BARKER RYAN STEWART
TOTAL PROJECT SOLUTIONS
ABN 26 134 067 842

Deicorp Pty Ltd

Soil & Water Management Plan

Proposed Residential Unit Development

89 John Whiteway Drive, Gosford

February 2023

PLANNING
PROJECT MANAGEMENT
ENGINEERING
CERTIFICATION

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Project No.	220435
Author	JR
Checked	SGB
Approved	SGB

Rev No.	Status	Date	Comments
1	For Approval	18/08/2022	
2	For Approval	24/08/2022	Revised for Approval
3	For Approval	09/09/2022	Revised for Council S68 Application
4	For Approval	30/11/2022	Updated for Auditor Comments
5	For Approval	30/03/2023	Updated for Auditor Comments

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1 Introduction

This report has been prepared to provide an overview of the soil & water management system proposed on the plans prepared by Barker Ryan Stewart, numbered 220435-01 series, supporting a State Significant Development (SSD) (SSD-10321) for a residential unit development consisting of 188 dwellings, basement carpark, associated landscaping and public domain works at 89 John Whiteway Drive, Gosford.

The design has been carried out in accordance with Landcom's '*Managing Urban Stormwater: Soils and Construction*', known as the 'Blue Book'.

The design has been prepared to meet the requirements of relevant Development Consent Conditions (SSD-10321), Section 4.38 of the EP&A Act 1979, dated 14 October 2021 (known as MOD2). Relevant Consent Conditions are presented in Table 1.

Table 1. Summary of Relevant Development Consent Conditions (SSD-10321)

Consent Number	Requirement	Relevant Report Section
C17	The Applicant must prepare a Construction Soil and Water Management Plan (CSWMSP) and the plan must address, but not be limited to the following: (a) be prepared by a suitably qualified expert, in consultation with Council; (b) describe all erosion and sediment controls to be implemented during construction, as a minimum, in accordance with the publication Managing Urban Stormwater: Soils & Construction (4th edition, Landcom 2004) commonly referred to as the 'Blue Book'; (c) provide a plan of how all construction works will be managed in a wet-weather events (i.e. storage of equipment, stabilisation of the Site); and (d) detail all off-Site flows from the Site.	Sections 1-9
D22	Adequate provisions must be made to collect and discharge stormwater drainage during construction of the buildings to the satisfaction of the Certifier. The prior written approval of Council must be obtained to connect or discharge site stormwater to Council's stormwater drainage system or street gutter.	Sections 1-9

2 Background

1. Site constraints and characteristics criteria are identified in Table 2.
2. The likely soil loss is calculated with the Revised Universal Soil Loss Equation (RUSLE) as presented in the 'Blue Book'. The values of the other RUSLE factors are:
   - LS = 2.05 (assuming a slope length of 80 m and an average gradient of 8%);
   - P = 1.3; and
   - C = 1.0 (assumed to be for bare soil).
3. The design capacity for possible sediment basins for the total site is 447 cubic metres.
4. The estimated annual average soil loss is calculated to be 279 cubic metres using the RUSLE, which is greater than 150 cubic metres; so, a sediment basin is required at this site.
5. Given that the site is Soil Loss Class 3, and the site is not waterfront land, no constraints on the timing of development occur at this site.

Table 2. Constraints and Characteristics

CONSTRAINTS	VALUE
Rainfall erosivity	Moderate (R-factor = 2,720)
Slope gradients	Moderate (avg 8%)
Potential erosion hazard	High (from Figure 4.6 in Landcom (2004))
Rainfall Zone	Zone 1
Soil erodibility	Low to moderate (highest K-factor = 0.050)
Calculated soil loss	362 tones/ha/yr
Soil Loss Class	Class 4
Soil texture group	Type C
Percent dispersible (subsoil)	6.25% (assumed)
Runoff coefficient	0.5 adopted
Total Site Area	2.23 Ha
Disturbed site area	13,450 m^2

3 General Instructions

1. The SWMP drawings (220435-01 series) are to be read with the engineering plans and any other plans or written instructions that may be issued and relating to development at the subject site.
2. Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated In *Managing Urban Stormwater: Soils & Construction* (Landcom 2004).
3. All subcontractors are to be informed of their responsibilities in reducing the potential for soil erosion and pollution to downslope area.

3.1 Wet Weather Conditions

To mitigate impacts from approaching storms and wet-weather events, the following measures are to be undertaken:

1. Using daily weather updates from the Bureau of Meteorology, provide information to construction personnel with purpose of implementing measures in case of wet weather conditions.
2. Where possible, inspection all soil and water management measures prior to rainfall.
3. Install additional temporary diversion swales and similar, if required, to direct runoff to approved soil and water control measures.
4. Ensure constructed access tracks are free draining to reduce delays from re-access following wet-weather events.
5. Ensure suitable storage volume is available within sediment control basins.

3.2 Erosion and Sediment Control During Tree Removal

Removal of selected trees and vegetation is required to facilitate the proposed development. Tree removal has the potential to disturb insitu soils that may lead to soil erosion. Requirements for erosion and sediment control during tree and vegetation removal is outlined in:

1. Biodiversity Management Sub-Plan, AEP, ref: 2583, Section 2.4.
2. Vegetation Management Plan, Conacher Consulting, ref: 21020, Section 3.7.

Both of the above documents are consistent in their recommendations and are presented below:

> *A site specific erosion and sediment control plan is to be prepared for the proposed earthworks and construction works. The controls are to be monitored throughout the works, particularly following heavy rainfall. The erosion and sediment control plan is to be updated on an ongoing basis to ensure that effective controls are in place for the duration of the works.*
>
> *To mitigate against potential erosion and sedimentation issues, trees to be removed within the APZ areas of the site are to be lopped at the base and the stump is to be retained. Where tree or weed removal works expose soils which are likely to be susceptible to erosion, appropriate erosion and sediment control measures are to be installed. Erosion and sediment control measures will need to be implemented to avoid damage to native vegetation and shall be coordinated with weed management works on site. Additional planting of ground cover vegetation within the site will also be completed to reduce existing erosion.*

It is noted that an Erosion and Sediment Control Plan is applicable to sites that propose disturbance to less than 2,500m² of land. Due to the size of the proposed development (>2,500m²), a Soil and Water Management Plan has been prepared for the site in accordance with the 'Blue Book'.

As required by the site Biodiversity Management Sub-Plan and the Vegetation Management Plan, trees will generally be lopped at the base and the stump retained to limit soil disturbance and thus erosion potential.

Where tree or weed removal works expose or disturb insitu soils, the following measures shall be implemented:

a. Installation of a diversion bund upstream of the proposed tree/vegetation removal area. Works in accordance with 'Earth Bank, Low Flow: SD 5-5' included in Appendix B.
b. Installation of a sediment control fence downstream of the proposed tree/vegetation removal area. Works in accordance with 'Sediment Fence: SD 6-8' included in Appendix B.

The above measures shall only be removed following stabilisation and establishment of the disturbed area.

4 Land Disturbance Conditions

1. Where practicable, the soil erosion hazard on the site will be kept as low as possible as recommended in Table 3.

Table 3. Limitations to access

LAND USE	LIMITATION	COMMENTS
Construction areas	Disturbance to be no further than five (preferably two) metres from the edge of any essential engineering activity as shown on the plans	All site workers will clearly recognize these zones that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope), or similar materials
Access areas	Limited to a maximum width of 10 metres	The site manager will determine and mark the location of these zones onsite. They can vary in position to best conserve the existing vegetation and protect downstream areas while being considerate of the needs of efficient works' activities. All site workers will clearly recognize their boundaries that where appropriate, are marked with barrier mesh, sediment fencing, or similar materials
Remaining lands	Entry prohibited except for essential thinning of plant growth	Thinning of growth might be necessary for fire hazard reduction

Works will be undertaken in the following sequence:

i. Install all barrier and sediment fencing where shown on 2200435-01-801 to detail on Standard Drawing (SD) 6-8
ii. Construct the stabilized site access next to the southwestern boundary to detail shown on SD 6-14;
iii. Construct sediment basin see (SD 6-4). The basin does not need to be constructed in earth as shown in SD 6-4 but must be constructed in impervious materials. Configuration of basin to be adjusted as required to suit site works and excavation;
iv. Construct low flow earth banks where shown on 2200435-01-801 and to detail on SD 5-5;
v. Install wind break fencing (SD 6-15) where shown on the 2200435-01-801;
vi. Install mesh and gravel filters (SD 6-11) at downslope kerb inlets;
vii. Install geotextile inlet filters (SD 6-12) around all drop inlets onsite;
viii. Clear the site and strip and stockpile the topsoil in the locations shown on 2200435-01-801 following SD 4-1;
ix. Undertake all essential construction works ensuring the roof stormwater systems are connected to permanent drainage as soon as practical;
x. Grade site to final landform and apply permanent stabilization (landscaping) within 20 days of completion of construction works; and
xi. Remove temporary erosion control measures after the permanent landscaping has been completed.

