FRAISH Consulting
Civil & Structural Engineers

Soil and Water Management Plan

Proposed Residential Subdivision

133 Mary's Mount Road, Goulburn NSW

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Introduction

FRAISH Consulting Pty Ltd have been engaged by Cappello developments No 10 to prepare this Soil and Water Management Plan (SWMP) as part of Development Application engineering documentation for the subdivision of 133 Marys Mount Road in Goulburn NSW.

2.0 Purpose and Scope

The purpose of this Soil and Water Management Plan is to identify erosion, sedimentation and water quality issues potentially arising from the subdivision works at 133 Marys Mount Road NSW and to minimise the adverse impacts of activities associated with the construction phase on local waterways and surrounding land.
The key principles of this Plan are to:

- Integrate erosion and sediment control issues into the site and construction planning;
- Minimise the extent and duration of soil disturbance;
- Control water movement around and through the site;
- Minimise soil erosion;
- Promptly stabilise disturbed areas;
- Maximise sediment retention on site;
- Maintain all ESC measures in proper working order at all times; and,
- Monitor the site and adjust ESC practices where necessary.

These processes shall be implemented by all parties either directly or subcontracted and will apply to all activities related to soil erosion, sediment control and water quality protection.

3.0 Proposed Development

The proposed development involves subdividing the land into 393 new urban lots and one residual, large, agricultural node as shown on the plan in Appendix 1. The urban lots would vary slightly in size but typically they would be 750 m2. The construction works will consist of the construction of roads and services to service the newly created lots.

New houses would be connected to reticulated water and sewer, although rainwater tanks would be used to augment domestic supply by collecting roof runoff. The new lots would be accessed by a new road network from Mary's Mount Road. The site would be developed in a single stage.

4.0 The Site

4.1 Location

The development area is at 133 Mary's Mount Road, Goulburn NSW. The site is north of Goulburn town centre, near the western end of Mary's Mount Road (Refer Figure 1)

Figure 1 Locality Plan

4.2 Land Use

There is an existing rural homestead on the site currently which is known as "Tenerife". The existing gravel drives and buildings are estimated to form less than 1% of the total site area. At least 90% of this land has been previously cleared for agriculture. Cattle and sheep grazing occur on both improved and voluntary pastures.

The adjacent properties are of a similar nature. They too have been rezoned for urban development. It is anticipated that the entire area will be developed for urban development in the coming years.

4.3 Landform and Topography

The landform consists of low hills and footslopes within low hills. Local relief 20-40m. Altitude 646-685m. Slopes 4-10%.Rock Outcrop <1%. Extensively cleared woodland.

4.4 Soils & Geology

According to OEH eSPADE web site the mapped soil landscape for the south of this site which includes the ridgeline is The Sooley Soil Landscape. The remainder of the site being the area to the north is contained within the Monastery Hill Soil Landscape. (Refer Figure 2)

The Sooley landscape has formed on Silurian and Devonian Metasediments and Volcanics (metamorphic) in the Sooley Rises. Soils consist of Brown Kurosols (Yellow Podzolic Soils), Brown Chromosols (Soloths), Red and Brown Dermosols (No Suitable Group) and minor Yellow Sodosols (Solodic Soils).

The Monastery Hill landscape has formed on teschenite (dolerite) intrusions. On crests and sideslopes are duplex orange coloured soils with acid to alkaline reaction, no development of A2 horizons and massive to moderately structured upper B horizons. These are similar to yellowish Chocolate Soils. Below about 1 m an alkaline mottled grey clay occurs.

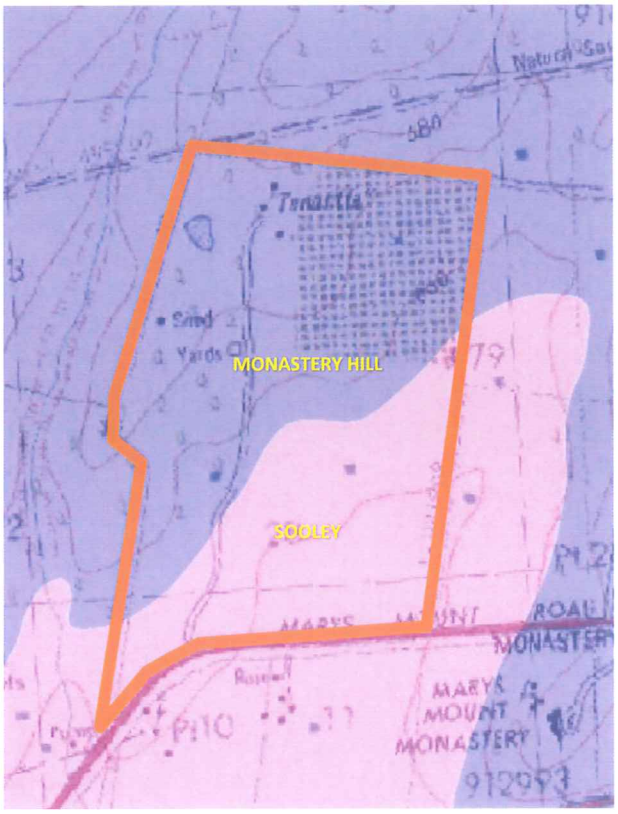


Figure 2 Soil Landscapes

4.5 Climate and Rainfall

Annual average rainfall for Goulburn city is around 640 mm and 1277mm mean annual evaporation. Rainfall is fairly evenly distributed throughout the year, but with a peak in November and trough in July. Evaporation is greater in late spring and summer.

4.6 Surface Drainage

The majority of the site drains south towards an existing culvert under Mary's Mount Road. There is a 1.08 ha portion of the site in the far northwest that drains offsite to the west; this would remain as agricultural land. There is also about 10ha of land (mostly to the north but some to the west) offsite that drains onto this site; runoff from it would become entrained in the site's stormwater system. There are two farm dams in the northwest of the site that would remain on the residual agricultural lot. The overflow from one feeds the second with any flow ultimately staying on this site. Appendix 1 shows the existing and proposed catchments.

5.0 Guidelines and Standards

This SWMP was prepared in accordance with the requirements of the Best Practice guidelines contained within Soils and Construction Vol. 1 (Landcom 2004) (Blue Book). Examples of standard drawings from the Blue Book are contained in Appendix B. The following principles will apply to this SWMP and Erosion & Sediment Control Plans (ESCP's) prepared as part of this plan :

- Sediment traps would be installed wherever there is potential for sediment to be released from site.
- Stockpiles generated as a result of construction activities would be bunded with silt fencing, (hay bales or similar) to reduce the potential for runoff from these areas.
- Stabilisation would be undertaken as soon as practicable during construction.

Furthermore, rehabilitation of disturbed ground would be carried out at the completion of construction works. Devices will be used to disperse rather than concentrate run-off. Soil and water management practices would be guided by the Blue Book

6.0 Assessment of the Site

6.1 Assess Erosion Risk of the Site

In order to assess the erosion risk from the site it is necessary to determine the Revised Universal Soil Loss Equation (RUSLE) in accordance with Appendix A of the *Blue Book*. The equation is written :-

$$A = R.K.LS.P.C$$

Where

A	=	Soil Loss (tonnes / Ha / year)
R	=	Rainfall Erosivity Factor
K	=	Soil Erodibility Factor
LS	=	Slope Length / Gradient Factor

P = Erosion Control Practice Factor
C = C-Factor

Rainfall Erosivity Factor (R-Factor)
From Appendix A in the blue book it can be determined that the R-Factor for Goulburn is **1280**.

