be sought from the relevant department prior to works occurring and copies of such permits will be held on site at all times during works.
- No vegetation clearing will occur unless identified on the attached approved plans.
- No excavation is to occur in any area not identified on the attached plan. All contractors are to be aware of their obligations to protect Aboriginal objects under the *National Parks and Wildlife Act* and Regulation. Should any Aboriginal object be identified then all work in the area must stop immediately and the process identified in the SEE and approvals must be strictly followed.

FOR WORKS ADJOINING THE RIVER

If the water operating level within the River is above the bench height, the following controls may be utilised where necessary.

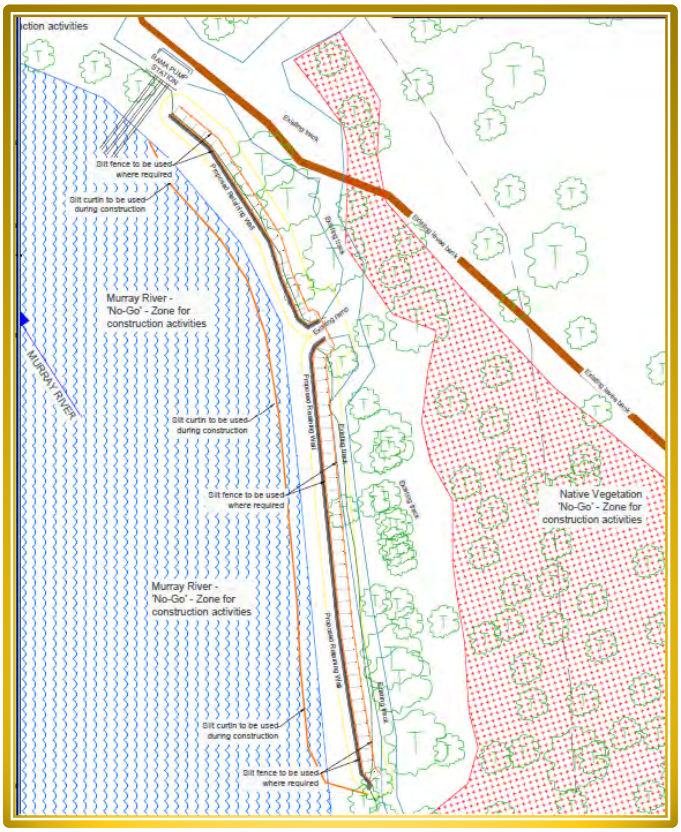
- A floating silt/sediment curtain and spillage boom must be placed in the river at the work area. Additionally, fabric silt curtains, socks or coir logs should be sited so that any area where works related activity will occur will be isolated from the river.
- As far as possible, works should be limited to the areas being excavated and storage or equipment areas should be sited away from the area on high flat ground.
- Vegetation planting areas are to be barrier protected and are not to be accessed unless for essential site access which must be barrier protected from the other area.
- When all installation and revegetation works have been finalised, inspected and approved, the control measures can be removed. The floating silt curtain or boom must remain in place until the turbidity of the water adjoining the project construction area diminishes to the same as the river.
- No invasive ripping or cultivation should occur adjacent to the riverbank and any ripping to restore compacted areas should ensure that sediments are trapped and contained within sediment controls.
- Essential site access should be contained where excavation and construction activities are to occur.
- All excavation material is to be immediately removed from the project area adjoining the river.

4.3. FLOOD MANAGEMENT

No flood management works temporary or otherwise are proposed as part of the project works. Flood events within this area are known well in advance. As a result, the project can be scheduled outside and preferably well after known flood events.

4.4. THE SITE PLAN

Specific site erosion and control methods have been identified below in **Figure 4-1**.



