Belmont Desalination Plant

Erosion and Sediment Control Plan

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PREPARED BY SOS ENVIRONMENTAL ON BEHALF OF JOHN HOLLAND PTY LTD

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Revisions

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Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	06.05.2024	S. Grunsell	SG	A. Grant	AG	J Nisbet	JN	HWC and ER Submission
B	14.08.2024	B Rice	BR	A. Grant	AG	S MacNish	SM	Update post modification
0	17.09.2024	B Rice	BR	A. Grant	AG	S MacNish	SM	Update post HWC and ER comments

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1. INTRODUCTION

1.1. Purpose of Strategy

The purpose of this Erosion and Sediment Control Strategy is to provide detailed guidance on the approach to mitigating the risks of erosion and sedimentation associated with the specific project works and local environment associated with the Belmont Desalination Plant Project ('The Project'). The strategy is aimed at topsoil stockpiles and exposed areas following disturbance from construction and the key management strategies to be implemented for these areas.

This Erosion and Sediment Control Strategy is to be:

- Included as an Appendix of the Soil and Surface Water Management Plan (SSWMP).
- A 'stand-alone' document.

1.2. Impacts of Erosion and Sedimentation

The construction activities to be undertaken on this project have the potential to impact on soil and water resources of the Belmont Lagoon and dune system adjacent to Blacksmiths Beach. Land to be disturbed or cleared of vegetation is potentially subject to erosion by stormwater and wind action.

Generally, soil particles eroded by stormwater runoff are transported downslope, usually settling in rivers, watercourses and wetlands etc (ie sedimentation). This may result in many adverse environmental impacts including:

- Reduction in water quality and nutrient enrichment of water bodies.
- Damage to vegetation communities.
- Disturbance to aquatic flora and fauna.
- Increased potential for flooding.
- Reduction in recreational values.
- Reduction in aesthetic values.
- Increased maintenance costs.
- Promotion of weed growth.

Additionally, erosion may be caused by wind moving unprotected soil / sand particles. This action may result in adverse impacts including:

- Loss of valuable soil (eg topsoil).
- Safety on and off site (eg traffic hazards).
- Inundation of areas with severe nuisance value.
- Existing Vegetation loss

This Strategy will form the initial document in an ongoing process to minimise on-site erosion and off-site sedimentation and therefore reduce adverse environmental impact.

2. SCOPE OF THIS STRATEGY

This Strategy is a document which describes intentions and fundamental principles for the duration of the entire project.

This Strategy will be complimented by the preparation of more detailed Progressive (Site Specific) Erosion and Sediment Control Plans (ESCP) prepared for:

- The different stages of construction (e.g. Clearing, Grubbing and Stripping & Stockpiling of Topsoil; Bulk Earthworks; Drainage).
- Various work areas (e.g. hardstand, building construction, offices / compounds, ancillary facilities etc).

The Progressive ESCPs will identify risk and be prepared just prior to construction activity and indicate (where relevant):

- Catchment areas (i.e. within and outside the road reserve).
- Construction boundaries.

- Exclusion zones and sensitive areas.
- Contours and drainage paths.
- Access points and tracks (e.g. haulage).
- Temporary drainage line crossings.
- Stockpile sites.
- Temporary work areas.
- Material processing areas.
- Concrete washout pit sites.
- Offices / ancillary facilities / compounds / laydown areas.
- Specific environmental sites (e.g. heritage).
- Permanent and temporary controls (including order of implementation).

In some instances, more than one (1) Progressive ESCP may be required for an activity due to:

- Staging rendering the process complicated.
- Change in the construction process, scope of work or work method.
- Controls are found to be ineffective following rainfall.

Progressive ESCPs will be prepared jointly by both the Project Soil Conservationist and the Contractor's environmental and field personnel to formulate practical documents for field reference. Additionally, Plans will be developed in consideration of other environmental aspects (e.g. sensitive vegetation).

The Progressive Plans will be entered onto a register (refer to **Attachment 1**) and placed behind this ESCP to create a 'living' record of erosion and sediment control.

The Plans will provide design criteria for erosion and sediment controls from the Blue Book (Volumes 1 & 2D) where relevant (e.g. bioswales, diversion banks).

