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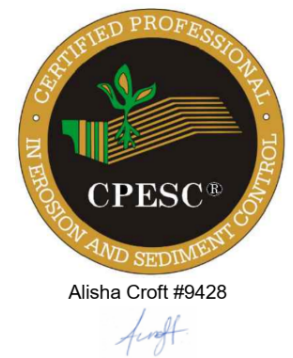
Erosion & Sediment Control Plan

‘Covella’ – Eastern Precinct & Western Precinct

Erosion and Sediment Control Plan

Revision No	Date	Prepared by	Reviewed By	Approval
0	29/11/2023	Ashleigh Bourne	Morgan Hamilton	Alisha Croft (CPESC #9428)
1	13/02/2024	Ashleigh Bourne	Morgan Hamilton	Alisha Croft (CPESC #9428)
2	31/05/2024	Ashleigh Bourne	Alisha Croft	Alisha Croft (CPESC #9428)
3	08/08/3034	Ashleigh Bourne	Alisha Croft	Alisha Croft (CPESC #9428)

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PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2024/1554
Date: 20 December 2024

1. SCOPE

This Erosion and Sediment Control Plan (ESCP) has been developed for the construction package of 'Covella' Estate Eastern Precinct (Stages 20, 21, 24, 25, 26) and Western Precinct (Stages 12-16) Greenbank QLD.

1.1 Guidelines

This ESCP has been prepared in accordance with the following document(s):

- Best Practice Erosion and Sediment Control (IECA, 2008)

1.2 Certification

This ESCP will be reviewed and certified by a CPESC prior to commencement of works. This review and certification will ensure the plan has been prepared to satisfy the intent and minimum standards nominated within the IECA (2008) Best Practice Erosion and Sediment Control Guideline.

2. PROJECT DESCRIPTION

2.1 Location & Land use

The site is located within the 'Covella' development located within the Logan City Council LGA. Site boundaries for the work area and individual stages have been delineated below (**Figure 1**).

Stage 21 & Eastern Precinct: Topography of the site generally sloping outwards from a high point at the Eastern end of road box in Stage 21.

Western Precinct Area: Topography of the site is generally sloping from West to East.