Soil Erodibility Factor (K-Factor)
Appendix C of the *Blue Book* has K-Factors for several areas of NSW. For soils at the study site locality a K factor of **0.083** has been adopted.

Slope Length / Gradient Factor (LS-Factor)
From Table A1 of the Blue Book, and using a slope length of 80m and slope ration of 1:10 it can be determined that the LS-Factor for the site is **2.81**

Erosion Control Practice Factor (P-Factor)
Assuming that the disturbed area will be compacted, track-walked from earthmoving plant and rolled with a smooth drum roller to seal the surface prior to approaching rainfall events it can be assumed that the P-Factor in accordance with Table A2 of the Blue Book is **1.3**

Cover Factor (C-Factor)
Assuming that the disturbed site will be bare soil it can be interpolated that the C-Factor in accordance with Figure A5 of the Blue Book is **1.0**

So therefore A = 1280 x 0.083 x 2.81 x 1.3 x 1.0 = 388 tonnes/Ha/year

From Table 4.2 of the Blue Book it can be determined that a site with a Soil Loss Value of 388 tonnes/Ha/year is of a Soil Class 3 and is a Moderate Erosion Hazard.

According to SCA/DLWC (2002) the soils are not dispersive but they are fine grained (Type F). They are hydrological group C which means runoff would occur under moderate to heavy rainfall events.

6.2 Assess Requirement for Sediment Basins

In accordance with Clause 6.3.2 of the Blue Book we see that sites which have and Annual Average Soil Loss of less than 150m3 (200t) do not require a sedimentation basin. It can be seen from the calculation below that a Sedimentation Basin is required for this site.

Figure 6.2 Catchment Plan

During construction the site will be split into three main catchments for treating sediment. These are :-

(a) Sediment Basin 1 (Future Wetland Catchment) = Disturbed catchments 5,6,7 & 8 = 24.6Ha
(b) Sediment Basin 2 (Future Biobasin 1) = Disturbed catchment 4 = 2.4Ha
(c) Sediment Basin 3 (Future Biobasin 2) = Disturbed catchment 3 = 10Ha

There are three upstream agricultural catchments Catchment 1- 12.8Ha, Catchment 2-11Ha, Part Catchment 3-8Ha that will remain undisturbed. It is intended that the "Clean Water" flows from these catchments will be diverted through the site and around the sedimentation basin to the existing culvert at Marys Mount Road.

Sediment Basin 1 (Future Wetland Catchment)

Disturbance Area = 24.6Ha
Annual Average Soil Loss = 24.6 x 388 x 1 = 9,544t = 6,000m3

According to table 6.1 of the Blue book for Type F Soils :-
Treatment Process
Slow settling in wet basins.
Basin Design capacity (Settling Zone)
Capacity to contain all runoff expected from the 75th percentile, 5-day rainfall depth
V=10 x Cv x A x R 75% 5day
V=10 x 0.5 x 24.6 x 14.2 = 1746m3

Basin Design capacity (Sediment Storage Zone)
Normally taken as 50 percent of the capacity of the settling zone. However, it can be taken as two months soil loss as calculated by the RUSLE
V=(6,000/12) x 2 =1000m3

In the Water Cycle Management Study there is a requirement for a 1880m3, 1000m2 Sediment forebay and 3,000m3, 2500m2 Wetland. It is proposed that the Sediment Forebay be constructed to act as a sediment basin prior to construction of any stages of the project.

Whilst the calculations have been carried out to accommodate full disturbance of the development area. It will be recommended that construction works are progressively undertaken and stabilised to try and minimise the disturbed area.

Sediment Basin 2 (Future Biobasin 1)

Disturbance Area = 2.4Ha
Annual Average Soil Loss = 2.4 x 388 x 1 = 931t = 600m3

According to table 6.1 of the Blue book for Type F Soils :-
Treatment Process
Slow settling in wet basins.
Basin Design capacity (Settling Zone)
Capacity to contain all runoff expected from the 75th percentile, 5-day rainfall depth
V=10 x Cv x A x R 75% 5day
V=10 x 0.5 x 2.4 x 14.2 = 170m3
Basin Design capacity (Sediment Storage Zone)
Normally taken as 50 percent of the capacity of the settling zone. However, it can be taken as two months soil loss as calculated by the RUSLE
V=(600/12) x 2 =100m3

In the Water Cycle Management Study there is a requirement for a 300m2 Biobasin at this location. It is proposed that the Biobasin sand filter layers be constructed and covered with geofabric to prevent infiltration of silt. The area above this is then to be utilised as a sediment basin be constructed prior to the road and services construction within this catchment and the Biobasin be completed upon completion of the subdivision works within this catchment.

Whilst the calculations have been carried out to accommodate full disturbance of the development area. It will be recommended that construction works are progressively undertaken and stabilised to try and minimise the disturbed area.

Sediment Basin 3 (Future Biobasin 2)

Disturbance Area = 10Ha
Annual Average Soil Loss = 10 x 388 x 1 = 3880t = 2425m3

According to table 6.1 of the Blue book for Type F Soils :-
Treatment Process
Slow settling in wet basins.
Basin Design capacity (Settling Zone)

Capacity to contain all runoff expected from the 75th percentile, 5-day rainfall depth
V=10 x Cv x A x R 75% 5day
V=10 x 0.5 x 10 x 14.2 = 710m3

Basin Design capacity (Sediment Storage Zone)

Normally taken as 50 percent of the capacity of the settling zone. However, it can be taken as two months soil loss as calculated by the RUSLE
V=(2425/12) x 2 =400m3

In the Water Cycle Management Study there is a requirement for a 1600m2 Biobasin at this location. It is proposed that the Biobasin sand filter layers be constructed and covered with geofabric to prevent infiltration of silt. The area above this is then to be utilised as a sediment basin be constructed prior to the road and services construction within this catchment and the Biobasin be completed upon completion of the subdivision works within this catchment..

Whilst the calculations have been carried out to accommodate full disturbance of the development area. It will be recommended that construction works are progressively undertaken and stabilised to try and minimise the disturbed area.

6.3 Diversion Drains for Clean Water and Dirty Water

In Appendix 1 there is an ERCP that identifuies the Diversion Drains required. Calculations for these drains are given below.