3. EROSION AND SEDIMENTATION HAZARD

Although the topography of the project is undulating across a sand dune system, a generally high erosion and sedimentation hazard will be created during the construction due to a combination of:

- The removal of protective vegetation with large scale disturbance exposing soils to water and wind action.
- Soil types with differing characteristics (e.g. high water erosion hazard, high water tables, seasonal waterlogging, strong acidity (i.e. acid sulphate and potential acid sulphate), dispersive, low fertility).
- Creeks adjacent to the site (Cold Tea Creek).
- Potential flooding impacts from Belmont Lagoon.
- Works on the dune system.
- The sometimes high and torrential rainfall events – average annual rainfall between 1100 & 1150 mm with a slight summer dominance.

4. SUPPORTING DOCUMENTATION

This Erosion and Sedimentation Control Strategy is based on the requirements and guidelines contained in the following manuals / documents:

- Department of Housing (1998), Managing Urban Stormwater: Soils and Construction, Vol 1, 4th Edition (ie Blue Book).
- Department of Environment and Climate Change (2008), Managing Urban Stormwater: Soils and Construction, Vol 2D, Main Road Construction (ie Blue Book).
- Belmont Desalination Plant EIS, Submission Report, CoAs and REMMs.
- Environment Protection Licence (EPL).

The strategies and techniques detailed in the above documents are appropriate for the protection of the adjacent environment of this project.

5. KEY MANAGEMENT STRATEGIES

The following list outlines principles and control measures that will be implemented on this project for minimising erosion and sedimentation. These points collectively fulfil the principles of sound soil conservation practice as detailed in the previously mentioned manuals / documents. This will ensure a 'preventative' rather than a 'cosmetic or remedial' approach to erosion and sediment control.

Major emphasis will be placed on:

5.1. Professional Expertise

Roles and responsibilities are identified in the CEMP and Section 7.1 of the SSWMP. Roles related to the management of erosion and sediment control include:

- The engagement of a Professional Soil Conservationist with extensive experience in infrastructure construction, who will co-ordinate and oversee all erosion and sediment control aspects during construction.

5.2. Training

Overall training requirements are addressed within the CEMP and Section 7.2 of the SSWMP. Requirements specifically related to erosion and sediment control include;

- Highlighting the importance of soil conservation issues during site inductions.
- Scheduling awareness seminars early in the project for all personnel involved in construction. The program will cover:
  - Environmental impacts;
  - Relevant legislation;
  - Principles of erosion and sediment control;
  - Techniques of erosion and sediment control.

  More details on the program appear in **Attachment 2**.
- Continually addressing relevant matters at regular 'toolbox' meetings during the course of the project (e.g. maintenance of temporary controls).

5.3. Minimising Extent and Duration of Disturbance

- Marking clearing limits.
- Staging of clearing operations.
- Initially clearing and grubbing to leave the soil surface in a reasonably rough condition with some surface vegetative cover.
- Minimising disturbance of vegetation along the road corridor with special emphasis on management of construction activities adjacent to drainage lines / areas of concentrated flow.
- Leaving drainage lines undisturbed until culvert construction has commenced and using the cut-stump method where possible instead of stump removal to further maintain stream bank stability.

5.4. Control of Stormwater Flows onto, through and from the Site

- Separating 'clean' run-on water from 'dirty' (e.g. turbid) construction area run-off.
- Constructing permanent drainage structures early in the project including:
  - Sediment traps;
  - Bioswales;
  - Catch drains with permanent linings;
  - Culverts and associated inlet and outlet protection (e.g. dissipators).

- Maximising the diversion of 'dirty' construction runoff into bioswales, sediment traps (e.g. mulch bunds), and swale drains (i.e. temporarily converted to sediment traps).
- Controlling run-off during the construction of embankments (e.g. fill shaping and the construction of temporary bunds and batter drains).
- Diverting formation run-off through sediment traps (e.g. sand / filter bags) and into pits and the stormwater drainage system as soon as practical to reduce surface flow lengths and velocities.