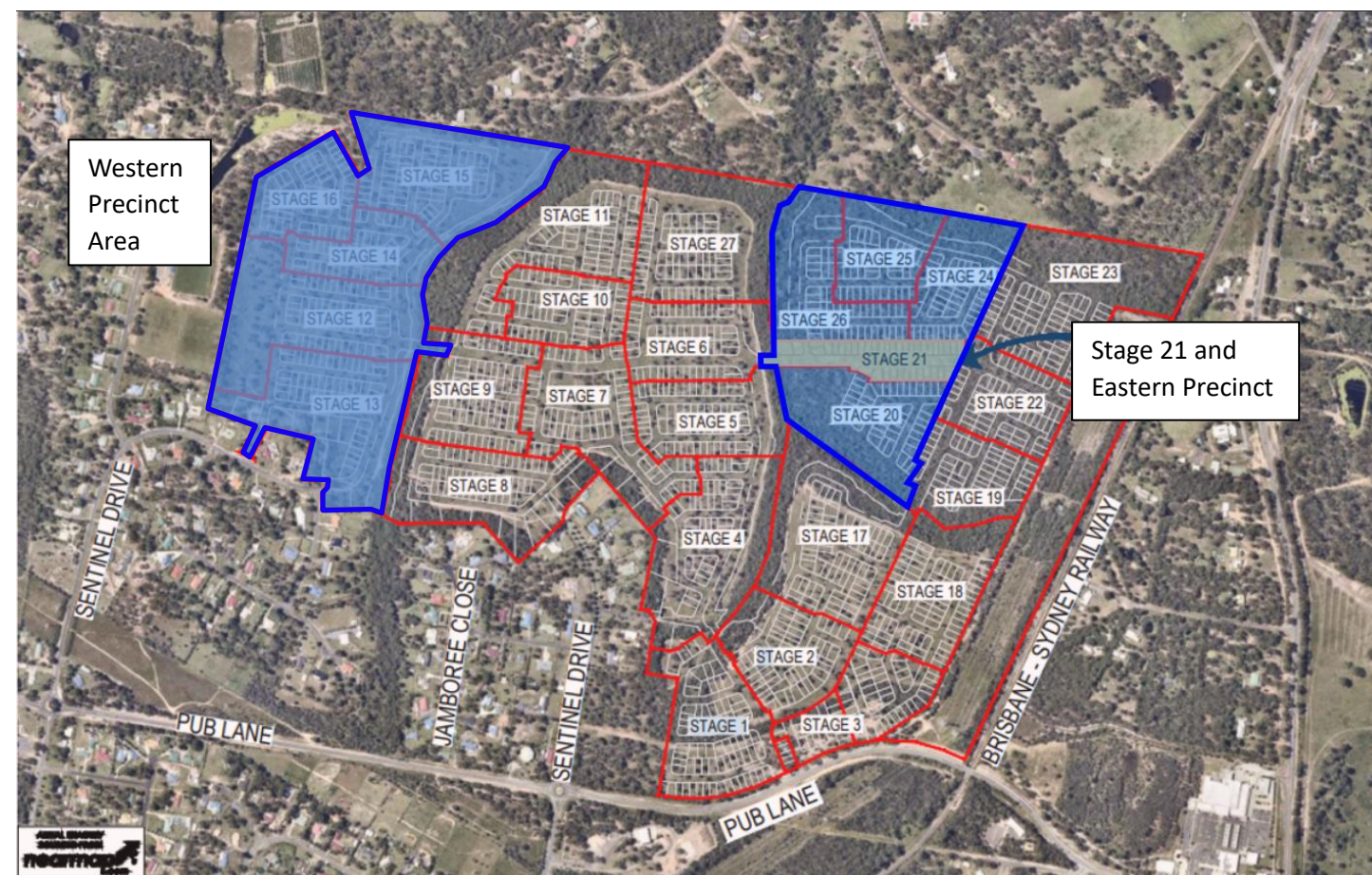


Figure 1: Locality Plan

2.1.1 Scope of Works

The scope of works is as follows:

- Bulk Earthworks
- Roadworks and Civilworks

3. SITE DESCRIPTION

3.1 Climate & Rainfall risk

Historic rainfall data for Greenbank Thompson Road (Station No. 40659) the closest long-term gauging station to the site, is illustrated in **Figure 2**. Relatively wetter conditions typically occur from October to March and drier conditions tend to persist from April to September. The corresponding Erosion Risk Rating (rainfall depth) is colour coded from **Table 1** (Based on IECA Table 4.4.2).

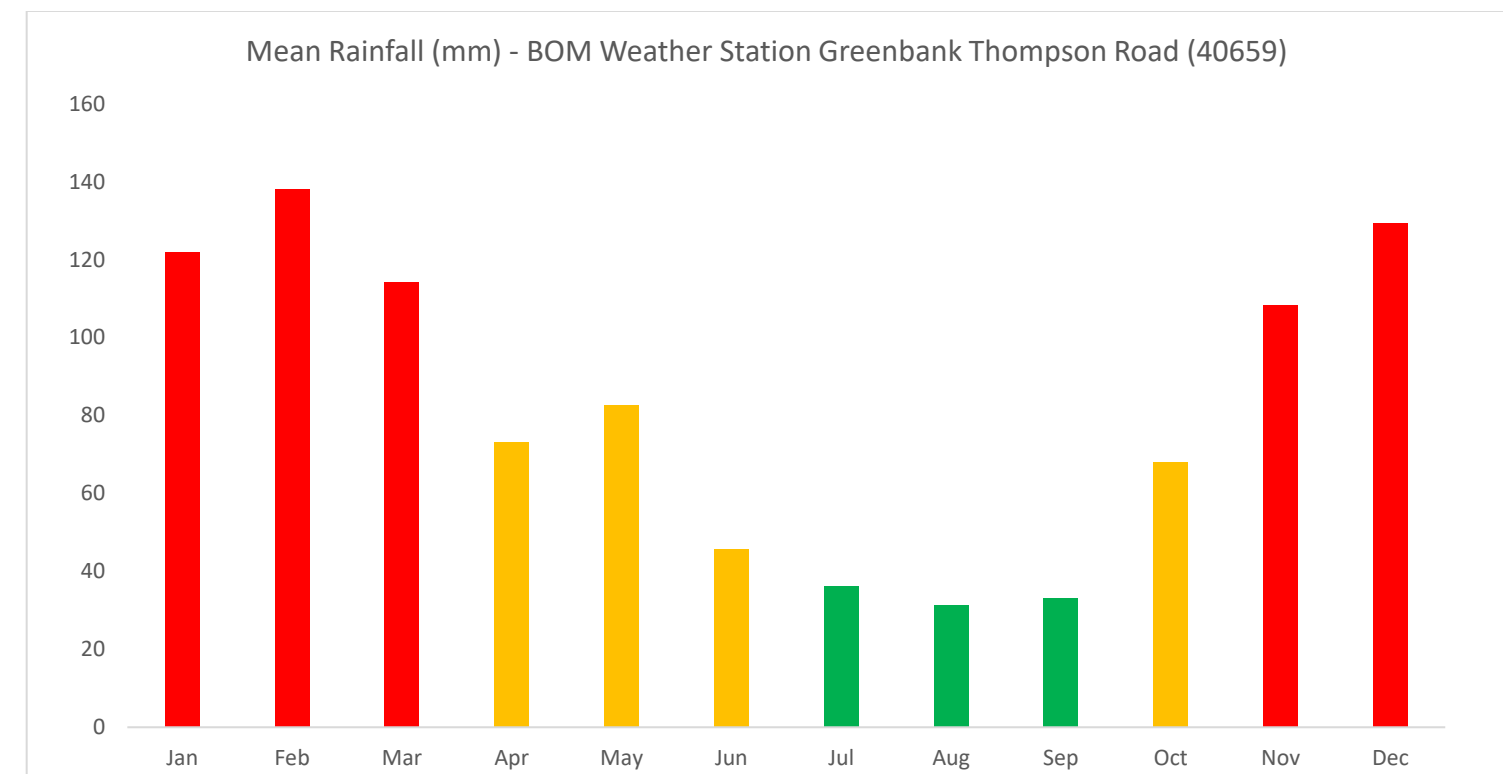


Figure 2: Mean Rainfall data, Greenbank Thompson Road Weather Station #40659

Table 1: Erosion Risk Rating Categories (rainfall depth) as per Table 4.4.2, IECA, 2008

Erosion Risk Rating	Average Monthly rainfall depth (mm)
Very Low	0 to 30
Low	30+ to 45
Moderate	45+ to 100
High	100+ to 225
Extreme	>225

3.2 Topography and drainage

Based on a site inspection and contours presented from drone imagery, the existing ground surface level across the Eastern Precinct is generally sloping outward from a high point at the Eastern end of road box in Stage 21. (**Figure 4**). Gradients

vary between sub catchments ranging from 2% to 5%. In the Western Spoil Area the ground surface level generally slopes down from West to East at an approximate gradient of 5%.