Diversion Drain label Label	Clean Water or Dirty Water Divession Drain	Design ARI Storm Event (Years)	Time of Concentration (Mins)	Rainfall Intensity (mm/hr)	Contributing Area (Ha)	Runoff Coefficient (C10)	Design Flow (m3/s)	Bottom width (m)	Side slopes (1:?)	Longitudinal Gradient (%)	Lining Material	Mannings (n)	Flow Depth (m)	Velocity (m/s)
CD1	Clean Water	10	5	111	7	0.35	0.8	1.0	3	2.4	Geofabric	0.022	0.23	2.06
CD2	Clean Water	10	N/A	CD1 & Eastern Development			3.8	3.0	3	2.4	Geofabric	0.022	0.338	2.87
CD 3	Clean Water	10	5	111	11	0.35	1.2	1.0	3	2.5	Geofabric	0.022	0.28	2.34
CD 4	Clean Water	10	5	111	22.8	0.35	2.5	2.0	3	3.3	Geofabric	0.022	0.291	2.99
CD 5	Clean Water	10	5	111	1	0.35	0.1	1.0	3	1	Geofabric	0.022	0.1	0.84
CD 6	Clean Water	10	5	111	22.8	0.35	2.5	2.0	3	1	Geofabric	0.022	0.4	1.96
DD 1	Dirty Water	10	5	111	0.7	0.35	0.1	1.0	3	1	Geofabric	0.022	0.1	0.84
DD 2	Clean Water	10	5	111	6.3	0.35	0.7	1.0	3	1	Geofabric	0.022	0.268	1.45
DD 3	Clean Water	10	5	111	12.8	0.35	1.4	1.0	3	2.4	Geofabric	0.022	0.305	2.4
DD 4	Clean Water	10	5	111	26.5	0.35	2.9	2.0	3	2.4	Geofabric	0.022	0.343	2.79

7.0 Erosion & Sediment Control

Erosion control is the first priority for the prevention of sedimentation off-site. A proactive approach to erosion control will minimise the sediment generated from the site and lessen the chance of off-site impacts. Effective and practical erosion control will be achieved through:

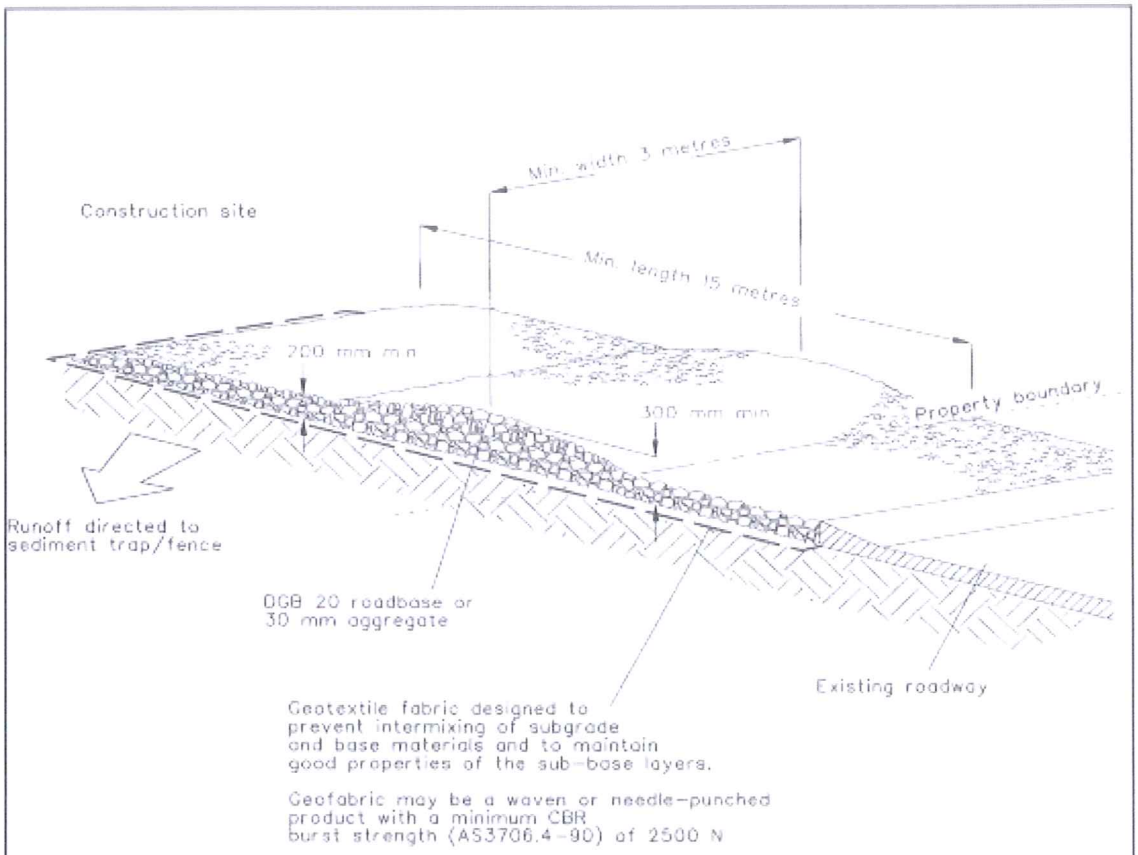
- Limiting area of disturbance and implementing progressive stabilisation;
- Integrating measures that reduce the volume of water moving over exposed surfaces;
- Implementing measures which slow the velocities water over exposed areas to prevent scour of the surface; and

- Providing additional protection, cover or stability to exposed surfaces so that it is less readily eroded such as additional compaction, mulches, jute mesh, temporary vegetation.

Erosion & Sediment Control Plans have been prepared as part of this SWMP. They are included in Appendix 1. The plans refer to Erosion Control Measure details that are provided below as extracted from the Blue book.

7.1 Stabilised Site Access

Stabilised Site Access should be installed at the locations shown on the ESCP's. They should be constructed in accordance with Standard Drawing SD 6-14 Stabilised Site Access.



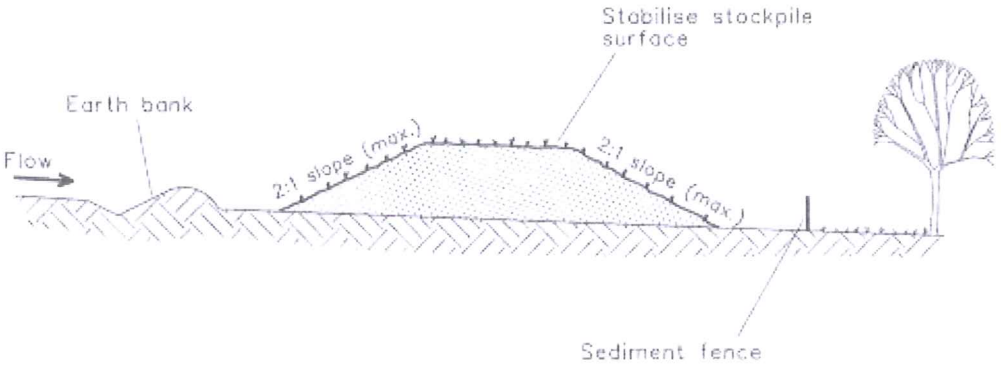
Construction Notes

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**

7.2 Topsoil Stockpiles

Topsoil Stockpiles should be installed at the locations shown on the ESCP's. They should be constructed in accordance with Standard Drawing SD 4-1 Stockpiles.