5.5. Erosion Control Measures to Prevent On-Site Damage

- Constructing a range of erosion controls within the various sub-catchments to reduce flow velocities and to compliment and increase the effectiveness and efficiency of sediment controls in the lower areas (e.g. slope breaks, diversion banks, progressive revegetation).
- Using geotextile linings or similar (e.g. soil binder polymer) to provide temporary surface protection in areas of concentrated flows (e.g. batter drains, temporary drains etc).
- Siting stockpiles of soil material in low-hazard areas clear of drainage lines (i.e. at least 50 metres). Additional protection to be afforded with temporary stabilisation, upslope diversion banks and downslope sediment control measures, if required. Toe of stockpiled material to be at least 5 metres from a fence, drain or trees to be retained.
- Stockpiles no greater than 2 metres in height with batters no steeper than 2:1.

5.6. Sediment Control Measures to Prevent Off-Site Damage

- Constructing control measures as close to the potential source of sediment as possible (e.g. sediment fences, mulch bund sediment traps).
- Ensuring the commencement of management of 'dirty' water within 24 hours after rain with one or a combination of:
- Pump-out for construction purposes or dust control – preferred;
- Flocculation with gypsum (or approved alternative flocculant).
- Dewatering of sediment traps and swales within a 5-day period following the cessation of rainfall.
- Managing water quality during de-watering activities (e.g. dust suppression, filter techniques, flocculation with gypsum).
- Controlling the deposition of mud and soil material onto local roads.
- Dust suppression via water carts, restricting plant and vehicle movements to designated routes and limiting vehicle speeds etc.
- Undertaking frequent site inspections.

5.7. Stabilisation and Revegetation

- Ensuring the success of the later revegetation program by utilising a good topsoil management program.
- Keying of topsoil to batters with the depth to be 5 to 10 cms.
- Progressively revegetating disturbed areas utilising appropriate species.
- Controlling dust through progressive revegetation techniques.

5.8. Inspection and Maintenance

Monitoring and inspection will occur in accordance with the CEMP and Section 7.4 of the SSWMP. Monitoring and inspection practices specifically related to erosion and sediment control include:

- Ensuring the progressive and continual implementation of temporary erosion and sediment controls (e.g. sediment fences, diversion banks, diversion drains, sediment traps).
- Initiating a program to ensure regular maintenance of all erosion and sediment control measures. Sediment cleaned from structures, including sediment swales, to be deposited in a secure location where further pollution will not occur.

- Arranging regular inspections by the Project Soil Conservationist (i.e. fortnightly) and construction personnel (i.e. weekly) to review and update control measures.
- Additional inspections to be conducted:
  - During significant rainfall events exceeding 20mm and during prolonged rainfall to monitor the functioning of controls.
  - Within 24 hours of cessation of a rainfall event causing runoff to occur on or from the project.
- Surface water quality monitoring (pH, Turbidity) will be undertaken for water discharge events from rock check locations, where water has the potential to leave site.
- pH and Turbidity levels will be compared to Lake Macquarie City Council construction dewatering guideline fact sheet levels (pH 6.5 – 8.5, Turbidity <60 NTU).

5.9. Documentation and Recording

Documentation and record keeping will occur in accordance with the CEMP. Documentation and record keeping specifically related to erosion and sediment control include;

- Rainfall / climatic records as per Section 7.4 of the SSWMP
- Developing documentation and systems for recording erosion and sediment control activities via:
  - Progressive ESCPs;
  - Inspection reports completed by the Project Soil Conservationist. A sample format for this report appears in **Attachment 3** and includes sections for location, control, recommendation / comment, priority, photograph and close out;
  - Register for Inspections and Maintenance to include volumes of sediment removed and method of disposal etc.
- Site notes distributed internally between environmental and construction personnel.
- Dewatering Management Procedure and associated records.
- Training records.
- Meeting minutes.
- Formal correspondence (e.g. Environment Protection Authority).
- Water quality monitoring results relating to dewatering.

5.10. General

- Monitoring weather forecasts for planning and site ‘securing’ purposes.
- Ensuring erosion and sediment controls are installed at all sites associated with construction activities including:
  - Access and haulage roads and tracks;
  - Stockpile areas;
  - Office and compound sites;
  - Workshop areas;
  - Temporary work areas.
- Leaving temporary erosion and sediment controls in place until the disturbed catchments have over 70% vegetation cover (i.e. beyond pavements).

6. SPECIFIC CONTROLS / MEASURES

6.1. Bio-Swales

Due to the high water table associated with the location of the Project, bioswales will be used in place of sediment basins to avoid interception of groundwater. Permanent bioswales will be excavated early during works at locations shown in **Attachment 4**. As the ‘trigger’ for a sediment basin occurs when the ‘soil loss’ from the catchment is calculated to exceed 150 cubic metres per year, catchments across the project will be minimised as far as possible so that bioswales will effectively manage runoff.