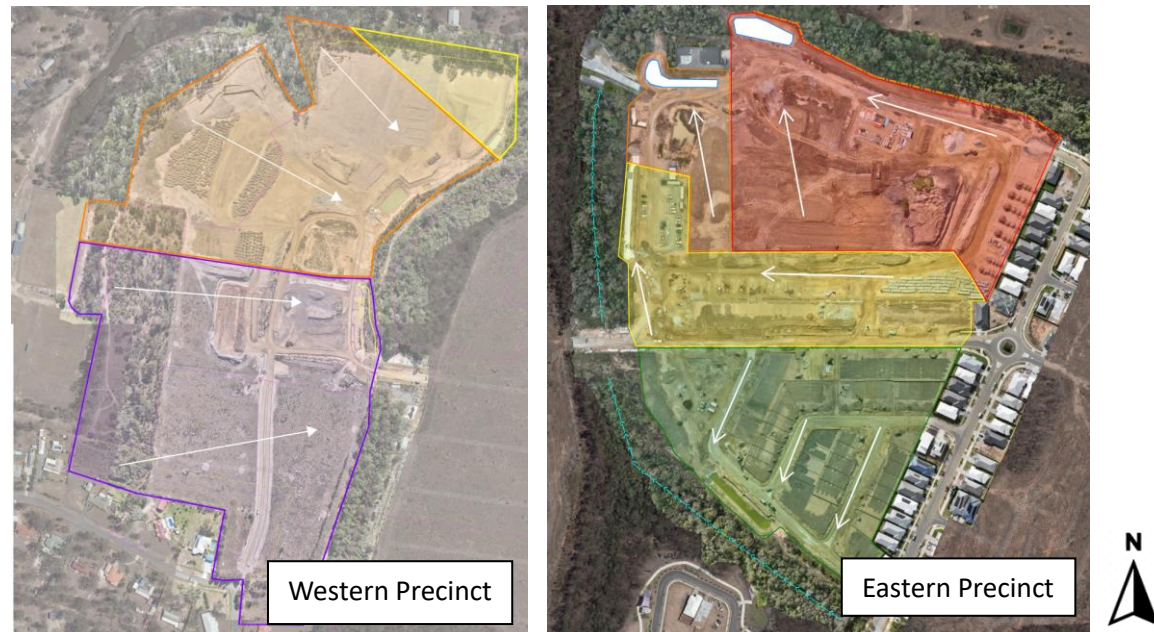


Figure 3: slope directions

3.3 Soils

Soils located onsite consist of clayey/silty sand and sandy/silty clay. As such a conservative assumption has been made for the K factor resulting in an adopted K factor of 0.051.

4. RISK ASSESSMENT

4.1 IECA Soil loss assessment

Based on the requirements of IECA (2008), an erosion risk assessment has been conducted using the Revised Universal Soil Loss Equation (RUSLE). The calculated soil loss is then used to determine the level of sediment control required.

$$A = K \times R \times LS \times P \times C$$

Equation 1 (IECA 2008)

Where:

A is the predicted soil loss (t/Ha/yr)

K is the soil erodibility factor

R is the rainfall erosivity factor

LS is the slope length/gradient factor

P is the erosion control practice factor

C is the ground cover and management factor

4.1.1 K - Factor - Soils

Soils located onsite consist of clayey/silty sand and sandy/silty clay. As such a conservative assumption has been made for the K factor resulting in an adopted K factor of 0.051.

4.1.2 R - Factor - Rainfall

An annual erosivity factor of 3262 has been adopted based on a 2-year, 6-hour rainfall intensity of 12.3mm/hr and the following equation from section E3.2 of IECA (2008). Monthly R-factor is presented in **Table 3**.

$$R = 164.74 (1.1177)^S 0.6444$$

Table 2: Monthly R-factor values for the site

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
591	604	451	252	157	140	98	69	69	170	264	398	3262

4.1.3 LS – Slope Length

As described in Section 3.2, the topography of the site comprises of moderate slopes. Grades, slope lengths and corresponding LS-factors are summarised in **Table 3**.

Table 3: LS factor for individual sub catchments

Site	Grade (%)	Slope length (m)	LS
Eastern Red	6	80	1.47
Eastern Orange	6	80	1.47
Eastern Yellow	1 (FSL)	40	0.16
Eastern Green	1 (FSL)	40	0.16
Western Orange	5	80	1.19
Western Yellow	5	80	1.19
Western Purple	4	80	0.91

4.1.4 Cover (C) and Practice (P) Factors

A C factor of 1 has been adopted in accordance with industry practice to reflect the worst-case level of cover offered during the proposed development activities.

The P factor represents the combined effect of management practices and structural methods to control erosion. An industry default P factor value of 1.3 has been applied to the risk assessment, which is recommended for the construction phase condition (per table E11 of IECA, 2008).