5 Soil Erosion Control Conditions

1. Clearly visible barrier fencing will be installed where shown on 2200435-01-801and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance.
2. Earth batters will be constructed with as low a gradient as practicable but no steeper than (subject to geotechnical advice):
    - 2(H): 1(V) where slope length is less than 13 metres
    - 2.5(H): 1(V) where slope length is between 13 and 17 metres
    - 3(H): 1(V) where slope length is between 17 and 20 metres
    - 4(H): 1(V) where slope length is greater than 20 metres.
3. All waterways, drain spillways and their outlets will be constructed to be stable in at least the 10 year ARI, time of concentration storm event.
4. Protection from erosive forces will be undertaken on all lands to meet the requirements of Table 4.
5. A suggested listing of plant species for temporary cover in areas of sheet flow is shown in Table 5. Reinforced Kikuyu turf is suggested for use in waterways. Wherever practicable, foot and vehicular traffic are to be kept away from rehabilitated areas.
6. Permanent rehabilitation will achieve a C-factor of less than 0.1 and set in motion a program that should ensure the C-factors will drop permanently, by vegetation, paving, armouring, etc. to less than 0.05 within a further 60 days. Local water restrictions permitting, lands that have been newly planted with grass species will be watered regularly until an effective cover has established and plants are growing vigorously. Follow-up seed and fertilizer will be applied as necessary in areas of minor soil erosion and/or inadequate vegetation protection.
7. The revegetation will be aimed at re-establishing natural species. Therefore, the natural surface soils will be replaced, and non-persistent annual cover crops will be used.

Table 4. Maximum C-factors at Nominated Times During Works

LANDS	MAXIMUM C-FACTOR	COMMENTS
Waterways and other areas subject to concentrated flows, post-construction	0.05	Applies after ten working days from completion of formation and before they are allowed to carry any concentrated flows. Flows will be limited to those shown in Table 5.1 of Managing Urban Stormwater – Soils & Construction, Landcom (2004). Foot and vehicular traffic will be prohibited in these areas. C-factor of 0.05 equals 70% ground cover.
Stockpiles, post-construction	0.1	Applies after ten working days from completion of formation. Maximum C-factor of 0.10 equals 60% ground cover.
All lands, including waterways, and stockpiles during construction	0.15	Applies after 20 working days of inactivity, even though works might continue later. Maximum C-factor of 0.15 equals 50% ground cover.

Table 5. Suggested Plant Species for Ground Cover

SOWING SEASON	SEED MIX
Autumn / Winter	Oats @ 40 kg/ha Japanese millet @ 10 kg/ha
Spring / Summer	Japanese millet @ 20 kg/ha Oats @ 20 kg/ha

6 Sediment Control Conditions

1. Sediment fences (SD 6-8) will:
    i. Be installed where shown on 220435-01-801and elsewhere at the discretion of the site superintendent to contain the coarser sediment fractions (including aggregated fines) as near as possible to their source; and
    ii. Have catchment areas not exceeding 900 square metres, a storage depth (including both settling and settled zones) of at least 0.6 metres, and internal dimensions that provide maximum surface area to passage of stormwater (i.e. very low gradient).
2. Sediment removed from any trapping device will be relocated where further pollution to downslope lands and waterways cannot occur, or disposed off site as instructed by the super intendent.
3. Stockpiles (SD 4-1) will be placed where shown on 220435-01-801and not within 5 metres of hazard areas including likely areas of high velocity flows such as waterways, paved areas and driveways.
4. Water will be prevented from directly entering the permanent drainage system with inlet filters (SD 6-11 or SD 6-12) unless it is relatively sediment free, i.e. the catchment area has been permanently landscaped and/or any likely sediment has been treated in an approved device. The actual locations of the inlet filters will be chosen by the Site Superintendent to protect the receiving waters best and, therefore, are not shown on drawing 220435-01-801.
5. Temporary sediment traps will be retained until after the site is completely rehabilitated.

7 Site Inspection and Maintenance Conditions

1. Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the site superintendent.
2. Acceptable bins will be provided for any concrete and mortar slurries, paints, acid washing, lightweight waste materials and litter. Clearance services are to be provided weekly.
3. The site superintendent will inspect the site at least weekly and will:
    i. Ensure that drains operate properly and to undertake any necessary repairs;
    ii. Remove spilled sand or other materials from hazard areas, including lands closer than five metres from areas of likely concentrated or high velocity flows especially waterways and paved areas;
    iii. Remove trapped sediment whenever less that design capacity remains within the structure;
    iv. Ensure rehabilitated lands have effectively reduced the erosion hazard and to initiate upgrading or repair as appropriate;
    v. Construct additional erosion and/or sediment control works as might become necessary to ensure the desired protection is given to downslope lands and waterways, i.e. make ongoing changes to 220435-01-801where it proves inadequate in practice or is subjected to changes in conditions on the worksite or elsewhere in the catchment;
    vi. Maintain erosion and sediment control measures in a fully functioning condition until all earthwork activities are completed and the site is rehabilitated; and
    vii. Remove temporary soil conservation structures as the last activity in the rehabilitation program.

8 Sediment Basin Volume Calculation

1. Per the 'Blue Book':
   - Basin volume = Settling zone volume + Sediment storage volume

2. *Settling Zone Volume*
   - The settling zone volume for Type C soils is calculated to provide capacity to allow the design particle (e.g. 0.02 mm in diameter) to settle in the peak flow expected from the design storm (e.g. 0.25-year ARI).
   - The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle.
   - Peak flow/discharge for the 0.25-year, ARI storm is given by the Rational Formula:

$$Q_{tc,0.25} = 0.5 \times [0.00278 \times C_{10} \times Fy \times I_{1\,yr,tc} \times A] \, {}^{m^3}/_{s}$$

   - In the above equation:

$Q_{tc,0.25}$ = flow rate ($^{m^3}/_{s}$) for the 0.25 ARI storm event
C_{10} = runoff coefficient (dimensionless for ARI of 10 years) = 0.69
Fy frequency factor for 1 year ARI storm = 0.62
$I_{1\,yr,tc}$ = Average intensity (mm/hr) for the 1-year ARI storm = 68.5
A = area of catchment in hectares (ha)= 2.23ha

$$Q_{tc,0.25} = 0.5 \times [0.00278 \times C_{10} \times Fy \times I_{1\,yr,tc} \times A] \, {}^{m^3}/_{s}$$
$$= 0.091 \; {}^{m^3}/_{s}$$

   - With consideration to the above:

Basin Surface Area = Area Factor x $Q_{tc,0.25}$ m^2
= 4100 x 0.091m^2
= 372m^2

3. *Sediment Storage Volume*
   - The sediment storage zone is normally taken as 100% of the capacity of the settling zone or as two months soil loss as calculated by RUSLE.
   - The two-month soil loss has been adopted for this project.
   - The settling zone volume is 223m^3 with a sediment storage volume of 64m^3 giving a total minimum basin volume of 287m^3.
   - Key basin parameters are presented in Table 6.

Table 6. Key Basin Parameters

Site	$Q_{tc,0.25}$ (m^3/s)	Area factor	Basin surface area (m^2)	Depth of settling zone (m)	Settling zone volume (m^3)	Sediment storage volume (m^3)	Total basin volume (m^3)	Basin shape		
								L:W Ratio	Length (m)	Width (m)
A	0.091	4100	372	0.6	223	64	287	2	27.3	13.6

9 Conclusion

This Soil and Water Management Plan demonstrates how the sediment basin volume has been calculated, and how soil and water management conditions are to be implemented in accordance with Landcom's '*Managing Urban Stormwater: Soils & Construction*'.

