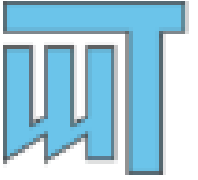




# ECM AWARDS 2024



## Kallang Whampoa C74



# Company Introduction



- Founded in 1987
- Grade A1 Builder
- Accomplished large varieties of distinguished projects



Residential – Private



Residential – Public



Industrial



Institutional



HDB  
Construction Awards



BCA  
Excellence Awards



BCA  
CONQUAS Star Awards



SCAL  
PIA Awards



SCAL  
WSH Innovation Awards



ROSPA  
Safety Awards



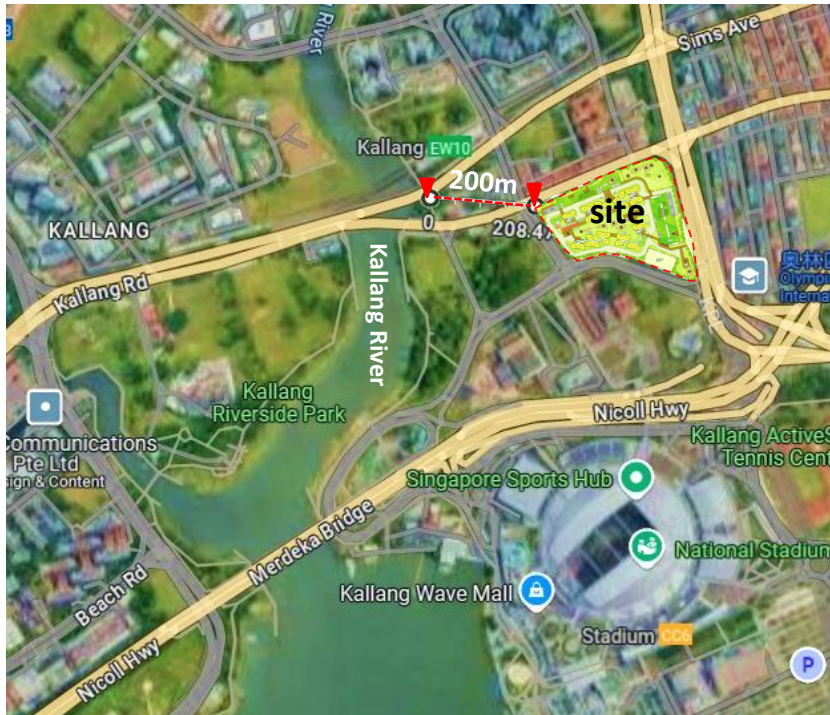


# Project Brief

## Verandah @ Kallang

Public Housing Development with 5 Block of Residential Block, a Commercial Block and a Multi-storey Carpark

### Project Location





# Introduction to Earth Control Measures

## Good Earth Control Measures Keep Our Waterways Clean and Beautiful

After a heavy downpour, our waterways often turn brown due to silt washed down from exposed earth surfaces and construction sites.

To tackle the problem of silty discharge, PUB has been working with stakeholders to implement good Earth Control Measures (ECM) practices through education and engagement, as well as technology upgrading.