4.1.5 Estimated Soil Loss

Results of the erosion risk assessment are presented in **Table 4**. Control type derived from IECA (2008) Table 4.5.1

Table 4: Estimated soil loss from each site catchment

Site	Disturbed Area (HA)	R	K	LS	P	C	A (t/ha/yr)	A (t/yr)	Adopted Control
Eastern Red	5.3	3262	0.051	1.47	1.3	1	317.9	1685	Type 1
Eastern Orange	1.34	3262	0.051	1.47	1.3	1	317.9	426	Type 1
Eastern Yellow	3.29	3262	0.051	0.16	1.3	1	34.6	114	Type 3 triggered, Type 1 adopted
Eastern Green	4.48	3262	0.051	0.16	1.3	1	34.6	155	Type 3 triggered, Type 1 adopted
Western Orange	9.92	3262	0.051	1.19	1.3	1	257.4	2553	Type 1
Western Yellow	1.74	3262	0.051	1.19	1.3	1	257.4	448	Type 1
Western Purple	12.78	3262	0.051	0.91	1.3	1	196.8	2515	Type 1



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Due to a maximum estimated soil loss of 317.9 t/ha/yr based on worst case soil loss, the Erosion risk for the project area is nominated as Moderate in accordance with Table 4.4.3 of IECA (Table 5).

Erosion and sediment control will be installed for the project in accordance with the risk profile and specific constraints of the site (Table 6).

Table 5: Erosion risk rating based on estimated soil loss rate (as per Table 4.4.3 IECA 2008)

Erosion Risk Rating*	Soil loss (t/ha/yr)
Very Low ✓	0 to 150
Low	150+ to 225
Moderate	225+ to 500
High	500+ to 1500
Extreme	>1500

Table 6: Erosion Control Standards

Erosion Risk as per Table 4.4.7 of IECA	Limit of forward Clearing	Stabilisation – Temporary	Stabilisation – Permanent
All	All reasonable and practicable steps taken to apply best practice erosion control measures to completed earth works, or otherwise stabilise such works, prior to anticipated rainfall-including existing unstable, undisturbed, soil surfaces under the management or control of the building/construction works.		
Low	Clearing and stripping is limited to 8 weeks prior to the scheduled commencement of bulk earthworks	Unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 30 days	Disturbed soil surfaces are stabilised with a minimum 70% cover within 30 days of the completion of works within any area of a work site.
Moderate	Clearing and stripping is limited to 6 weeks prior to the scheduled commencement of bulk earthworks	Unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 20 days.	Disturbed soil surfaces are stabilised with a minimum 70% cover within 20 days of the completion of works within any area of a work site.
High	Clearing and stripping is limited to 4 weeks prior to the scheduled commencement of bulk earthworks	Soil Stockpile & unfinished earthworks are suitably stabilised if rainfall is reasonably possible, and disturbance is expected to be suspended for a period exceeding 10 days.	Disturbed soil surfaces are stabilised with a minimum 75% cover within 10 days of the completion of works within any area of a work site

5. GENERAL NOTES

- This Erosion and Sediment Control Plan (ESCP) has been prepared to provide a site specific ESCP to demonstrate the management of erosion and sediment control in accordance with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008).
- This ESCP shall be supplemented by Progressive Erosion and Sediment Control Plans (PESCP). PESCPs are to be developed to identify the specific location and, where required, additional erosion and sediment controls applicable to individual work stages. PESCPs shall be documented via mark ups to approved plans. Where a change in the level of sediment control standard is proposed in a PESCP, the PESCP shall be reviewed and approved by an appropriately qualified person prior to the change being implemented.
- Minimise the extent and duration of disturbance, maintaining existing ground cover to the greatest extent possible.
- Commissioning / decommissioning of plant and refuelling to be undertaken a minimum of 30m away from any watercourse/drainage line.
- All ERSED controls to be inspected regularly (weekly, pre/post rainfall event i.e. forecast or actual rainfall of >10mm) with maintenance/repairs to be undertaken when necessary

- Revegetation of disturbed/bare areas to be progressively implemented
- Where clean water drains and sediment traps/sumps are necessary, all clean water drains and sediment traps and associated drainage must be installed and commissioned prior to the commencement of any grubbing works within the catchment area
- All controls must be installed within approved project footprint.
- Ensure all site access is stabilised with rumble grid and clean rock.

6. DEWATERING AND WATER QUALITY

- Basins/sumps to be dewatered prior to rain event that is likely to produce runoff; however, during dry conditions water may be retained in the settling pond as a source of construction water (i.e. dust suppression).
- If possible, it is recommended that dewatering/spread of collected runoff from basins be applied to well vegetated lands at least 40m away from any waterway to allow it to infiltrate within the site boundary, if this is done, ensure water is applied slowly and in a manner that avoids concentrated surface runoff and/or erosion.
- If actively discharging (pumping or siphoning) the water out of the basin, water must be treated to achieve, pH 6.5-8.5, <10mg/L oil and grease and no visible trace and a standard 90%ile total suspended solids concentration not exceeding 50mg/L or 50%ile NTU reading (as per IECA Best Practice Erosion and Sediment Control Guidelines Appendix B) and no more than a 10% increase in background conditions.
- Where captured basin water is to be used onsite for dust suppression or construction purposed, water does not require testing or treatment.