The design of the soil and water management measures have been prepared in accordance with Development Consent Conditions No C17 and No D22 of SSD-10321, dated 14 October 2021.

This report is to be read in conjunction with the drawings prepared by Barker Ryan Stewart and included in Appendix A.

Appendix A – Soil and Water Management Plan

LEGEND:

- SEDIMENT FENCE
- STABILISED SITE ACCESS AT ENTRANCE TO WORKS
- SURFACE INLET PIT SEDIMENT TRAP
- HAY BALE SEDIMENT TRAP

EROSION AND SEDIMENT CONTROL NOTES:

1. PRIOR TO THE COMMENCEMENT OF SITE DISTURBANCE, THE CONTRACTOR SHALL ESTABLISH ALL NECESSARY EROSION AND SEDIMENTATION CONTROL MEASURES IN ACCORDANCE WITH THIS PLAN, COUNCIL'S "CIVIL WORKS SPECIFICATION, PART 2 -CONSTRUCTION", AND THE NSW DEPARTMENT OF HOUSING'S PUBLICATION "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION".
2. THE LOCATION OF EROSION AND SEDIMENTATION CONTROL DEVICES SHOWN ON THIS PLAN ARE INDICATIVE ONLY AND SHOULD BE ADJUSTED TO SUIT SITE CONDITIONS.
3. WHERE WORKS ARE DELAYED OR IN ABEYANCE AND DISTURBED AREAS ARE LIKELY TO BE EXPOSED FOR A PERIOD OF TWO MONTHS OR MORE, TEMPORARY REHABILITATION WORKS SHALL BE UNDERTAKEN TO PROTECT THE SITE.
4. ALL DISTURBED AREAS SHALL BE TOPSOILED, SEEDED AND MULCHED WITHIN 20 DAYS OF THE COMPLETION OF THE WORKS.
5. ALL AREAS WITH SLOPES STEEPER THAN 12% (1 in 8) SHALL BE STRAW MULCHED IN CONJUNCTION WITH SEEDING, OR TURFED.
6. SILT BARRIERS LOCATED AROUND KERB INLET AND ROAD PITS SHALL BE REINSTATED FOLLOWING ROAD PAVING WORKS IF IT IS LIKELY THAT UNDISTURBED AREAS WILL STILL DRAIN TO THE PIT.
7. SANDBAGS SHALL BE PLACED ACROSS THE END OF ROAD CONSTRUCTION AT THE COMPLETION OF EACH DAYS WORK TO PREVENT EROSION OF THE CONSTRUCTED MATERIAL.
8. THE CONTRACTOR SHALL CONDUCT WEEKLY INSPECTIONS OF THE SITE TO ENSURE THAT ALL DEVICES AND REHABILITATION AREAS HAVE BEEN ADEQUATELY MAINTAINED. THE CONTRACTOR SHALL ALSO KEEP A LOG BOOK DETAILING SUCH INSPECTIONS.
9. TOPSOIL SHALL BE STOCKPILED IN THE LOCATIONS SHOWN ON THIS PLAN OR AS DIRECTED BY COUNCIL'S ENGINEER. WHERE IT IS LIKELY THAT STOCKPILES WILL REMAIN IN PLACE FOR A PERIOD EXCEEDING 4 WEEKS, THEN THE STOCKPILE SHALL BE STABILISED BY SEEDING OR EQUIVALENT METHODS.
10. ALL REVEGETATION WORKS ARE TO BE MAINTAINED, INCLUDING WATERING AND MOWING WHERE NECESSARY UNTIL THE COMPLETION OF THE MAINTENANCE PERIOD.
11. THE MOVEMENT OF VEHICULAR TRAFFIC ON THE SITE SHALL BE CONFINED TO DESIGNATED AREAS DURING CONSTRUCTION WORKS. VEHICULAR ACCESS SHALL BE DENIED TO AREAS TO BE LEFT UNDISTURBED.
12. SITE ACCESS SHALL BE LIMITED TO THE LOCATIONS SHOWN ON THIS PLAN. SHAKE-DOWN AREAS SHALL BE CONSTRUCTED AS SHOWN.
13. DURING CONSTRUCTION WORKS, DUST CONTROL MEASURES SHALL BE IMPLEMENTED TO MINIMISE THE AMOUNT OF DUST GENERATED FROM THE SITE. THESE MEASURES TO BE IMPLEMENTED TO COUNCIL'S SATISFACTION.
14. MAINTENANCE AND CLEANING OF CONSTRUCTION PLANT SHALL BE CARRIED OUT IN AN AREA WHERE RUNOFF CAN BE CONTAINED AND APPROPRIATELY TREATED AND DISPOSED OF.
15. ALL EROSION AND SEDIMENTATION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS HAVE ADEQUATELY REGENERATED. THIS STAGE SHALL BE DETERMINED BY THE CERTIFIER.

PLAN
SCALE 1:500

10 0 10 20 30 40 50 METRES 1:500

REV	AMENDMENT	ISSUED	DATE
A	FIRST ISSUE	JB	18/08/2022
B	REVISED FOR APPROVAL	JB	23/08/2022
C	REVISED FOR APPROVAL	SB	09/09/2022

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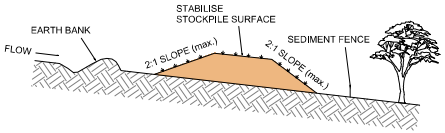
CONSTRUCTION TRAFFIC AND PEDESTRIAN MANAGEMENT

SOIL AND WATER MANAGEMENT SUB-PLAN

Designed: JR
Drawn: RG
Checked: JR

Scales: @A1 Plan 1:500, Horiz. -, Vert. -, X-Sect. -
Datum: A.H.D.

Plan No. 220435-01-801
File Ref. 220435
REV. C



CONSTRUCTION NOTES

1. WHERE POSSIBLE LOCATE STOCKPILE AT LEAST 5 METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOWS, ROADS, HAZARD AREAS AND MIN. 1.5m AWAY FROM EMBANKMENTS.

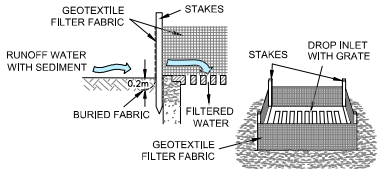
2. CONSTRUCT ON THE CONTOUR AS A LOW, FLAT ELONGATED MOUND.

3. WHERE THERE IS SUFFICIENT AREA TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.

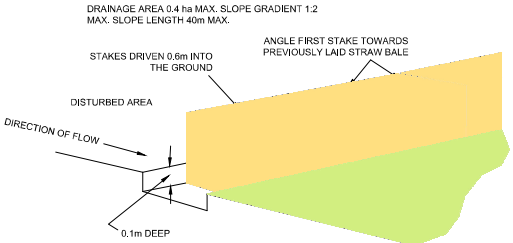
4. REHABILITATE IN ACCORDANCE WITH THE SWMP/ESCP.

5. CONSTRUCT EARTH BANK (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT RUN OFF AROUND THE STOCKPILE AND A SEDIMENT FENCE (STANDARD DRAWING 6-8) 1 TO 2 METRES DOWNSLOPE OF STOCKPILE.

