ECM DRAWING GUIDELINES

PUB
Catchments & Waterways Department

Version Oct 2022

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This 'ECM Drawing Guidelines' aims to specify the standard element symbology and presentation format for the submission of ECM drawings to PUB.

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GENERAL DRAWING GUIDELINE

1. Drawing views, annotations & labels should not overlap. Use appropriate drawing scale and split drawing views into multiple sheets as required.

2. Background layer shall be clean and in black/white . Hide/remove irrelevant CAD layers. (i.e. keep spot level layer)

3. Hatch patterns should be kept to minimum.

4. Text orientation should be <u>horizontal only</u>.

5. All ECM elements shall be annotated clearly on all drawing views.

6. Drawing shall be submitted in colour and complete legend must be provided.

7. ECM Drawings shall follow PUB's standard symbology, colour, font size, line thickness and table formats.
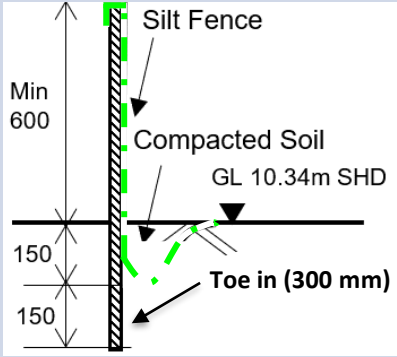
STANDARDISED ECM PLAN – SAMPLE
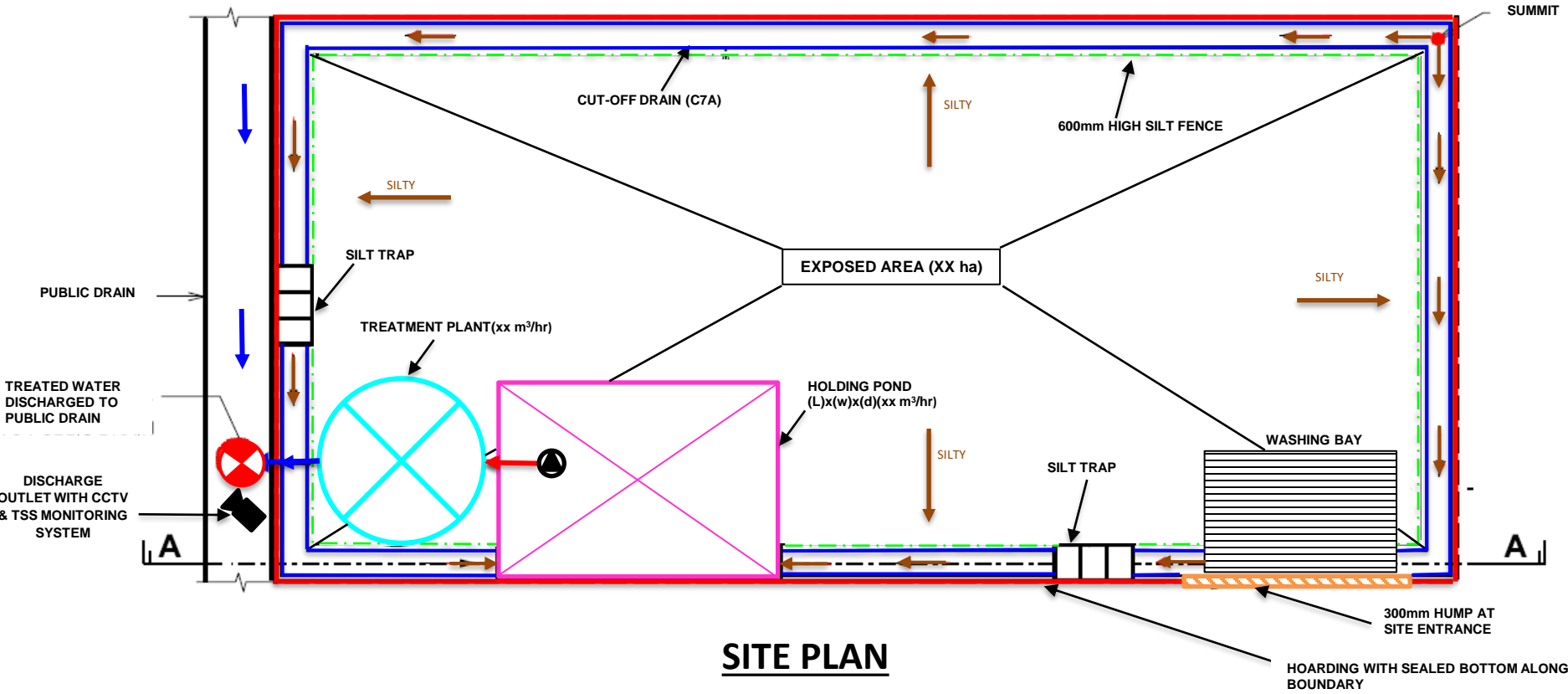
SITE PLAN

