Centennial Coal

EROSION AND SEDIMENT CONTROL PLAN

Bore 8 Dewatering Facility

Springvale Mine

March 2013

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1. Introduction

1.1. Relationship to Approvals and Industry Standards

This Erosion and Sediment Control Plan (ESCP) has been prepared to address the specific requirement detailed in the Department of Planning and Infrastructure's Project Modification Approval for Springvale's Bore 8 Dewatering Project.

This ESCP has been prepared in recognition of industry best practice principles for the region and the specific requirements of the following documents:

- Managing Urban Stormwater; Soils and Construction (The Blue Book) Volume 1; Landcom, Sydney, 2006
- Managing Urban Stormwater; Soils and Construction Volume 2A, Installation of Services; Department of Environment and Climate Change NSW, Sydney 2008
- Managing Urban Stormwater; Soils and Construction Volume 2C, Unsealed Roads; Department of Environment and Climate Change NSW, Sydney 2008
- Managing Urban Stormwater; Soils and Construction Volume 2E, Mines and Quarries; Department of Environment and Climate Change NSW, Sydney 2008
- Environmental Assessment, Bore 8 Dewatering Facility, Springvale Colliery; GSS Environmental, September 2012
- Surface Water Assessment, Bore 8 Dewatering Facility, Springvale Colliery; GSS Environmental, September 2012
- Soil Landscapes of the Wallerawang 1:100,000 Sheet, King 1993; NSW Department of Land and Water Conservation, Sydney

1.2. Relationship to Project CEMP

Although this ESCP is presented as a standalone document, it is an integral part of the project's Construction Environmental Management Plan (CEMP).

2. Background

2.1. Project Overview and Description

This Project includes the construction and operation of a Mine Dewatering Facility additional to existing Springvale Mine surface infrastructure, and referred to as "Bore 8". Associated infrastructure requirements include an underground power supply cable, water pipeline and access track. The location of the new Bore 8 facility and its associated infrastructure is within the Newnes State Forest on the Newnes Plateau.

Bore 8, through its dewatering function, will facilitate the progress of coal extraction further to the east of existing workings at Springvale. Water levels can be kept at safe and manageable levels within the mine, through its successful operation. This facility will form a critical part of Springvale's existing dewatering system as longwall mining progresses through approved longwalls (LW) LW416 to LW419. Water pumped out of the underground workings at Bore 8 will be transferred via pipelines (predominantly trenched) to Wallerawang Power Station, as part of the existing Springvale–Delta Water Transfer Scheme (SDWTS).

Upon Project completion, the Bore 8 facility will be a fenced compound housing four surface to seam boreholes installed with submersible pumps, an associated switchroom with power control equipment for the operation of the pumps, and a sediment basin.

An upgraded access track and new infrastructure corridor into Bore 8 will also be constructed as part of this project. This infrastructure corridor is approximately 3.5 km in length and 10 m in width (including the existing track which is around 3.0m wide on average). It will contain a trench containing buried 11 kV power supply cables, fibre optic cable and the water transfer pipeline. Refer **Figure 1.**