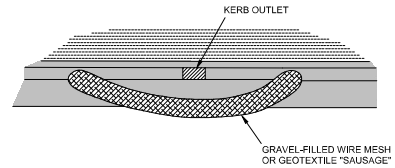
TOPSOIL STOCKPILE



SURFACE INLET PIT SEDIMENT TRAP



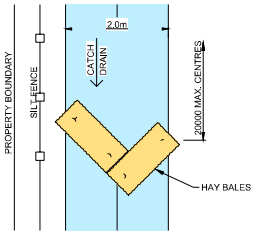
STRAW BALE SEDIMENT FILTER



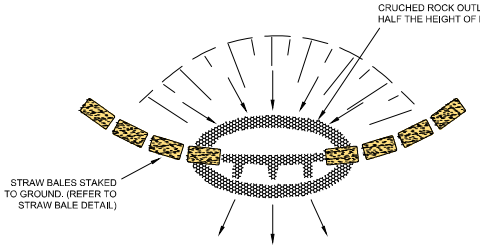
CONSTRUCTION NOTES

1. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH AND FILL IT WITH 25mm TO 50mm GRAVEL.
2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH X 400mm WIDE.
3. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING FILTER.
4. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

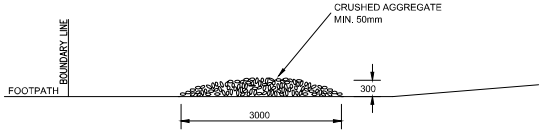
MESH & GRAVEL FILTER "SAUSAGE" BARRIER



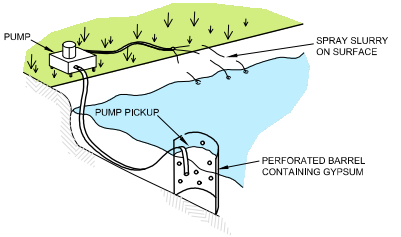
CATCH DRAIN DETAIL



STRAW BALE & CRUSHED ROCK SEDIMENT FILTER



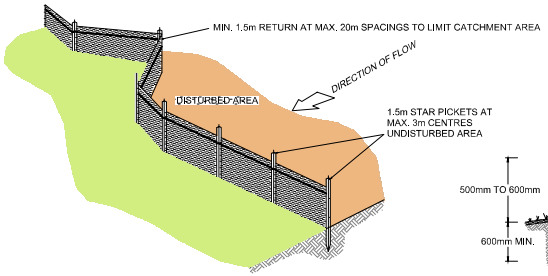
VEHICLE DUST SHAKE DOWN DETAIL

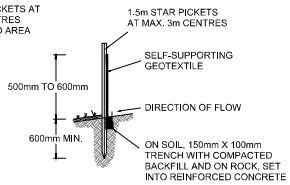


NOTE:
1. FLOCCULATION TO BE USED IF WATER IS NOT CLEAR (IE: SEDIMENT GREATER THAN 50 mg/L) PRIOR TO DISCHARGING FROM TEMPORARY PUMP OUT

2. FOR RATES & AGENTS SEE APPENDIX E OF HOUSING NSW "MANAGING URBAN SW SOILS & CONSTRUCTION".

FLOCCULATION DETAIL





SECTION DETAIL

CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO BEING PARRALLEL 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 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.

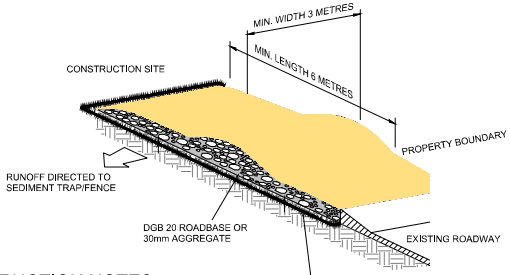
3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.

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 150mm OVERLAP.

6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

SEDIMENT FENCE



CONSTRUCTION NOTES

1. STRIP TOPSOIL AND LEVEL SITE.

2. COMPACT SUBGRADE.

3. COVER AREA WITH NEEDLE-PUNCHED GEOTEXTILE.

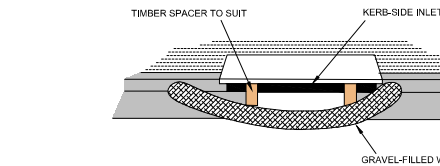
4. CONSTRUCT 200mm THICK PAD OVER GEOTEXTILE USING ROADBASE OR 30mm AGGREGATE. MINIMUM LENGTH 15 METRES OR TO BUILDING ALIGNMENT. MINIMUM WIDTH 3 METRES.

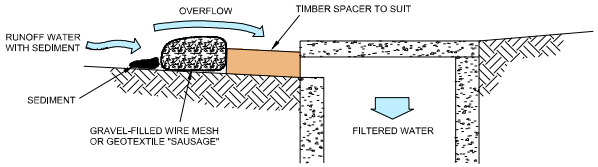
5. CONSTRUCT HUMP IMMEDIATELY WITHIN BOUNDARY TO DIVERT WATER TO A SEDIMENT FENCE OR OTHER SEDIMENT TRAP.

GEOTEXTILE FABRIC DESIGNED TO PREVENT INTERMIXING OF SUBGRADE AND BASE MATERIALS AND TO MAINTAIN GOOD PROPERTIES OF THE SUB-BASE LAYERS.

GEOFABRIC MAY BE A WOVEN OR NEEDLE PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N

STABILISED SITE ACCESS





CONSTRUCTION NOTES

1. INSTALL FILTERS TO KERB INLET ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH X 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

MESH & GRAVEL INLET "SAUSAGE" FILTER

REV	AMENDMENT	ISSUED	DATE
A	FIRST ISSUE	JB	18/08/2022
B	REVISED FOR APPROVAL	JB	23/08/2022
C	REVISED FOR APPROVAL	SB	09/09/2022

BARKER RYAN STEWART
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Client: DEICORP PTY LTD

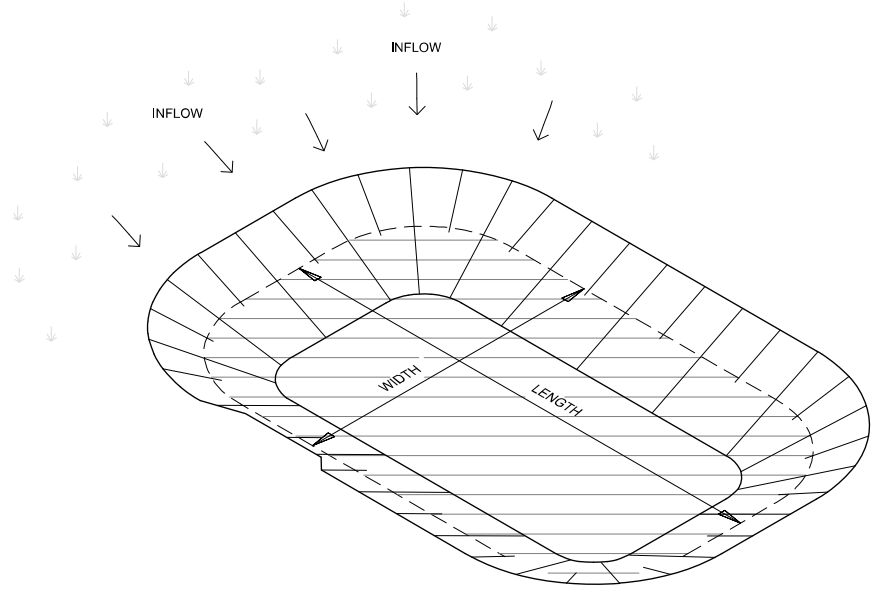
87-89 JOHN WHITEWAY DRIVE, GOSFORD
CONSTRUCTION TRAFFIC AND PEDESTRIAN MANAGEMENT

SOIL AND WATER MANAGEMENT SUB-PLAN DETAILS SHEET 1

Designed: JR
Drawn: RG
Checked: JR

Scales: @A1 Plan - Horiz. - Vert. - X-Sect. -
Datum: A.H.D.

Plan No. 220435-01-802
File Ref. 220435
REV. C



PERSPECTIVE VIEW

Site area	Site					
	A					
Total catchment area (ha)	2.23					
Disturbed catchment area (ha)	1.345					

Rainfall data							
Design rainfall depth (days)	5						See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	80						See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	35						See Section 6.3.4 (h)
Rainfall intensity: 2-year, 6-hour storm	11.2						See IFD chart for the site

RUSLE Factors							
Rainfall erosivity (*R*-factor)	2720						Automatic calculation from above data
Soil erodibility (*K*-factor)	0.05						RUSLE data can be obtained from Appendixes A, B and C
Slope length (m)	80						
Slope gradient (%)	8						
Length/gradient (*LS*-factor)	2.05						
Erosion control practice (*P*-factor)	1.3						
Ground cover (*C*-factor)	1						

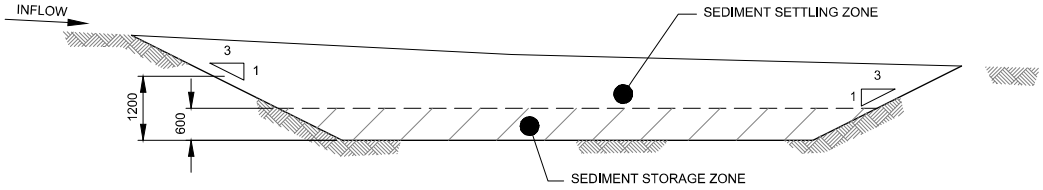
Calculations							
Soil loss (t/ha/yr)	362						
Soil Loss Class	4						See Section 4.4.2(b)
Soil loss (m^3/ha/yr)	279						
Sediment basin storage volume, m^3	64						See Sections 6.3.4(i) and 6.3.5 (e)

