NARRABRI MINE

EROSION AND SEDIMENT CONTROL PLAN

Prepared by:

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1. Introduction

1.1 Background

The Narrabri Mine is an existing underground coal mining operation situated in the Gunnedah Coalfield, approximately 25 kilometres (**km**) southeast of Narrabri and approximately 60 km northwest of Gunnedah, within the Narrabri Shire Council (**NSC**) Local Government Area, in New South Wales (**NSW**). It is operated by Narrabri Coal Operations Pty Ltd (**NCOPL**), on behalf of the Narrabri Mine Joint Venture[1], which consists of two Whitehaven Coal Limited's (**WHC**) wholly owned subsidiaries, and other joint-venture partners.

The Narrabri Underground Mine Stage 3 Extension Project (**Stage 3**) involves a southern extension to the previously approved Stage 2 mining area (approximately 609 ha of additional surface development footprint) to gain access to additional areas of coal reserves within Mining Lease Application (**MLA**) 1 and 2, an increase in the mine life to 2044, and the development of supporting surface infrastructure[2].

1.2 Purpose and scope

This Erosion and Sediment Control Plan (**ESCP** or **Plan**) has been developed in accordance with the Stage 3 Extension Project State Significant Development (**SSD**) 10269 Conditions of Consent (**CoC**) B36(e)(ii), the applicable regulatory framework industry guidelines for erosion and sediment control, and the requirements of the Water Group within the Department of Planning and Environment (**DPE Water**) and the Environment Protection Authority (**EPA**).

As required by CoC B38, NCOPL will implement the ESCP as approved by the Planning Secretary. In accordance with CoC B37, NCOPL will not commence construction until this Plan is approved by the Planning Secretary.

This ESCP forms Attachment 2 of the Narrabri Mine Water Management Plan (**WMP**), developed in accordance with CoC B35 to CoC B38.

1.3 Objectives

The objectives of this Plan are to:

- provide details of the relevant statutory requirements, including any relevant approval, licence or lease conditions;
- describe the measures to be implemented to ensure compliance with the water management performance measures in accordance with CoC B34;
- identify the activities that could cause soil erosion or generate sediment;
- describe the measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;
- ensure the erosion and sediment controls implemented onsite are in accordance with the required industry guidelines;
- describe the location, function, and capacity of erosion and sediment control structures; and

[1] For full details on the joint venture ownership, refer to the introduction of the Environmental Management Strategy.

[2] For full detail on the background of the Narrabri Mine, refer to the overarching WMP.

- describe the measures to be implemented to maintain (and if necessary, decommission) the structures over time.

1.4 Regulatory requirements

In accordance with CoC E5(b), Appendix A provides a summary of the relevant regulatory requirements relating to erosion and sediment control and outlines the section of the ESCP in which each of these conditions and commitments have been addressed.

In accordance with CoC E5(c), Appendix B provides a summary of the relevant commitments or recommendations within the EIS relating to erosion and sediment control and outlines the section of the WMP (including sub-plans) in which each of these commitments have been addressed. The relevant commitments or recommendations include those as amended or added to by the:

- Applicant's Submission Report submitted 31 May 2021;
- Applicant's Amendment Report submitted 31 May 2021; and
- Applicant's final Biodiversity Development Assessment Report dated September 2021.

A detailed overview of the statutory requirements relating to water management is described in section 3 of the WMP.

1.5 Definitions

The terminology used within this ESCP are defined in the WMP.

2. Baseline data

2.1 Topography, landforms, geology and land use

Narrabri Mine is located in the North West Slopes and Plains region of NSW, which includes the Namoi River valley and associated agricultural land uses, and elevated, vegetated country managed as State Forests and National Parks.

Topography in the vicinity of the mine is characterised by the vegetated, hilly country of Jacks Creek State Forest and Pilliga East State Forest to the west, grading down to the alluvial plains associated with the Namoi River approximately 5 km east of the underground mining area. Further east, topography is dominated by the ranges of the Mount Kaputar National Park. Topography ranges from approximately 370 m Australian Height Datum (**AHD**) in the south-west to approximately 240 m AHD in the east of the mining area.

A majority of the mining lease is characterised as gently to moderately undulating grazing land, with isolated landform features such as minor cliffs, rock outcrops and steep slopes have been identified within the vicinity of the site.

Land use varies from east to west, reflecting topography and increasing vegetation cover. The eastern portion of the mining lease is predominantly cleared (except for some remnant riparian vegetation), with land uses including grazing of cattle, sheep and horses and some limited cereal cropping and horticulture.

To the west, vegetation cover increases with topography to the Pilliga East State Forest and Jacks Creek State Forest, which are managed by the Forestry Corporation of NSW.

2.2 Soils

The soils associated with the Narrabri Mine have been variably affected by soil erosion, as evidenced by many sets of soil conservation banks and waterway systems, particularly on the Purlawaugh Formation and Garrawilla Volcanics. Most of the soils display low to moderate erodibility with the exception of sandy topsoils, which are susceptible to erosion quickly if unprotected.

Soil formations within the underground mining area include Pilliga Sandstone, Garrawilla Volcanics and Napperby Siltstone. Dominant soil types derived from these formations are orthic tenosols, vertosols, dermosols and sodosols. Vertosols located in the southern end of MLA 1 generally have dispersive (ESP>15) subsoils (2rog Consulting 2020).

2.3 Regional drainage network

Narrabri Mine is located in the Namoi River catchment and within the tributary sub catchments of Kurrajong Creek, Pine Creek, and Tulla Mullen Creek. The Namoi River flows in a north westerly direction at a distance of approximately 4 to 5 km to the east of the eastern boundary of the mine. The Namoi River has a catchment area of approximately 28,500 km^2 to Narrabri.

The Namoi River catchment has been used extensively for agricultural activities for over 100 years. It is one of Australia's most developed irrigation areas, supporting significant cotton and broad acre cropping (mainly sorghum, sunflower and wheat) as well as other crops, and some livestock grazing.

2.4 Local drainage network

The northern portion of the mining area (ML 1609) is located within the catchments of Kurrajong and Pine Creeks. The main Kurrajong Creek channel originates to the west of the Narrabri Mine within the Pilliga East State Forest and drains in a north-easterly direction. It is predominately a 3rd order watercourse under the Strahler stream ordering system[3].

MLAs 1 and 2 are located within the Kurrajong and Tulla Mullen Creek catchments, with both catchments draining to Tulla Mullen Creek to the east. Tulla Mullen Creek Tributary 1 originates to the west of the mining lease within the Pilliga East State Forest and drains in a north-easterly and then easterly direction. Tulla Mullen Creek Tributary 1 is a 1st order watercourse under the Strahler stream ordering system. It becomes a 3rd order watercourse as it crosses longwall 207.

The creeks are all ephemeral with minimal to no baseflow. Further detail on channel characteristics is provided in section 2.3.1 of the Surface Water Management Plan (**SWMP**) (Attachment 3 of the WMP).

Several farm dams which were constructed prior to the Narrabri Mine and not used in the mine water management system are also located across these drainage lines with two farm dams on Kurrajong Creek to be decommissioned prior to longwall mining.

2.5 Surface water quality

In relation to assessing effectiveness of erosion and sediment controls, the surface water quality in the watercourses associated with the Narrabri Mine can be characterised as having variable levels of total suspended solids (**TSS**), with median values ranging from approximately 20 milligrams per litre (**mg/L**) to 132 mg/L. Baseline surface water quality and monitoring is discussed in detail in section 2 of the SWMP (Attachment 3 of the WMP).

[3] Strahler stream order defined using the methodology described in Schedule 2 of the *Water Management (General) Regulation 2018*.

3. Implementation and management

3.1 Potential sources of erosion and sedimentation

Erosion and sedimentation can result directly or indirectly from:

- surface runoff and erosion from vegetation clearing, topsoil stripping and soil stockpiles;
- surface runoff from the construction and maintenance of unsealed roads and newly constructed embankments and drains;
- surface runoff from the construction and maintenance of new infrastructure required under the Stage 3 SSD 10269;
- erosion of drainage channels;
- disturbed areas not yet rehabilitated; and/or
- operation of the Reject Emplacement Area (**REA**).

Elevated winds may also result in erosion of finer material during clearing and soil stripping activities, and from exposed surfaces and stockpiles.

Subsidence modelling identified that there will be a likely maximum subsidence of approximately 2.8 m for each of the proposed panels with resulting consequences of increased erosion risk. There is also the potential for altered flow patterns to occur as a result of slope changes (as described in Appendix A of the EIS).

3.1.1 Topography and slope stability

The gently to moderately undulating surface topography across the mining area is generally <17.6% meaning there is an extremely low likelihood of mass movement of landslips. Areas with slopes <17.6% are anticipated to have low erosion rates, except for creek channels which may undergo re-adjustment following subsidence. In areas with dispersive soils and slope >17.6%, any soil exposure is likely to increase erosion.

The development of the Narrabri Mine will result in the following changes to existing topography and landforms:

- surface disturbance associated with the Surface Development Footprint (Figure 1-2 in WMP);
- subsidence from underground longwall mining; and
- rehabilitation of the Surface Development Footprint and previously disturbed areas.

Subsidence cracking at the surface or sub-surface can provide erosion initiation points. Additionally, with alteration to surface topography, it follows that surface runoff patterns and soil moisture patterns may also be altered. In areas with shallow water tables, ponding from groundwater can also occur.

Overall, a significant risk of erosion that is directly attributable to subsidence is not predicted.

3.2 General principles

NCOPL will adopt the following principles to manage erosion and sedimentation:

- design and construction of appropriate erosion and sediment controls prior to disturbance of any land in accordance with *Managing Urban Stormwater: Soils and Construction including Volume 1: Blue Book* (**Blue Book**) (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction including Volume 2E: Mines and quarries*;
- limiting the extent of the disturbance to the practical minimum;
- diversion of clean water around disturbed areas where practicable to do so;
- reducing the velocity of water flowing across exposed surfaces and in areas where water concentrates;
- monitoring weather conditions and forecasts (including rainfall prediction maps) to allow for adequate planning for significant rain events;
- stabilisation of exposed surfaces (i.e. non-persistent cover crop) in areas not required for operational purposes;
- revegetating earth embankments and bunds;
- protecting natural drainage lines and watercourses by the construction of erosion control devices such as diversion banks (up-slope of the area to be disturbed), channels and sediment basins;
- during periods of active subsidence, ground cover vegetation will be maintained and cultivation avoided to improve surface soil stability and minimise erosion risk;
- services corridors, access tracks and other infrastructure will be designed, installed, and maintained in accordance with the NSW Fisheries *Policy and Guidelines for Fish Habitat Conservation and Management,* and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*; with consideration given to the *Guidelines for Controlled Activities on Waterfront Land*;
- personnel responsible for installing and maintaining erosion and sediment control devices will be competent in the effective installation and construction of such controls; and
- regularly inspecting erosion and sediment control devices and repair and/or redesign as required.

Appendix C provides the applicable standard drawings obtained from the “Blue Book”. These drawings are to be referred to when planning and constructing erosion and sediment control devices, with consideration given to the guidelines published by NSW Fisheries and the *Guidelines for Controlled Activities on Waterfront Land*.

The following sections outline all reasonable and feasible management measures to be implemented at the Narrabri Mine.

3.2.1 Erosion control measures

In addition to the general principles, the following measures will be implemented to control erosion across the site:

- the separation of ‘clean’ (offsite) run-on water from ‘dirty’ (onsite) (e.g. sediment laden) runoff where practicable;
- slope lengths will be maintained at appropriate lengths (where necessary) to prevent concentrated flow forming to reduce erosion risk;
- exposed soils will be stabilised with soil stabilisers (where necessary) to reduce erosion;
- stockpiles of soil material will be sited in low-hazard areas clear of watercourses;

- stockpiles will be stabilised in accordance with the requirements in section 3.5; and
- dust suppression (e.g. water cart) will be carried out whenever necessary to minimise sediments becoming air borne due to wind erosion.

3.2.2 Drainage control measures

Drainage controls will be designed in accordance with Table 6.1 of the Blue Book (Volume 2E). In addition to the minimum design criteria, the following measures will be implemented to control concentrated flows across the site:

- effectively separate 'clean' and 'dirty' runoff where practicable;
- construct clean and dirty water diversion drains/banks or other drainage structures to contain sediment laden runoff in sediment controls;
- appropriately line drainage channels to prevent erosion (i.e. vegetation, rock lining or synthetic material);
- reduce the risk of erosion by constructing appropriate drainage structures to direct flows and reduce velocities, including:
    - locating energy dissipaters at the outlet of drainage controls;
    - installing slope breaks (contours) to reduce slope length;
    - establishing appropriate drainage on all access tracks; and
    - installing appropriate watercourse crossings.

3.2.3 Sediment control measures

Sediment controls shall be designed in accordance with Table 6.1 of the Blue Book (Volume 2E). In addition to the minimum design criteria, the following measures will be implemented to minimise sedimentation across the site:

- construct sediment control measures in appropriate areas downslope of disturbed areas. Various types of sediment controls that may be used include (but are not limited to):
    - sediment dams (refer to section 3.4.1);
    - sediment fence or coir logs;
    - mulch berms; and
    - excavate sumps and checks sediment dams;
- any discharge of water from site will comply with Condition L2 of EPL 12789 (refer to section 4.2 of the SWMP [Attachment 3 of the WMP]);
- sediment controls will be desilted as when required; and
- sediment controls will only be removed after adequate stabilisation of disturbed surfaces is achieved.