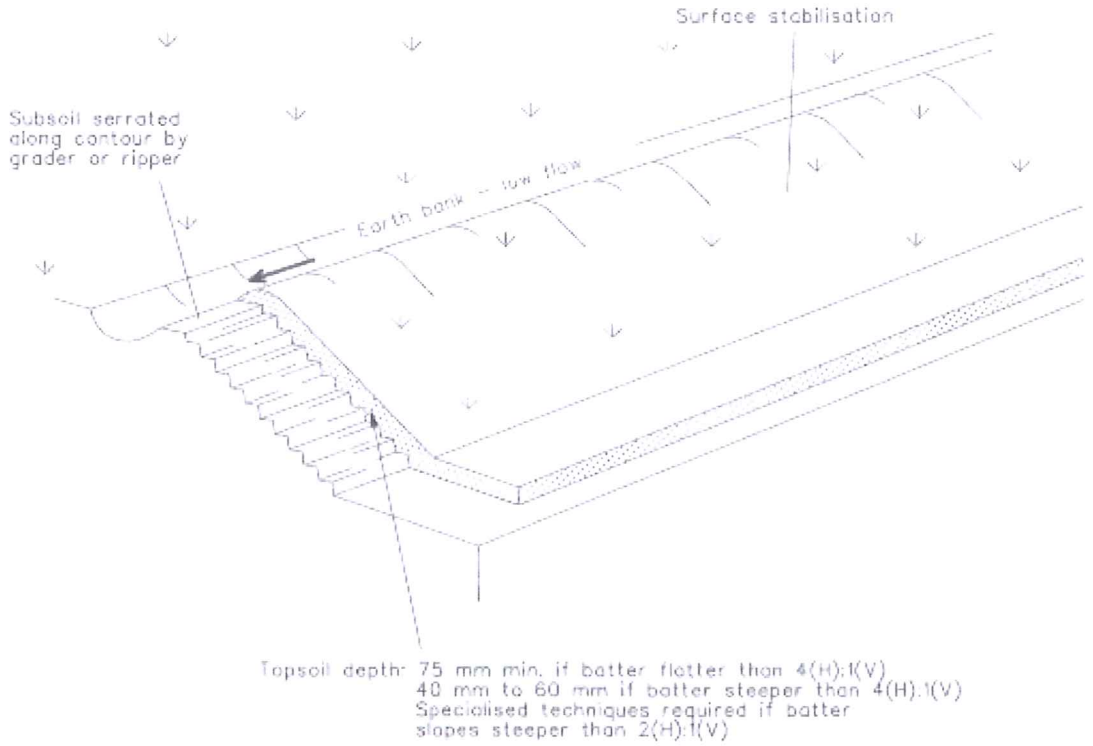
Construction Notes

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**

7.3 Replacing Topsoil

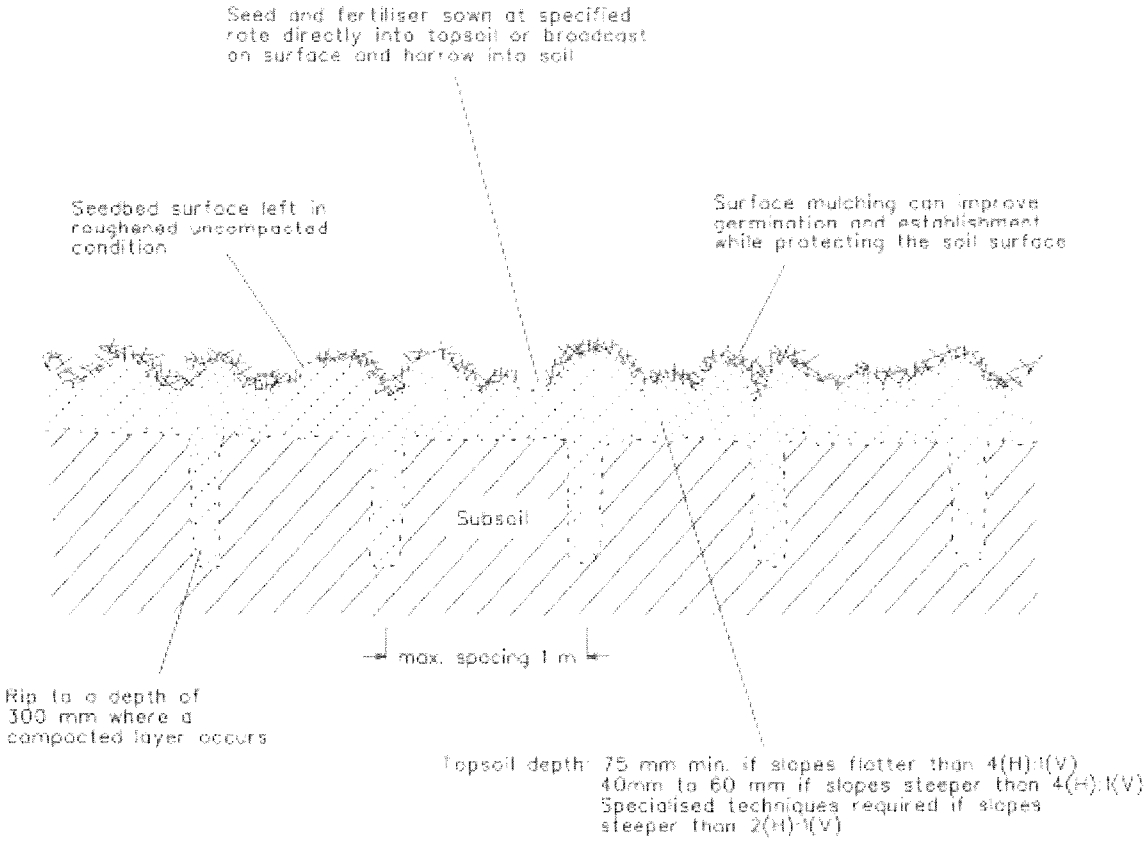
Topsoil should be placed to a depth of 100mm on all constructed earthworks surfaces. Topsoil should be placed in accordance with Standard Drawing SD 4-2 Replacing Topsoil and prepared in accordance with Standard Drawing SD 7-1 Seedbed Preparation.



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**



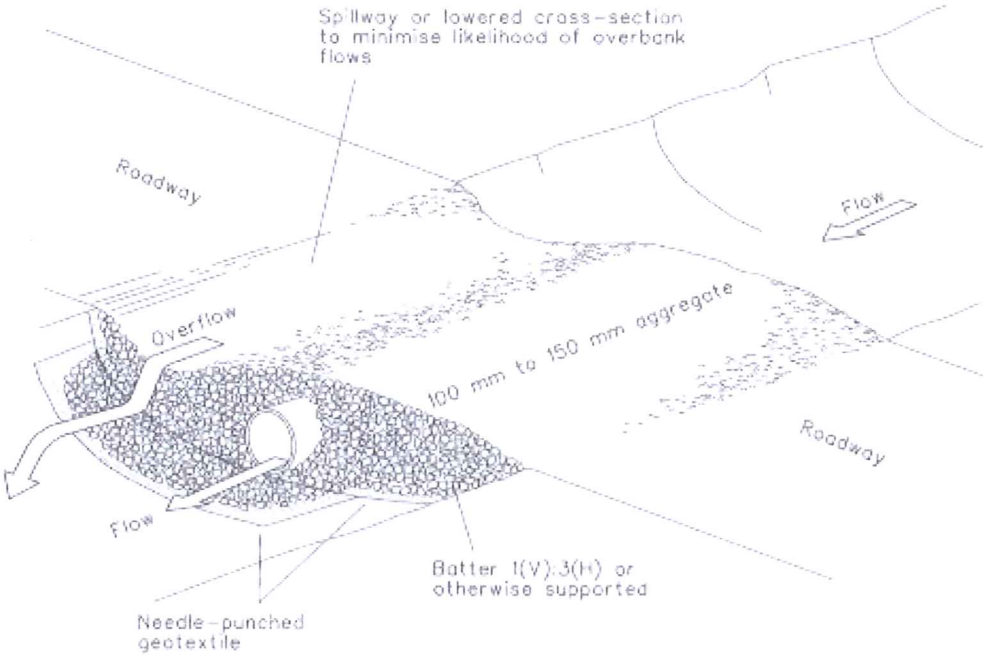
Construction Notes

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

7.4 Temporary Crossing of Swale or Waterway

Temporary Crossing should be constructed at the locations on the ESCP's. They should be constructed in accordance with Standard Drawing SD 5-1 Temporary Waterway Crossings.