7. DESILTING

- Install an appropriate painted desilting marker in the basin to indicate top of sediment storage zone. Basin must be desilted if the next storm event is likely to cause sediment to rise above this marker point; or if sediment is already above the marker; or if the sediment has exceeded 90% of the nominated sediment storage volume.
- Removal of all sediment/materials collected from the basin to be disposed of in a suitable manner that will not cause an erosion or pollution/environmental hazard.
- Refer to ESCP for recommended volume and dimensions for proposed sediment basin. Note that all dimensions are approximate and subject to verification with review of detailed ground survey and alignment.
- All earthen embankments (for basins or otherwise) greater than 1m in height to be certified by a qualified geotechnical specialist to ensure structural integrity for the desired design criteria and anticipated period of operation
- Upon decommissioning of sediment basins, all water contained within must be removed and disposed of appropriately before the removal of any basin embankments.

8. OVERVIEW OF KEY ESC TECHNIQUES

Drainage Controls – Catch Drains (CD) and Diversion Banks (DB)

This ESCP identifies the location of catch drains and diversion banks required to divert upslope clean water away from areas of soil disturbance, stockpiles and excavations, and to collect dirty runoff water from disturbed areas and stockpiles and direct it to a sediment trap and to control water flow through the worksite to avoid damage to unfinished areas of earthworks and infrastructure.



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Sediment Controls

The following key sediment controls are specified in this plan and have been applied to individual catchments based on the results of the RUSLE soil loss predictions (Section 3.5).

Sediment basin (Type 1) – Due to the size and slopes present onsite, one Type 1 sediment basin has been nominated to capture and treat site runoff in applicable catchments (Eastern Precinct red, green and blue. Western Spoil precinct orange and yellow).

Rock Checks/Filter Dam – Where drainage topography allows, rock checks have been utilised to slow the velocities of site dirty water.

Sediment fence (Type/3) –Type 3/perimeter controls may be constructed from sediment fence or mulch bunds.

Site Exit / Entry - To prevent sediment tracking onto public roads, stabilised rock pad entry locations have been identified. Associated drainage and sediment controls have been identified to contain and treat runoff in accordance with the adopted sediment control standard for individual catchments. Adjacent roads should be inspected regularly, and any sediment deposited on public roads should be removed in a safe manner and disposed of to an approved disposal facility

9. STOCKPILE MANAGEMENT

Place stripped soil at approved stockpile locations

Stockpile topsoil at a height no greater than 2m.

Stockpile any excess subsoil or spoil separately from topsoils and at designated stockpile locations upslope of sediment traps.

Install non-woven sediment fence (bidim A34 or equiv) around stockpiles as per SD-FF-1

Where topsoil stockpiles will remain undisturbed for greater than nominated erosion standard, apply seeding of a cover crop at the rate of 10kg/ha to topsoil stockpiles. Refer to revegetation specifications for seed mix.

Where subsoil / spoil stockpiles will remain undisturbed for greater then nominated erosion standard, apply temporary cover or soil binder.

Temporary Stabilisation Erosion Standard

Month	Temporary Stabilisation Erosion Standard
Dec, Jan, Feb	10 days
Mar – Jun, Oct – Nov	20 days
July – Sept	30 days

10. INSPECTIONS & MONITORING

All erosion and sediment control measures, including drainage measures, must be always maintained and in proper working order during their operational life.

All drainage, erosion and sediment controls shall be inspected daily when rain is occurring (if site access is available) weekly, prior to and following a rainfall event of sufficient intensity and duration to cause on-site runoff immediately prior to and following periods of site shutdown.

Inspections shall include checks of all drainage, erosion and sediment control measures including site discharge points for:

- evidence of excessive sediment transport and or deposition either on or off site
- evidence of excessive erosion either on site or immediately downstream
- treatment and de-watering requirements for sediment basins / sediment traps
- the progress and stability of site rehabilitation and revegetation works.

Where inspections identify a non-conforming control measure, or issues that are likely to prevent the achievement of the erosion and sediment control objectives, corrective or preventative actions will be developed and implemented as necessary to achieve the required erosion and sediment control performance standards.

A written record / register of monitoring observations and maintenance tasks shall be kept on site and available for inspection.

11. SITE REHABILITATION

Once roadworks, drainage and service installation works are completed, stabilisation will be applied in the form of hydromulch, turf and/or mulch blankets.



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Appendix A : Erosion and Sediment Control Drawings

Erosion Sediment Control Plan
Site: Eastern Precinct
Stage: Bulk Earthworks/Civils

Basin 2
Required volume: 383 m3
Target dimensions: 419m2(area) x 1.0m(D)

Basin 1
Required volume: 1513 m3
Target dimensions: 807m2(area) x 1.9m(D)

Basin 3
Basin not triggered, sediment trap triggered minimum area 160m2.
Design basin dimensions sufficient: 361m2(area) x 0.6m (D)

Basin 4
Required volume: 1210 m3
Target dimensions: 80m(L) x 15m(W) x 1.0m(D)

Cut diversion drain/bund

Decommission

Decommission

1.34ha

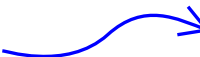
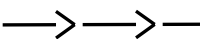
5.30ha

3.29ha

4.48ha

Maintain
shoulder bund
behind carpark
until lots are at
finished
surface level

LEGEND:

- Site water (sheet flow) 
- Site water drain 
- Clean water 
- Rock check 
- Batter chute 
- Sediment basin 
- Stabilised site access 
- Catchments 
- Perimeter control (Sediment Fence/Mulch Bund) 