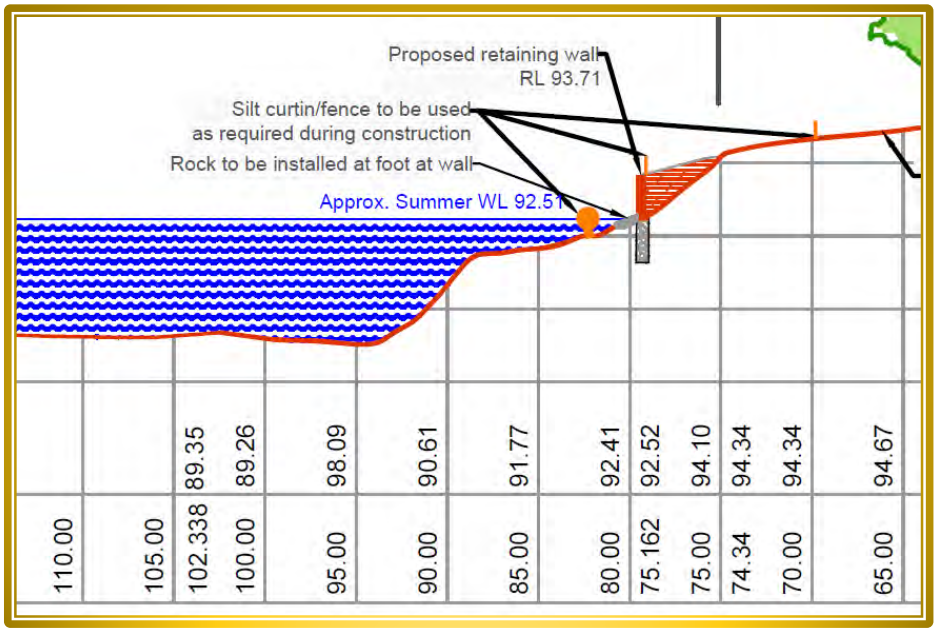


Figure 4-1 - Erosion and Sediment Control Plan

Specifically, this plan has been formed taking into account the following:

TIMING

Project works are proposed to occur following the receipt of all approvals. Works will be planned where possible taking into consideration predicted rainfall events, potential river flows and a review of potential flood events.

SITE DISTURBANCE

As identified above, the site ground disturbance activities within the River area are proposed to cover an area of approximately 1,056m^2 (excludes existing access and parking area).

The plan has clearly identified that there are adjoining areas where no construction machinery should enter which are identified as “No Go Zones”. All contractors will be made aware of these areas to ensure no additional site disturbance occurs.

The excavation works are proposed within the existing previously disturbed area and no vegetation clearing is proposed.

SURROUNDING SITE

The area surrounding the site consists of the Murray River, Riparian Area, access through the vegetated area and the irrigation area away from the site. Any clean water from the surrounding area will continue to follow its natural drainage patterns and will not be introduced into the site.

STOCKPILES

The project works propose the use of a small stockpile which will consist of earth removed as part of trenching and minor excavation activities. This earth will be temporarily located adjoining the excavation area whilst the retaining wall anchor points are being installed. These works are proposed to occur for the minimal time necessary and where required will be surrounded by a silt fence.

SPECIFIC CONTROL MEASURES.

SILT FENCES

There are two areas within the site that silt fences are proposed for use. Their location and use is dependent on project works and rainfall events. If an unexpected rainfall event occurs, fences may also be utilised parallel to and surrounding to the trenching and stockpile areas. These are proposed as per the Landcom Standard Drawing SD6-8 or SD6-9 where no excavation is allowed.

STRAW BALE FILTER

There are no straw bale filters proposed within the site however if they are to be utilised as a result of unexpected weather, these are to be as per the Landcom Standard Drawing SD6-7.

REHABILITATION

Rehabilitation works will occur as per the Vegetation Management Plan.

5. MAINTENANCE AND MONITORING

Routine inspections of erosion and sediment control structures, as well as inspections following rainfall events of 25mm or more in a 24 hour period, will be conducted by construction personnel or their delegate. During these inspections, erosion and sediment control structures are to be inspected for capacity, structural integrity and effectiveness. Inspections will be documented using a check sheet adapted from Landcom (2004) (refer Volume 1, Tables 8.1 and 8.2).