ECM DESIGN SUMMARY

Area	Total Site Area (ha)	Max Exposed Area (ha)	Total Runoff Volume (m³)	Storage Tank Volume (m³)	Cut-off Drain volume (m³)	Total Storage Volume(m³)	Water Treatment plant provided (m³/hr)
Area 1	0.24	0.12	62.00	33.00	30.00	63.00	10.00
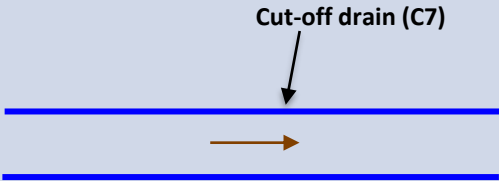
ELEMENT LABELS

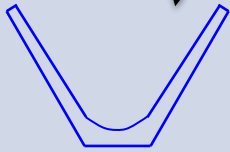| Element Labels	Description	Standard Symbols/ Line type & Colour
Ground Level	To be indicated in cross and longitudinal section showing excavation. In Singapore Height Datum	On site plan: Indicated as spot levels. On cross section: E.g. ▼ GL 10.34m SHD
Silt Fence (xxx mm)	Silt fences minimum 600mm in height.	On site plan: Green – DWG colour code 3 (RGB 0,255,0) ━ ∙ ━ ∙ ━
Toe In (xxx mm)	To be indicated in cross section drawing. Toe in to be minimum 150mm.	On cross section:

ELEMENT LABELS

Line wt = 1mm / Symbol: Full Fill= 1
Or whichever for clear presentation

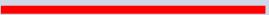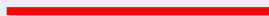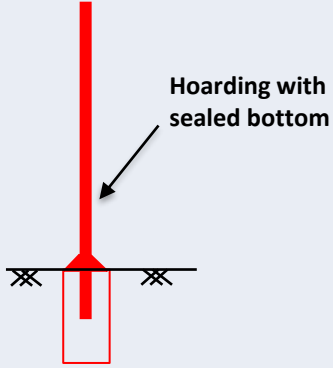| Element Labels	Description of Elements	Recommended Symbols/ Line type & Colour
Exposed Area (xxx ha)	Area within site that is bare/ erodible surfaces	No hatching. AutoCad Fill = 0
Unexposed Area (xxx ha)	Area within site that is paved/ covered.	Concrete hatching/ Grey solid fill.
Cut-Off Drain (type/width)	Type/width and flow direction of drain to be indicated. For proposed precast channel drains – Indicate type *(Type e.g. C7)* For proposed U-drains – Indicate width *More than one type of drain may be used on site. To annotate clearly the drain type on site.*	On plan/ longitudinal section: Blue - DWG colour code # 5 (RGB 0,0,255) Brown – DWG Colour Code #34 (RGB 129,64,0) **Cut-off drain (C7)**

ELEMENT LABELS

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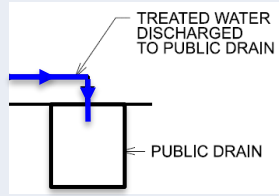| Element Labels	Description of Elements	Recommended Symbols/ Line type & Colour
Cut-Off Drain (type/width)	Type/width to be indicated. For proposed precast channel drains – Indicate type *(Type e.g. C7)* For proposed U-drains – Indicate width	On Cross- section: Blue - DWG colour code # 5 (RGB 0,0,255) **Cut-off drain (C7)**
Hump	Division hump separating the exposed and unexposed area within site.	On Plan: Orange – DWG Colour code # 30 (RG B 255,127,0)
Hump at site entrance	Raised hump/berm separating exposed and unexposed area at site entrance.	On Plan: Orange – DWG Colour code # 30 (RG B 255,127,0)

ELEMENT LABELS

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Or whichever for clear presentation

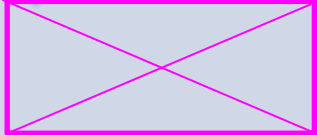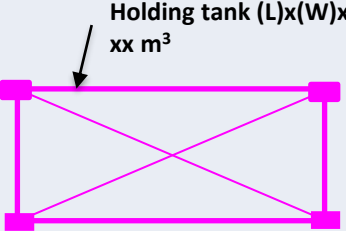| Element Labels	Description of Elements	Recommended Symbols/ Line type & Colour
Site Boundary	**Plan view** of Site Boundary	Red – DWG Colour code # 1 (RG B 255,0,0) ————
Hoarding with sealed bottom	**Plan view** of Hoarding along site boundary. Indicate as same line as site boundary	Red – DWG Colour code # 1 (RG B 255,0,0) ————
	Plan view of Hoarding with sealed bottom, if separate from site boundary. e.g. A&A Works in big factory compound	Purple – DWG colour Code #190 (RGB 127,0,255) ————
	Cross section of Hoarding with sealed bottom	Red – DWG Colour code # 1 (RG B 255,0,0) OR Purple – AutoCad Code #190 (RGB 127,0,255) **Hoarding with sealed bottom**