Total Basin Volume

Site	$Q_{1c, 0.25}$ (m^3/s)	Area factor	Basin surface area (m^2)	Depth of settling zone (m)	Settling zone volume (m^3)	Sediment storage volume (m^3)	Total basin volume (m^3)	Basin shape		
								L:W Ratio	Length (m)	Width (m)
A	0.091	4100	372	0.6	223	64	287	2	27.3	13.6

CALCULATION NOTES:

1. SEDIMENT STORAGE ZONE DESIGN BASED UPON THE 2-MONTH SOIL LOSS AS CALCULATED BY THE RUSLE (SECTION 6.3.5(E)(IV).



TYPICAL SECTION

SEDIMENTATION BASIN NOTES:

1. SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND CONSTRUCTION, MANAGING URBAN STORMWATER - THE BLUE BOOK' CAPACITY BASED ON 5 DAY RAINFALL DEPTH AT 80th PERCENTILE INTENSITY.
2. SEDIMENTATION BASINS TO COLLECT RUNOFF IN EXTREME RAINFALL EVENTS. COLLECTED RUNOFF IS TO BE ASSESSED BY A QUALIFIED LABORATORY FOR DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.
3. BASIN IS TO HAVE A MARKER PLACED AT THE TOP LEVEL OF THE STORAGE ZONE TO INDICATED WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED AND DEWATERED PRIOR TO REMOVAL FROM SITE.
4. ALLOWANCE IS TO BE MADE DURING BENCHING OF SITE TO ENSURE RUNOFF IS DIRECTED TO SEDIMENTATION BASINS.

TYPE 'C' RETENTION BASIN
N.T.S.

REV	AMENDMENT	ISSUED	DATE
A	FIRST ISSUE	JB	18/08/2022
B	REVISED FOR APPROVAL	JB	23/08/2022
C	REVISED FOR APPROVAL	SB	09/09/2022

BARKER RYAN STEWART
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ABN: 26 134 067 842 62019

Client: DEICORP PTY LTD

87-89 JOHN WHITEWAY DRIVE, GOSFORD
CONSTRUCTION TRAFFIC AND PEDESTRIAN MANAGEMENT

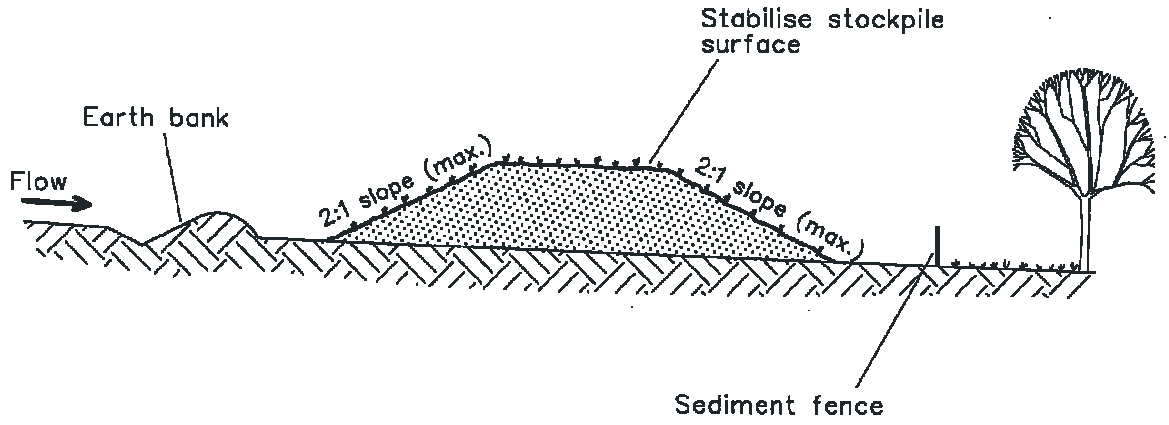
SOIL AND WATER MANAGEMENT SUB-PLAN DETAILS SHEET 2

Designed: JR
Drawn: RG
Checked: JR

Scales: @A1 Plan - Horiz. - Vert. - X-Sect. -
Datum: A.H.D.

Plan No. 220435-01-803
File Ref. 220435
REV. C

Appendix B – Standard Soil and Water Protection Measures

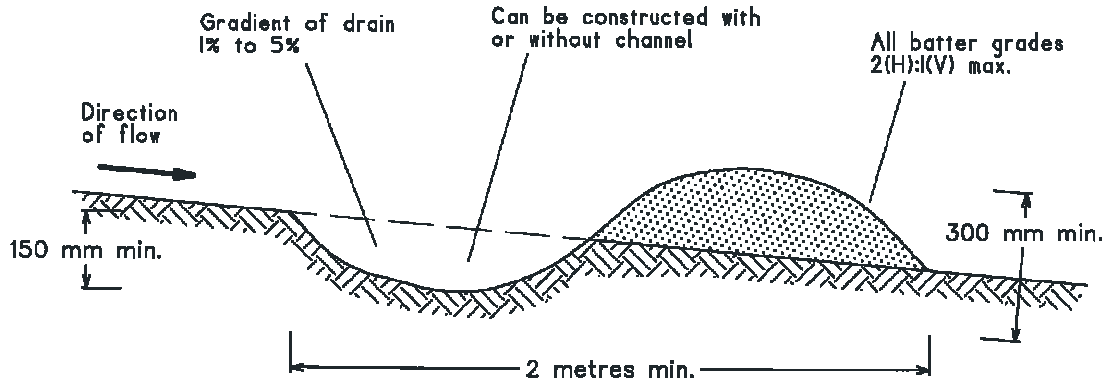


Construction Notes

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

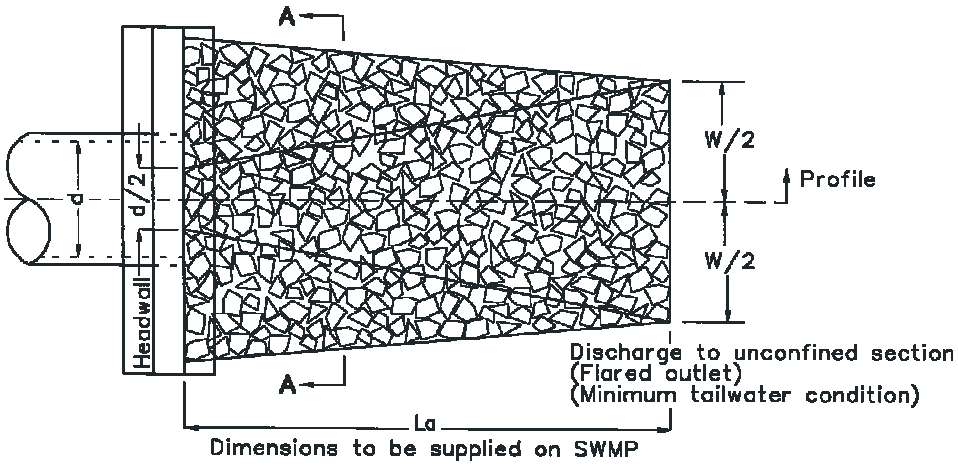


NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

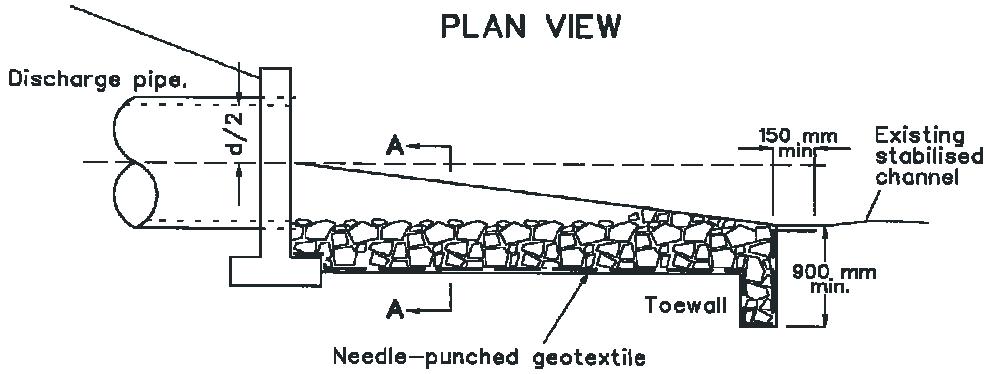
Construction Notes

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.