All bioswales are to be designed and constructed in accordance with the 'Blue Book' guidelines (i.e. volumes determined in part by the 5 day 85th percentile rainfall data parameter).

6.2. Excavated Sediment Traps

Excavated sediment traps may be installed where there is no risk of intercepting the water table and as an alternative to a trap within a bioswale.

Sediment traps are installed when the 'soil loss' from a catchment is calculated to be less than 150 cubic metres per year and a robust control is require (e.g. adjacent to a drainage line). As mentioned in Section 6.1 the 'trigger' for a sediment basin is a 'soil loss' calculated to exceed 150 cubic metres per year from a catchment.

A typical arrangement sketch for an excavated sediment trap is shown at **Attachment 5**.

6.3. Culvert Construction

'Clean' water passage through the works to be achieved via one or a combination of:

- Pump through with geofabric lined bunds upstream and downstream.
- Construction of a temporary geofabric lined diversion channel.
- Temporary pipelines.
- Use of a box culvert excavation stabilised by the blinding layer on the base and geofabric lining on the sides – refer to **Attachment 6**.
- The natural drainage line (or sections) where the works are 'offset'.

'Dirty' runoff from the sides to be treated prior to entry to the 'clean' water area via excavated sediment traps or traditional sediment fences etc.

6.4. Sediment Fences

Two (2) types of sediment fences to be installed as follows:

- Traditional sediment fences along the toes of fill batters, behind culvert head and wing walls, along the banks of drainage lines and downslope of stockpiles etc.
- Geofabric sediment fences along the outside toes of bioswales. The sediment fences to be:
  - Secured under the toes of the batters.
  - Minimum one (1) metre in height.
  - Held up the stakes at two (2) metre intervals.
  - Strengthened with a 'top wire' tied to all stakes and along the top of the geofabric.

6.5. Mulch Bund Sediment Traps / Blankets

Mulch bund sediment traps to be used as an alternative to traditional sediment fences away from drainage lines.

Typical Arrangement sketches for mulch bund sediment trap configurations are shown at **Attachment 7**.

Mulch to be spread in thin blankets / layers (i.e. 10 cms) over small bare / disturbed areas for surface stabilisation (e.g. upslope of 'clean' water catch drains).

6.6. Stormwater Pits

Controls at stormwater pits to mainly consist of sandbag diversions, sandbag sediment traps, filters bags, pit bags and sediment fences etc.

Runoff to be diverted via sediment traps into pits and the stormwater systems at frequent intervals to reduce surface flow lengths, flow velocities and scouring potential (i.e. runoff control).

6.7. Water Reuse

In relation to erosion and sediment control, the priority will be the reuse of water from excavated sediment traps and excavations for dust suppression and earthworks rather than discharge from site.

7. CONCLUSION

The strategies presented in this Strategy are considered to appropriately address all issues relevant to erosion and sediment control and to minimise potential impact.

Forward planning, adherence to a system of documentation and training will be key elements to ensure sound performance in the field.

ATTACHMENT 1

PROJECT: BELMONT DESALINATION PLANT PROJECT

REGISTER – PROGRESSIVE EROSION AND SEDIMENT CONTROL PLANS

PLAN NO	CHAINAGE / DESCRIPTION	PERSONNEL INVOLVED IN PREPARATION	DATE OF PREPARATION	SOIL CONSERVATIONIST INITIALS & DATE	ENVIRONMENTAL MANAGER INITIALS & DATE	SUPERCEDED BY PLAN NO / COMMENT

ATTACHMENT 2

PROGRAM

BELMONT DESALINATION PLANT PROJECT

EROSION AND SEDIMENT CONTROL

AWARENESS SEMINAR

1 Introduction

2 Environmental Impacts – This session focuses upon the on-site and off-site environmental impacts of erosion and sedimentation (e.g. water quality, fauna, flora etc). It concludes with an exercise listing all impacts.

3 Environmental Legislation – This session examines:
- Relevant legislation (P.O.E.O. Act).
- Practical application in the field.