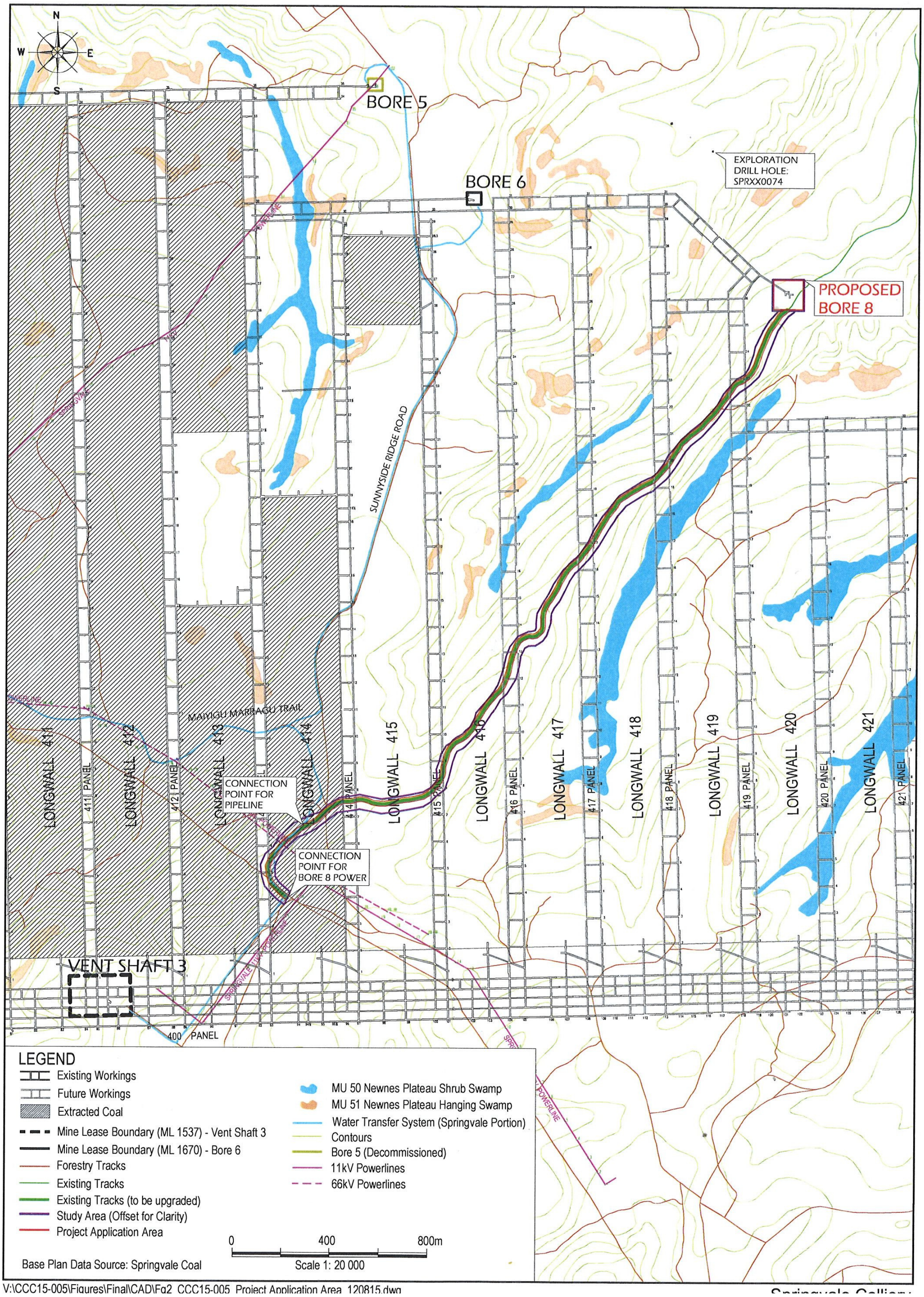

Figure 1: Location of Bore 8 infrastructure corridor and compound site (Source: Environmental Assessment, Bore 8 Dewatering Facility, GSSE 2012).

2.2. Construction Sequence

It is anticipated that the construction of the Bore 8 project will be undertaken in accordance with the following elements:

1. Installation of erosion and sediment controls along the access track and around the drill pad, including a sediment basin downslope of the drill pad;
2. Clearing of drill site;
3. Installation of surface water management structures and temporary security fencing around the drill site;
4. Drilling and casing of boreholes;
5. Progressive clearing of infrastructure corridor and upgrading of existing access track;
6. Installation of utilities (underground power cable and water pipeline) along access corridor to Bore 8.
7. Progressive rehabilitation of the access track and infrastructure corridor to a final width of approximately 5 m;
8. Installation and commissioning of submersible pumps;
9. Construction of a number of low rise buildings to house a VVVF (Variable Voltage Variable Frequency) control room, soft starter control room and an 11 kV switch room;
10. Rehabilitation of the drill site footprint will be undertaken upon completion of construction and drilling works, to reduce the area of disturbance to a final footprint of around 0.35 ha required for the operational phase of the project; and,
11. Installation of a permanent fence on the perimeter of the facility (including the basin area) with access via a lockable gate

Depending on weather conditions and construction/commissioning constraints, it is anticipated that the project will be completed within four months. Construction is expected to commence in early March 2013, with completion by late June or early July 2013.

2.3. Existing Site Conditions, Limitations and Constraints

Site Drainage

The Bore 8 project area is located in the headwaters of the Carne Creek catchment, a sub–catchment of the Wolgan River catchment. Both the infrastructure corridor and the Bore 8 compound site are located on a gently undulating ridge with no appreciable volume of runon water entering the site. No watercourse is intersected by the either the access track or the compound site.

The Surface Water Assessment (GSSE, 2012) concludes that negligible impacts are expected on the local THPSS communities (Hanging Swamps and Shrub Swamps) given the large distance from the works area to the closest THPSS communities.

Soil Erodibility

Three soil landscape units will be intersected by this project; refer **Figure 2.** The following descriptions are sourced from *Soil Landscapes of the Wallerawang 1:100,000 Sheet* (King 1993).