Where inspections indicate that sediment accumulation is approaching or exceeding the sediment zone of a control, desilting will be undertaken so as to reinstate the minimum volumes and freeboard designed. Silt fences and straw bale filters will be inspected and trapped sediment removed or straw bales replaced as necessary. Removed sediment will be placed within the disturbed project footprint.

6. REVIEW AND REVISION

This plan will be reviewed and revised:

- On an annual basis,
- If there are major changes to the project, the design or its operations,
- In response to issues raised by any authorities, and
- In response to any incident which results in a failure to meet any of the commitments of this Plan.

7. REFERENCES

DLWC (2001), Guidelines for Erosion and Sediment Control on Building Sites, Department of Land and Water Conservation, 2nd edition.

DEC NSW (2006), A resource guide for local councils: erosion and sediment control, Dept of Environment and Conservation, NSW Government, May.

Landcom (2004), *Managing Urban Stormwater: Soils and Construction*, Volume 1, NSW Government, 4th ed., March.

Witheridge 2017, *Erosion & Sediment Control Field Guide for Pipeline Projects – Part 1*. Catchments and Creeks Pty Ltd., Brisbane, Queensland

8. APPENDICES

8.1. PLANS

For all project plans, please see those detained in the Statement of Environmental Effects J122.2-SEE-V1R4 Section 8.1

Legend

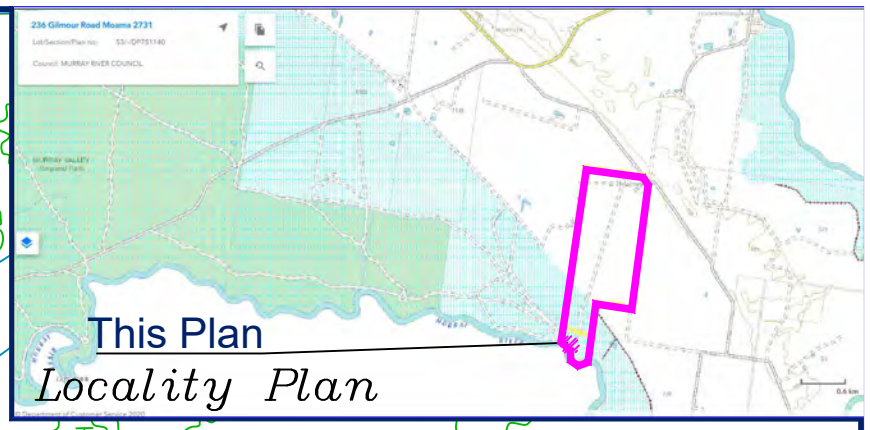
- Old Channel
- Existing Channel
- New Channel
- Old Drain
- Existing Drain
- New Drain
- Existing Track
- New Track
- Existing Pipe
- New Pipe
- Boundary Fence
- Internal Fence
- Check Banks
- Field Direction
- Waterway
- Top of Bank
- Powerline
- Tree for Removal

Construction Area

- Construction Area
- Excavation Zone
- 'No Go' Zone

Erosion Control

- Diversion Bank
- Silt Fence
- Straw Bale Filter
- Silt Curtain
- Rip Rap
- Erosion Control