3.2.4 Stabilisation measures

In addition to the general principles, the following measures will be implemented for stabilisation:

- all reasonable endeavours will be made to implement the most appropriate stabilisation measures in the shortest practicable timeframe, considering seasonal rainfall conditions;

- soil stabilisers or mulch will be used in conjunction with topsoil and seeding[4] where required to achieve stabilisation requirements;
- stabilisation of waterways including their beds and banks is to be commenced immediately after the completion of any works within these areas with consideration given to the guidelines published by NSW Fisheries and the *Guidelines for Controlled Activities on Waterfront Land*; and
- temporary soil stabilisers will be used where necessary to stabilise exposed construction areas and access tracks.

3.3 Permit to Work procedure

Prior to the commencement of any ground disturbance activities, a Permit to Work (**Permit**) is required to be completed in accordance with the site procedure 'Permit to Work – Surface Disturbance and Penetration Work.' The Permit will include strategies to minimise impacts as follows:

- the extent of disturbance and any "no-go" zones will be demarcated using well-defined barrier tape, survey marks or an effective alternative prior to any construction, clearing or stripping works commencing;
- erosion and sediment control measures shall be installed prior to disturbance where practicable;
- disturbance will not occur immediately prior to forecast rain or during periods of rain;
- land clearing will occur progressively and will be limited to the areas associated with the current phase of works only;
- critical aspects of in-stream works will be scheduled for forecasted dry weather periods, and watercourses and adjacent areas will be left undisturbed until the point immediately prior to access track works or other works in these areas commencing; and
- disturbance and clearing in and around natural watercourses will be minimised as much as possible.

Where required, the Permit is to include a site-specific ESCP outlining the erosion and sediment control measures (see section 3.2) that will be implemented prior to disturbance occurring.

Prior to the commencement of any ground disturbance works, a site-specific ESCP will be reviewed by the Environmental Superintendent or delegate as part of the Permit process. All site-specific ESCPs will be developed in accordance with the Blue Book and this Plan. Approval of the proposed disturbance will be conditional on the installation of any required erosion and sediment control measures being verified prior to or commencement of the disturbance and/or at specified stages during works.

3.4 Site specific strategies

The key erosion and sediment control structures at the Narrabri Mine are described below, including their locations, function, and capacity.

3.4.1 Sediment dams and sediment basins

Runoff from operational areas that cannot be stabilised will be captured in the Pit top Area sediment control structures, and:

[4] Seeding on privately owned land or within a State Forest will be in consultation with the private landholder and/or the Forestry Corporation of NSW.

- transferred to the site water management system[5] for re-use in mine operations; and/or
- controlled release via licensed discharge points, in accordance with the requirements of Condition L2 of EPL 12789.

The general principles for sediment control structures are:

- sediment control structures and associated infrastructure will be designed, installed and maintained in accordance with the Blue Book to ensure adequate capacity (Volume 2E);
- sediment clean-out will be conducted as required. Removed sediment will be relocated to locations that will not result in future erosion or pollution hazard;
- water levels in sediment dams will be managed appropriately with weather forecasts taken into consideration and made ready for the significant rain event, where feasible. Water may be taken and used for activities that will not result in a pollution hazard (e.g. dust control); and
- controlled discharges of water may occur accordance with Condition L2 of EPL 12789.

The locations, function and capacity of the Pit Top Area sediment dams and sediment basins are detailed further in Section 3.1.3 of the SWB (Attachment 2 of the WMP).

3.4.2 Ventilation shaft sites

Ventilation shaft pads will be designed and constructed such that any runoff will be retained on the pad itself or in sediment basins. Sediment basins will perform the function of capturing run off that would otherwise be discharged to the local drainage network or impacting undisturbed vegetation. Drilling process water during construction of the vent shafts will be stored in temporary in-ground lined sumps or above-ground tanks.

Sediment basins will be progressively constructed and decommissioned as the ventilation shaft sites and infrastructure are developed and decommissioned over the mine life. The locations of the proposed vent shafts are outlined in section 1.1 of the WMP.

Sediment basins will be designed, installed, and maintained in accordance with the Blue Book to ensure adequate capacity (Volume 2E).

3.4.3 Pit Top Area

A series of dirty water diversion drains have been designed and constructed to perform the function of diverting runoff from the Pit Top Area (Figure 1-1 of the WMP) to the sediment control structures. These diversion drains and structures have been retained to allow for continued water management across the Pit Top Area.

3.5 Soils and stockpile management

Soils

Inspections of stripped areas are to be undertaken to observe any signs of erosion and appropriate erosion and sediment controls will be implemented as per section 3.2.

[5] Refer to the Site Water Balance (Attachment 1 of the WMP) for further detail on the site water management system.

NCOPL will implement land management planning and actions as detailed further in the relevant Extraction Plan/s to assist in minimising erosion through the maintenance of groundcover, repairing residual soil cracks and managing areas of poor drainage following mining of the longwall panels. Land management actions are to include amelioration of erosion should it occur.

Stockpiles

Soil stockpiles will be managed to prevent erosion and sedimentation and may consider implementation of the following measures:

- topsoil and subsoils should be kept separate to prevent mixing of soils;
- topsoil stockpiles should be retained at a height of no more than 2 m, and subsoil stockpiles at a height of no more than 3 m, with slopes no greater than 1(V):2(H) and a slightly roughened surface to minimise erosion;
- wherever practicable, soil should not be trafficked, deeply ripped or removed in wet conditions to avoid breakdown in soil structure;
- topsoil stockpiles should be seeded with a non-persistent cover crop to reduce erosion potential as soon as practicable after stockpiling. Where seasonal conditions preclude adequate development of a cover crop, stockpiles should be treated (e.g. with a straw/vegetative mulch/cleared vegetation/geomesh) to improve stability;
- vehicle access to soil stockpiles should be restricted;
- if unacceptable weed generation is observed on soil stockpiles, a weed control program should be implemented;
- topsoil and sub soil stockpile placement will (where practicable) avoid location in drainage lines and areas of concentrated surface water flows, or where unavoidable, have drainage diversion structures installed to prevent erosion, and where required, sediment control fencing will be placed immediately down-slope of stockpiles until stable vegetation cover has established; and
- inspection (once completed) with scheduled ongoing maintenance as required.

3.5.1 Works in watercourses and riparian corridors

Watercourses and adjacent riparian corridors are considered to be sensitive environments and are particularly prone to erosion when vegetation has been removed and soils are exposed. Waterfront land includes the bed and bank of any watercourse and all land within 40 m of the highest bank of a watercourse. The *Guidelines for Controlled Activities on Waterfront Land*[6] will be reviewed for any new infrastructure located on the waterfront land, and riparian corridor widths as defined by the guidelines will be considered in determining appropriate controls.

[6] The *Guidelines for Controlled Activities on Waterfront Land* (DPI Water 2012) provide the planning requirements for controlled activities carried out in, on, or under waterfront land are regulated by the *Water Management Act 2000* (**WM Act**). Section 4.41 of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**) provides that a controlled activity approval is not required under the WM Act for an SSD that is authorised by a development consent granted under Division 4.7 of Part 4 of the EP&A Act (notwithstanding that the proposed activity must conducted in compliance with the conditions of SSD-10269).

Additional controls and provisions will be implemented when works need to occur within watercourses and on waterfront land, as follows:

- any creek or watercourse crossing will be designed, installed and maintained generally in accordance with the NSW Fisheries *Policy and Guidelines for Fish Habitat Conservation and Management* and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*[7];
- vegetation and soil disturbance will be minimised as much as practicable;
- grass vegetation removal and stripping works will only commence in these locations immediately prior to works commencing;
- with exception of emergency works, all works in watercourses are to be scheduled for a period when the 3-day weather forecast predicts rainfall is unlikely, and where possible, will be completed within this period;
- if rainfall is imminent while works are occurring in watercourses, reasonable measures will be undertaken to minimise exposed soils within the watercourse (up to the top bank of the watercourse, both sides); and
- where required, exposed access track surfaces will have a trafficable erosion control methodology applied.

3.5.2 Access tracks

Unsealed roads and access tracks will be developed in accordance with the Blue Book guidance series. The management principles are as follows:

- assess the implications of potential soil loss and water quality during planning;
- plan controls during the design phase;
- minimise the area of disturbance;
- control water flow from the top of and through the designated work area;
- rehabilitate disturbed lands as soon as possible; and
- maintain erosion and sediment control measures appropriately.

Access tracks in watercourses will be constructed and maintained in accordance with section 3.5.1.

3.5.3 Reject Emplacement Area

A detailed Capping Assessment and Closure Design study was completed in 2022 (ATC Williams 2022) which addresses erosion and sediment control risks during capping and closure. The following erosion and sediment controls will be applied during operation and capping practices:

- maintain perimeter drains and associated sediment basin;
- revegetation of capped surface by the use of hydromulch (with tackifier); and
- remove check dams and sediment fences when vegetation established.

Stripped topsoil is to be stockpiled in accordance with the requirements set out in section 3.5.

[7] Section 4.41 of the (**EP&A Act**) provides that permits under s201, s205 and s219 of the NSW *Fisheries Management Act 1994* are not required for an SSD that is authorised by a development consent granted under Division 4.7 of Part 4 of the EP&A Act.

3.5.4 Subsidence

Surface cracking

Monitoring of surface cracking associated with mine subsidence and the implementation of remedial measures will be undertaken to minimise potential impacts of short-term erosion during first flush events.

The management and remediation strategies surface cracking include:

- visual monitoring of the surface following subsidence to identify cracks that could lead to safety, access or erosion issues;
- restricting access by livestock and unauthorised personnel to areas of active subsidence;
- allow smaller cracks (<100 mm) to fill by natural erosive forces;
- remedial works for larger cracks (>100 mm) to occur within six months of its development;
- development of site-specific management plans for areas that require broader remediation (e.g. persistent cracking areas);
- any “non-natural” cracks or erosion deemed to be in excess of natural rates to be repaired and remedial measures (e.g. check dams or drop structures) installed;
- ponding located in areas with no significant vegetation and the water quality of the ponded water is non-saline is to be left to self-correct; and
- ponding located in areas with significant vegetation to be assessed and remedial measures (e.g. drainage) developed and implemented in consultation with a geomorphologist.

Prior to any remediation of surface cracks, NCOPL will undertake a preliminary assessment of potential environmental impacts that may result from the remediation at the specific location and consider whether remediation of surface cracks is environmentally beneficial or if alternative methods of remediating the crack are warranted (e.g. without machinery).

Slope instability

The following measures will be implemented to manage slope instability:

- monitor surface slope displacement along subsidence crosslines (in addition to general subsidence monitoring);
- infill surface cracking to prevent excessive ingress of runoff into the slopes;
- conduct mitigation works such as re-grading, installation of new contour banks and revegetation of exposed areas in areas that are significantly affected by erosion after mining;
- regularly review and appraise any significant changes to surface slopes after each longwall is extracted;
- in the unlikely event of large-scale slope instability and erosion stabilisation, remediation actions will be undertaken such as:
    - installation of deep sub-surface drainage trenches and the construction of catch drains along slope crests so that surface run-off is controlled; and
    - stabilisation works undertaken along sections of bank which are damaged or steeply eroded.

3.5.5 Maintenance

All drainage, erosion and sediment control measures will be maintained until their function is no longer required and adequate surface stabilisation is achieved. The maintenance activities during this period will include:

- all water, debris, and sediment removed from control measures will be disposed of or re-used in a manner that will not create an erosion or pollution hazard;
- effectiveness of sediment traps, check dams and silt fences will be maintained;
- remove spilled soil or other materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows especially waterways and hardstand areas;
- ensure drains are operating effectively and implement any necessary repairs as soon as practicable;
- construct additional erosion and/or sediment controls as required to ensure the desired protection is given to downslope lands and waterways, i.e. make ongoing changes to drawings where it proves inadequate in practice or is subjected to changes in conditions on the work-site or elsewhere in the catchment; and
- assess rehabilitated areas have established sufficient groundcover to reduce the erosion hazard effectively and initiate repair as appropriate.

If the erosion and sediment control structures identified as requiring repair and/or redesign cannot be addressed immediately, the timeframe for the modification, repair or replacement of the structure will be based on an assessment of the risk to the surrounding environment.

3.5.6 Rehabilitation

Operational sediment and erosion control works will be maintained during the establishment of revegetation. Once self-sustaining stable final landforms have been achieved within an area, key elements of the operational sediment control structures will be either left as passive water control storages or removed to allow the area to become free draining.

The following general rehabilitation measures will be implemented:

- progressively rehabilitating disturbed land and constructing drainage controls to improve stability of rehabilitated land;
- ripping of rehabilitation areas to promote infiltration;
- provide soil conditions that minimise the risk of soil loss via wind and water erosion during and after rehabilitation are to be considered; and
- restrict access to rehabilitated areas.

Rehabilitation activities will be conducted in accordance with the Rehabilitation Management Plan.

4. Monitoring program

NCOPL has implemented a monitoring and maintenance program that ensures erosion and sediment control measures are appropriately operated and maintained to ensure the controls remain effective. The effectiveness of erosion and sediment controls is monitored in the following ways:

- inspection of controls to assess if damage/erosion has occurred and remedial work is required. Repeated damage in the same location will trigger review of the controls and if additional controls are required;
- inspection of sediment controls to determine if dewatering or desilting is required; and
- monitoring of water quality to determine if water quality is being impacted, or the water is suitable to discharge.

All site monitoring data including site inspection records, rainfall records, dates of water quality testing, testing results will be documented on-site in accordance with the WMP and its sub plans. The currency of the documentation will be maintained for the duration of the works.

4.1 Inspections

Sediment and erosion controls will be inspected following a rainfall event measured at the premises that exceeds 38.4 mm over any consecutive 5-day period[8].