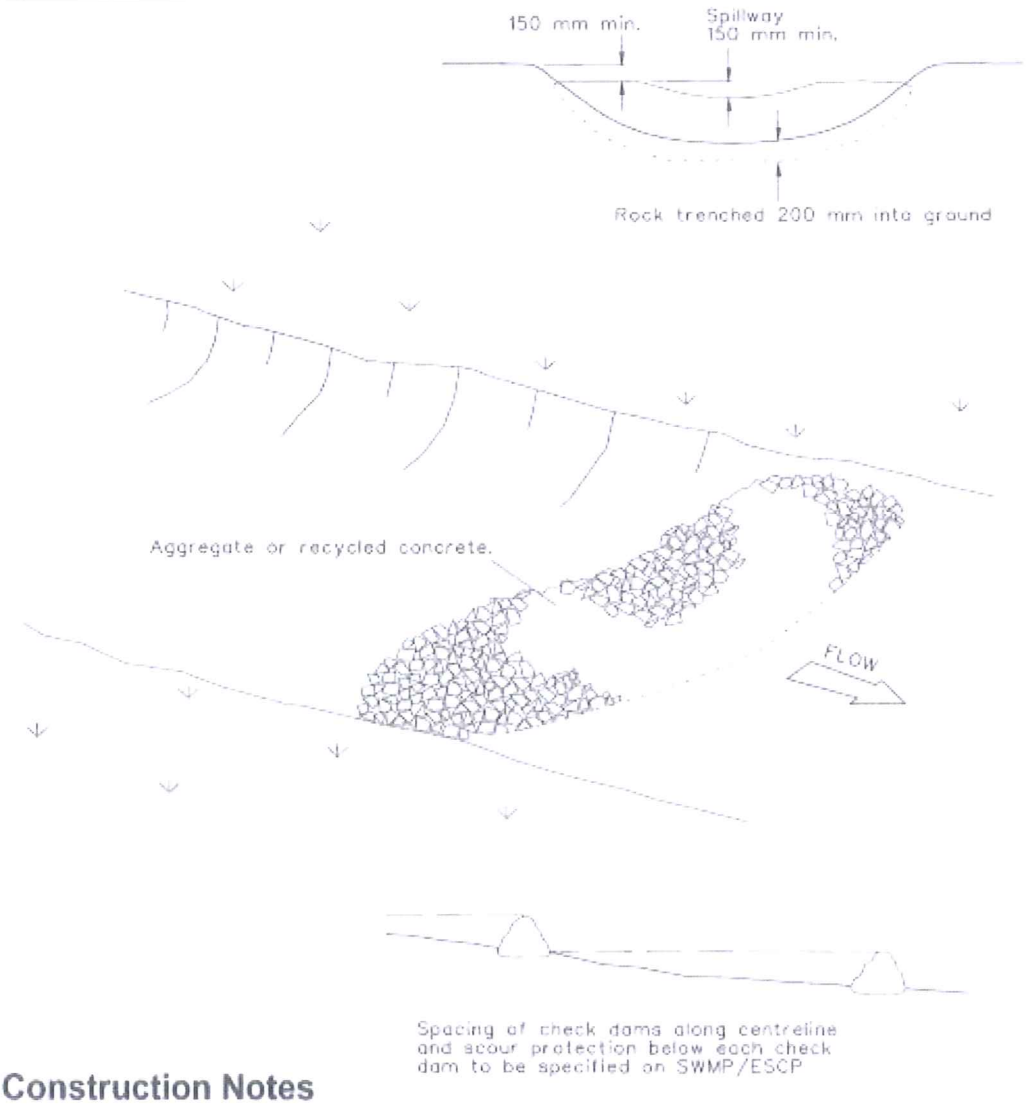
Construction Notes

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**

7.5 Rock Check Dams (Alternative is Coarse Mulch Check Dams)

Check Dams should be constructed at the locations on the ESCP's. They should be constructed in accordance with Standard Drawing SD 5-4 Rock Check Dam. Note that the Rocks can be substituted for the coarse mulch that has been generated on the site. (refer to next section for spacing requirements)



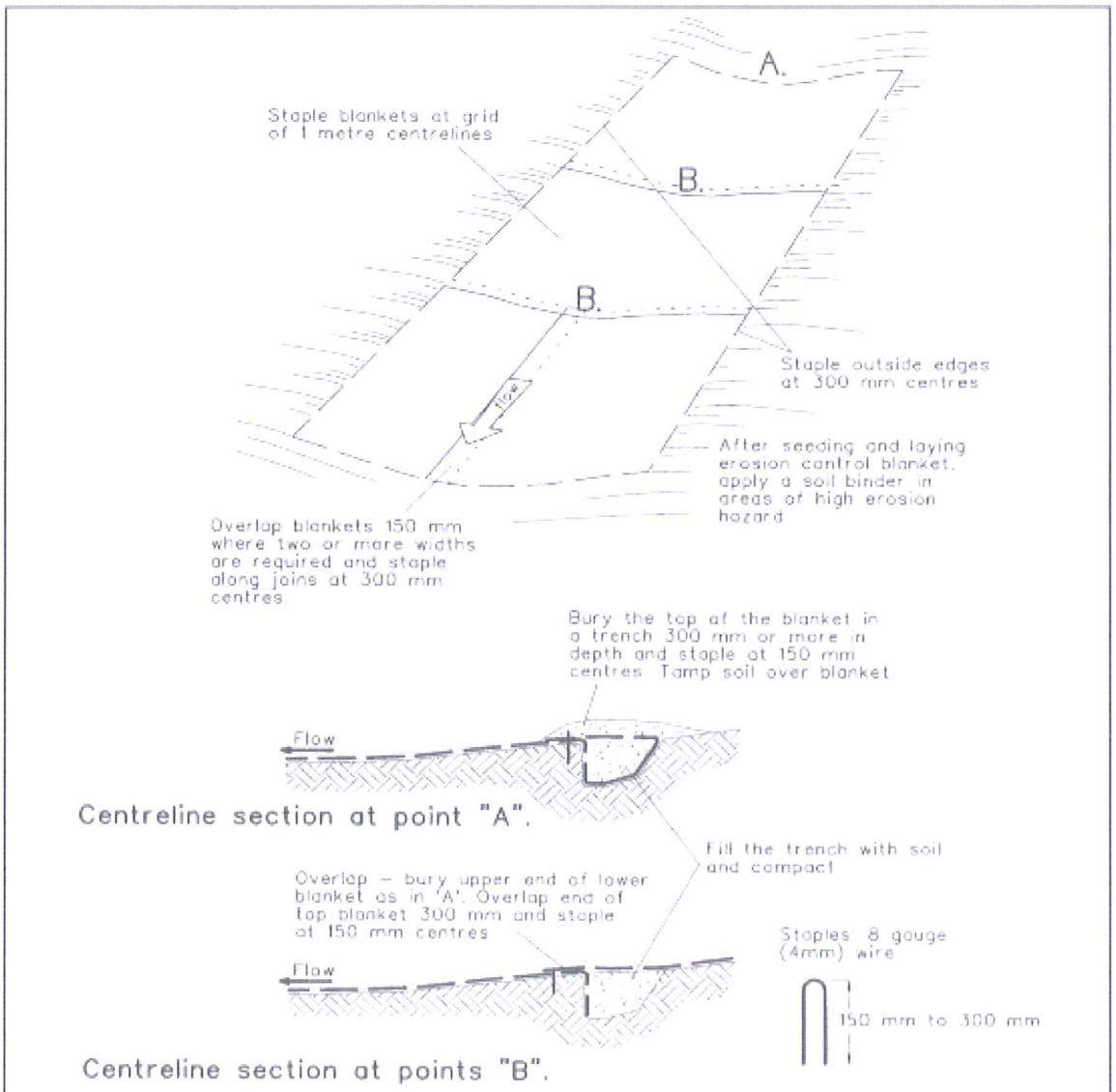
Construction Notes

1. Check dams can be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement each two to four months.
2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
4. Space the dams so the toe of the upstream dam is level with the spillway of the next downstream dam.