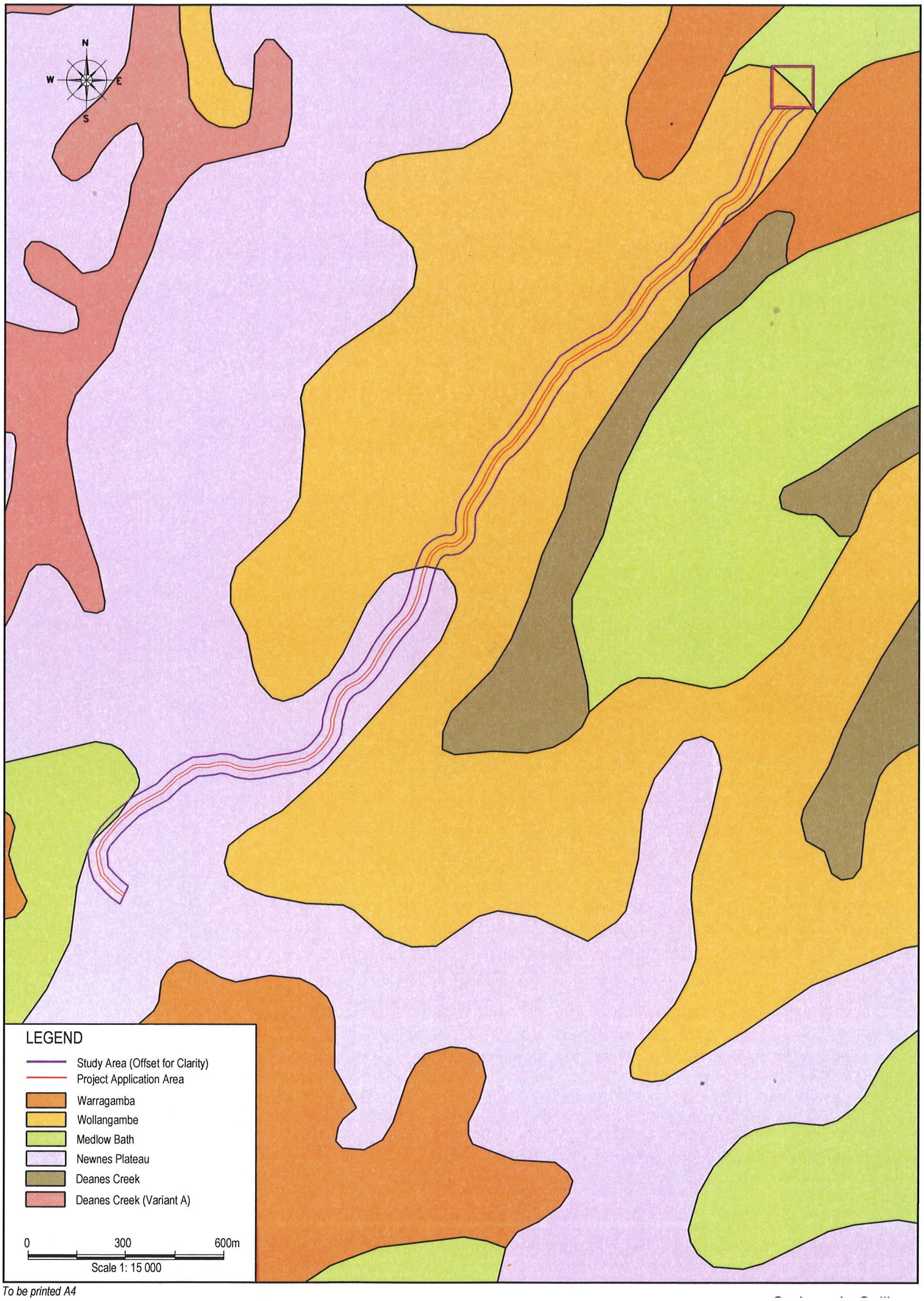

Figure 2: Soil Landscapes traversed by the project (Source: Environmental Assessment, Bore 8 Dewatering Facility, GSSE 2012).

These are:

- *Newnes Plateau (np) soil landscape unit* which occurs on the undulating crests higher in the catchment and is characterised by acidic shallow sands and clayey sands overlying sandy clay loams and friable sandstone;
- *Wollangambe (wb) soil landscape unit* which occurs further down the ridge towards the compound area and consists of sands, loamy sands, and clayey sands overlaying shallow to deep sandstone subsoils;
- *Meadlow Bath (mb) soil landscape unit* which underlies a portion of the compound site and consist of moderately deep stony and acidic earthy sands and yellow earths.

With regards to erosion and sediment control planning, all of these soils exhibit a sandy to sandy loam texture. Both erodibility and dispersibility is low (K factor values range from 0.013 – 0.017) (King 1993). While these soils are relatively easy to detach in a concentrated flow situation, subsequent transportation and sedimentation is easily controlled due to the inherent predominance of large particle sizes. Low levels of clay indicate that the site runoff should also exhibit low levels of suspended solids and resultant turbidity.

Rainfall Intensity

In this region there is higher long term average rainfall during summer months, and a marginally lower rainfall average in winter and early spring. Long term rainfall data indicates that January is in most years the wettest month, and September the driest.

The average number of mean rain days is reasonably consistent throughout the year. This then clearly indicates that higher summer rainfall averages are due to higher intensity storm events, rather than *more frequent* but *lower intensity* rainfall events. Rainfall erosivity is therefore usually at its highest during December, January and February, and at its lowest during June, July and August.

Construction is expected to commence in early March 2013, with completion by late June or early July 2013, and therefore should avoid the higher intensity summer rainfall events and the associated increased risk of erosive forces on disturbed ground.

Slope Gradient

Slope gradients both along the access track and across the compound site are very low. This will generally result in runoff velocities below the maximum permissible velocity for the abovementioned soil landscape units.

Average slope gradient along the access track is 2.5%, however, there is a limited 222m section between chainage (ch) 2055 and 2277 where the slope increases to 5.8%. Slope grade across the compound area will be confirmed following clearing, but has been estimated to be less than 3%.

3. Control Measures and Management Practices

The following suite of control measures aim to manage erosion and sedimentation by initially minimising soil detachment and transportation, controlling runoff volume and velocity, and maximising sediment deposition and retention on site.

From this point forward and for the purposes of this document, the access track and services trenching aspect of the project will be referred to as the “infrastructure corridor”, and the Bore 8 site facility as the “compound area”.

3.1. Site Management Practices – all areas

Best practice site management aims to schedule and conduct site activities so as to minimise both the extent and the duration of disturbance. Accordingly, the following site management practices will be adopted on this project:

- The maximum limits of clearing will be clearly marked out prior to clearing activities commencing. Identified communities of *Persoonia hindii* will be clearly demarcated or "flagged out", with yellow flagging tape, and will constitute a "No-Go zone".
- Ground disturbance will be avoided outside of the areas identified above, vehicle movements will be restricted to designated tracks, and existing clearings will be utilised as turnaround areas and laydown sites.
- Where site access permits, erosion and sediment control structures will be installed/constructed prior to commencement of site clearing/ground disturbing activities.
- In situations where some preliminary clearing is required to gain access to the site (i.e. the compound area), the required erosion and sediment control structures will be installed/constructed as a matter of priority.
- Disturbance along the infrastructure corridor will be confined to those areas involved in current construction activities. Where possible, forward clearing and trenching activities will be limited to a maximum of 200m ahead of active pipe laying activities.
- The Bureau of Meteorology five day weather forecast will be used as a trigger to minimise forward clearing activities, expedite rehabilitation activities, and schedule additional erosion control measures along the corridor when inclement weather is predicted.
- Works will also be scheduled so that an absolute minimum quantity of trench (e.g. less than 50m) is left open over any weekend.
- Timber and other vegetative material will be removed and stockpiled immediately adjacent to the works. Where practicable, this material will be windrowed on the downstream side of the works to act as a sediment barrier.
- Where possible, unless located *directly* over the trench alignment, tree stumps and roots will not generally be grubbed, in an effort to promote coppicing.
- There will be an excess of vegetative material cleared from the compound site. This material may be tub ground, stockpiled and allowed to compost in preparation for final site rehabilitation following decommissioning of the site in 2017.
- Topsoil and forest litter will be removed (to a nominal depth of 50-100mm) and stockpiled in a windrow adjacent to the timber windrow; refer to **Figure 3**. In order to maintain topsoil viability, stockpiles will not exceed 1.5m in height and will not be compacted.
- Where site contours permit, the topsoil windrow may also be used as an upslope perimeter bank, to divert clean runon water around or away from disturbed areas.
- Rehabilitation of the infrastructure corridor will commence immediately following trench backfilling. Where practicable, there will not be more than 75m of backfilled trench left un-rehabilitated as work progresses