4 Principles of Erosion and Sediment Control – This session covers nine (9) principles which include:
- Investigation of site features
- Planning
- Minimum disturbance
- Topsoil
- Control of run-off
- Minimisation of erosion
- Trapping sediment
- Progressive rehabilitation
- Maintenance

5 Techniques of Erosion and Sediment Control – This session includes the most common techniques. Aspects covered include:
- Clearing
- Topsoil management
- Drainage and installation of permanent structures (e.g. culverts, catch drains etc)
- Diversions banks
- Drains and channels
- Batter protection
- Revegetation
- Bioswales and management
- Sediment traps
- Sand bags and their application
- Maintenance
- Miscellaneous matters (e.g. mud on local roads, dewatering, dust etc).

6 Field Inspection – This session examines techniques constructed in the field together with associated discussions on Impacts, Legislation and Principles.

ATTACHMENT 3

EROSION AND SEDIMENT CONTROL REPORT

REPORT DATE		**REPORT No**	
CLIENT	**JOHN HOLLAND**		
PROJECT	**BELMONT DESALINATION PROJECT**		
DATE OF INSPECTION			
WEATHER CONDITIONS			
ATTENDEES			
REPORT TO			
REPORT BY	**Grant Fletcher – Soil Conservationist SOS M: 0416 120963 E: Grant.fletcher@outlook.com.au**		

No.	LOCATION	CONTROL	RECOMMENDATION / COMMENT	PRIORITY	PHOTOGRAPH	CLOSE OUT
1						
2						

BELMONT DESALINATION PROJECT

PROCEDURE FOR WATER QUALITY MANAGEMENT IN SEDIMENT BASINS

WHY SEDIMENT BASIN MANAGEMENT IS REQUIRED?

An important component of water quality control is effective management of sediment basins from the construction phase through to their conversion to chemical spill traps or water quality ponds post construction.

There is a legal responsibility to ensure that runoff leaving a construction site has an acceptable water quality standard including that water being discharged from sediment basins after storm events.

Unless otherwise amended by an EPL, it is assumed the parameters and limits to be monitored in the management of sediment basins include:

- Total Suspended Solids (T.S.S.) - <50mg/l;
- pH – 6.5 to 8.5;
- Oil and grease – maximum 10mg/l.

It is these water quality parameters that are addressed in this Procedure.

PROCEDURE

To effectively manage the sediment basins the following procedure should be undertaken:

1 All sediment basins to be inspected for capacity and water quality immediately following cessation of a rain period. A marker should indicate the top of the sediment storage zone and the bottom of the settling zone.

2 If water is to be used for construction purposes (eg compaction, dust control) no treatment is required. However, the water should be removed at least from the settling zone routinely within 4 days.

3 If the capacity of the sediment storage zone has been reduced by 60% or more by sediment then desilting to be immediately scheduled with water treatment as per the procedure below.

4 If the water level is above the sediment storage zone the parameters of pH, T.S.S. and oil and grease to be tested under the supervision of the Project Environment Manager and addressed as follows:

i. <u>pH</u>
   - Test basin water with a calibrated water quality meter.
   - No action if pH reading between 6.5 and 8.5.
   - Lime to be added if pH below 6.5.
   - Hydrochloric Acid (32% Muriatic) to be added if pH above 8.5.
   - Determine volume of water in basin.

- Determine percentage of lime or acid required by taking a 10 litre sample of basin water and adding a known amount of lime or acid (initially 0.004%). If the pH is still not acceptable, vary the amount of lime or acid until within the limits.
- Once the required percentage has been determined, calculate the actual amount of lime or acid to be added by multiplying the volume of water in the basin by the determined percentage.
- Add the required amount of lime or acid to the basin.
- Mix the water in the sediment basin well.
- Treat for pH prior to T.S.S.

ii. T.S.S

- Test basin water by comparing with water samples contained in jars with representative readings up to 100mg/l created through laboratory testing. This will enable a relatively accurate comparison which will be verified by laboratory testing approximately every six (6) rainfall events.
- No action if T.S.S. reading <50mg/l.
- If basins require flocculation (eg T.S.S. >50mg/l), bulk gypsum as a flocculant to be immediately applied evenly across the top of the water at an acceptable rate (i.e. trial and error as different for each basin). Methods of application to include:
  a) broadcast by shovels on small basins (ie <200m^3);
  b) mixing in a drum with water and pumping through a hose on large basins (ie >200m^3).

iii. Oil and Grease

- Examine surface of water for evidence (eg sheen, discolouration).
- No action if no visual contamination.
- Oil absorbent material to be spread if there is contamination (eg cell-u-sorb).