tive Vegetation
-Go' - Zone for
uction activities

BAMA PUMP STATION

Silt fence to be used where required

Silt curtin to be used during construction

Proposed Retaining Wall

Existing track

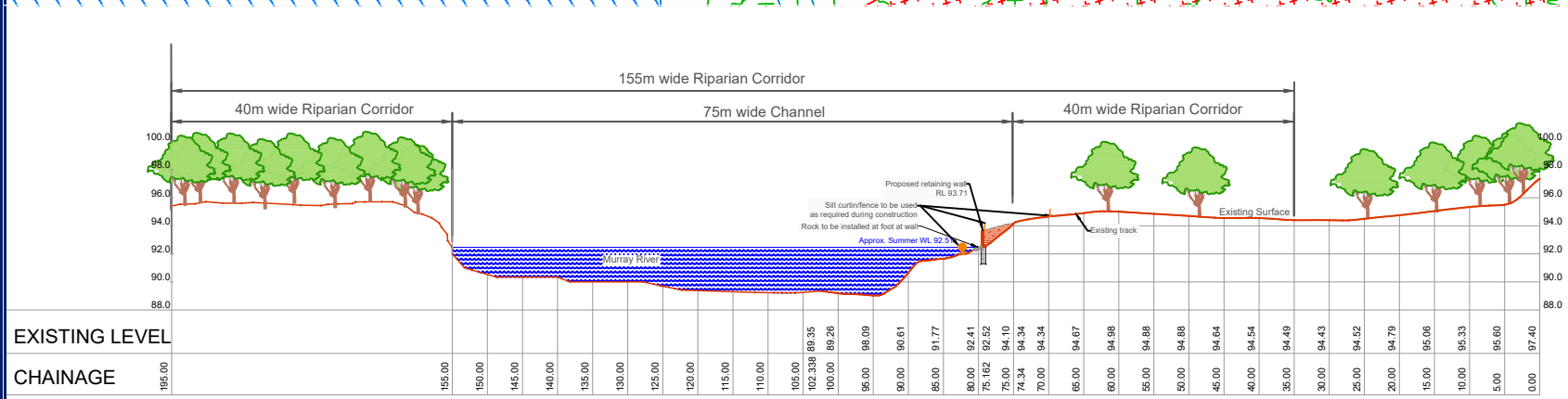
Existing ramp

Existing levee bank

MURRAY RIVER

Murray River - 'No-Go' - Zone for construction activities

Native Vegetation 'No-Go' - Zone for construction activities



Murray River Cross Section View Looking Downstream at project site
Scale: Horizontal 1:1,000, Verticle 1:500

Plan Type/Stage

FINAL

Erosion & Sediment Control Plan

For Approval

PROGRESSIVE RURAL SOLUTIONS

Progressive Rural Solutions Pty Ltd
PO Box 74, DENILIQUIN NSW 2710
Ph. 0408577248 ACN: 634 646 825 ABN: 58 634 646 825
Email: admin@prsltd.com.au Web: www.prsltd.com.au

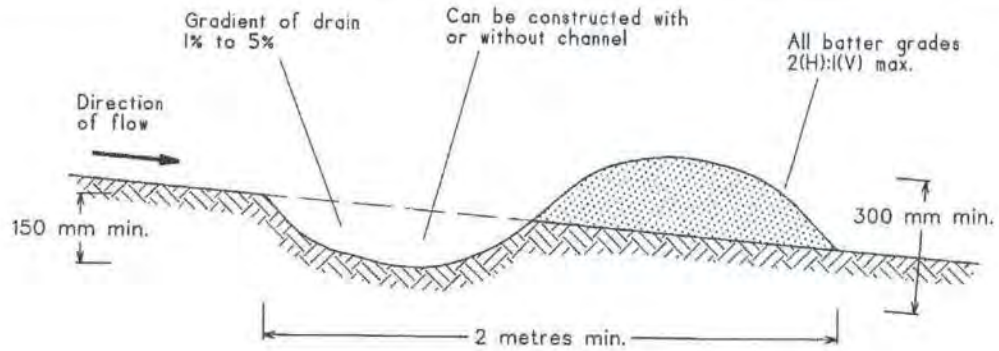
Scale:	1:750 or as shown
Sheet Size:	A3
Date:	20/03/2022
Client:	C.S Muir (C.M. Pastoral Co)
Property:	'Pine View" Gilmour Rd Moama Lot 53 DP751140
Project:	Erosion control (retaining wall) works on Murray River (NSW)
Plan Type:	Erosion and Sediment Control Plan
Plan Description:	Plan showing proposed erosion and sediment control measures