- All site earthworks activities (including refuelling and servicing of plant and equipment) will cease during periods of heavy and/or prolonged rainfall (i.e. >25mm in 24 hours).

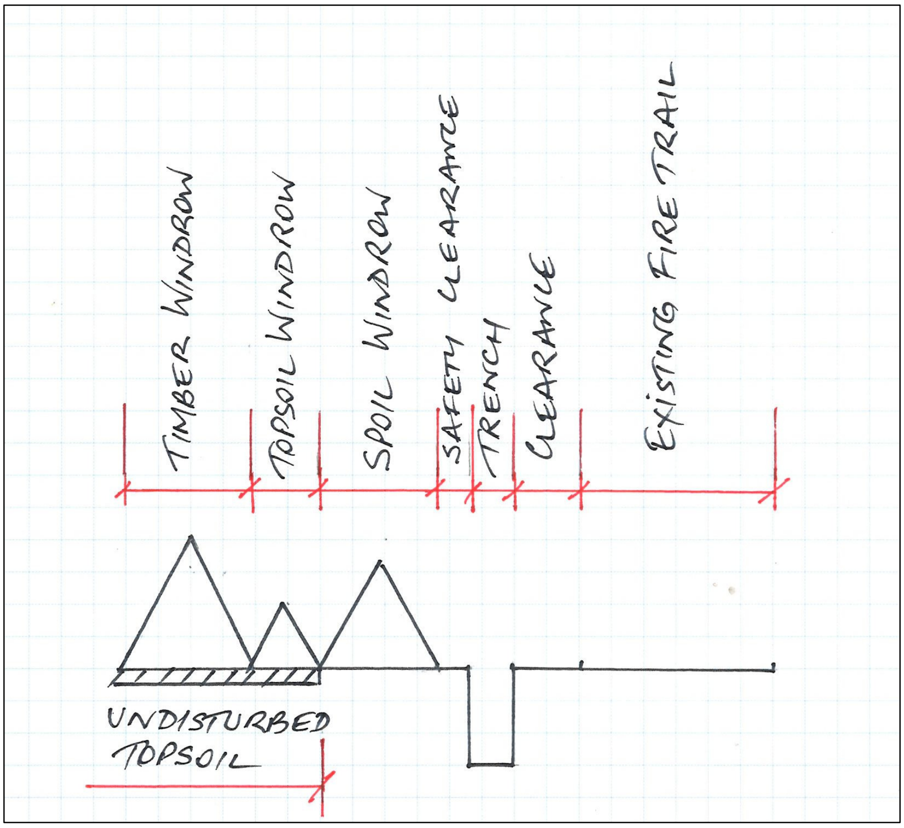

Figure 3: Diagrammatic representation of trenching, clearing and topsoil removal. Not to scale.

3.2. Erosion Control Measures – infrastructure corridor

In addition to the site management strategies listed above in 3.1, the following site specific erosion control measures will be implemented on the infrastructure corridor works:

- The backfilled trench will be thoroughly compacted to avoid settlement/subsidence of the fill material and inadvertent channelisation of water. The top 150mm of fill may subsequently be scarified or roughened (if required) to assist topsoil adhesion and vegetation establishment.
- Topsoil and forest litter material will be respread over the trench area. Logs and windrowed timber will be "randomly" scattered over the topsoiled areas. However, care will be taken to ensure that any large logs etc are always placed parallel to the contour to avoid concentration of overland flows.
- As the track follows a ridge along its entire length, the running surface of the access track will be constructed with a crown so that runoff water sheds to both sides of the track; refer **Figure 4.**
- Mitre drains will be constructed periodically to direct runoff away from the track; refer **Figure 5.**