Inspections are to be carried out by competent personnel who have:

- a good working knowledge of the correct installation, operation, and maintenance procedures for the full range of drainage, erosion and sediment control measures used on the site;
- an understanding of site environmental values that could be impacted; and
- an ability to provide advice and guidance on appropriate erosion and sediment control measures.

4.2 Surface water quality monitoring and reporting

Erosion and sediment transport can result in a degradation of water quality which may impact downstream water bodies and users. Changes in water quality are generally observed as an increase in TSS and turbidity. The surface water monitoring program detailed in section 4 of the SWMP (Attachment 3 of the WMP) will be used to assess the performance of erosion and sediment controls.

[8] 38.4 mm equates to the 5-day 90%ile rainfall depth for Gunnedah sourced from Table 6.3a *Managing Urban Stormwater: Soils and Construction Volume 1: 4th edition*, March 2004.

5. Trigger Action Response Plan

The trigger action response plan (**TARP**) (Table 5-1) includes triggers to respond to any exceedance of the surface water related criteria and performance measures. The TARP also includes trigger levels for identifying and investigating any potential adverse impacts (or trends) associated with downstream surface water quality and post-mining water pollution from rehabilitated areas.

Table 5-1 Trigger Action Response Plan

Method	Status	Trigger	Action	Response
Sediment build-up in sediment dams				
Ensure capacity of sediment dams is maintained. **Sites**: • All sediment dams **Parameter**: • Sediment level **Analysis**: • Confirm sediment zone volume is not impeded by sediment build-up. **Frequency**: • Quarterly.	**Normal**	Sediment zone volume not impeded by sediment build-up so as to have sufficient capacity to store run off from a 38.4 mm 5-day rainfall event (95th percentile rainfall event).	• Record sediment level. • Continue to inspect control structure.	None required.
	Level 1	Sediment level within control structure approaching settlement zone of sediment dam.	• Record sediment level. • Arrange for desilting of control structures.	Desilt control structures prior to next rain event and review structures efficiency.
	Level 2	Sediment level within control structure exceeds settlement zone of sediment dam.	• Record sediment level. • Arrange for immediate desilting of control structures.	• Immediately desilt control structures and review structures efficiency. • Investigate and determine cause of sediment levels exceeding settlement zone.
Sediment dam capacity				
Ensure there is sufficient storage for high rainfall event. **Sites**: • All sediment dams **Parameter**: • Water level **Analysis**: • Confirm water level is below maximum operating volume (MOV) for each dam. **Frequency**: • Quarterly.	**Normal**	Water level is less than MOV level.	• Record water level. • Continue ongoing inspection and maintenance of sediment dams.	None required.
	Level 1	Water level is above MOV level.	• Record water level. • Arrange for sediment dam to be dewatered.	Dewater sediment dam within 5 days of a rainfall event such that they have sufficient capacity to store run off from a 38.4 mm 5-day rainfall event (95th percentile rainfall event).
	Level 2	Discharge from dam.	• Record water level and estimated discharge volume. • Conduct water sampling in accordance with SWMP (Attachment 3 of the WMP)	• Dewater sediment dam within 5 days of a rainfall event such that they have sufficient capacity to store run off from a 38.4 mm 5-day rainfall event (95th percentile rainfall event). • Investigate and determine cause of discharge from dam.
Condition of erosion and sediment control infrastructure				
Inspection to identify damage to erosion and sediment control infrastructure, such as washouts of drainage lines etc. **Sites**:	**Normal**	Erosion and sediment control infrastructure in good condition, with no damage observed.	Continue ongoing inspection and maintenance of erosion and sediment control infrastructure.	None required.

Method	Status	Trigger	Action	Response
• All erosion and sediment control structures. **Parameter**: • Damage/failure of structure. **Analysis**: • Visual inspection. **Frequency**: • After rainfall event of greater than 38.4 mm over any consecutive 5-day period.	**Level 1**	Erosion and sediment control infrastructure in good condition, with minor defects/issue observed.	• Record visual observations, including photographs. • Arrange for remedial actions to be implemented.	• Desilt control structures and review efficiency of structures. • Implement remedial actions to address defects/issues.
	Level 2	Failure or damage to erosion and sediment control infrastructure observed.	• Record visual observations, including photographs. • Develop remedial action plan to repair structures.	• Desilt control structures and review efficiency of structures. • Repair control structures where failure has occurred.

6. Reporting, evaluation and review

Results of the surface water quality monitoring program will be reviewed against the impact assessment criteria and used to determine if erosion and sediment control infrastructure and stabilisation works require improvements (i.e. repair and/or re-design).

All internal and external reporting and periodic review of this Plan will be undertaken in accordance with section 7 of the WMP. The revision status of this Plan is indicated in section 8.

7. References

2rog Consulting (2020) *Narrabri Underground Mine Stage 3 Extension Project Agricultural Impact Statement.* Prepared for Narrabri Coal Operations Pty Ltd.

ATC Williams (2022) *Narrabri Mine Rejects Emplacement Area Capping Assessment and Closure Design.* Prepared for Narrabri Coal Operations Pty Ltd.

Department of Environment and Climate Change (DECC) (2008) *Volume 2A: Installation of Services*.

Department of Environment and Climate Change (DECC) (2008) *Managing Urban Stormwater: Soils and Construction – Volume 2C: Unsealed Roads.*

Department of Environment and Climate Change (DECC) (2008) *Volume 2E: Mines and Quarries*.

Department of Primary Industries (DPI) (2012) *Guidelines for Controlled Activities on Waterfront Land.*

Fisheries NSW (2003) *Policy and Guidelines for Fish Habitat Conservation and Management*.

Fairfull, S. and Witheridge, G. (2003) *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.*

Fisheries NSW (2003) *Policy and Guidelines for Fish Habitat Conservation and Management*.

Landcom (2004) *Managing Urban Stormwater: Soils and Construction including Volume 1: Blue Book.*

NSW Independent Planning Commission (April 2022). *Development Consent SSD 10269, Narrabri Underground Mine Stage 3 Extension Project.*

Resource Strategies Pty Ltd (2020) *Narrabri Underground Mine Stage 3 Extension Project – Environmental Impact Statement*. Prepared for Narrabri Coal Operations Pty Ltd.

R.W. Corkery & Co Pty Ltd (2009) *Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project*. Prepared for Narrabri Coal Operations Pty Ltd.

8. Review history

Revision	Comments	Author	Authorised by	Date

Appendix A - Compliance conditions relevant to this Plan

Table A-1 SSD 10269 consent conditions directly relevant to this Plan

Condition	Requirement	Document reference
Obligation to minimise harm to the environment		
A1.	In addition to meeting the specific performance measures and criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.	Section 1.3 Section 3 Section 6.2 of the WMP
Evidence of Consultation		
A20.	Where conditions of this consent require consultation with an identified party, the Applicant must: (a) consult with the relevant party prior to submitting the subject document; and (b) provide details to the Department of the consultation undertaken including: (i) the outcome of that consultation, matters resolved and unresolved; and (ii) details of any matters not resolved between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.	Section 1.4 of the WMP
Staging, combining and updating strategies, plans or programs		
A21.	With the approval of the Planning Secretary, the Applicant may:	
	a) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program);	No staging of ESCP proposed
	b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined);	No combining of ESCP with another plan proposed
	c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development); and	Section 6
	d) combine any strategy, plan or program required by this consent with any similar strategy, plan or program required by an adjoining mining consent or approval, in common ownership or management.	No combining of ESCP with another plan proposed
Compliance		
A30.	The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.	Section 2 of the WMP
Applicability of guidelines		
A31.	References in the conditions of this consent to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of inclusion (or later update) in the condition.	Section 3.7 of the WMP
A32.	However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, in respect of ongoing monitoring and management obligations, agree to or require compliance with an	

<table>
<tr><th>Condition</th><th>Requirement</th><th>Document reference</th></tr>
<tr><td></td><td>updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.</td><td></td></tr>
<tr><td colspan="3">Water Management Performance Measures</td></tr>
<tr><td>B34.</td><td>The Applicant must comply with the performance measures in Table 4.

Table 4: Water management performance measures
<table>
<tr><th>Feature</th><th>Performance measure</th></tr>
<tr><td>Water management – general</td><td>• Maintain separation between clean, dirty (i.e. sediment-laden) and mine water management systems;
• Minimise the use of clean and potable water on the site;
• Maximise water recycling, reuse and sharing opportunities;
• Minimise the use of make-up water from external sources;
• Design, install, operate and maintain water management systems in a proper and efficient manner; and
• Minimise risks to the receiving environment and downstream water users.</td></tr>
<tr><td>Erosion and sediment control works</td><td>• Design, install and maintain new erosion and sediment controls in accordance with the guidance series Managing Urban Stormwater: Soils and Construction including Volume 1: Blue Book (Landcom, 2004), Volume 2A: Installation of Services (DECC, 2008), Volume 2C: Unsealed Roads (DECC,2008), Volume 2D: Main Road Construction (DECC, 2008) and Volume 2E: Mines and Quarries (DECC, 2008).
• Design, install and maintain any new infrastructure located within 40 metres of watercourses in accordance with the guidance series for Controlled Activities on Waterfront Land (DPI Water, 2012);
• Design, install and maintain any new creek crossings generally in accordance with the Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013) and Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003); and
• Ensure all new works on waterfront land are consistent with the guidance series for Controlled Activities on Waterfront Land (DPI Water, 2012).</td></tr>
<tr><td>Clean water diversions and storage infrastructure</td><td>Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on the site, except where clean water is captured for use on the site.</td></tr>
</table></td><td>Section 3
Section 5</td></tr>
</table>

Condition	Requirement		Document reference
	Sediment dams	Design, install and maintain sediment dams in accordance with the guidance series *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom, 2004) and *2E Mines and Quarries* (DECC, 2008).	
	Mine water discharges	Negligible environmental consequences beyond those predicted in the document/s listed in condition A2(c).	
Water Management Plan			
B36.	This plan must:		
	(a) be prepared by a suitably qualified and experienced person/s;		Section 1.4 of the WMP
	(b) be prepared in consultation with DPIE Water and the EPA;		
	(c) describe the measures to be implemented to ensure that the Applicant complies with the water management performance measures (see Table 4 above);		Section 3
	(d) build on existing monitoring programs and utilise existing data from nearby mines, where practicable;		Section 4
	(e) include a:		
	(ii) **Erosion and Sediment Control Plan** that:		
	• is consistent with the requirements of *Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book* (Landcom, 2004) and *Volume 2E: Mines and Quarries* (DECC, 2008);		Section 3
	• identifies activities that could cause soil erosion or generate sediment;		Section 3.1
	• describes measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;		Section 3
	• describes the location, function, and capacity of erosion and sediment control structures; and		Section 3
	• describes what measures would be implemented to maintain (and if necessary, decommission) the structures over time;		Section 3 Section 4
Management plan requirements			
E5.	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:		
	a) summary of relevant background or baseline data;		Section 2
	b) details of:		
	i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);		Section 1.4
	ii) any relevant limits or performance measures and criteria; and		Section 1.3 Section 3 Appendix C
	iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;		
	c) any relevant commitments or recommendations identified in the document/s listed in condition A2(c);		Appendix B
	d) a description of the management measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;		Section 3

Condition	Requirement	Document reference
	e) a program to monitor and report on the:	
	i) impacts and environmental performance of the development; and	Section 4
	ii) effectiveness of the management measures set out pursuant to paragraph (d);	
	f) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Section 5
	g) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 7.6 of the WMP
	h) a protocol for managing and reporting any:	
	i) incident, non-compliance or exceedance of any impact assessment criterion or performance criterion;	Section 6 of the WMP
	ii) complaint; or	Section 8 of the WMP
	iii) failure to comply with other statutory requirements;	Section 6.2 of the WMP
	i) public sources of information and data to assist stakeholders in understanding environmental impacts of the development; and	Section 3.7 of the WMP
	j) a protocol for periodic review of the plan.	Section 6
E6.	The Applicant must ensure that management plans prepared for the development are consistent with the conditions of this consent and any EPL issued for the site.	Appendix A Appendix B

Table A-2 EPL 12789 compliance conditions directly relevant to this Plan

<table>
<tr><th>Condition</th><th>Requirement</th><th>Document reference</th></tr>
<tr><td colspan="3">Discharges to Air and Water and Applications to Land</td></tr>
<tr><td>P1</td><td>Location of monitoring/discharge points and areas
P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

<table>
<tr><th>EPA ID No.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description including NCOPL ID No.</th></tr>
<tr><td>11</td><td>Wet weather discharge

Discharge water quality monitoring</td><td>Wet weather discharge

Discharge water quality monitoring</td><td>Discharge point (SD4) on northern side of mine boundary.</td></tr>
<tr><td>13</td><td>Wet weather discharge

Discharge water quality monitoring</td><td>Wet weather discharge

Discharge water quality monitoring</td><td>Discharge point (SD2) on southern side of mine boundary.</td></tr>
<tr><td>14</td><td>Ambient Water Quality Monitoring</td><td></td><td>Upstream of mine discharge point on Kurrajong Creek Tributary 1

KC1US</td></tr>
<tr><td>15</td><td>Ambient Water Quality Monitoring</td><td></td><td>Downstream of mine discharge point on Kurrajong Creek Tributary 1

KC1DS</td></tr>
<tr><td>16</td><td>Ambient Water Quality Monitoring</td><td></td><td>Upstream of mine discharge point on Kurrajong Creek Tributary 2

KC2US</td></tr>
<tr><td>17</td><td>Ambient Water Quality Monitoring</td><td></td><td>Downstream of mine discharge point on Kurrajong Creek Tributary 2

KC2DS</td></tr>
<tr><td>18</td><td>Wet weather discharge

Discharge water quality monitoring</td><td>Wet weather discharge

Discharge water quality monitoring</td><td>Discharge point (SD7) on western side of mine boundary</td></tr>
</table>
</td><td>Section 3
Attachment 3 of the WMP</td></tr>
</table>

Condition	Requirement			Document reference
	19	Ambient Water Quality Monitoring		Upstream location of Kurrajong Creek (KCUS)
	20	Ambient Water Quality Monitoring		Upstream location of Kurrajong Creek (KCDS)
	21	Ambient Water Quality Monitoring		Northern portion of mining area (PCa) in Pine Creek
	22	Ambient Water Quality Monitoring		Monitoring point (PC1) in Pine Creek Tributary 1
	24	Water Quality Monitoring	Water Quality Monitoring	Discharge point (NR1) at Namoi River
	25	Ambient Water Quality Monitoring	Ambient Water Quality Monitoring	Discharge point (NRUS) at Namoi River
	26	Ambient Water Quality Monitoring	Ambient Water Quality Monitoring	Discharge point (NRDS) at Namoi River
	27	Wet weather discharge Discharge water quality monitoring	Wet weather discharge Discharge water quality monitoring	Discharge point (SD8) at Ventilation Shaft

P1.4 Point W1 in the table, is identified in this licence for the purpose of monitoring of weather parameters at that point.