5 Leave basins to compensate for 24 to 48 hours.

6 After retesting, and once the above field tests indicate the water quality is acceptable discharge water from basin ensuring water quality is not compromised.

7 The process at points 4 and 5 and the retesting at point 6 may need to be repeated if acceptable water quality is not achieved initially.

8 Records to be kept of the rainfall events, inspections undertaken, field tests undertaken, dosage rates and when basin water is released etc (refer to the attached checklist).

9 The whole process of water quality management in sediment basins should be completed routinely within 4 days of cessation of a rain period.

PROJECT: BELMONT DESALINATION PLANT PROJECT Document No: _____

SEDIMENT BASIN MANAGEMENT

Rainfall Event mm:
Days:

Allowable Limits: T.S.S. <50mg/l
pH 6.5 to 8.5
Oil & Grease max. 10mg/l (by observation)
Desilting >30% reduction in design capacity

BASIN NO	DESIGN CAPACITY M3	IS WATER TO BE USED FOR CONSTRUCTION	WATER QUALITY BEFORE TREATMENT			RATE OF LIME ADDED	RATE OF ACID ADDED	RATE OF GYPSUM ADDED	OIL ABSOR -BENT ADDED	WATER QUALITY AFTER TREATMENT			DATE VALVE OPENED	DATED VALVE CLOSED	DESILTING REQUIRED	DATE DESILTED	COMMENTS
			T.S.S	pH	OIL & GREASE					T.S.S.	pH	OIL & GREASE					

_____ _____ _____ _____

Inspected by / Position Date Environmental Manager Date

ATTACHMENT 5

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.

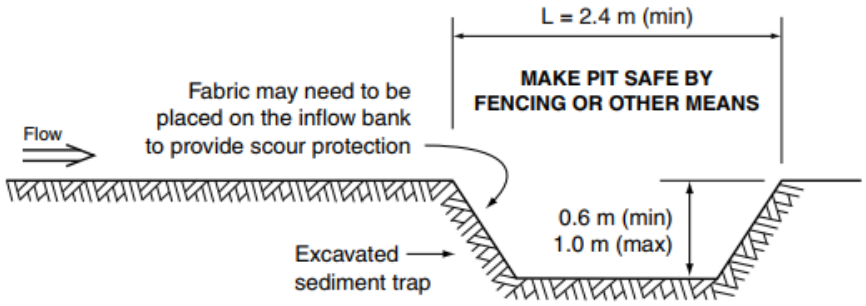
6. DISPOSE OF SEDIMENT AND DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

REMOVAL

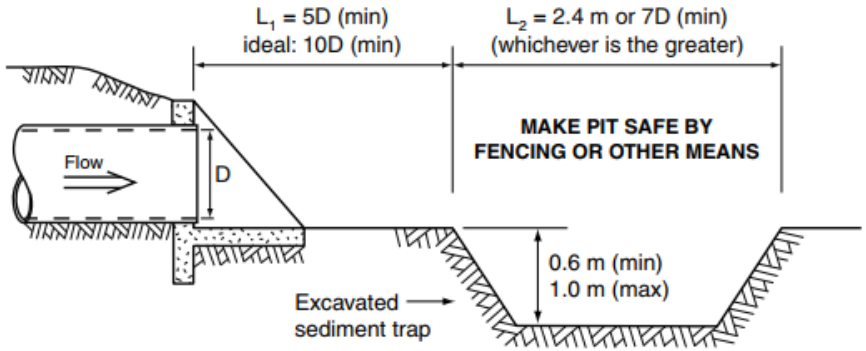
1. WHEN THE UP-SLOPE DRAINAGE AREA HAS BEEN STABILISED, REMOVE ALL MATERIALS INCLUDED DEPOSITED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