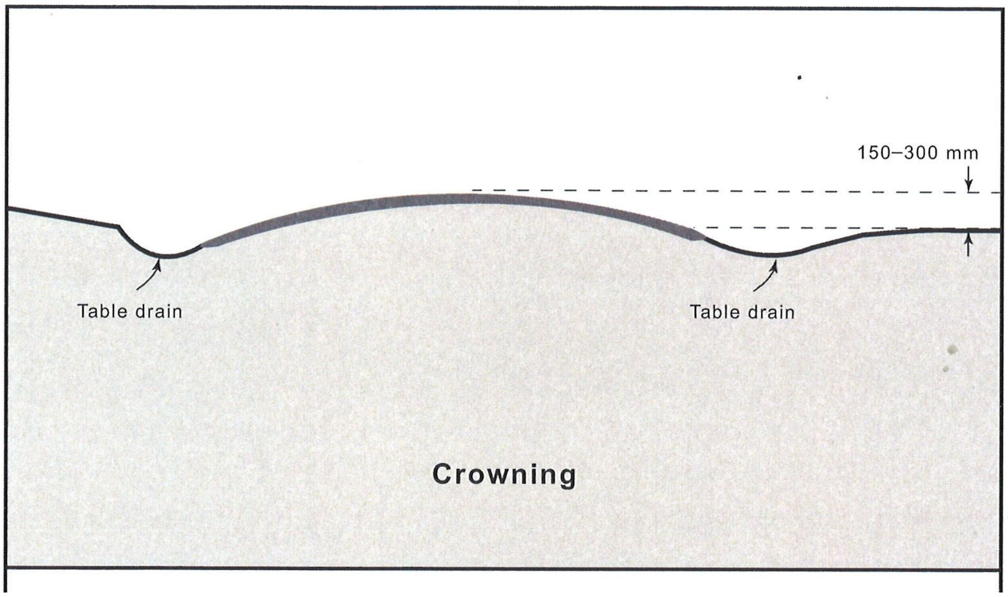

Figure 4: Typical crowning of the track surface on ridge top tracks (Source: Managing Urban Stormwater; Soils and Construction – Volume 2C Unsealed Roads).

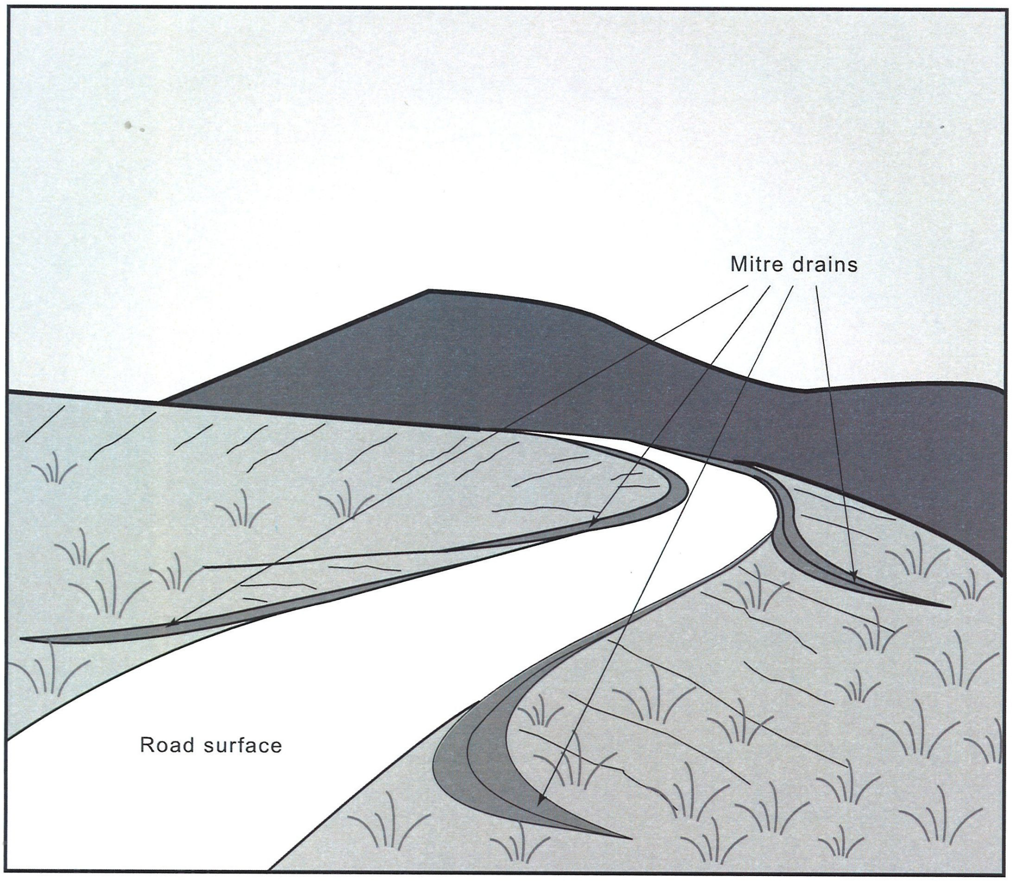

Figure 5: Typical layout of mitre drains on ridge top tracks (Source: Managing Urban Stormwater; Soils and Construction – Volume 2C Unsealed Roads).

Mitre drains will be located to utilise local surface topography. However, with an average slope gradient of only 2.5%, there will be a nominal spacing of 50m between structures.

- Mitre drains will be constructed with a trapezoidal or parabolic profile, and the channel gradient will not exceed 1:10.
- A steeper section of track exists between ch. 2055 and 2277 where the slope increases to 5.8%. Cross banks (aka. Roll over banks or Whoa-boys) will be constructed through this section to divert runoff water across and away from the track surface to a stable discharge point; refer **Figure 6**.
- Exact location of cross banks will be determined by surface topography, however, there will be a nominal spacing of 40m between structures through this area.
- Cross banks will be constructed in accordance with the specifications included in **Figure 7**.
- As all-weather access is required to this business critical facility, roadbase and/or gravel will be used (as required) to stabilise isolated areas of the track's running surface, where soft pockets of soil or boggy areas are observed.