EPA identification number	Type of Monitoring Point	Description of Location
W1	Weather analysis	Weather station identified as "W1" on map titled EPL 12789 Monitoring Locations" dated 21/02/2017 - EPA DOC17/131971.

Limit Conditions

L2 **Concentration limits** — Section 3.2.3, Section 3.4.1, Attachment 3 of the WMP

L2.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in L2.4.

L2.4 Water and/or Land Concentration Limits

Point 11, 13, 18, 27					
Pollutant	**Units of measure**	**50th percentile conc**	**90th percentile conc**	**3DGM conc limit**	**100th percentile conc**

Condition	Requirement	Document reference

Oil and Grease	mg/L	-	-	-	10

Point 11, 13, 18, 24, 27					
Pollutant	**Units of measure**	**50th percentile conc**	**90th percentile conc**	**3DGM conc limit**	**100th percentile conc**
pH	pH	-	-	-	6.5-8.5

Point 11, 13, 18, 27					
Pollutant	**Units of measure**	**50th percentile conc**	**90th percentile conc**	**3DGM conc limit**	**100th percentile conc**
TSS	mg/L	-	-	-	50

Point 24					
Pollutant	**Units of measure**	**50th percentile conc**	**90th percentile conc**	**3DGM conc limit**	**100th percentile conc**
TDS	mg/L	250	-	-	350

L2.5 The TTS concentration limits specified for Points 11, 13, 18 and 27 may be exceeded for water discharged provided that:

a) the discharge occurs solely as a result of rainfall measured at the premises that exceeds 38.4 millimetres over any consecutive 5 day period immediately prior to the discharge occurring; and

b) all practical measures have been implemented to dewater all sediment dams within 5 days of rainfall such that they have sufficient capacity to store run off from a 38.4 millimetre, 5 day rainfall event.

Note: 38.4 mm equates to the 5 day 90%ile rainfall depth for Gunnedah sourced from Table 6.3a *Managing Urban Stormwater: Soils and Construction Volume 1*: 4th edition, March 2004.

Monitoring and Recording Conditions

M2 **Requirement to monitor concentration of pollutants discharged** — Section 4.2, Appendix 3 of the WMP

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.3 Water and/or Land Monitoring Requirements

Point 11, 13, 18, 27			
Pollutant	**Units of measure**	**Frequency**	**Sampling Method**
Conductivity	Micro siemens per cm	Special Frequency 1	In situ
Oil and Grease	mg/L	Special Frequency 1	Grab sample
pH	mg/L	Special Frequency 1	In situ

Condition	Requirement	Document reference

TOC	mg/L	Special Frequency 1	Grab sample
TSS	mg/L	Special Frequency 1	Grab sample

Point 14, 15, 16, 17, 19, 20, 21, 22			
Pollutant	**Units of measure**	**Frequency**	**Sampling Method**
pH	pH	Special Frequency 2	In situ

Point 11, 14, 15, 16, 17, 19, 20, 21, 22			
Pollutant	**Units of measure**	**Frequency**	**Sampling Method**
Conductivity	Micro siemens per cm	Special Frequency 2	In situ
Oil and Grease	mg/L	Special Frequency 2	Grab sample
TOC	mg/L	Special Frequency 2	Grab sample
TSS	mg/L	Special Frequency 2	Grab sample

M2.4 For the purposes of the table(s) above Special Frequency 1 means the collection of samples as soon as practicable after each discharge commences and in any case not more than 12 hours after each discharge commences.

M2.5 For the purposes of the table(s) above Special Frequency 2 means the collection of samples quarterly (in the event of flow during the quarter) at a time when there is flow and as soon as practicable after each wet weather discharge from points 11, 13,18 or 27 commences and in any case not more than 12 hours after each discharge commences.

M2.7 For the purposes of the table(s) above Special Frequency 3 means the collection of samples as soon as practicable after each discharge commences from point NR1 and in any case not more than 4 hours after each discharge.

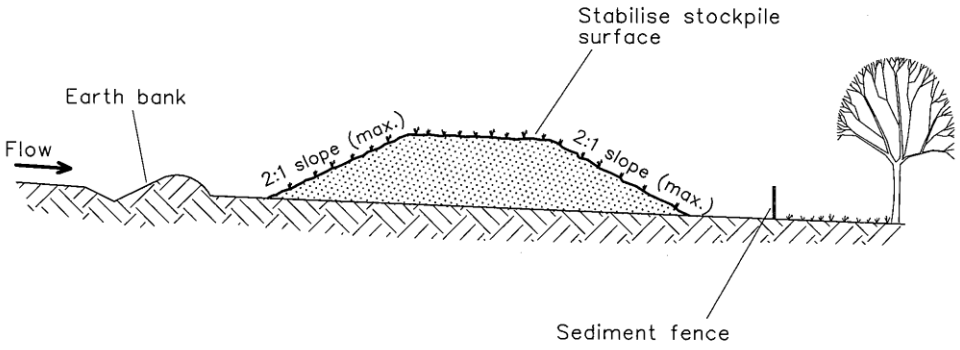
Appendix B - Key EIS commitments

Table B-1 Key EIS erosion and sediment control commitments

Source	Aspect	Details	Document reference
EIS Section 6.5.3	Flow Regime - Changes in Contributing Catchment	Runoff from Narrabri Mine disturbance areas and areas under active rehabilitation will be captured in sediment dams and: • transferred to Narrabri Mine site water management system for re-use in mine operations; and/or • controlled release via licensed discharge points, in accordance with the requirements of EPL 12789 following rainfall events that exceed sediment dam design capacity.	Section 3.4.1
EIS Section 6.5.3	Flow Regime - Changes in Contributing Catchment	For the exploration boreholes, pre-conditioning areas and gas management areas, short-term sediment management measures in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) will be implemented to minimise potential water quality impacts.	Section 3.4.2
EIS Section 6.5.3	Surface Water Quality	Sediment dams will continue to be dewatered following runoff events and will comply with EPL 12789 limits for wet weather discharges from licensed discharge points.	Section 3.4.1 Section 4.2 Section 5
EIS Section 6.5.4	Water Management Plan - Erosion and Sediment Control Plan	The Erosion and Sediment Control Plan component of the Water Management Plan will be reviewed and updated for Stage 3 to identify measures to minimise soil erosion and transport of sediment off-site.	This sub-plan
Amended BDAR Section 7.1	Lower Darling River aquatic ecological community	**Biodiversity Measure 1** The main impact of Narrabri Mine on biodiversity is clearance of vegetation and habitat. The purpose of a Vegetation Clearance Protocol is to minimise the impacts of clearing on vegetation and fauna present during clearing. The Vegetation Clearance Protocol will include, but not be limited to: • mine staff and contractors involved in vegetation clearance works will be made aware of clearing limits in the relevant Stage 3 approval documentation and of restricted access areas; • micro-siting of access tracks and other disturbance to minimise clearance of trees with hollows and drainage features (creeks); • the area cleared at any particular time will generally be no greater than that required to accommodate development needs for the following 12 months; • clearance authorisation process with final signoff for the areas to be cleared by the Environment	Section 3.3

Source	Aspect	Details	Document reference
		Superintendent or delegate; • clear delineation of the areas to be cleared on the ground prior to clearing activities (e.g. paint, flagging tape and posts) and restriction of clearing to within these areas (signposts to alert personnel not to enter vegetation outside of the disturbance areas).	
Amended BDAR Section 7.2	Lower Darling River aquatic ecological community	**Biodiversity Measure 2** Surface disturbance areas associated with the Development Footprint will be rehabilitated and revegetated (when the surface facilities are no longer required or at the end of the mine life where no further ongoing beneficial use is identified). Mine components that will be progressively rehabilitated include goaf gas drainage infrastructure, service boreholes, access tracks and post drainage corridor and pre-conditioning area. Other mine components, such as the vents and services corridors, will typically be decommissioned following mine closure.	Section 3.5.6
Amended BDAR Section 7.6	Lower Darling River aquatic ecological community	**Biodiversity Measure 6** The potential for localised Project-related channel erosion on Kurrajong Creek and other ephemeral creek lines has been assessed by WRM (2020) and will be managed using appropriate sediment and erosion controls.	Section 3.2
Amended BDAR Section 7.8	Lower Darling River aquatic ecological community	**Biodiversity Measure 8** Construction of drainage line crossings will be undertaken in accordance with the policy and guideline document of DPI-Fisheries NSW *Why do fish need to cross the road?* (Fairfull and Witheridge, 2003) as required by the Fisheries *NSW Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013). The waterways traversed by the Development Footprint are Class 3 (Minimal fish habitat) and Class 4 (Unlikely fish habitat) (Fairfull and Witheridge, 2003). Crossings will involve installation of fords or culverts.	Section 3.5.1
Amended BDAR Section 7.13	Lower Darling River aquatic ecological community	**Biodiversity Measure 13** Remediation of mine subsidence effects (e.g. surface cracking and minor erosion). A preliminary assessment will be undertaken to minimise impact of remediation actions. Prior to any remediation of surface cracks, NCOPL will undertake a review of environmental impacts that may result from the remediation at the specific location and consider whether remediation of surface cracks is environmentally beneficial or if alternative methods of remediating the crack are warranted (e.g. without machinery). The review will consider, among other factors, avoidance of known locations of threatened flora species.	Section 3.5.4

Appendix C - Applicable standard drawings

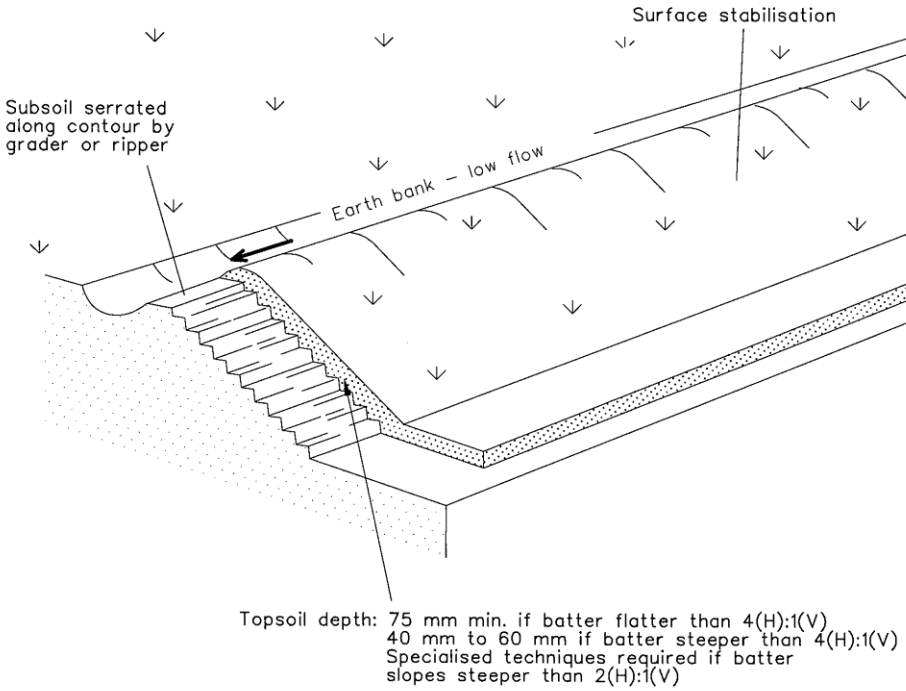


Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

STOCKPILES **SD 4-1**

Source: Blue Book

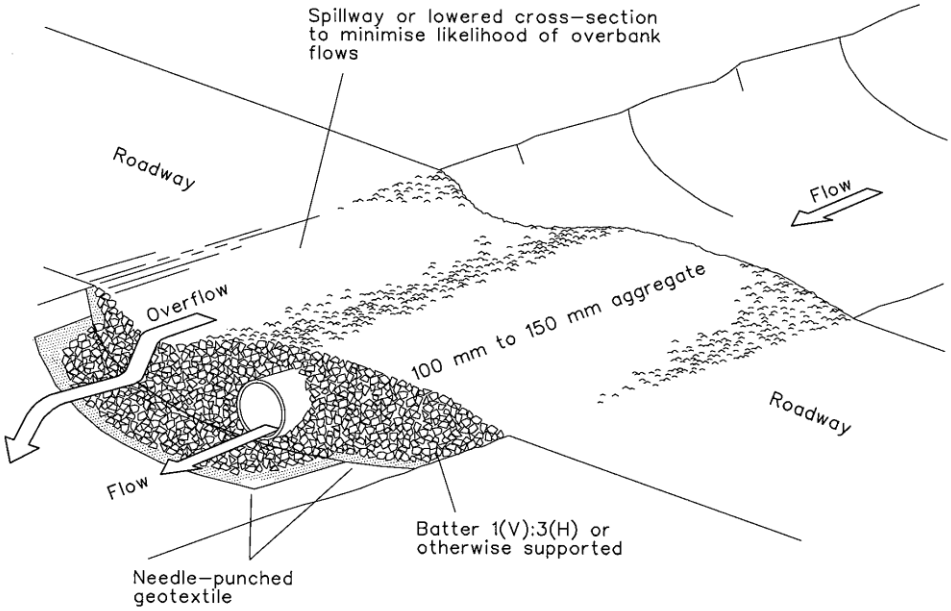


Construction Notes

1. Scarify the ground surface along the line of the contour to a depth of 50 mm to 100 mm to break up any hardsetting surfaces and to provide a good bond between the respread material and subsoil.
2. Add soil ameliorants as required by the ESCP or SWMP.
3. Rip to a depth of 300 mm if compacted layers occur.
4. Where possible, replace topsoil to a depth of 40 to 60 mm on lands where the slope exceeds 4(H):1(V) and to at least 75 mm on lower gradients.