ROCK CHECK DAM **SD 5-4**

7.6 Lining of Swales / Channels Subject to Concentrated Flows.

Stabilise the inverts of Swales and Channels with fabric where any erosion is detected in swales and channels. They should be constructed in accordance with Standard Drawing SD 5-7 RECP : Concentrated Flow.



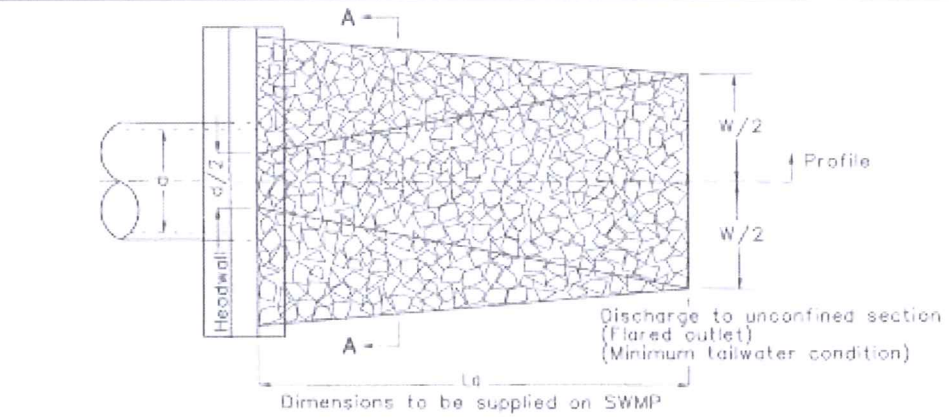
Construction Notes

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.

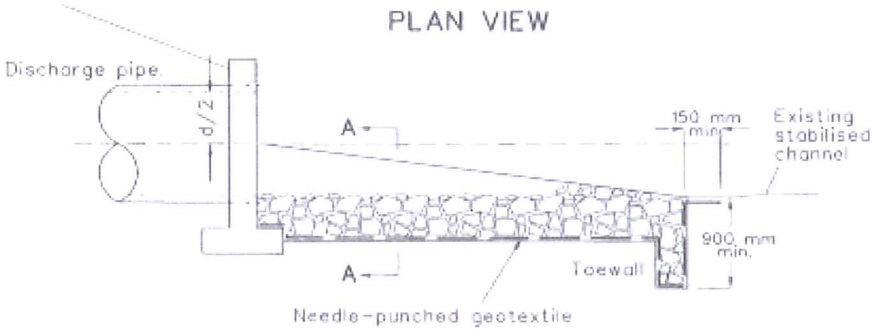
RECP : CONCENTRATED FLOW **SD 5-7**

7.7 Energy Dissipaters

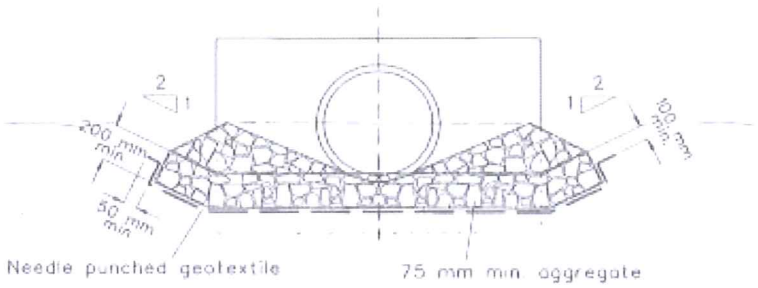
Energy Dissipaters have been designed by the Civil Design Consultant. Where there is insufficient information in the civil design drawings. The Energy Dissipaters should be installed in accordance with Standard Drawing SD 5-8 Energy Dissipater.