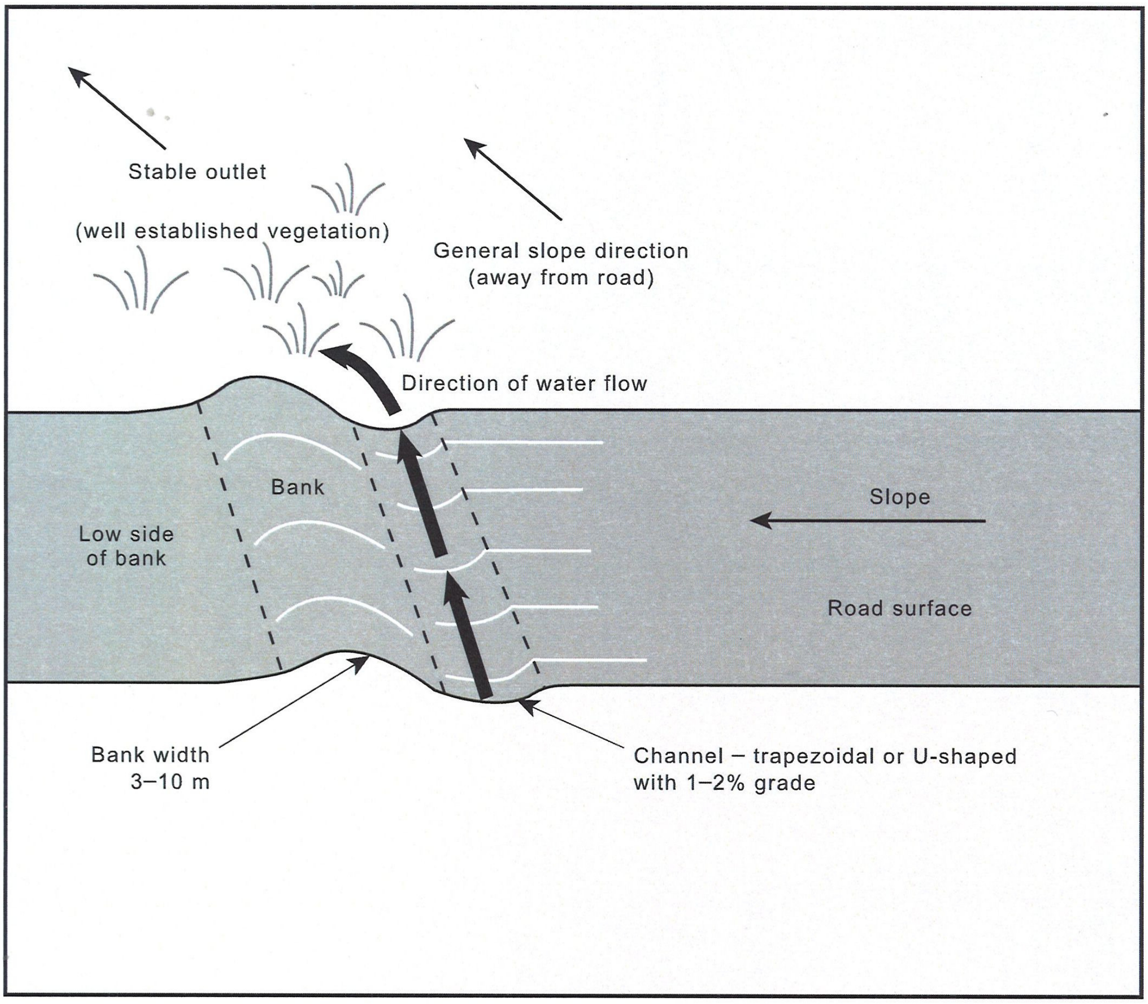

Figure 6: Typical cross bank layout and construction (Source: Managing Urban Stormwater; Soils and Construction – Volume 2C Unsealed Roads).

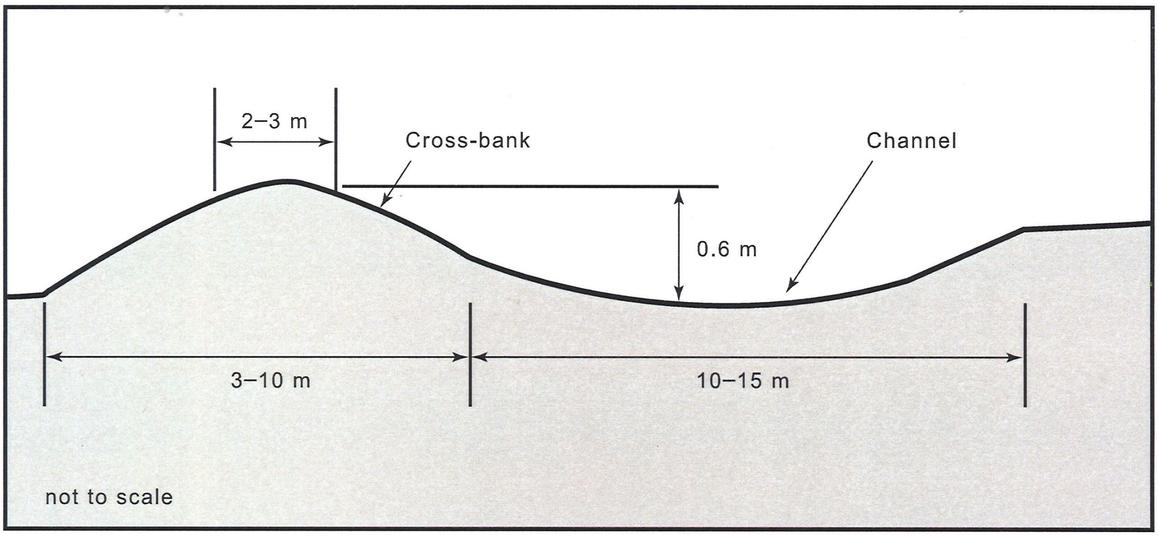

Figure 7: Cross bank dimensions (Source: Managing Urban Stormwater; Soils and Construction – Volume 2C Unsealed Roads).

3.3. Erosion Control Measures – compound area

In addition to the site management strategies listed above in 3.1, the following site specific erosion control measures will be implemented on the compound area.