METHODOLOGY:

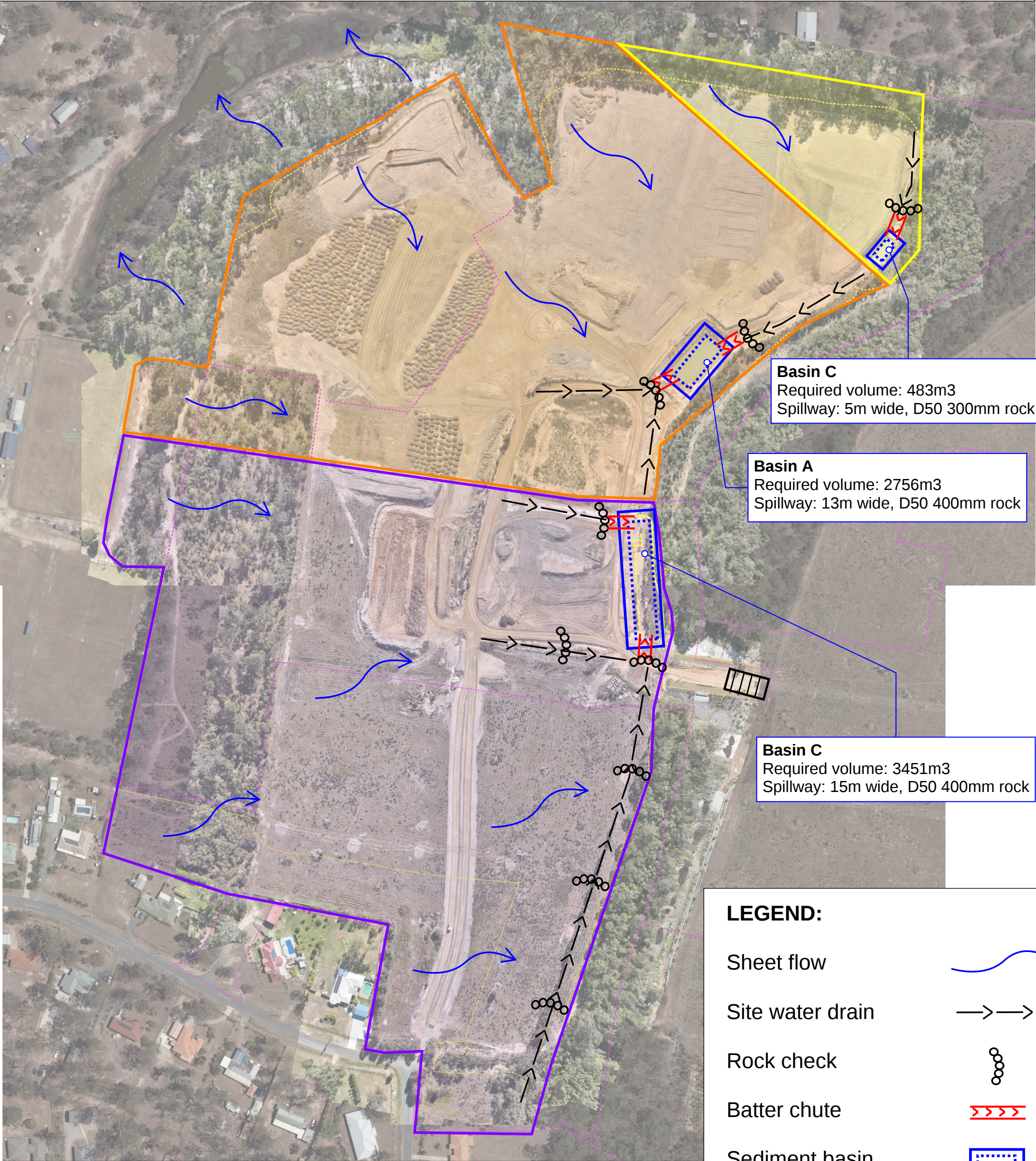
1. Establish all no-go zones with flagging and signage. Construct Site water drains and ensure perimeter controls are in working order
2. Construct Basin 1
3. Partially backfill basin existing "red catchment" basin
4. Undertake topsoil stripping.
5. Construct check dams in site water drains at no more than 80m intervals. These can be constructed from rock, sandbags or coir logs.
6. Expand Basin 2 to meet "green catchment" required capacity
7. Undertake bulk earthworks and maintain ESCs
8. Undertake civil works and continue to direct site water to sediment basins and traps.
9. Undertake site stabilisation via design surface treatments and landscaping/revegetation



Erosion Sediment Control Plan

Site: Western Precinct

Stage: Bulk Earthworks



METHODOLOGY:

1. Establish all no-go zones with flagging and signage. Construct Site water drains and ensure perimeter controls are in working order
2. Construct sediment basins
3. Construct check dams in site water drains at no more than 80m intervals. These can be constructed from rock, sandbags or coir logs
4. Undertake bulk earthworks and maintain ESCs
5. Undertake civil works and continue to direct site water to sediment basins
6. Undertake site stabilisation via design surface treatments and landscaping/revegetation



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Appendix B : Standard Drawings and Calculations



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Appendix C

Basin size calculations:

EROSION HAZARD & SEDIMENT BASINS							
Site Name:	Covella Eastern Precinct			Covella Western Precinct			
Stage:	Bulk Earthworks			Bulk Earthworks			
Other:							
Site Area	Sub-catchment						
	Red	Orange	Yellow	Green	West orange	West yellow	West purple
Total Catchment Area (ha)	5.3	1.34	3.29	4.48	9.92	1.74	12.78
Disturbed Catchment Area (ha)	5.3	1.34	3.29	4.48	9.92	1.74	12.78
Soil Analysis							
Sediment Type (C, F or D) if known	D	D	D	D	D	D	D
Soil Texture Group	D	D	D	D	D	D	D
Rainfall Data							
Design Rainfall depth (no of days)	5	5	5	5	5	5	5
Design Rainfall depth (percentile)	80	80	80	80	80	80	80
x-day, x-percentile rainfall event (mm)	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Rainfall R-factor (if known)	3262	3262	3262	3262	3262	3262	3262
RUSLE Factors							
Rainfall erosivity (R -factor)	3262	3262	3262	3262	3262	3262	3262
Soil Erodibility (K -factor)	0.051	0.051	0.051	0.051	0.051	0.051	0.051
Slope Length (m)	80	80	40	40	80	80	80
Slope Gradient (%)	6	6	1	1	5	5	4
Length/gradient (LS -factor)	1.47	1.47	0.16	0.16	1.19	1.19	0.91
Erosion control practice (P -factor)	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Ground cover (C -factor)	1	1	1	1	1	1	1
Sediment Basin Design Criteria							
Storage (soil) zone design (no of months)	2	2	2	2	2	2	2
Cv (Volumetric Runoff Coefficient)	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Calculations and Basin Volumes							
Soil loss (t/ha/yr)	318	318	35	35	257	257	197
Soil Loss Class							
Soil loss (m3/ha/yr)	245	245	27	27	198	198	151
Soil loss (m3/catchment/yr)	1296	328	88	119	1964	344	1935
Basin Triggered?	Yes	Yes	No	No	Yes	Yes	Yes
Sediment basin storage (soil) volume (m3)	216	55	15	20	327	57	322
Sediment basin settling (water) volume (m3)	1297	328	805	1097	2428	426	3129
Sediment basin total volume (m3)	1513	383	820	1117	2756	483	3451

Basin spillway design:

							WEIR						CHUTE						DISSIPATER			
BASIN ID	CATCH AREA (HA)	ARI	C _{ARI}	TIME OF CONC (MINS)	I _{ARI}	FLOW - Q (m ³ /s)	BASE WIDTH	SIDE SLOPE 1 (1 in x)	U/S WATER LEVEL (m)	FREEBOAR D (m)	MIN. HEIGHT SPILLWAY TO TOB (m)	TOP WIDTH (m)	LONG. SLOPE (m/m)	ROCK SIZE - D ₅₀ (mm)	MANNING ROUGH COEFF	DESIGN VEL (m/s)	DEPTH OF FLOW (m)	DEPTH WITH F/BOARD (m)	MEAN ROCK SIZE - D ₅₀ (mm)	WIDTH 1 (m)	WIDTH 2 (m)	LENGTH (m)
West -orange	9.92	20	0.49	19	136	1.84	13	4	0.13	0.3	0.43	16.43	5	394	0.364	2.17	0.06	0.36	100	16.5	16.7	2
West - yellow	1.74	20	0.49	10	180	0.43	5	4	0.13	0.45	0.45	8.60	5	305	0.299	1.26	0.06	0.36	100	8.5	8.5	1.3
West - purple	12.78	20	0.49	21	129	2.24	15	4	0.13	0.45	0.45	18.60	5	405	0.374	2.32	0.06	0.36	100	18.5	18.7	2