REPLACING TOPSOIL **SD 4-2**

Source: Blue Book

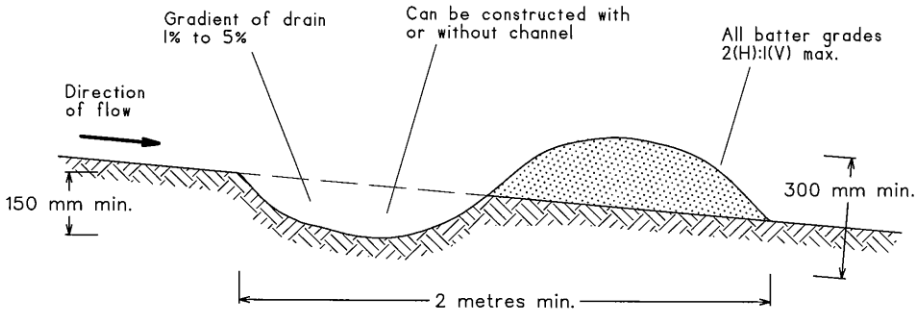


Construction Notes

1. Prohibit all traffic until the access way is constructed.
2. Strip any topsoil and place a needle-punched textile over the base of the crossing.
3. Place clean, rigid, non polluting aggregate or gravel in the 100 mm to 150 mm size class over the fabric to a minimum depth of 200 mm.
4. Provide a 3-metre wide carriageway with sufficient length of culvert pipe to allow less than a 3(H): 1 (V) slope on side batters.
5. Install a lower section to act as an emergency spillway in greater than design storm events.
6. Ensure that culvert outlets extend beyond the toe of fill embankments.

TEMPORARY WATERWAY CROSSING **SD 5-1**

Source: Blue Book



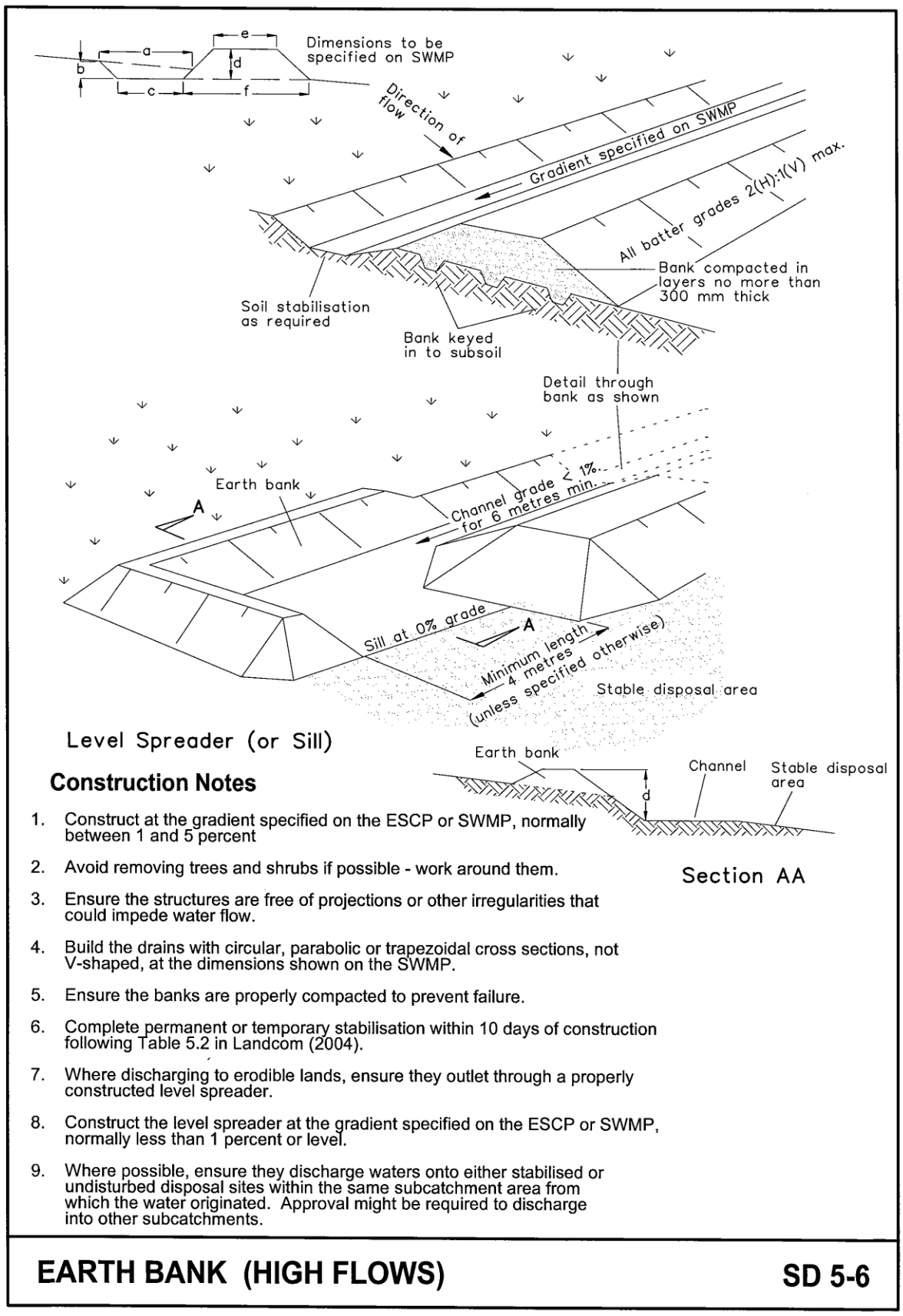
NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

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**

Source: Blue Book

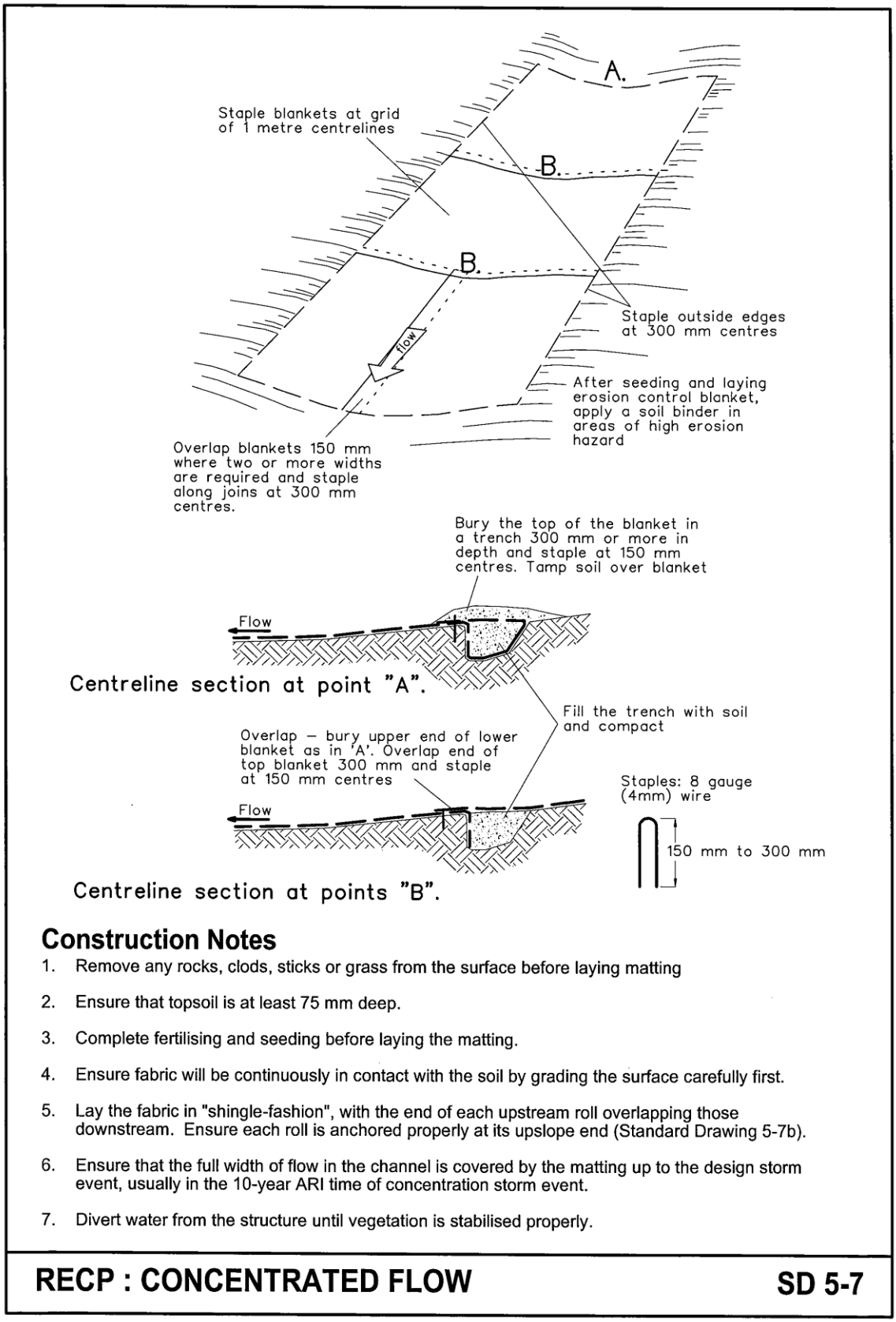


Construction Notes

1. Construct at the gradient specified on the ESCP or SWMP, normally between 1 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, at the dimensions shown on the SWMP.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction following Table 5.2 in Landcom (2004).
7. Where discharging to erodible lands, ensure they outlet through a properly constructed level spreader.
8. Construct the level spreader at the gradient specified on the ESCP or SWMP, normally less than 1 percent or level.
9. Where possible, ensure they discharge waters onto either stabilised or undisturbed disposal sites within the same subcatchment area from which the water originated. Approval might be required to discharge into other subcatchments.