- Topsoil and forest litter material will be removed from the compound area and windrowed to form an upslope perimeter (diversion) bank around the top side(s) of the site.
- This bank will act to minimise the volume of water *entering* the site by segregating clean upslope runon water, from sediment laden runoff water off the site.
- Clean water from the perimeter bank will be discharged in a location(s) such that it will not run back onto the site causing erosion.
- Following removal of the topsoil, the compound area will be covered with a protective layer (50mm) of gravel or ballast.
- Following completion of the four boreholes and construction of all ancillary buildings and structures, the compound area not required for ongoing operations will be rehabilitated. This rehabilitation will reduce the total project footprint from approx. 1.7ha in the construction phase to approx. 0.35ha in its operational phase.
- Rehabilitation will include reshaping of the surface as required to produce a free draining landform that mimics, as far as possible, the natural landform.
- The upper 150mm of the rehabilitation area may be scarified or roughened prior to re-topsoiling to assist topsoil adhesion and vegetation establishment.
- Topsoil and forest litter material will be respread over the rehabilitation area. Logs and previously windrowed timber will be “randomly” scattered back over the topsoiled areas. However, care will be taken to ensure that any large logs etc are always placed parallel to the contour to avoid concentration of overland flows.

3.4. Sediment Control Measures – infrastructure corridor

Effective erosion control will minimise the requirement for sediment control. Hence erosion control, including progressive rehabilitation, will be a priority. In addition to the site management strategies listed above in 3.1, the following site specific sediment control measures will be implemented on the infrastructure corridor works:

- In areas where the ground slope below the outlet of the mitre drain is less than 5% gradient, the coarse textured soils will generally fall out of suspension within the confines of the mitre drain, and periodically removed as required.
- In areas where the slope gradient below the outlet of the mitre drains is greater than 5%, sediments have the potential to be moved off site. In these instances, sand and/or aggregate filled sandbags may be used to construct a temporary sediment trap across the outlet of the mitre drain; refer **Figure 8**.
- As an alternative, a small excavated sediment sump (approx. 1m^3 capacity) may be excavated at the end of the above mitre drains to effectively convert them into a spoon drain.
- Timber and other vegetation cleared from the alignment may also be selectively placed and tightly stacked across the outlet of the mitre drains to act as a temporary sediment barrier.
- All these areas will be monitored on a daily basis as part of the site management protocol.

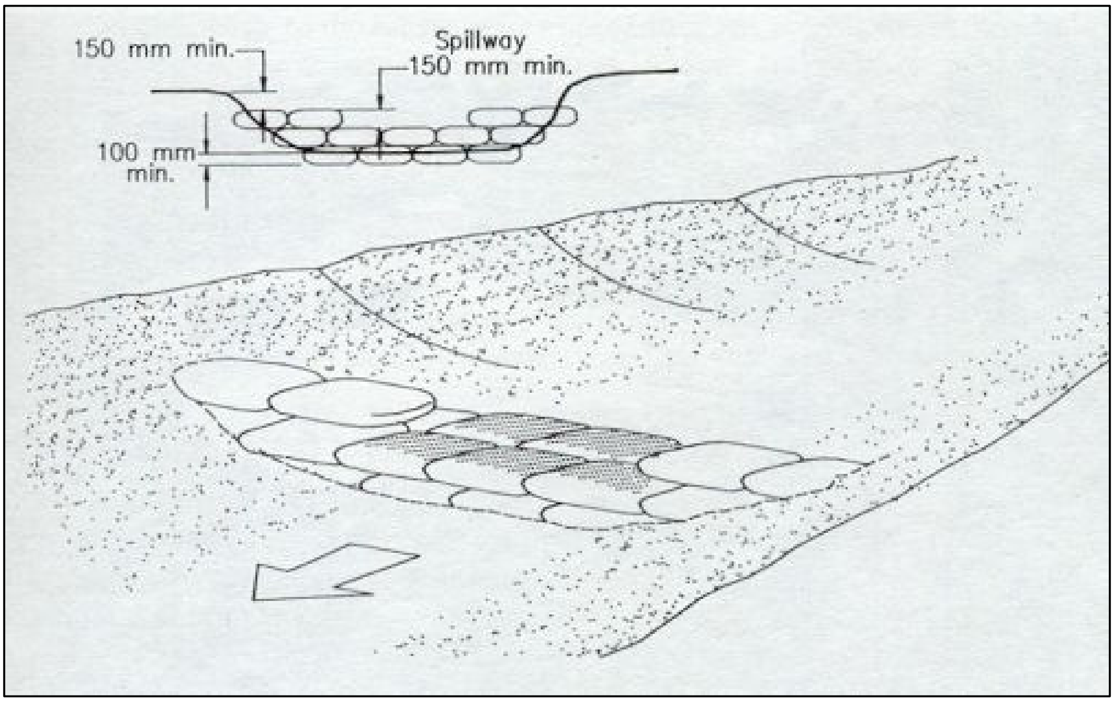

Figure 8: Diagrammatic representation of a sandbag sediment trap across the end of a mitre drain

3.5. Sediment Control Measures – compound area

Effective erosion control will minimise the requirement for sediment control. Hence again erosion control, including progressive rehabilitation, will be a priority. In addition to the site management strategies listed above in 3.1, the following site specific sediment control measures will be implemented on the compound area.