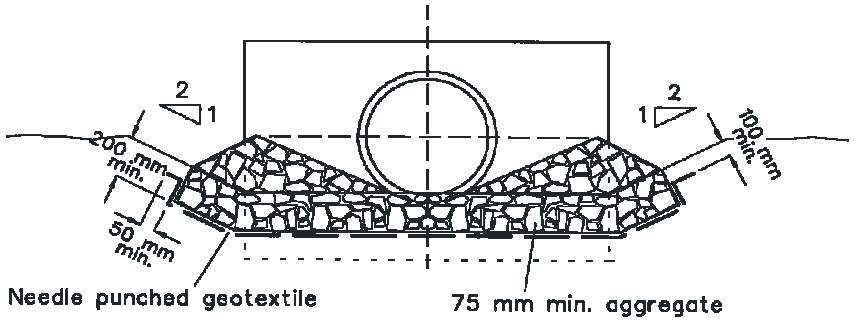
EARTH BANK (LOW FLOW) SD 5-5



PLAN VIEW



PLAN VIEW

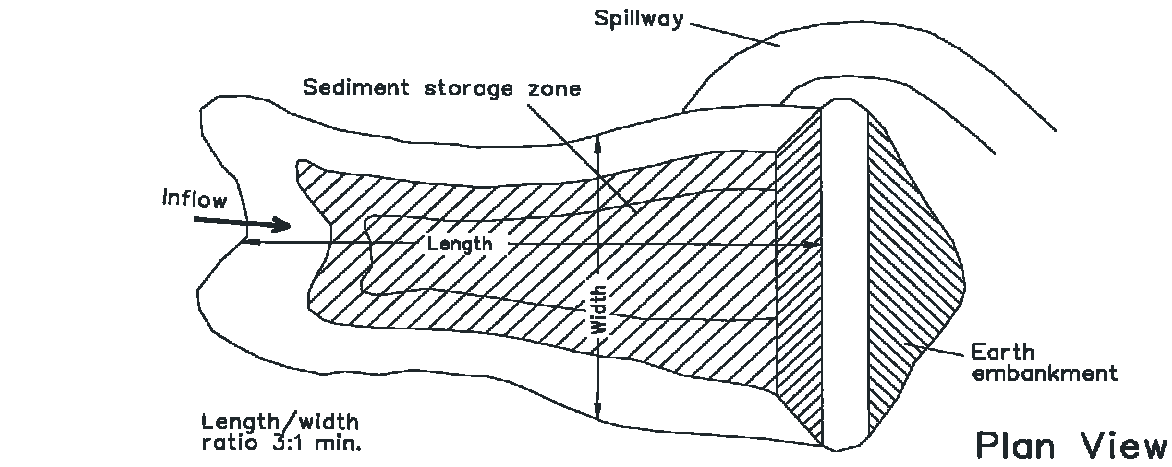


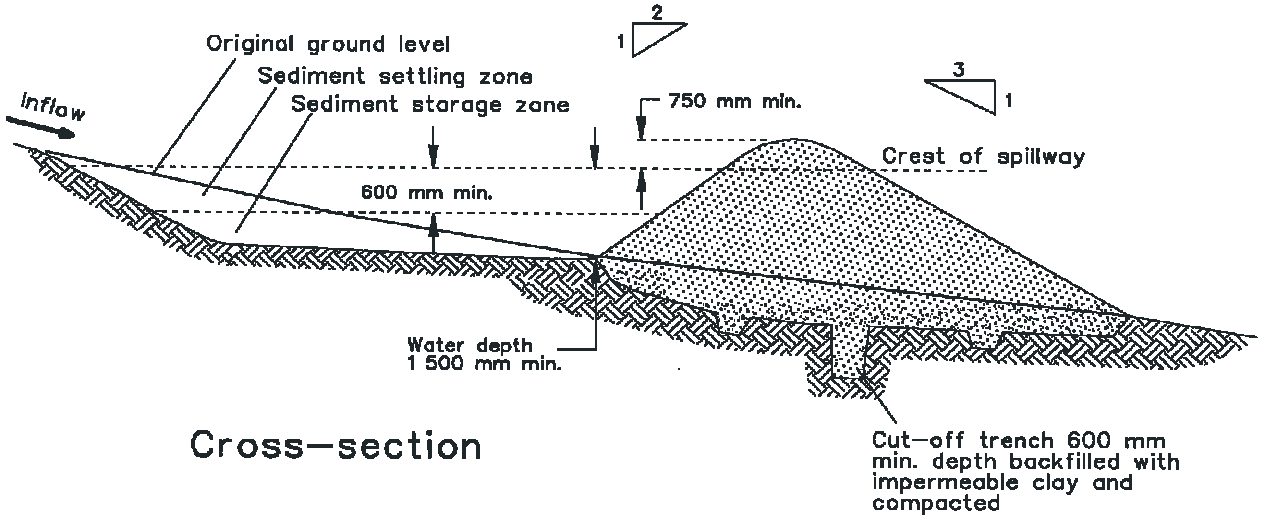
CROSS SECTION AA

Construction Notes

1. Compact the subgrade fill to the density of the surrounding undisturbed material.
2. Prepare a smooth, even foundation for the structure that will ensure that the needle-punched geotextile does not sustain serious damage when covered with rock.
3. Should any minor damage to the geotextile occur, repair it before spreading any aggregate. For repairs, patch one piece of fabric over the damage, making sure that all joints and patches overlap more than 300 mm.
4. Lay rock following the drawing, according to Table 5.2 of Landcom (2004) and with a minimum diameter of 75 mm.
5. Ensure that any concrete or riprap used for the energy dissipater or the outlet protection conforms to the grading limits specified on the SWMP.

ENERGY DISSIPATER SD 5-8





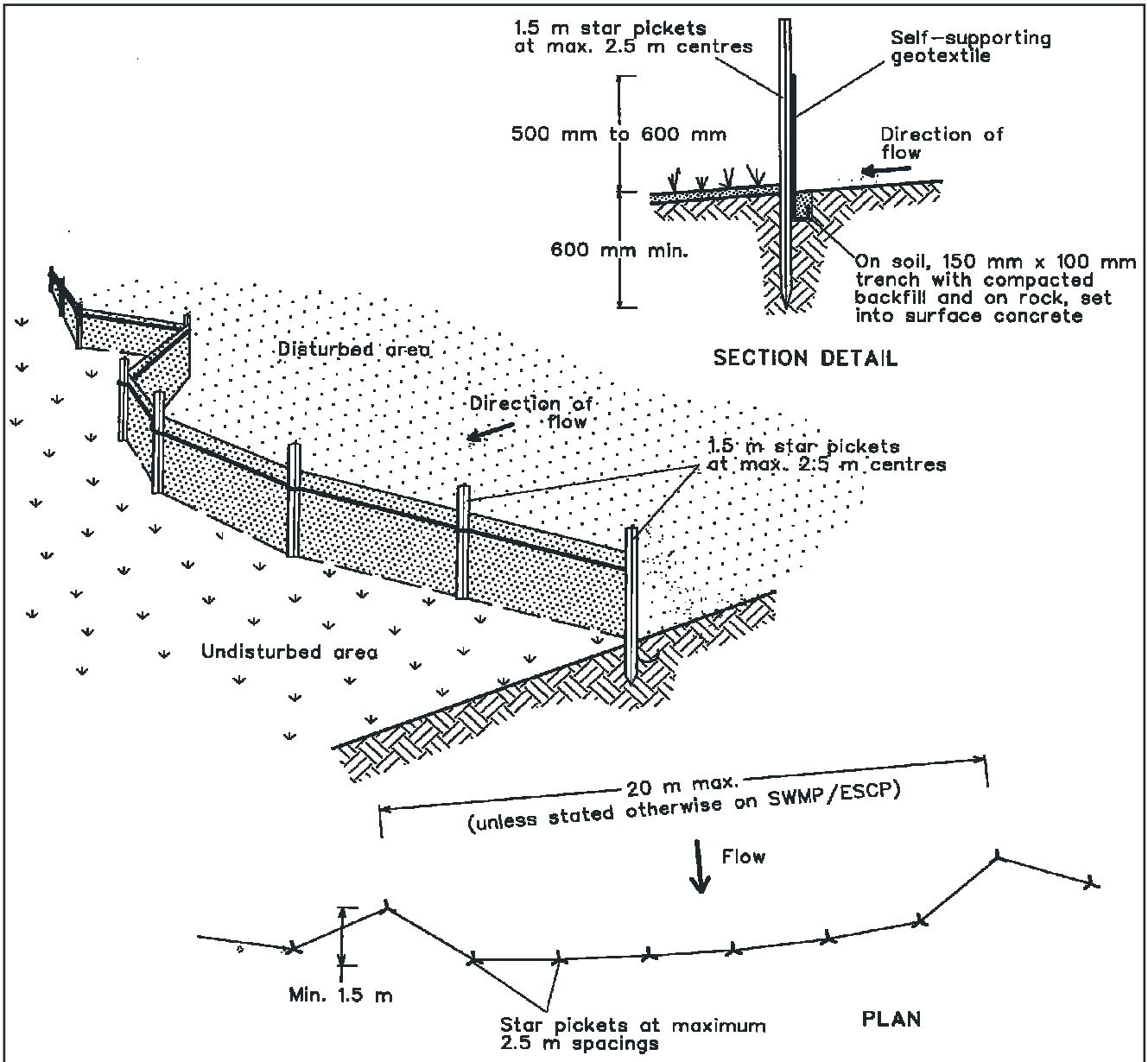
Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