EARTH BANK (HIGH FLOWS) **SD 5-6**

Source: Blue Book

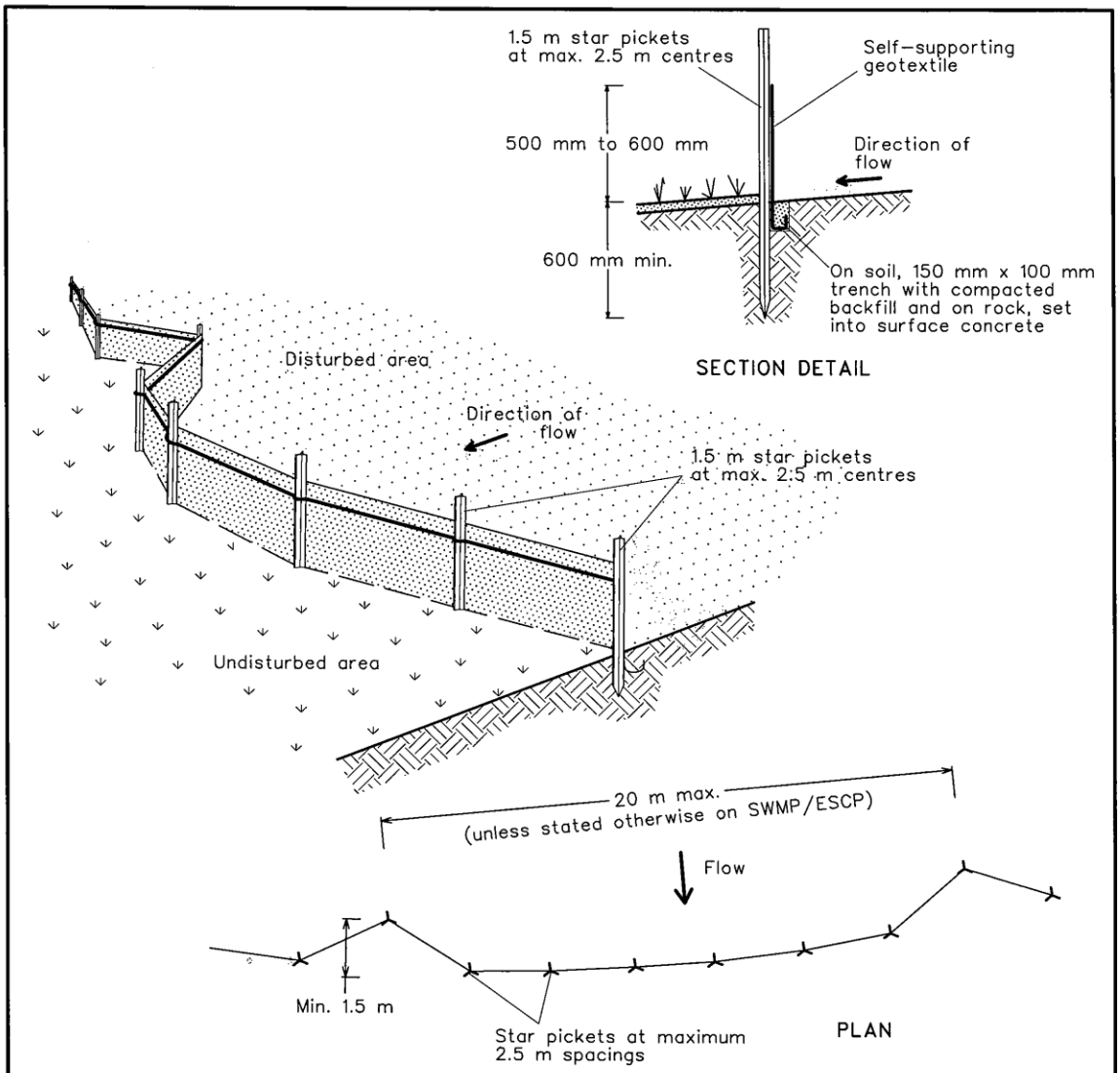


Construction Notes

1. Remove any rocks, clods, sticks or grass from the surface before laying matting
2. Ensure that topsoil is at least 75 mm deep.
3. Complete fertilising and seeding before laying the matting.
4. Ensure fabric will be continuously in contact with the soil by grading the surface carefully first.
5. Lay the fabric in "shingle-fashion", with the end of each upstream roll overlapping those downstream. Ensure each roll is anchored properly at its upslope end (Standard Drawing 5-7b).
6. Ensure that the full width of flow in the channel is covered by the matting up to the design storm event, usually in the 10-year ARI time of concentration storm event.
7. Divert water from the structure until vegetation is stabilised properly.

RECP : CONCENTRATED FLOW **SD 5-7**

Source: Blue Book

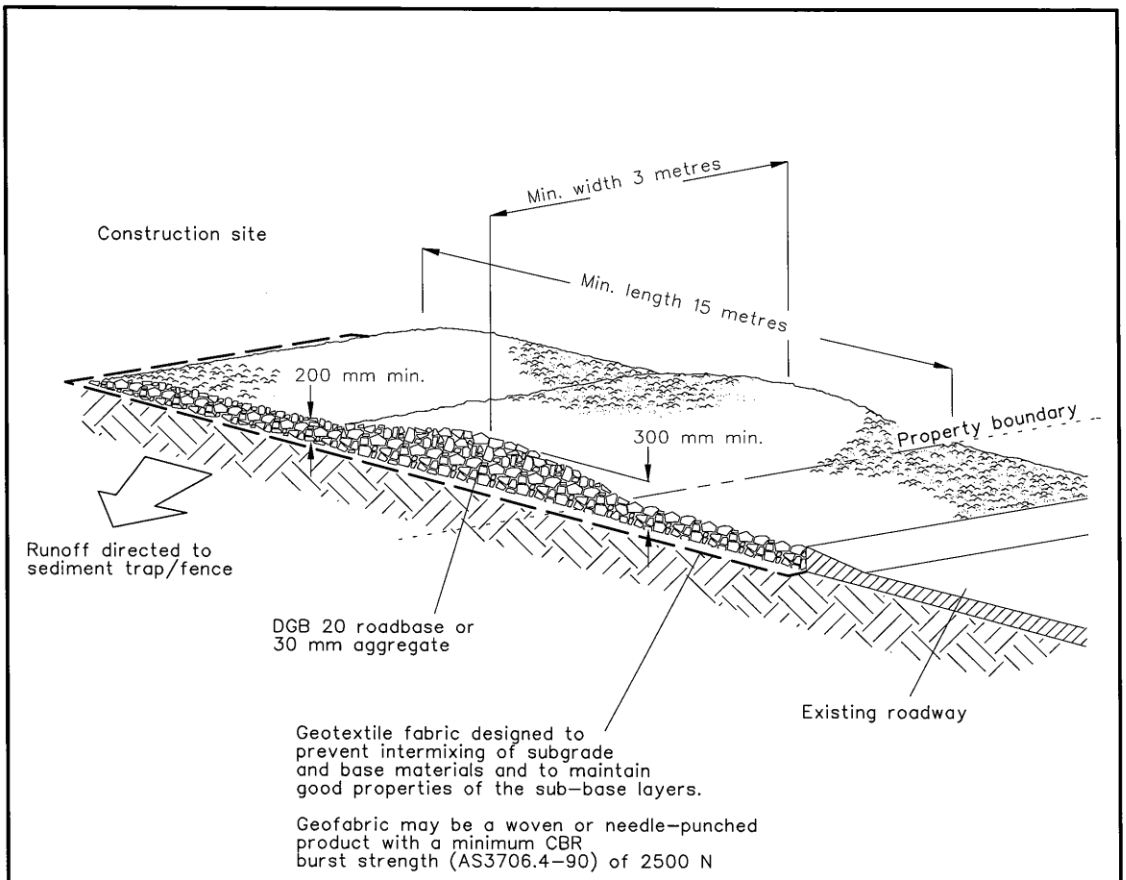


Construction Notes

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**

Source: Blue Book

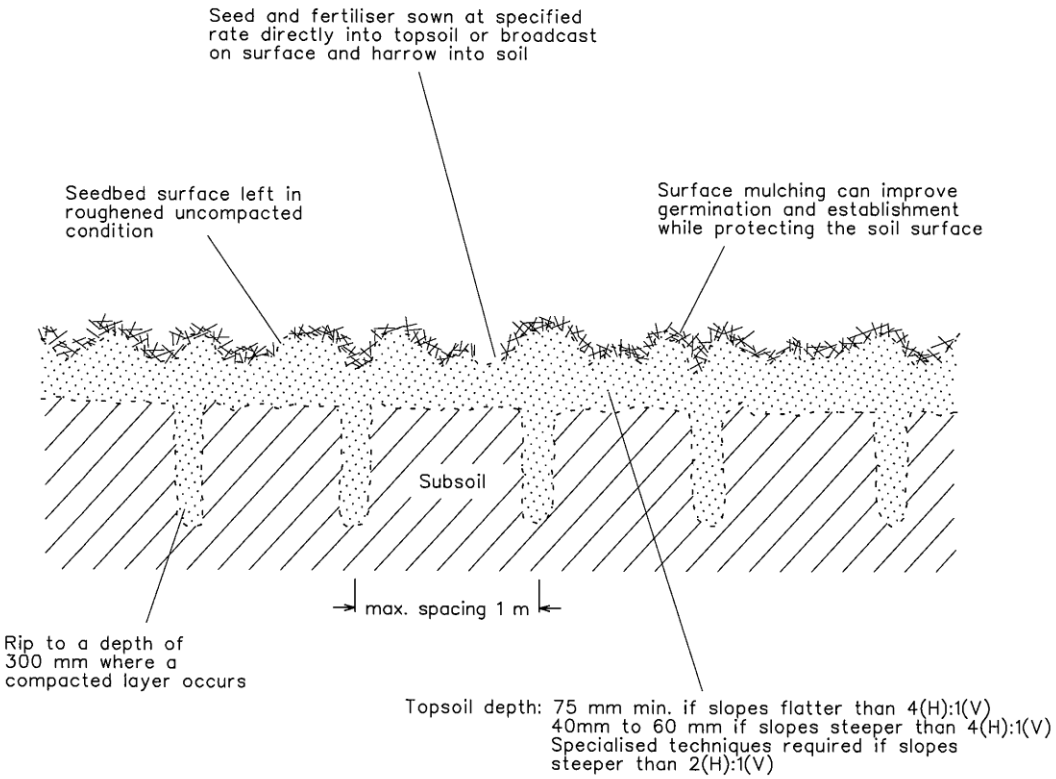


Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200-mm thick pad over the geotextile using road base or 30-mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

STABILISED SITE ACCESS **SD 6-14**

Source: Blue Book



Construction Notes

1. Loosen compacted soil before sowing any seed. If necessary, rip the soil to a depth of 300 mm. Avoid rotary hoe cultivation.
2. Work the ground only as much as necessary to achieve the desired tilth and prepare a good seedbed.
3. Avoid cultivation in very wet or very dry conditions.
4. Cultivate on or close to the contour where possible, not up and down the slope.

SEEDBED PREPARATION **SD 7-1**

Source: Blue Book

CONSTRUCTION

1. REFER TO APPROVED PLANS FOR LOCATION AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.

2. CLEAR THE FOUNDATION AREA OF THE OUTLET STRUCTURE (IF ANY), AND INSTALL AS PER SEPARATE INSTRUCTIONS.

3. EXCAVATE THE SETTLING POND IN ACCORDANCE WITH THE APPROVED PLANS. UNLESS OTHERWISE SPECIFIED, THE EXCAVATED PIT SHOULD HAVE A SIDE SLOPE OF 2:1(H:V) OR FLATTER.

4. APPROPRIATELY STABILISE ANY BANK SUBJECT TO DIRECT INFLOW.

5. ESTABLISH ALL NECESSARY UP-SLOPE DRAINAGE CONTROL MEASURES TO ENSURE THAT SEDIMENT-LADEN RUNOFF IS APPROPRIATELY DIRECTED INTO THE SEDIMENT TRAP.

6. TAKE ALL NECESSARY MEASURE TO MINIMISE THE SAFETY RISK CAUSED BY THE STRUCTURE.

MAINTENANCE

1. CHECK EXCAVATED SEDIMENT TRAPS AFTER EACH RUNOFF EVENT AND MAKE REPAIRS IMMEDIATELY.

2. INSPECT THE BANKS FOR SLUMPING OR EXCESSIVE SCOUR.

3. IF FLOW THROUGH THE STRUCTURE IS REDUCED TO AN UNACCEPTABLE LEVEL DUE TO BLOCKAGE OF THE OUTLET STRUCTURE (IF ANY), THEN MAKE ALL NECESSARY REPAIRS AND MAINTENANCE TO RESTORE THE DESIRED FLOW CONDITIONS.

4. CHECK THE STRUCTURE AND SURROUNDING CHANNEL BANKS FOR DAMAGE FROM OVERTOPPING FLOWS AND MAKE REPAIRS AS NECESSARY.

5. REMOVE SEDIMENT AND RESTORE ORIGINAL SEDIMENT STORAGE VOLUME WHEN COLLECTED SEDIMENT EXCEEDS 30% OF THE PIT VOLUME.

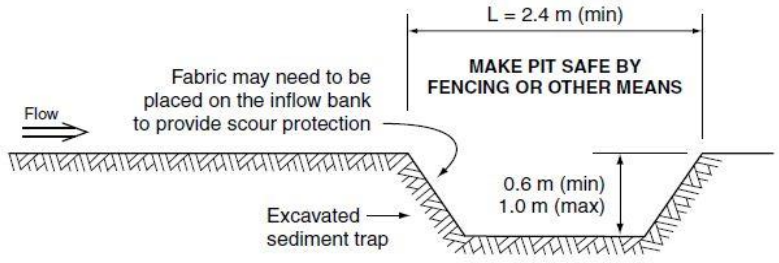
6. DISPOSE OF SEDIMENT AND DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

REMOVAL

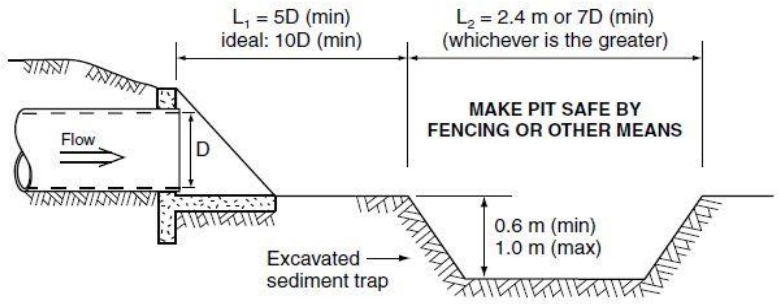
1. WHEN THE UP-SLOPE DRAINAGE AREA HAS BEEN STABILISED, REMOVE ALL MATERIALS INCLUDED DEPOSITED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

2. ALL WATER AND SEDIMENT SHOULD BE REMOVED FROM THE BASIN PRIOR TO THE DAM'S REMOVAL. DISPOSE OF SEDIMENT AND WATER IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

3. BRING THE DISTURBED AREA TO A PROPER GRADE, THEN SMOOTH, COMPACT AND STABILISE AND/OR REVEGETATE AS REQUIRED.



(a) Excavated sediment trap located within a minor drainage path



Where space is not available, make optimum use of the available space

(b) Excavated sediment trap located downstream of a stormwater outlet

Drawn:	Date:		
GMW	Apr-10	Excavated Sediment Trap	EST-01

Catchments & Creeks Pty Ltd

Source: International Erosion Control Association Best Practice Erosion and Sediment Control Guideline (IECA, 2008)

MATERIALS

(i) MULCH MUST COMPLY WITH THE REQUIREMENTS OF AS4454.

(ii) MAXIMUM SOLUBLE SALT CONCENTRATION OF 5dS/m.

(iii) MOISTURE CONTENT OF 30 TO 50% PRIOR TO APPLICATION.

INSTALLATION

1. REFER TO APPROVED PLANS FOR LOCATION AND EXTENT. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, MATERIAL TYPE, OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.