- In addition to the use of selectively placed and tightly stacked timber and vegetation as a downslope sediment barrier, the principal sediment control structure at the compound area will be the sediment basin.
- This basin will be situated to take full advantage of site topography. It will be constructed using very large concrete blocks (1200mm x 600mm x 600mm) and will be supported by an earthen embankment approximately 2.4m high.
- A Bidim A34 grade needle punched geotextile will be used as additional filter medium in front of the concrete blocks.
- Final basin capacity will be confirmed following a detailed survey. This work is scheduled for completion immediately following the initial site clearing activities. Indications at this stage suggest that the structure will have an operating capacity of between 900m^3 -1,000m^3.
- Basin sizing calculations for the site have been undertaken in accordance with the procedure detailed in the "Blue Book" for Type C basins and included as **Appendix A**. Type C basins are recommended for use with coarse grained (e.g. sandy) soils where the particles are likely to settle rapidly.
- For this project basin calculations were undertaken based on the soils of the Wollangambe (wb) soil landscape unit. These soils consist of sands, loamy sands, and clayey sands overlaying shallow to deep sandstone subsoils.
- The basin calculations in Appendix A indicate that the minimum basin size required for the compound area on this project is 88m^3. As noted above, the proposed basin/sump at the Bore 8 compound site will have an operating capacity of between 900m^3 -1,000m^3.
- Operation of the sediment basin will be monitored on a daily basis as part of the site management protocol.

4. Inspection, Maintenance, Audit & Review

4.1. Daily Reviews

The Project Manager will undertake daily reviews of the work site and will schedule any routine maintenance and/or augmentation of management practices or control measures.

4.2. Weekly Inspections and Site Meetings

Springvale's Environment Co-ordinator will undertake formal weekly inspections of the project and will also attend weekly project meetings where specific environmental issues are to be raised and/or discussed. If required, actions will then be assigned to the most appropriate responsible person.

The Environment Co-ordinator will also schedule additional site inspections following periods of heavy and/or prolonged rainfall (i.e. >25mm in 24 hours), or as requested by the Project Manager.

4.3. Specialist Advice and Audit

The Soil Conservation Service (SCS) has been engaged to provide specialist erosion and sediment control advice should the need arise at any time during the project.

The SCS has also been retained to undertake formal audits against the requirements of this plan, the project's Statement of Commitments, and the Environmental Assessment documentation should the need arise.

4.4. Monthly Review of this Plan

The Environment Co-ordinator and/or the SCS will review the adequacy of this plan on a monthly basis. If required, the proposed management strategies and control measure will be modified to address evolving site conditions, latent conditions and/or changes to the proposed construction sequence.

Any changes to the Plan will then be communicated to the relevant site personnel via daily "toolbox talk" training and weekly project meetings.

APPENDIX A

<u>TYPE C</u> SEDIMENT BASIN DESIGN SHEET

<u>Structure</u>: **<u>Bore 8 Compound Sediment Basin</u>**

Design data:

- total catchment area - hectares (A_t) = 1.7
- disturbed catchment area – hectares (A_d) = 1.7
- slope gradient on steepest disturbed area - % = 3
- slope length on steepest disturbed area – m = 150
- rainfall erosivity factor (R) = 1705
- soil erodibility factor (K) = 0.026
- disturbed catchment area slope length factor (LS) = 1.09
- soil cover factor (C) = 1.0
- soil conservation factor (P) = 1.3
- sediment bulk density - t/m³ (b.d.) = 1.3

PART A - Design Peak Discharge of Catchment

Step 1 *Critical duration of design rainfall:* $t_c = 0.76\ (A/100)^{0.38}$

$= 0.76\ (1.7/100)^{0.38}$

$= 0.16$ hours (10 minutes)

Step 2 *Design rainfall intensity for an ARI of 1 year and duration of 10 minutes is:*

$I_{1,\ 0.16} = 46.5$ mm/hr

Step 3 *Design runoff co-efficient:* $C_{10} = 0.89$

Step 4 *Newnes Plateau is in Zone B with elevation above 500m*

$FF_1 = 0.57$

$C_1 = C_{10} \times FF_1$

$= 0.89 \times 0.57$

$= 0.51$

Step 5 *Design flood magnitude:* $Q_{1yr,\ tc} = 0.00278 \times C_1 \times I_{1,\ 0.16} \times A_t$

$= 0.00278 \times 0.51 \times 46.5 \times 1.78$

$= 0.12$ m³/sec

PART B – Volumetric Design of Basin

Step 1 *Sediment settling zone design inflow rate*

$Q_{(d)} = 0.25 \times Q_{1yr, tc}$

$= 0.25 \times 0.12$

$= 0.03\ m^3/sec$

Step 2 *Basin surface area*

$A_s = 4100 \times Q_d$

$= 4100 \times 0.03$

$= 123\ m^2$

Step 3 *Length and width*

$W = \sqrt{(A_s / 3)}$

$= \sqrt{(123 / 3)}$

$= 6.4\ m$

$L = W \times 3$

$= 6.4 \times 3$

$= 19.2\ m$

Step 4 *Depth of sediment settling zone* = Type C basins adopt 0.6 m

Step 5 *Sediment <u>settling zone</u> volume*

$V_{set} = W \times L \times d$

$= 6.4 \times 19.2 \times 0.6$

$= 73.7\ m^3$

Step 6 *Two month sediment <u>storage zone</u> volume*

$$V_{store} = \frac{0.17 \times A_d\ (R \times K \times LS \times C \times P)}{b.d}$$

$$= \frac{0.17 \times 1.78\ (1705 \times 0.026 \times 1.09 \times 1.0 \times 1.3)}{1.3}$$

$= 14.6\ m^3$

Step 7 *Depth of two month sediment storage zone*

$$d_{store} = \frac{V_{store}}{A_s}$$

$$= \frac{14.6}{123}$$

= 0.12 m

Step 8 *Type C Sediment Basin Volume* = volume of settling + volume of storage
= 73.7 m^3 + 14.6 m^3
= 88.3 m^3

Type C Basin Summary – Bore 8 Compound Sediment Basin

Basin width (min)	= 6.4 m	
Basin length (min)	= 19.2 m	
Total depth (min)	= 0.72 m	(0.6 m settling zone + 0.12 m storage zone)
Total volume (min)	= 88 m^3	(approx. 49.4 m^3/ha)

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