PLAN VIEW



PLAN VIEW



CROSS SECTION AA

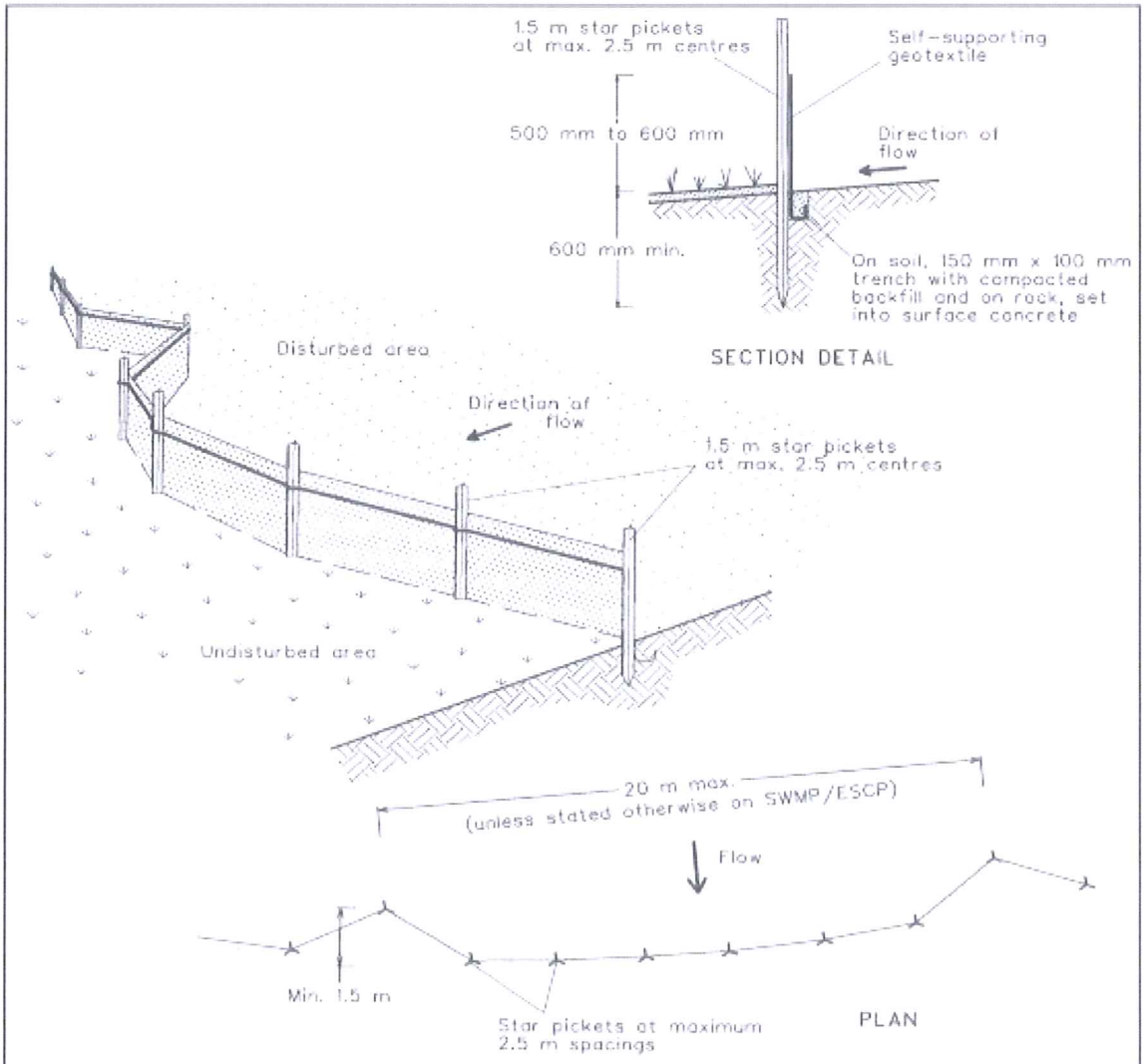
Construction Notes

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**

7.8 Sediment Fences

Sediment Fences should be constructed at the locations on the ESCP's. They should be constructed in accordance with Standard Drawing SD 6-8 Sediment Fence.



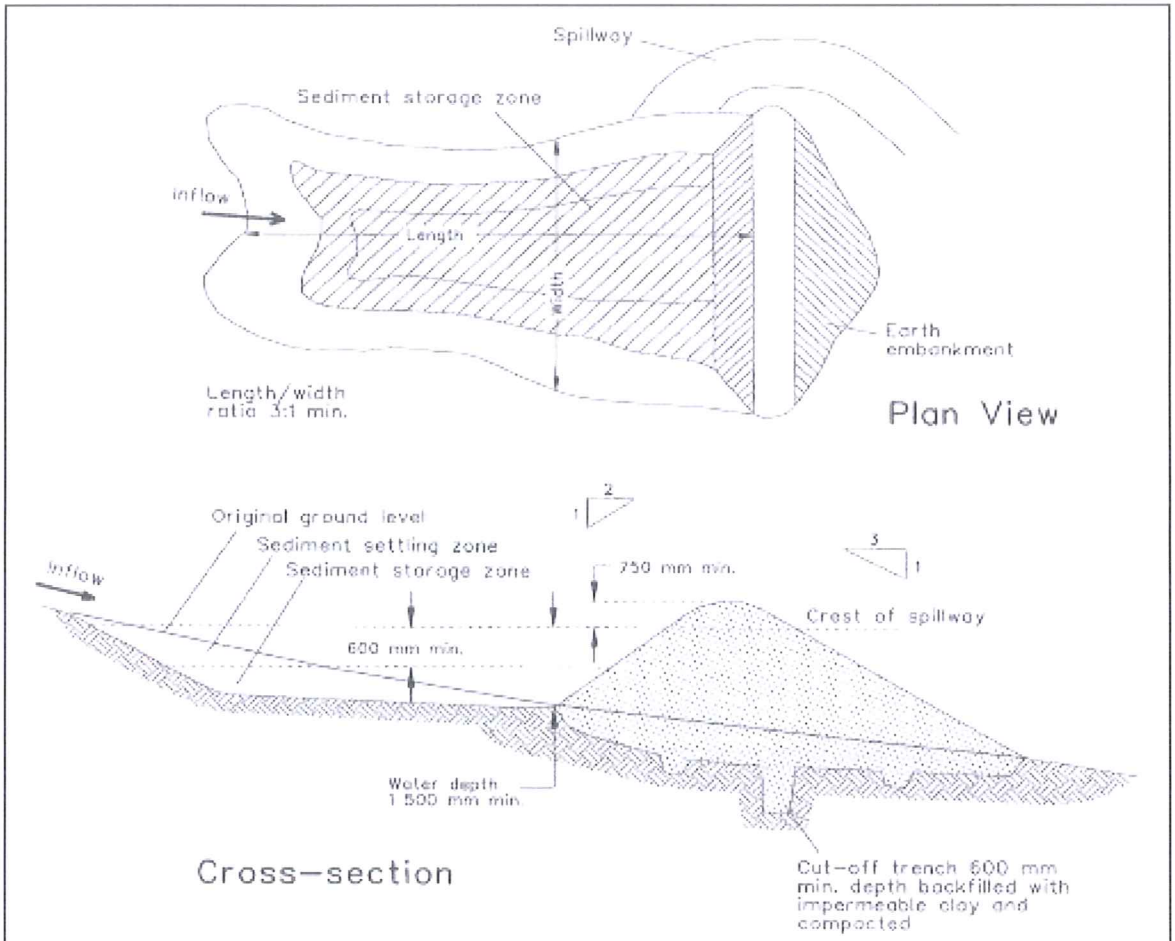
Construction Notes

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

SEDIMENT FENCE **SD 6-8**

7.9 Sediment Basin

Sediment Basins should be constructed at the locations on the ESCP's. They should be constructed in accordance with Standard Drawing SD 6-4 Earth Basin - Wet



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

8.0 Inspection & Maintenance

Planning and installation are only the first parts in the treatment train. One of the most important is the inspection and monitoring of the Erosion Control Measures. A weekly inspection should be undertaken and a Weekly Erosion Control measures Checklist completed. A copy of a Weekly Erosion Control Measure Checklist is below. An additional checklist should be completed after each rainfall event.

FRAISH Consulting Civil & Structural Engineers	WEEKLY EROSION CONTROL MEASURE CHECKLIST

Project _____ Stage/Area _____

Inspection Date _____ Inspection Time _____

Inspection By (Name) _____ Signature _____

ITEM	INSPECTION DESCRIPTION	N/A	NO	YES	REMARKS
1.	Soil and Water Management				
a	Are all Erosion Control Measures installed at the locations as per the project Erosion & Sediment Control Plans.				
b	Are modifications required to the Erosion & Sediment Control Plans.				
c	Has there been a rainfall event since the last inspection?				
d	Is there any uncontrolled runoff being discharged from the site?				
e	Sediment Basins -Has Settlement Zone sufficient capacity? -Is flocculation Required? -Does sediment require removal? -Is the Outflow Structure installed correctly? -Are the embankments protected from erosion?				
f	Straw Bales -Are they installed in trenches? -Are they tightly abutting? -Are they staked? -Has backfill been placed on the upstream side? -Is runoff running around, between bales? -Does sediment require removal?				
g	Sediment Fences -Is the filter fabric in a trench and backfilled? -Are stakes installed at correct spacing? -Has sediment accumulated to 300mm from top? -Does sediment require removal? -Is runoff running around or below the fence?				
h	Stabilized Site Access -Has geofabric been placed prior to rock? -Is rock >30mm been used? -Is SSD stopping sediment from tracking off site?				
i	Check Dams -Are check dams installed correctly? -Does sediment require removal? -Is runoff running around or below the dam?				
j	Stockpiles -Are there stockpiles in place longer than 10 days that are not stabilized. -Are stockpiles less than 2m high?				