Drawing No.- J154-Plan_ESC-

Version	Date	Amendment
V1R1	30/12/2021	Initial Plan
V1R2	01/03/2022	Draft for internal review
V1R3	07/03/2022	Final Draft for review
V1R4	20/03/2022	FINAL For lodgement

8.2. LANDCOM STANDARD DRAWINGS

8.2.1. EARTH BANK – LOW FLOW



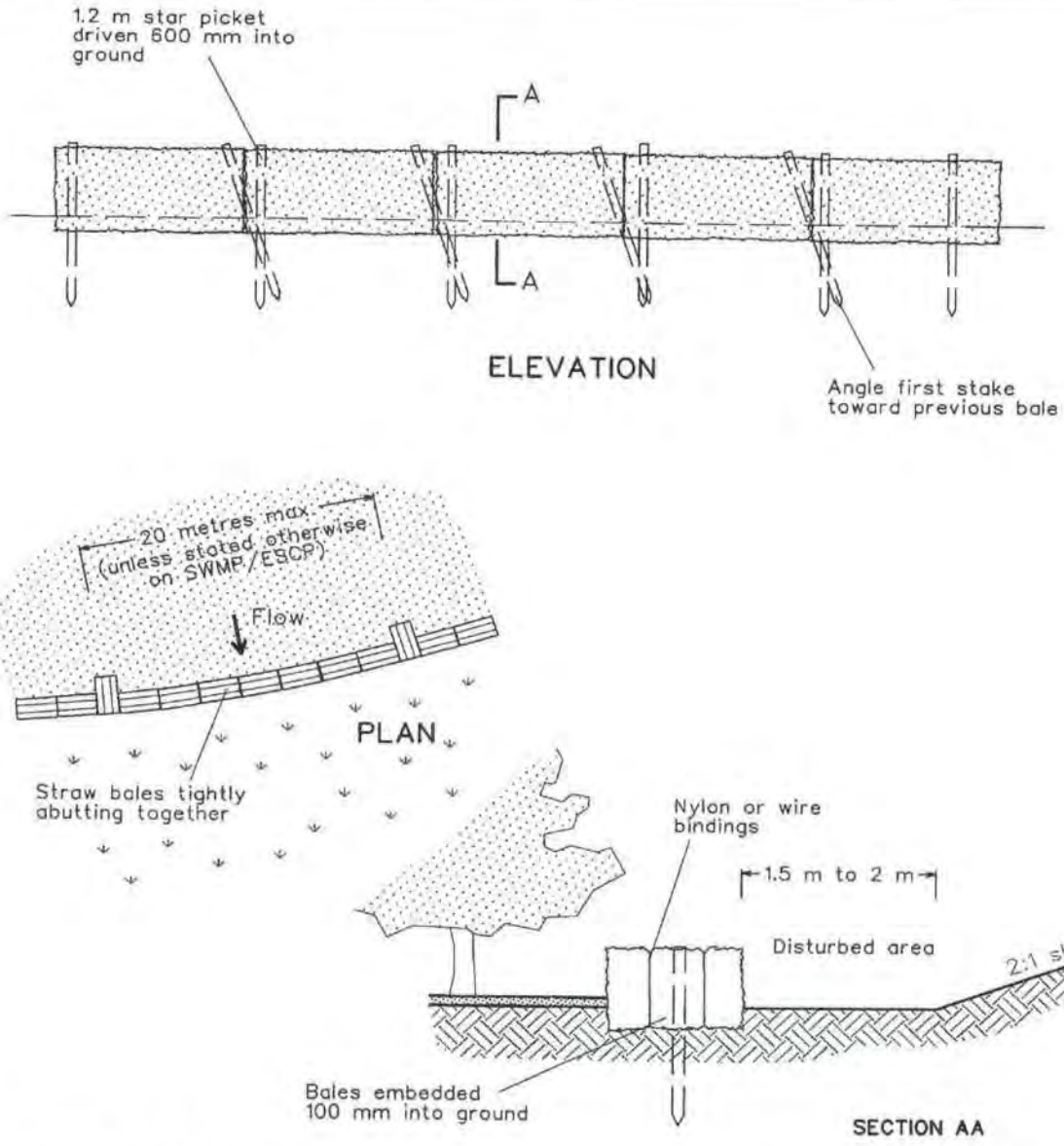
NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