EARTH BASIN - WET

(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

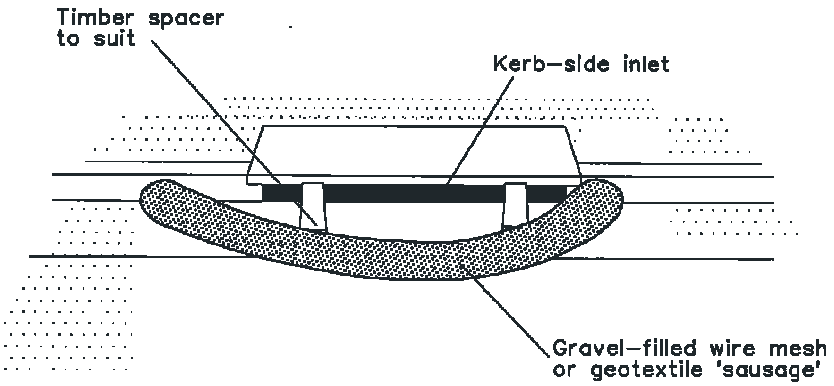
SD 6-4

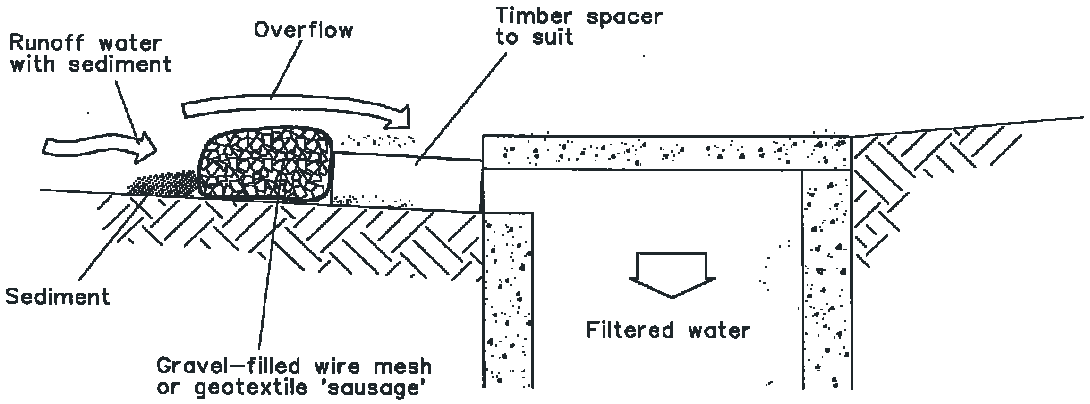


Construction Notes

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



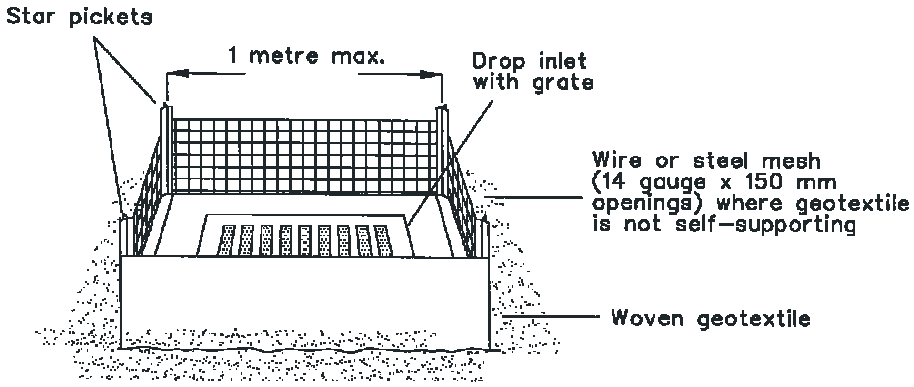


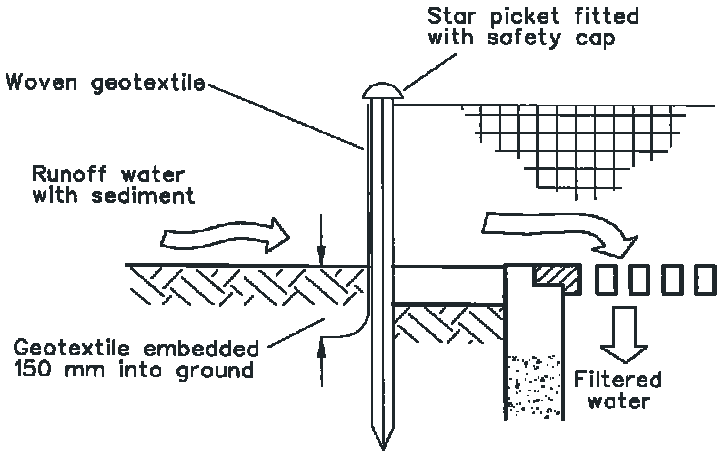
NOTE: This practice only to be used where specified in an approved SWMP/ESCP.

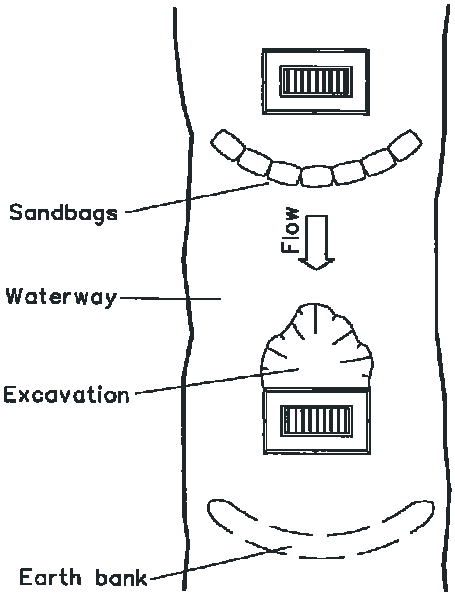
Construction Notes

1. Install filters to kerb inlets only at sag points.
2. Fabricate a sleeve made from geotextile or wire mesh longer than the length of the inlet pit and fill it with 25 mm to 50 mm gravel.
3. Form an elliptical cross-section about 150 mm high x 400 mm wide.
4. Place the filter at the opening leaving at least a 100-mm space between it and the kerb inlet. Maintain the opening with spacer blocks.
5. Form a seal with the kerb to prevent sediment bypassing the filter.
6. Sandbags filled with gravel can substitute for the mesh or geotextile providing they are placed so that they firmly abut each other and sediment-laden waters cannot pass between.