2. WHEN SELECTING THE LOCATION OF A MULCH FILTER BERM, TO THE MAXIMUM DEGREE PRACTICAL, ENSURE THE BERM IS LOCATED:

(i) TOTALLY WITHIN THE PROPERTY BOUNDARIES;

(ii) ALONG A LINE OF CONSTANT ELEVATION (PREFERRED, BUT NOT ALWAYS PRACTICAL);

(iii) AT LEAST 1m, IDEALLY 3m, FROM THE TOE OF A FILL EMBANKMENT;

(iv) AWAY FROM AREAS OF CONCENTRATED FLOW.

3. ENSURE THE BERM IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE BERM, OR THE UNDESIRABLE DISCHARGE OF WATER AROUND THE END OF THE BERM.

4. ENSURE THE BERM HAS BEEN PLACED SUCH THAT PONDING UP-SLOPE OF THE BERM IS MAXIMISED.

5. ENSURE BOTH ENDS OF THE BERM ARE ADEQUATELY TURNED UP THE SLOPE TO PREVENT FLOW BYPASSING PRIOR TO WATER PASSING OVER THE BERM.

6. ENSURE 100% CONTACT WITH THE SOIL SURFACE.

7. WHERE SPECIFIED, TAKE APPROPRIATE STEPS TO VEGETATE THE BERM.

MAINTENANCE

1. DURING THE CONSTRUCTION PERIOD, INSPECT ALL BERMS AT LEAST WEEKLY AND AFTER ANY SIGNIFICANT RAIN. MAKE NECESSARY REPAIRS IMMEDIATELY.

2. REPAIR OR REPLACE ANY DAMAGED SECTIONS.

3. WHEN MAKING REPAIRS, ALWAYS RESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED.

4. REMOVE ACCUMULATED SEDIMENT IF THE SEDIMENT DEPOSIT EXCEEDS A DEPTH OF 100mm OR 1/3 THE HEIGHT OF THE BERM.

5. DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

REMOVAL (IF REQUIRED)

1. WHEN DISTURBED AREAS UP-SLOPE OF THE BERM ARE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, THE BERM MAYBE REMOVED.

2. REMOVE ANY COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

3. REHABILITATE/REVEGETATE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.

Recommended maximum berm spacing

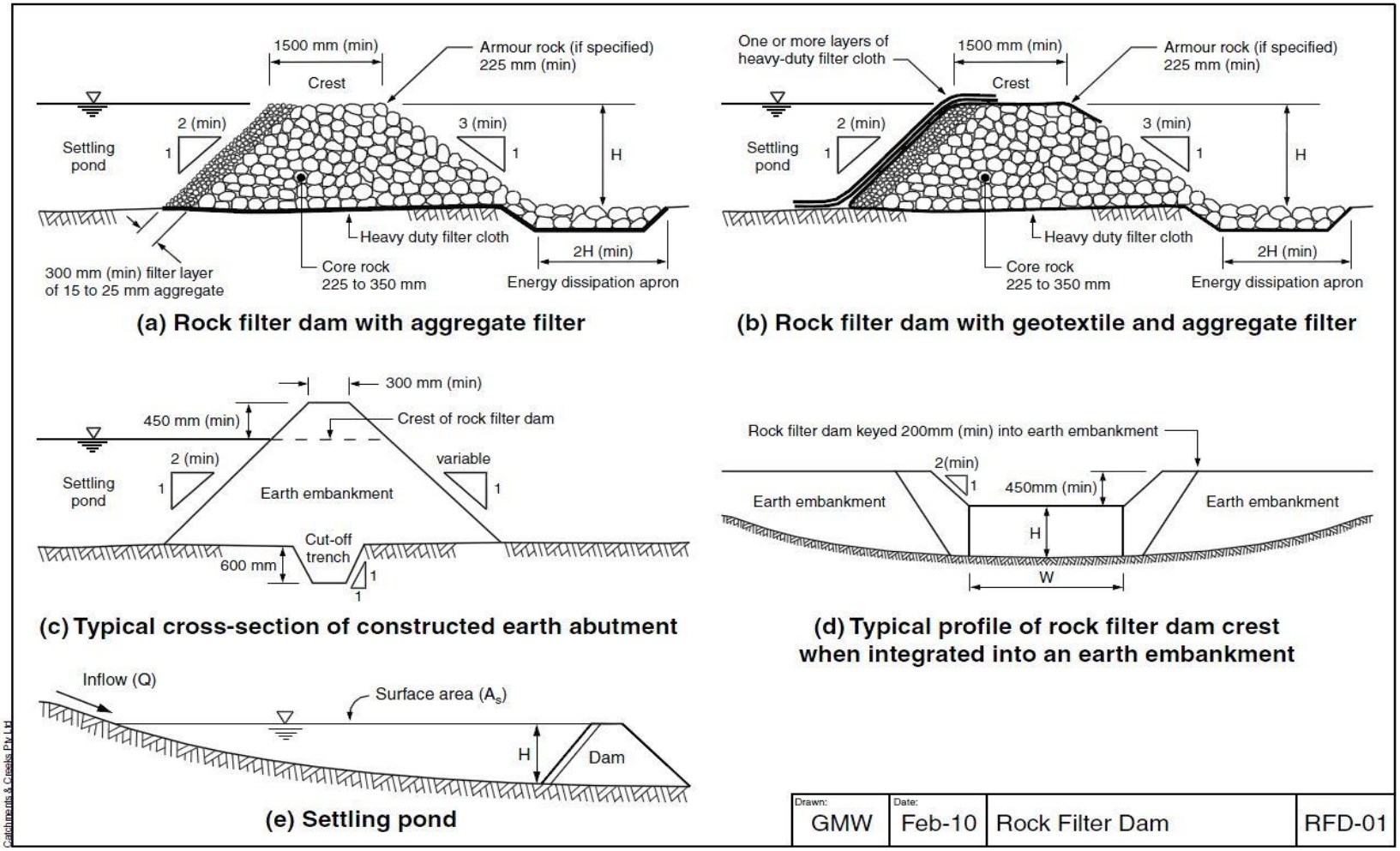
Land slope	Max spacing
< 2%	30 m
5%	25 m
10%	15 m
20%	8 m

Figure 1 - Typical placement of mulch filter berm

Drawn:	Date:		
GMW	Apr-10	Mulch Filter Berms	MB-01

Catchments & Creeks Pty Ltd

Source: IECA Best Practice Erosion and Sediment Control Guideline (IECA, 2008)



Source: IECA Best Practice Erosion and Sediment Control Guideline (IECA, 2008)

MATERIALS

PRIMARY CORE ROCK: WELL GRADED, HARD, ANGULAR, EROSION RESISTANT ROCK, WITH MEAN SIZE AS SPECIFIED IN THE APPROVED PLAN, BUT NOT LESS THAN 225mm, OR GREATER THAN 350mm.

ARMOUR ROCK: WELL GRADED, HARD, ANGULAR, EROSION RESISTANT ROCK, WITH MEAN SIZE AS SPECIFIED IN THE APPROVED PLAN, BUT NOT LESS THAN 225mm.

AGGREGATE FILTER: 15 TO 25mm CLEAN AGGREGATE.

GEOTEXTILE FILTER FABRIC: HEAVY-DUTY NON-WOVEN, NEEDLE-PUNCHED FILTER FABRIC, MINIMUM 'BIDIM' A34 OR EQUIVALENT.

INSTALLATION

1. REFER TO APPROVED PLANS FOR LOCATION AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.

2. CLEAR THE FOUNDATION AREA OF THE ROCK FILTER DAM OF WOODY VEGETATION AND ORGANIC MATTER. DELAY CLEARING THE UP-SLOPE POND AREA UNTIL THE DAM IS FORMED AND IS ABLE TO ACT AS A SUITABLE SEDIMENT TRAP, OTHERWISE AN ALTERNATIVE TEMPORARY DOWNSTREAM SEDIMENT TRAP MAY BE REQUIRED DURING CONSTRUCTION OF THE ROCK FILTER DAM.

3. IF SPECIFIED ON THE PLANS, EXCAVATE A CUT-OFF TRENCH ALONG THE CENTRE-LINE OF THE DAM AND EARTH ABUTMENTS (IF ANY).

4. COVER THE FOUNDATION AREA AND CUT-OFF TRENCH WITH HEAVY-DUTY FILTER FABRIC BEFORE BACKFILLING WITH THE CORE ROCK. OVERLAP ADJOINING FABRIC SHEETS A MINIMUM OF 600mm.

5. CONSTRUCT THE ASSOCIATED EARTH ABUTMENT (IF ANY). ALL CUT AND FILL SLOPES SHOULD BE 2:1(H:V) OR FLATTER. THE DOWNSTREAM FACE OF EARTH ABUTMENTS SHOULD BE 3:1(H:V) OR FLATTER. EARTH ABUTMENTS SHOULD BE CONSTRUCTED OF WELL-COMPACTED, EROSION RESISTANT SOIL THAT IS FREE OF VEGETATION AND ROOTS. OVERFILL EARTH ABUTMENTS 150mm TO ALLOW FOR SETTLEMENT.

6. PLACE THE CORE ROCK FOR THE ROCK FILTER DAM. ENSURE THE UPSTREAM FACE IS 2:1(H:V) OR FLATTER, AND THE DOWNSTREAM FACE IS 3:1(H:V) OR FLATTER.

7. ENSURE THE ROCK IS MACHINE PLACED WITH THE SMALLER ROCKS WORKED INTO THE VOIDS OF THE LARGER ROCKS.

8. IF SPECIFIED, CONSTRUCT THE SPILLWAY SECTION USING THE SPECIFIED ARMOUR ROCK. THE SPILLWAY SHOULD HAVE A MINIMUM PROFILE DEPTH OF 300mm. THE SPILLWAY WEIR CREST MUST BE LEVEL ACROSS ITS FULL WIDTH. THE MAXIMUM LONGITUDINAL SLOPE OF THE ROCK SPILLWAY SHOULD BE 3:1(H:V). THE MINIMUM THICKNESS OF ARMOUR ROCK PROTECTION SHOULD BE 500mm, OR TWICE THE NOMINAL ROCK SIZE, WHICHEVER IS THE GREATER.

9. ENSURE THE SPILLWAY OUTLET SECTION EXTENDS DOWNSTREAM PAST THE TOE OF THE FORMED EMBANKMENT UNTIL STABLE CONDITIONS ARE REACHED, OR A DISTANCE EQUAL TO THE HEIGHT OF THE DAM, WHICHEVER IS THE GREATER. THE EDGES OF THE SPILLWAY SHOULD BE LEFT FLUSH WITH THE SURROUNDING GROUND.

10. INSTALL THE SPECIFIED FILTER (AGGREGATE AND/OR FILTER CLOTH) ON THE UPSTREAM FACE OF THE ROCK FILTER DAM.

11. IF FILTER CLOTH IS USED, THEN:
(i) EXTEND THE FABRIC OVER THE CREST OF THE ROCK FILTER DAM INTO THE SPILLWAY CHUTE;
(ii) CONSIDER THE PLACEMENT OF SEVERAL LAYERS OF OVERLAPPING FABRIC, THUS ALLOWING EACH LAYER TO BE REMOVED INDIVIDUALLY ONCE THE FABRIC BECOMES BLOCKED WITH SEDIMENT.

12. CLEAR THE SETTLING POND AREA OF WOODY VEGETATION AND ORGANIC MATTER TO THE DIMENSIONS SPECIFIED WITHIN THE PLANS.

13. WHERE NECESSARY, EXCAVATE THE UPSTREAM SETTLING POND AND/OR SEDIMENT STORAGE PIT IN ACCORDANCE WITH THE APPROVED PLANS. EXCAVATED PITS TYPICALLY HAVE SIDE SLOPES OF 2:1(H:V) OR FLATTER UNLESS STEEPER SLOPES ARE KNOWN TO BE STABLE.

14. STABILISE ANY ASSOCIATED EARTH EMBANKMENTS IMMEDIATELY AFTER CONSTRUCTION THROUGH APPROPRIATE COMPACTION, VEGETATION AND/OR EROSION CONTROL MATTING.

15. ESTABLISH ALL NECESSARY UP-SLOPE DRAINAGE CONTROL MEASURES TO ENSURE THAT SEDIMENT-LADEN RUNOFF IS APPROPRIATELY DIRECTED INTO THE SEDIMENT TRAP.

16. TAKE ALL NECESSARY MEASURE TO MINIMISE THE SAFETY RISK CAUSED BY THE STRUCTURE.

MAINTENANCE

1. CHECK ALL ROCK FILTER DAMS AFTER EACH RUNOFF EVENT AND MAKE REPAIRS IMMEDIATELY.

2. INSPECT ALL ROCK AND EARTH EMBANKMENTS FOR UNDERCUTTING OR UNDESIRABLE SEEPAGE FLOWS.

3. IDEALLY, ROCK FILTER DAMS SHOULD DISCHARGE (FROM FULL) OVER NO LESS THAN 8 HOURS. IF DRAINAGE IS TOO RAPID, THEN ADDITIONAL FILTER AGGREGATE MAYBE REQUIRED TO ACHIEVE OPTIMUM HYDRAULIC PERFORMANCE.

4. IF FLOW THROUGH THE STRUCTURE IS REDUCED TO AN UNACCEPTABLE LEVEL, THE UPSTREAM FILTER MEDIUM (AGGREGATE OR FILTER CLOTH) SHOULD BE REMOVED AND REPLACED.

5. IF A GREATER DEGREE OF WATER TREATMENT (FILTRATION) IS REQUIRED, EXTRA GEOTEXTILE FILTER FABRIC SHOULD BE PLACED OVER THE UPSTREAM FACE OF THE STRUCTURE.