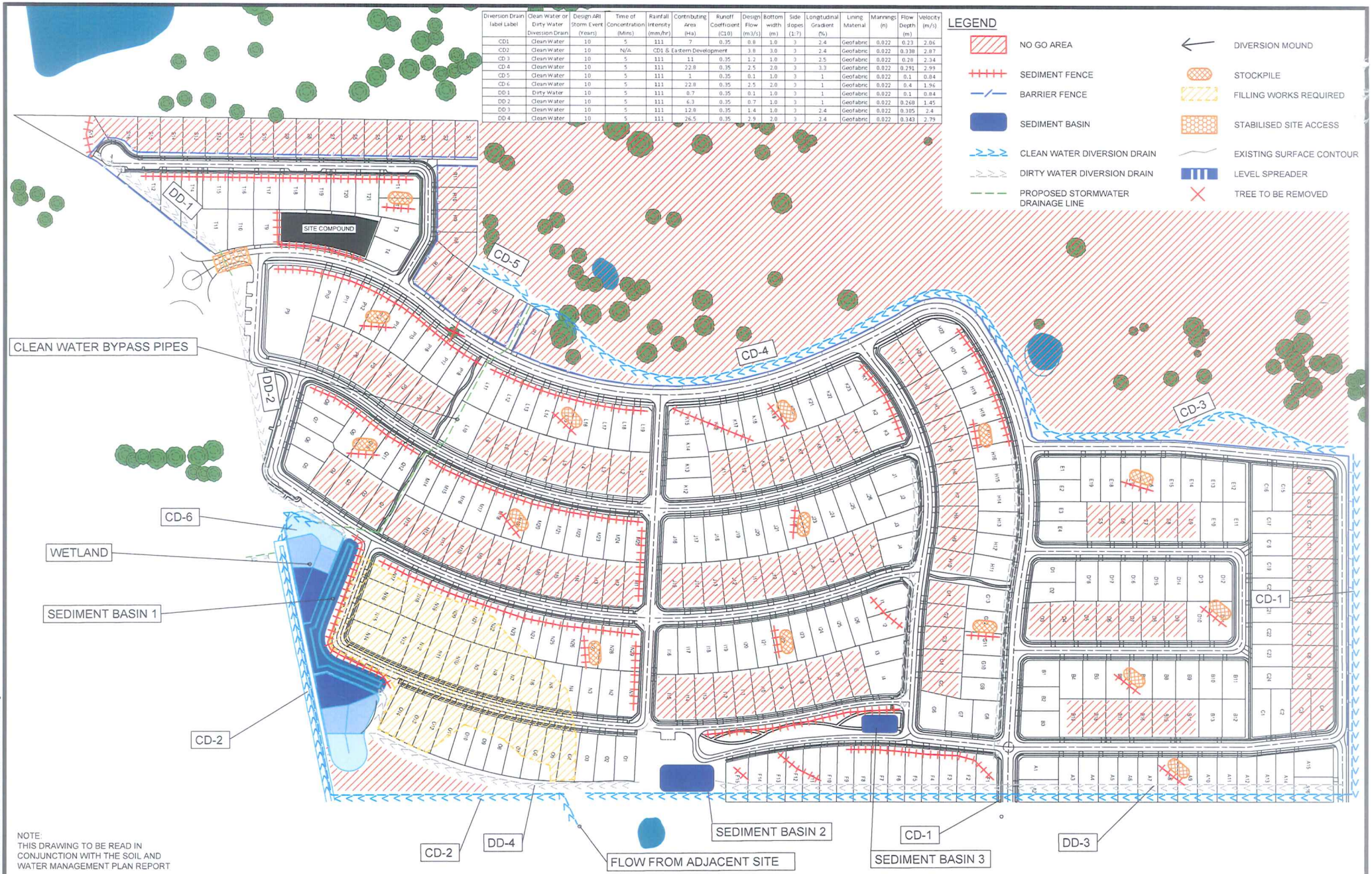
List of Maintenance / Improvements Required:

DESCRIPTION	ACTION BY

SIGN OFF (Once all Maintenance / Improvements Completed)

Signed:..... Position:.....

Appendix 1 - Drawings



Diversion Drain label Label	Clean Water or Dirty Water Diversion Drain	Design ARI Storm Event (Years)	Time of Concentration (Mins)	Rainfall Intensity (mm/hr)	Contributing Area (Ha)	Runoff Coefficient (C10)	Design Flow (m3/s)	Bottom width (m)	Side Slopes (1:?)	Longitudinal Gradient (%)	Lining Material	Mannings (n)	Flow Depth (m)	Velocity (m/s)
CD1	Clean Water	10	5	111	7	0.35	0.8	1.0	3	2.4	Geofabric	0.022	0.23	2.06
CD2	Clean Water	10	N/A	CD1 & Eastern Development			3.8	3.0	3	2.4	Geofabric	0.022	0.338	2.87
CD 3	Clean Water	10	5	111	11	0.35	1.2	1.0	3	2.5	Geofabric	0.022	0.28	2.34
CD 4	Clean Water	10	5	111	22.8	0.35	2.5	2.0	3	3.3	Geofabric	0.022	0.291	2.99
CD 5	Clean Water	10	5	111	1	0.35	0.1	1.0	3	1	Geofabric	0.022	0.1	0.84
CD 6	Clean Water	10	5	111	22.8	0.35	2.5	2.0	3	1	Geofabric	0.022	0.4	1.96
DD 1	Dirty Water	10	5	111	0.7	0.35	0.1	1.0	3	1	Geofabric	0.022	0.1	0.84
DD 2	Clean Water	10	5	111	6.3	0.35	0.7	1.0	3	1	Geofabric	0.022	0.268	1.45
DD 3	Clean Water	10	5	111	12.8	0.35	1.4	1.0	3	2.4	Geofabric	0.022	0.305	2.4
DD 4	Clean Water	10	5	111	26.5	0.35	2.9	2.0	3	2.4	Geofabric	0.022	0.343	2.79

LEGEND

- NO GO AREA
- SEDIMENT FENCE
- BARRIER FENCE
- SEDIMENT BASIN
- CLEAN WATER DIVERSION DRAIN
- DIRTY WATER DIVERSION DRAIN
- PROPOSED STORMWATER DRAINAGE LINE
- DIVERSION MOUND
- STOCKPILE
- FILLING WORKS REQUIRED
- STABILISED SITE ACCESS
- EXISTING SURFACE CONTOUR
- LEVEL SPREADER
- TREE TO BE REMOVED

NOTE:
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SOIL AND WATER MANAGEMENT PLAN REPORT

REVISION	DATE	AMENDMENT / REVISION DESCRIPTION	DRAWN
A	20/11/17	ISSUED FOR DEVELOPMENT APPLICATION	LKK
B	15/06/18	UPDATED TO SUIT NEW SPACELAB LAYOUT	LKK
C	10/09/18	SUBDIVISION LAYOUT REVISED	AJB
D	12/09/18	SEDIMENT BASINS 2 AND 3 ADDED	AJB

TITLE	NAME
DRAWN	LKK
DESIGNER	AJB

DO NOT SCALE OFF DRAWINGS VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK.

SCALE: 0m 30m 60m 90m 120m
SCALE A1 1:1500 A3 1:3000

DESIGNER
FRAISH Consulting
Civil & Structural Engineers

CLIENT
CAPPELLO DEVELOPMENTS NO.10

PROJECT TITLE
SUBDIVISION OF LOT 28, DP479
MARY'S MOUNT ROAD, GOULBURN NSW
SEDIMENT & EROSION CONTROL PLAN
SHEET 1

SCALE	PHASE	DRAWING No.	REV
AS SHOWN	DA	C211	D

Z:\PROJECTS\Cappello Developments No 10\DrA\DA\DA - CAP10 - C211 TO C213 SEDIMENT & EROSION.dwg