MESH AND GRAVEL INLET FILTER SD 6-11





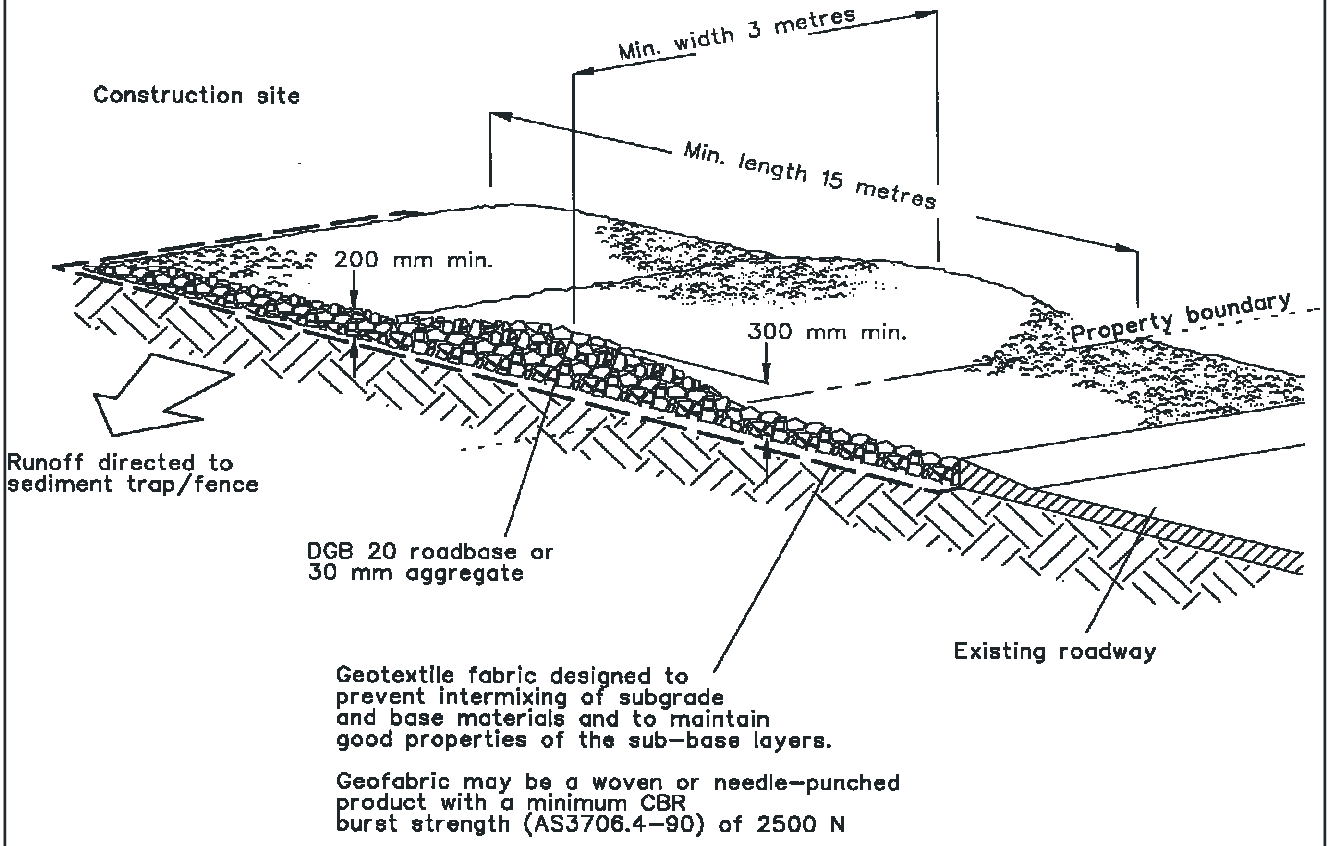


For drop inlets at non-sag points, sandbags, earth bank or excavation used to create artificial sag point

Construction Notes

1. Fabricate a sediment barrier made from geotextile or straw bales.
2. Follow Standard Drawing 6-7 and Standard Drawing 6-8 for installation procedures for the straw bales or geofabric. Reduce the picket spacing to 1 metre centres.
3. In waterways, artificial sag points can be created with sandbags or earth banks as shown in the drawing.
4. Do not cover the inlet with geotextile unless the design is adequate to allow for all waters to bypass it.

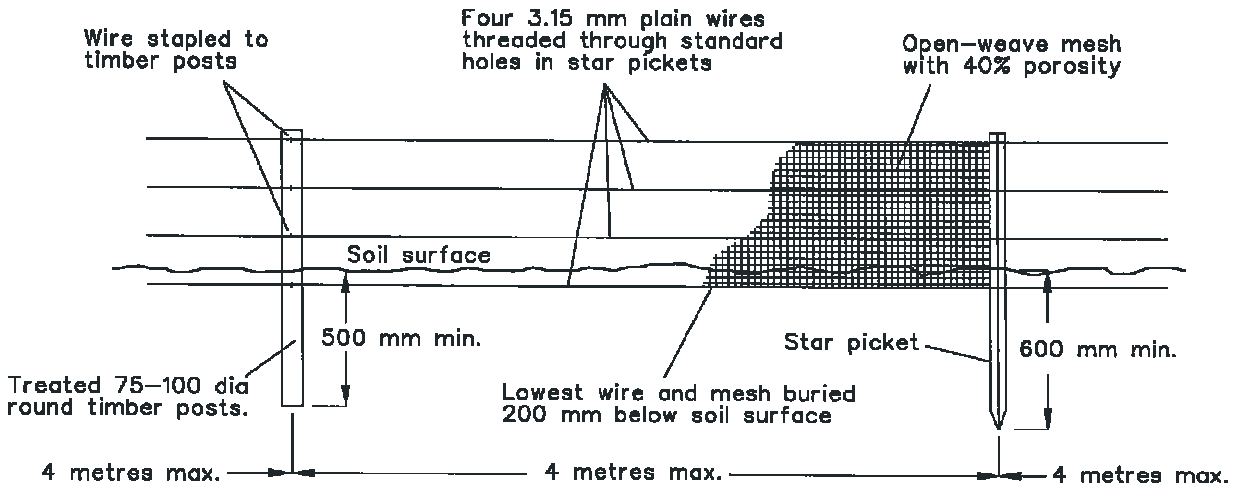
GEOTEXTILE INLET FILTER SD 6-12

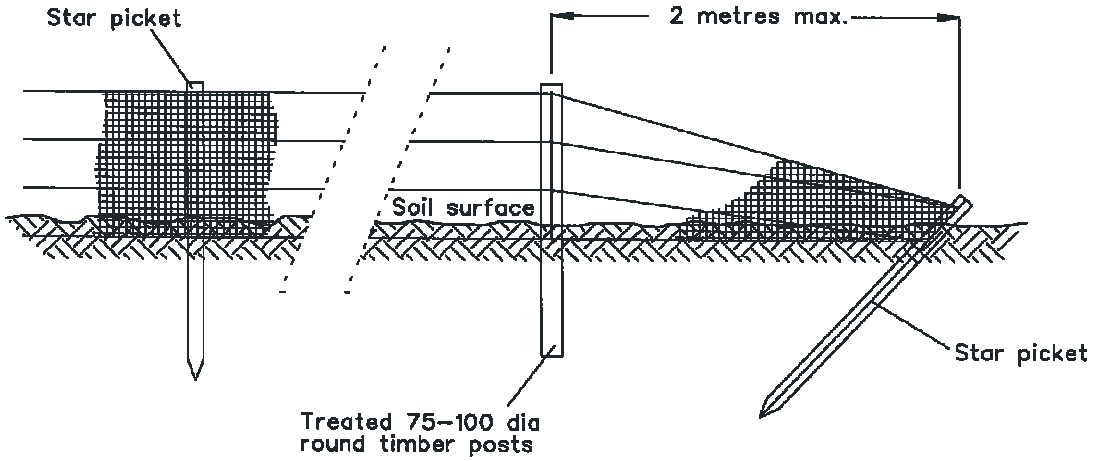


Construction Notes

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





Construction Notes

1. Install the fence to the height specified in the ESCP/SWMP.
2. Cut a channel 200 mm deep along the fence line.
3. Place wire and light resistant, open-weave polymer mesh with 40 percent porosity on the prevailing wind side of fence.
4. Fasten the mesh to all wires using ring fasteners at 100 mm to 150 mm intervals on top wire and 300 mm intervals on other wires.
5. Use one 75-mm to100-mm diameter treated round timber post every 20 metres.
6. Where star pickets are used, ensure they are fitted with safety caps.

CONTROL OF WIND EROSION SD 6-15