EARTH BANK (LOW FLOW) **SD 5-5**

8.2.2. STRAW BALE FILTER

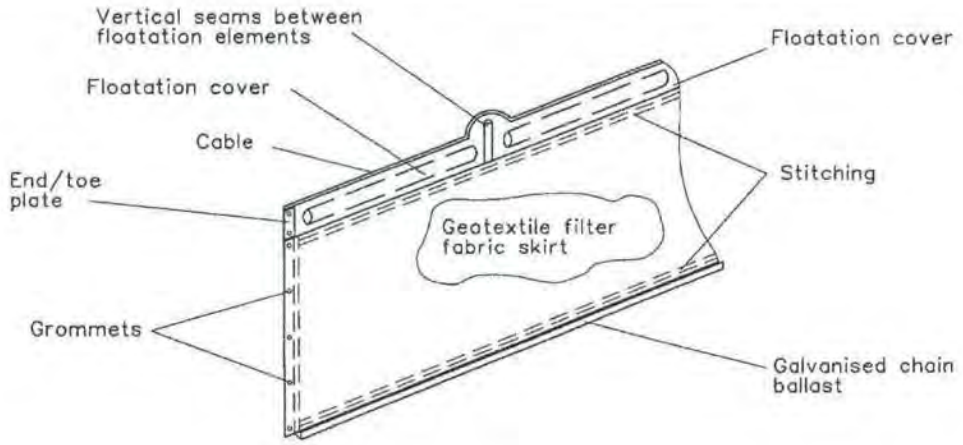


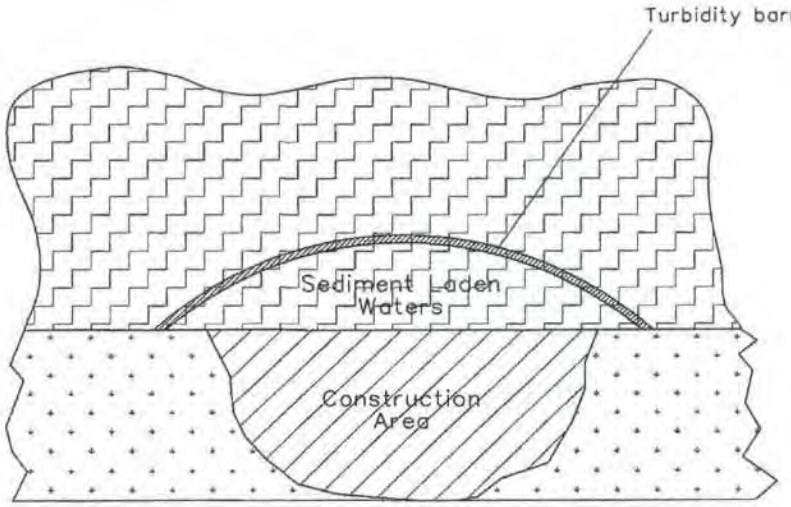
Construction Notes

1. Construct the straw bale filter as close as possible to being parallel to the contours of the site.
2. Place bales lengthwise in a row with ends tightly abutting. Use straw to fill any gaps between bales. Straws are to be placed parallel to ground.
3. Ensure that the maximum height of the filter is one bale.
4. Embed each bale in the ground 75 mm to 100 mm and anchor with two 1.2 metre star pickets or stakes. Angle the first star picket or stake in each bale towards the previously laid bale. Drive them 600 mm into the ground and, if possible, flush with the top of the bales. Where star pickets are used and they protrude above the bales, ensure they are fitted with safety caps.
5. Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1 to 2 metres downslope from the toe.
6. Establish a maintenance program that ensures the integrity of the bales is retained - they could require replacement each two to four months.