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



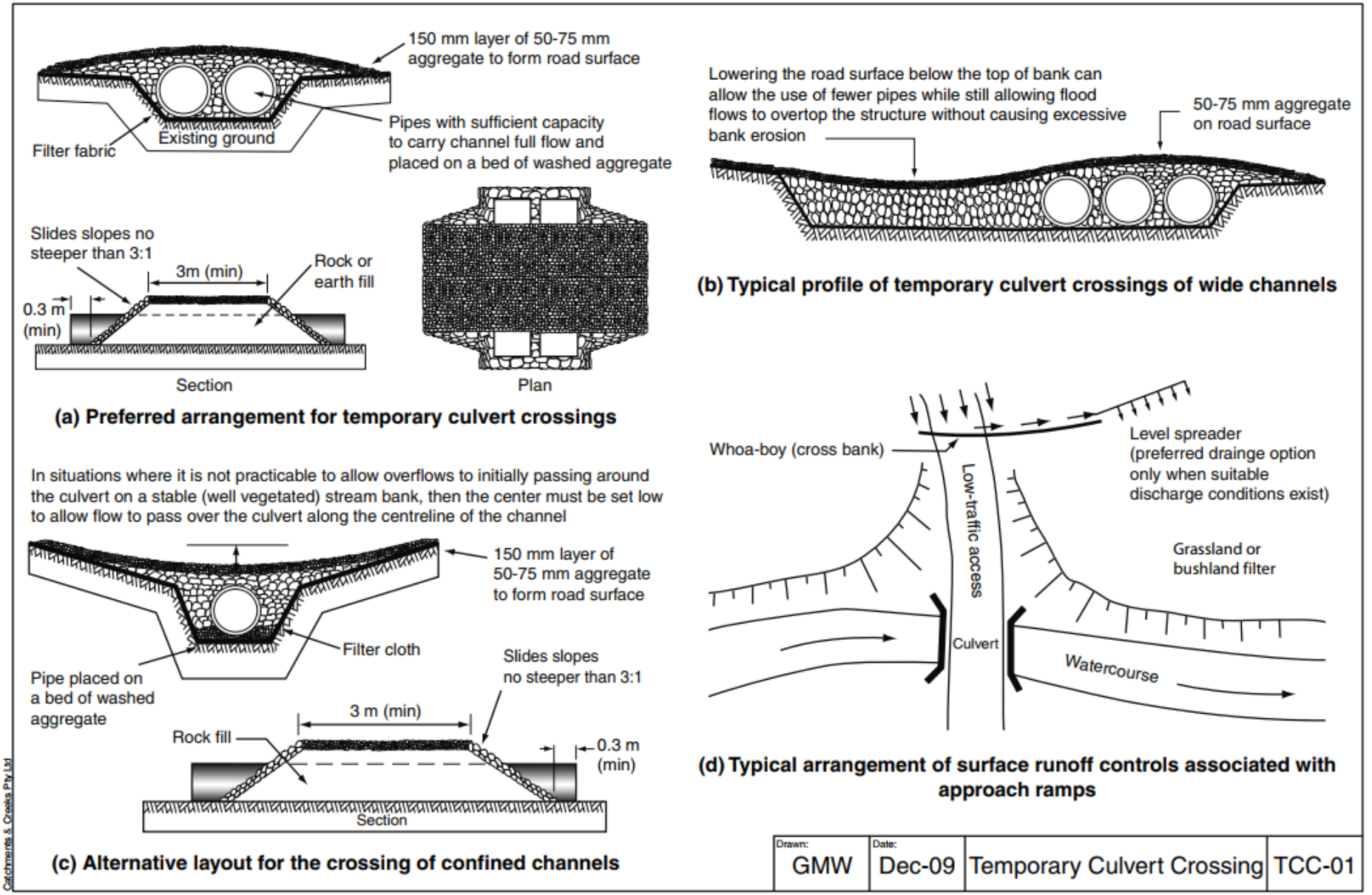
Where space is not available, make optimum use of the available space

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

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

Catchments & Creeks Pty Ltd

ATTACHMENT 6



ATTACHMENT 7

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.

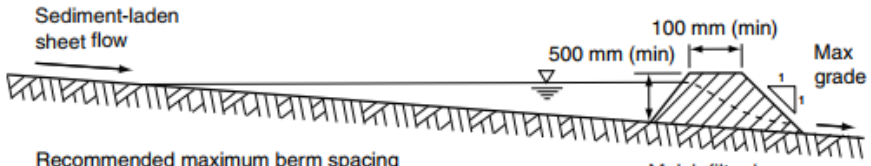
5. DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

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