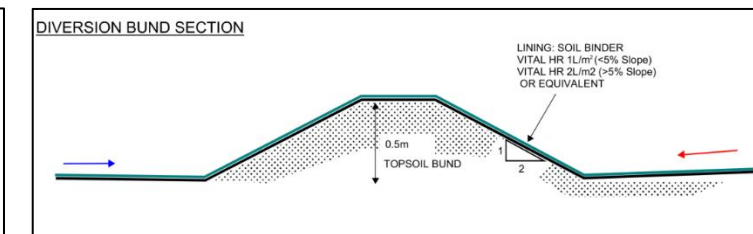
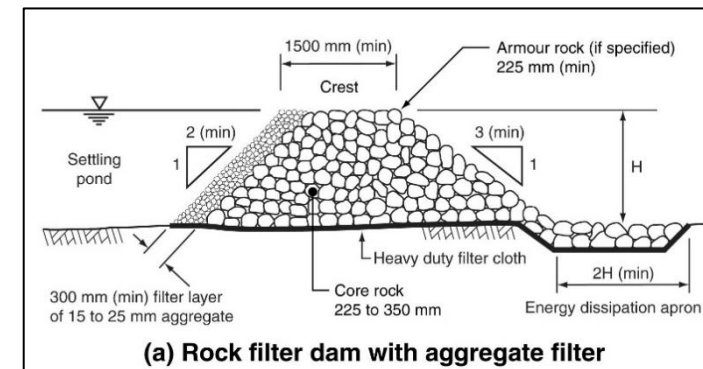
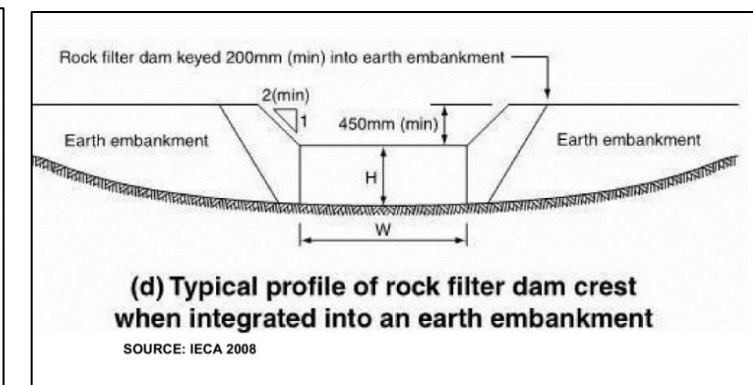
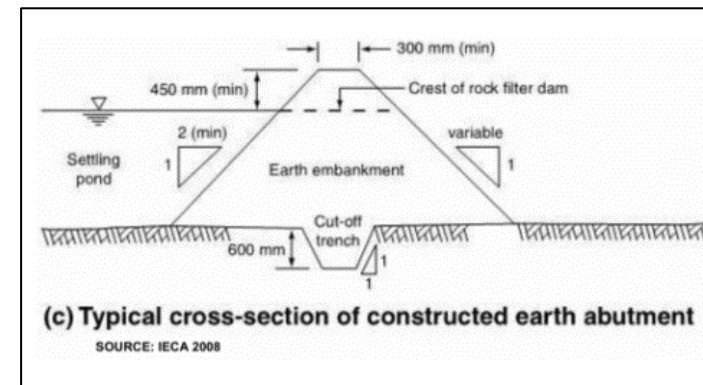
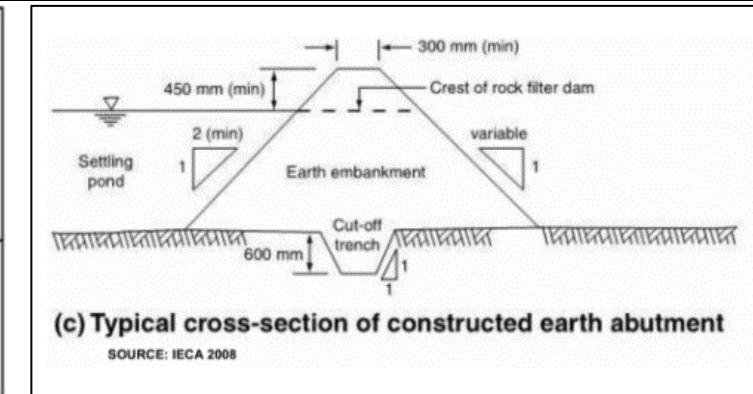
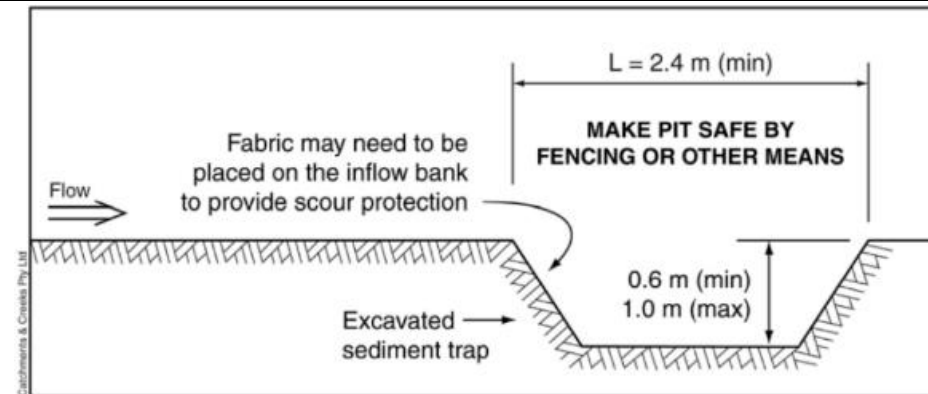
Design standard	Critical sediment size (mm)	Surface area of settling pond per unit discharge (m ² /m ³ /s) ^[1]			Allowable through-velocity (m/s)
		10° C ^[2]	15° C ^[2]	20° C ^[2]	
Type 3 sediment trap	0.50	6	5.2	4.6	0.3
	0.20	38	33	29	0.3
	0.15	67	60	52	0.3
Type 2 sediment trap	0.10	150	130	115	0.2
Type 1 sediment trap	0.05	600	525	460	0.2
	0.04	940	820	720	0.2
	0.02	3700	3230	2860	0.2

[1] Pond area is based on a rectangular pond operating with uniform inflow conditions across its width.

[2] Assume a pond temperature the same as the typical rainwater temperature during the time of year when the pond is likely to be operating at capacity.

Classification	Minimum particle size	Typical trapped particles
Type 1	< 0.045mm	Clay, silt & sand
Type 2	0.045 – 0.14mm	Silt & sand ^[1]
Type 3	> 0.14mm	Sand
Supplementary	> 0.14mm	Sand

[1] Technically, silt particles have a grain size of 0.002 to 0.02mm, which means that only Type 1 sediment traps are likely to capture silt-sized particles. However, for general discussion purposes, it can be assumed that Type 2 systems capture a significant proportion of silt-sized particles.



Site access Arrangement