OPUB

ELEMENT LABELS

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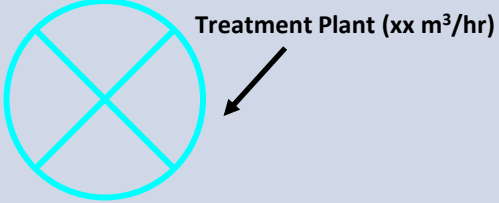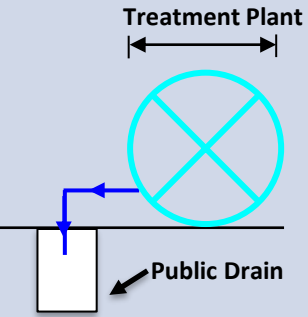| Element Labels	Description of Elements	Recommended Symbols/ Line type & Colour
Cut off Drain Invert Level	Level taken from the bottom of the inside of the drain. In Singapore Height Datum	INV 10.34m SHD
Summit Point	Highest point along the perimeter cut off drain. Level taken from the bottom of the inside of the drain.	Red – DWG Colour code # 1 (RG B 255,0,0) Brown – DWG Colour Code #34 (RGB 129,64,0) One Way: Two-way:
Silt trap	Shall be provided along the perimeter cut-off drain.	On Plan:
Public drain	To show the discharge from treatment plant to public drain in cross section drawing.	Blue - DWG colour code # 5 (RGB 0,0,255) TREATED WATER DISCHARGED TO PUBLIC DRAIN PUBLIC DRAIN

OPUB

ELEMENT LABELS

Line wt = 1mm / Symbol: Full Fill= 1
Or whichever for clear presentation

Element Labels	Description of Elements	Recommended Symbols/ Line type & Colour
Holding/Storage <u>Pond</u> (xx m³)	Storage pond with volume indicated**. To be located underground.** To indicate the max depth of storage pond in the cross-section drawing. Show the internal dimension If there are multiple storage ponds, to indicate as "Storage pond 1, (xx m³)"; "Storage pond 2, (yy m³) etc".	Magenta – DWG colour code #6 (RGB 255,0,255) Holding Pond (L)x(W)x(D) xx m³
Holding/Storage <u>tank*</u> (xx m³)	Holding Tank with volume indicated. **To be located above ground.** To show the internal dimension. If there are multiple Holding tank, to indicate as "Holding tank 1, (xx m³)"; "Holding tank 2, (yy m³) etc" *(*Only for MRT Tunnel projects, sewer trench or basement)*	Magenta – DWG colour code #6 (RGB 255,0,255) Holding tank (L)x(W)x(D) xx m³

The standard symbol for holding pond & treatment plant shall be used regardless of actual shape of holding pond/treatment on site.
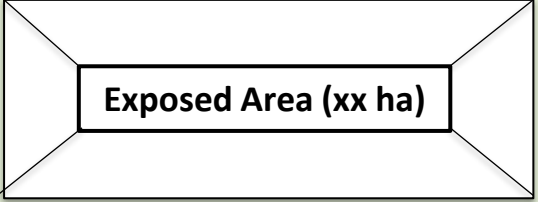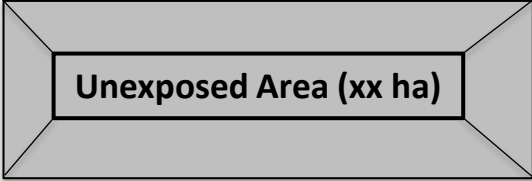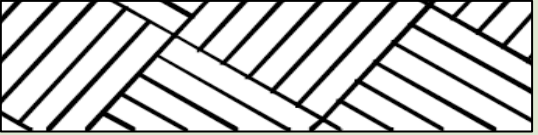
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ELEMENT LABELS

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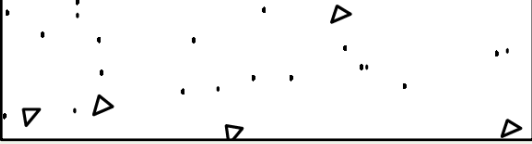| Element Labels	Description of Elements	Recommended Symbols/ Line type & Colour
Treatment Plant (xx m³/hr)	Treatment plant with capacity indicated. If there are multiple treatment plants, to indicate as "Treatment Plant 1 (xx m³/hr)"; "Treatment Plant 2 (yy m³/hr) etc"	On Plan: Cyan – DWG colour code #4 (RGB 0,255,255) Treatment Plant (xx m³/hr) On Cross section: Treatment Plant Public Drain
Discharge outlet with CCTV & TSS Monitoring system	Site more than 0.2ha or at sensitive area (e.g. reservoir area, next to waterway)	On Plan:

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ELEMENT LABELS

Element Labels	Description of Elements	Recommended Symbols/ Line type & Colour
Discharge Point	Discharge point of treated water into public drains. Discharge point of internal drains into public drains. Whenever possible, shall be via gravity.	On Plan: Red – DWG Colour code # 1 (RG B 255,0,0)
Pump	Pumps to transfer water from the storage pond into the treatment plant. Describe Pump type. (e.g. submersible pump)	On Plan:
Sand Bags (yy layers, xx mm)	Sand bags with number of layers and total height indicated. Sand bags are to be **a minimum two layers at a maximum height of 300mm.**	Brown – DWG Colour Code #34 (RGB 129,64,0) Plan Cross-Section

HATCH PATTERNS

Line wt = 1mm / Symbol: Full Fill= 1
Or whichever for clear presentation

Element Labels	Description of Elements	Recommended AutoCAD Hatch Pattern
Exposed Area (xx Ha)	Exposed area To be indicated in cross and longitudinal section showing excavations.	**Exposed Area (xx ha)**
Unexposed Area (xx Ha)	Unexposed area	Grey – DWG coour code #9 (RGB 128,128,128) **Unexposed Area (xx ha)**
Ground	When displaying a cross section/longitudinal section showing underground element, the ground level shall be hatched clearly. *(minimal hatching)*	Soil hatching
Paved Surfaces	Access path/ Road/ Site office areas *Not representing hardcore*.	Concrete hatching

ARROWS

Line wt = 1mm / Symbol: Full Fill= 1
Or whichever for clear presentation

Arrows	Drawings Required	Recommended AutoCAD Hatch Pattern
Flow of silty runoff		SILTY : Brown Solid Arrow Brown – DWG Colour Code #34 (RGB 129,64,0) SILTY →
Flow of clean runoff	Site plan, cross- section & longitudinal sections Clearly differentiate if discharge is silty or clean.	Clean : Blue Solid Arrow. Blue - DWG colour code # 5 (RGB 0,0,255) →
Flow of silty water from storage pond into treatment plant.	Site plan, cross section, longitudinal sections.	Red solid Arrow Red – DWG Colour code # 1 (RG B 255,0,0) →
Discharge point into public drain.	Site Plan	Clean: Blue solid Double Arrow Head Blue - DWG colour code # 5 (RGB 0,0,255) →→

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USEFUL RESOURCES ON ECM

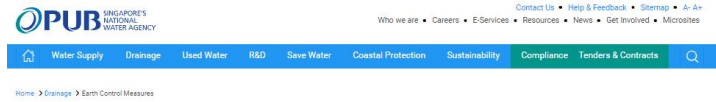For assistance/ enquiry: PUB BPU email PUB_BPU@pub.gov.sg.

BPU Qualified Persons Portal
via Singpass Login

https://bpu.pub.gov.sg/Forms/EForms
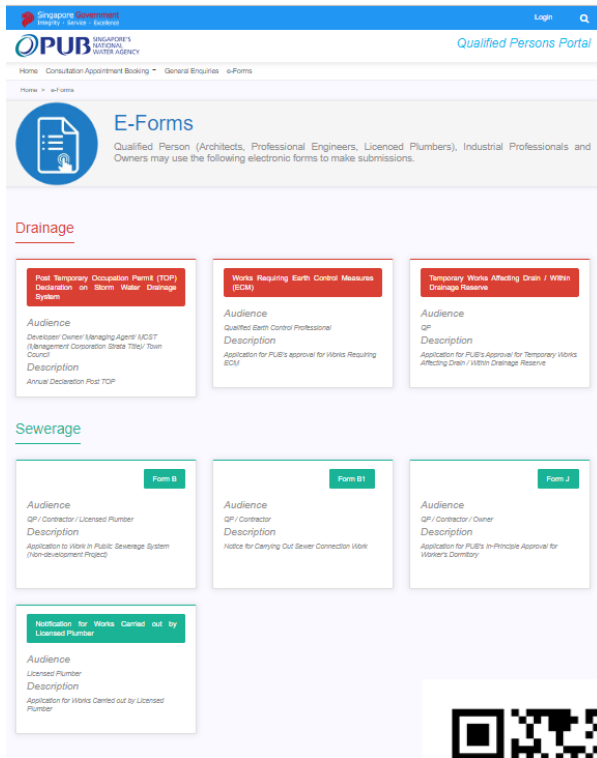
PUB Website - ECM
For latest circular & references

https://www.pub.gov.sg/drainage/earthcontrolmeasures

Thank You