STRAW BALE FILTER **SD 6-7**

8.2.3. TURBIDITY BARRIER



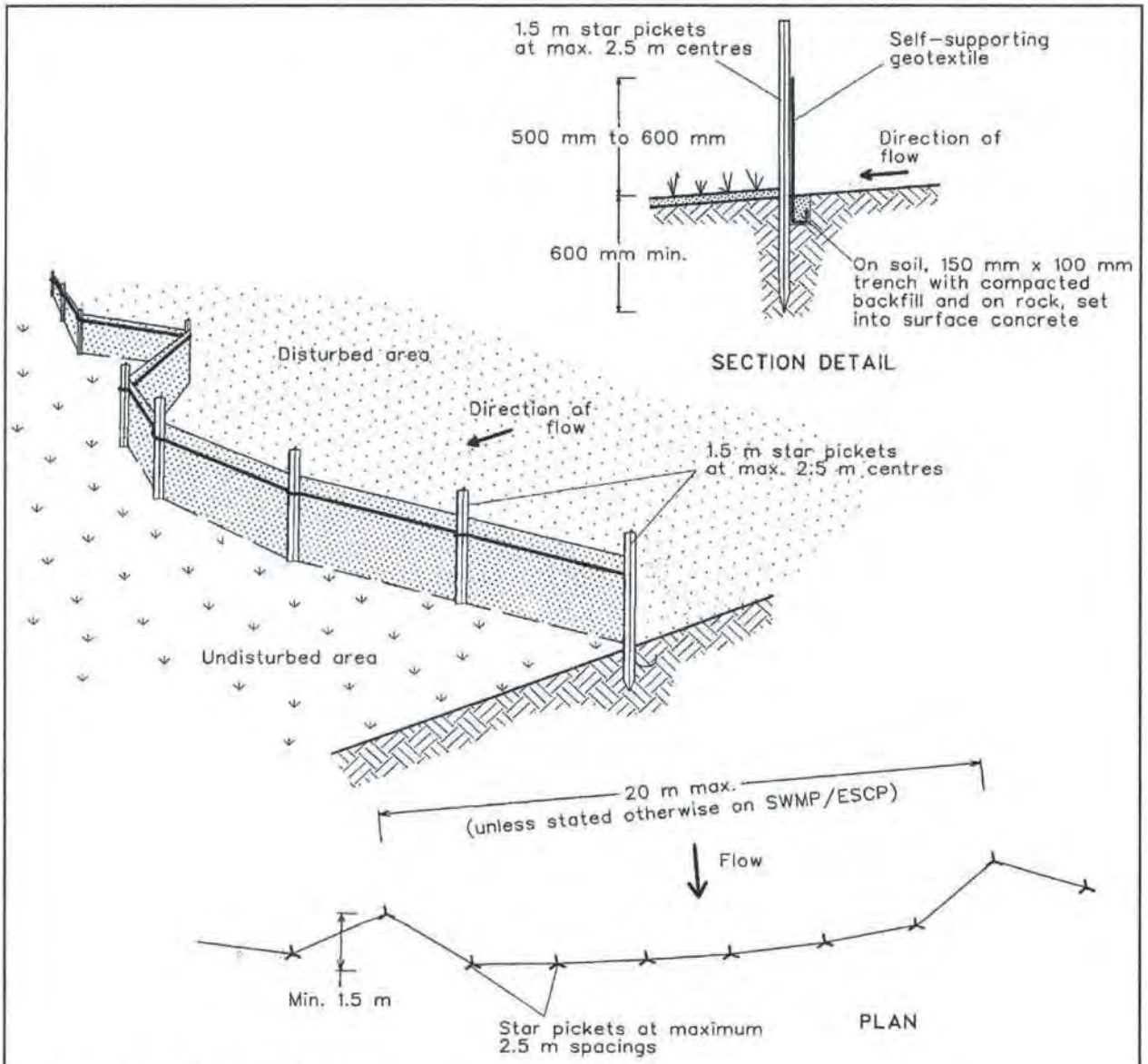


Construction Notes

1. Use turbidity barriers only where high flows are unlikely to remove accumulated sediment and/or move the curtain significantly.
2. Where the barrier is to remain in place for more than one month, ensure the floatation cover is a UV-resistant, durable material.
3. Use only closed cell foam or foam-filled PVC piping as floatation elements. Do not use unfilled pipes.
4. Use only woven or heat-set non woven geotextiles. Needle-punched, non woven geotextiles can become fouled with debris that fray and delaminate them as they move with the waves or currents.
5. Remove captured sediment before the barrier is decommissioned.
6. In tidal areas, ensure the barrier can rise and fall without being moved from its position.

TURBIDITY BARRIER **SD 6-10**

8.2.4. SEDIMENT FENCE