6. CHECK THE STRUCTURE AND DOWNSTREAM CHANNEL BANKS FOR DAMAGE FROM OVERTOPPING FLOWS. MAKE REPAIRS AS NECESSARY.

7. IMMEDIATELY REPLACE ANY ROCK DISPLACED FROM THE SPILLWAY.

8. REMOVE SEDIMENT AND RESTORE ORIGINAL SEDIMENT STORAGE VOLUME WHEN COLLECTED SEDIMENT EXCEEDS 10% OF THE SPECIFIED STORAGE VOLUME.

9. DISPOSE OF SEDIMENT AND DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

REMOVAL

1. WHEN THE UP-SLOPE DRAINAGE AREA HAS BEEN STABILISED, REMOVE ALL MATERIALS INCLUDED DEPOSITED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

2. ALL WATER AND SEDIMENT SHOULD BE REMOVED FROM THE SETTLING POND PRIOR TO THE DAM'S REMOVAL. DISPOSE OF SEDIMENT AND WATER IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

3. BRING THE DISTURBED AREA TO A PROPER GRADE, THEN SMOOTH, COMPACT AND STABILISE AND/OR REVEGETATE AS REQUIRED TO MINIMISE THE EROSION HAZARD.

Drawn:	Date:		
GMW	Apr-10	Rock Filter Dam	RFD-02

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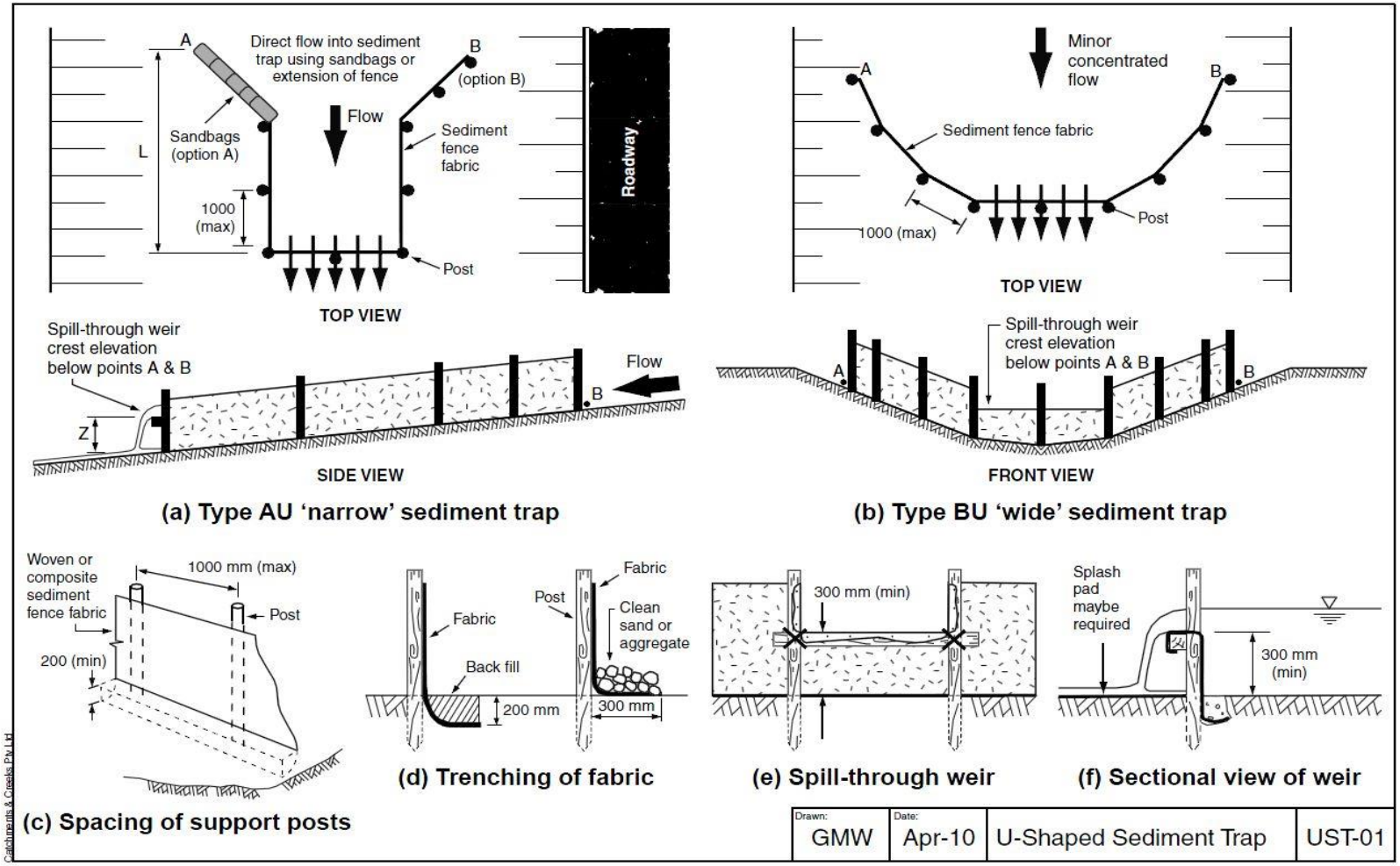
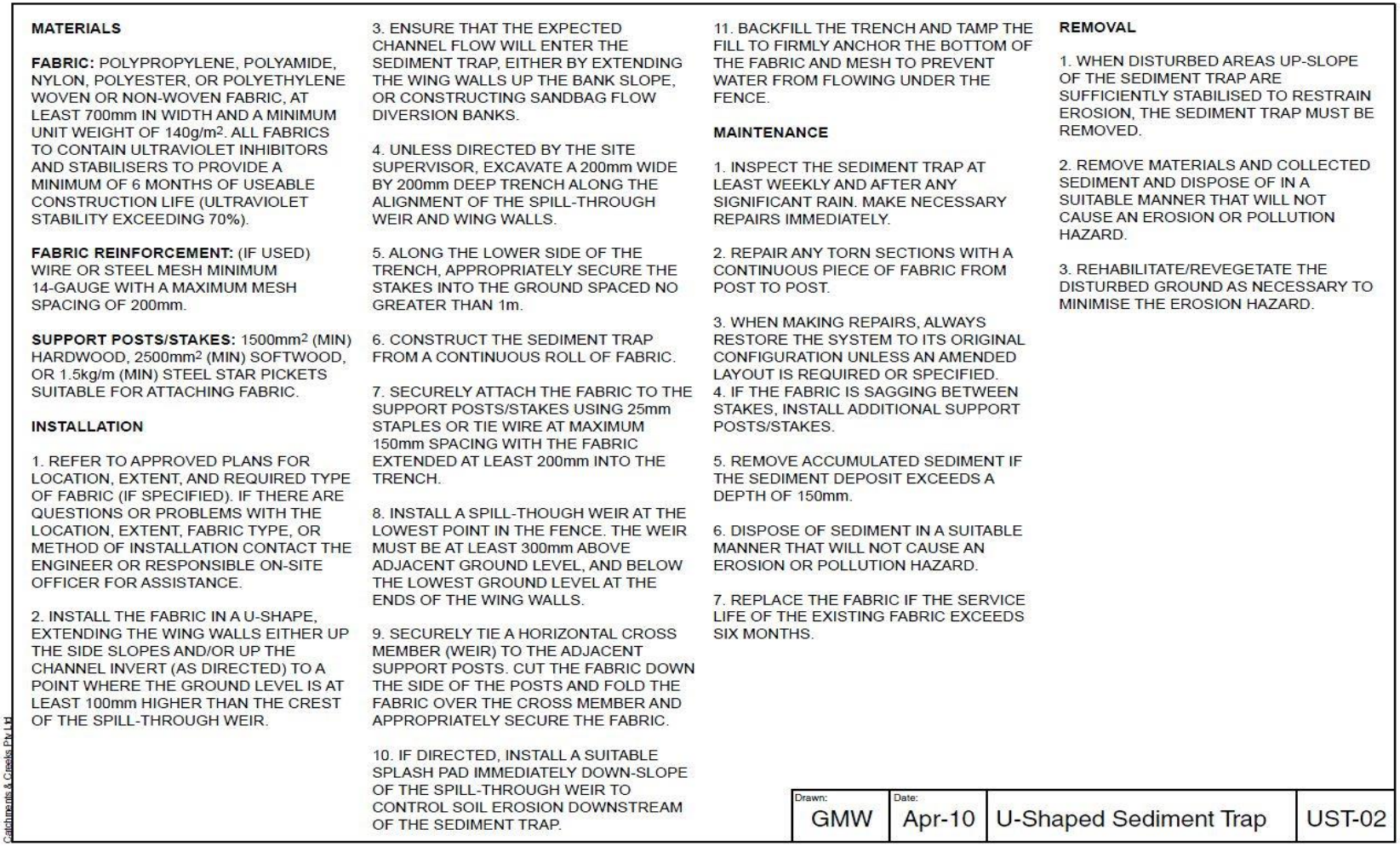
Source: IECA Best Practice Erosion and Sediment Control Guideline (IECA, 2008)



Source: IECA Best Practice Erosion and Sediment Control Guideline (IECA, 2008)



MATERIALS

FABRIC: POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER, OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 140g/m^2. ALL FABRICS TO CONTAIN ULTRAVIOLET INHIBITORS AND STABILISERS TO PROVIDE A MINIMUM OF 6 MONTHS OF USEABLE CONSTRUCTION LIFE (ULTRAVIOLET STABILITY EXCEEDING 70%).

FABRIC REINFORCEMENT: (IF USED) WIRE OR STEEL MESH MINIMUM 14-GAUGE WITH A MAXIMUM MESH SPACING OF 200mm.

SUPPORT POSTS/STAKES: 1500mm^2 (MIN) HARDWOOD, 2500mm^2 (MIN) SOFTWOOD, OR 1.5kg/m (MIN) STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC.

INSTALLATION

1. REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND REQUIRED TYPE OF FABRIC (IF SPECIFIED). IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, FABRIC TYPE, OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.

2. INSTALL THE FABRIC IN A U-SHAPE, EXTENDING THE WING WALLS EITHER UP THE SIDE SLOPES AND/OR UP THE CHANNEL INVERT (AS DIRECTED) TO A POINT WHERE THE GROUND LEVEL IS AT LEAST 100mm HIGHER THAN THE CREST OF THE SPILL-THROUGH WEIR.

3. ENSURE THAT THE EXPECTED CHANNEL FLOW WILL ENTER THE SEDIMENT TRAP, EITHER BY EXTENDING THE WING WALLS UP THE BANK SLOPE, OR CONSTRUCTING SANDBAG FLOW DIVERSION BANKS.

4. UNLESS DIRECTED BY THE SITE SUPERVISOR, EXCAVATE A 200mm WIDE BY 200mm DEEP TRENCH ALONG THE ALIGNMENT OF THE SPILL-THROUGH WEIR AND WING WALLS.

5. ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE STAKES INTO THE GROUND SPACED NO GREATER THAN 1m.

6. CONSTRUCT THE SEDIMENT TRAP FROM A CONTINUOUS ROLL OF FABRIC.

7. SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS/STAKES USING 25mm STAPLES OR TIE WIRE AT MAXIMUM 150mm SPACING WITH THE FABRIC EXTENDED AT LEAST 200mm INTO THE TRENCH.

8. INSTALL A SPILL-THOUGH WEIR AT THE LOWEST POINT IN THE FENCE. THE WEIR MUST BE AT LEAST 300mm ABOVE ADJACENT GROUND LEVEL, AND BELOW THE LOWEST GROUND LEVEL AT THE ENDS OF THE WING WALLS.

9. SECURELY TIE A HORIZONTAL CROSS MEMBER (WEIR) TO THE ADJACENT SUPPORT POSTS. CUT THE FABRIC DOWN THE SIDE OF THE POSTS AND FOLD THE FABRIC OVER THE CROSS MEMBER AND APPROPRIATELY SECURE THE FABRIC.

10. IF DIRECTED, INSTALL A SUITABLE SPLASH PAD IMMEDIATELY DOWN-SLOPE OF THE SPILL-THROUGH WEIR TO CONTROL SOIL EROSION DOWNSTREAM OF THE SEDIMENT TRAP.

11. BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.

MAINTENANCE

1. INSPECT THE SEDIMENT TRAP AT LEAST WEEKLY AND AFTER ANY SIGNIFICANT RAIN. MAKE NECESSARY REPAIRS IMMEDIATELY.

2. REPAIR ANY TORN SECTIONS WITH A CONTINUOUS PIECE OF FABRIC FROM POST TO POST.

3. WHEN MAKING REPAIRS, ALWAYS RESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED.
4. IF THE FABRIC IS SAGGING BETWEEN STAKES, INSTALL ADDITIONAL SUPPORT POSTS/STAKES.

5. REMOVE ACCUMULATED SEDIMENT IF THE SEDIMENT DEPOSIT EXCEEDS A DEPTH OF 150mm.

6. DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

7. REPLACE THE FABRIC IF THE SERVICE LIFE OF THE EXISTING FABRIC EXCEEDS SIX MONTHS.

REMOVAL

1. WHEN DISTURBED AREAS UP-SLOPE OF THE SEDIMENT TRAP ARE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, THE SEDIMENT TRAP MUST BE REMOVED.

2. REMOVE MATERIALS AND COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

3. REHABILITATE/REVEGETATE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.

Drawn:	Date:		
GMW	Apr-10	U-Shaped Sediment Trap	UST-02

Catchments & Creeks Pty Ltd

Source: IECA Best Practice Erosion and Sediment Control Guideline (IECA, 2008)