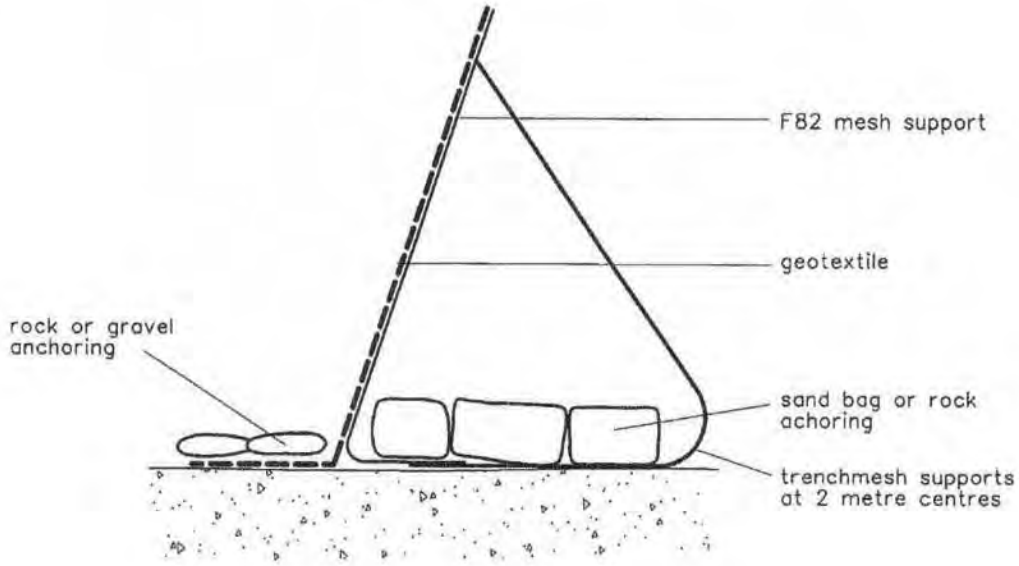


Construction Notes

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.

SEDIMENT FENCE **SD 6-8**

8.2.5. ALTERNATIVE SEDIMENT FENCE



Construction Notes

1. Install this type of sediment fence when use of support posts is not desirable or not possible. Such conditions might apply, for example, where approval is granted from the appropriate authorities to place these fences in highly sensitive estuarine areas.
2. Use bent trench mesh to support the F82 welded mesh facing as shown on the drawing above. Attach the geotextile to the welded mesh facing using UV resistant cable ties.
3. Stabilise the whole structure with sandbag or rock anchoring over the trench mesh and the leading edge of the geotextile. The anchoring should be sufficiently large to ensure stability of the structure in the design storm event, usually the 10 year event.

ALTERNATIVE SEDIMENT FENCE **SD 6-9**