Photo from PUB Website



Photo from PUB Website

## Mission for Earth Control Measures

**“ Good Earth Control Measures Keep our Kallang River Clean and Beautiful ”**



**Existing Kallang River Condition...**

**Effective ECM Journey Steps...**



# Effective ECM Journey Steps



# JOURNEY

**Stage-1**

ECM study and design

**Stage-2**

ECM planning &  
construction

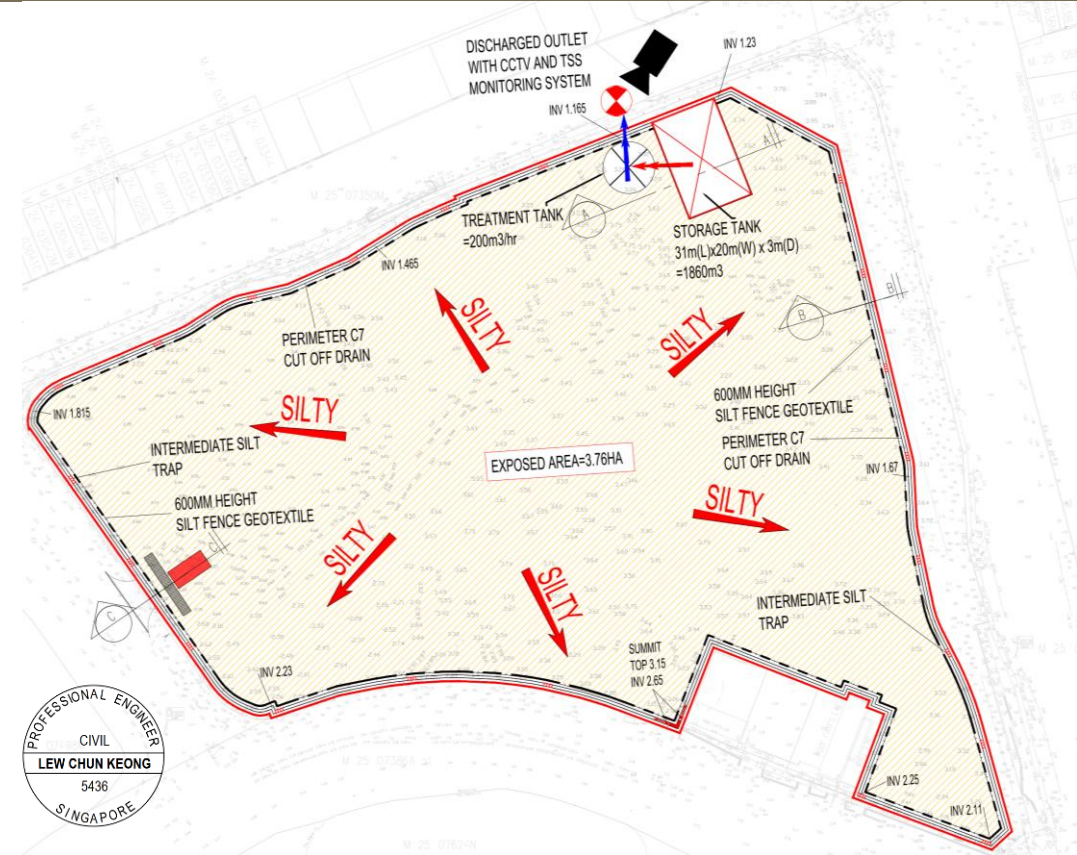
**Stage-3**

ECM implementation, review,  
enhancement and innovation

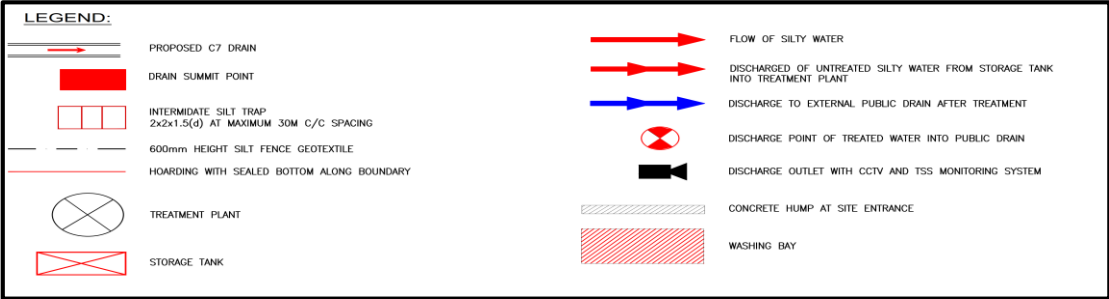




# 2. ECM Design



TOTAL SITE AREA (m <sup>2</sup> )	EXPOSED AREA (m <sup>2</sup> )	VOLUME OF RUNOFF (m <sup>3</sup> )	C7 DRAIN (a) (m <sup>3</sup> )	STORAGE TANK (b)				TOTAL STORAGE (m <sup>3</sup> ) (a+b)	VOLUME TO BE TREATED (m <sup>3</sup> /hr)	WATER TREATMENT CAPACITY (m <sup>3</sup> /hr)
				D (m)	L (m)	W (m)	V (m <sup>3</sup> )			
37548	37548	1952.5	106.82	3	31	20	1860	1966.82	195.25	200



1. Storage Tank and Cut off drain

2. Flow Direction of Silt Run Off

3. ECM Treatment Plant

4. Discharge Outlet

Total Exposed Area = 3.76HA



9 Football Fields

Total Excavation Volume =53,000m3

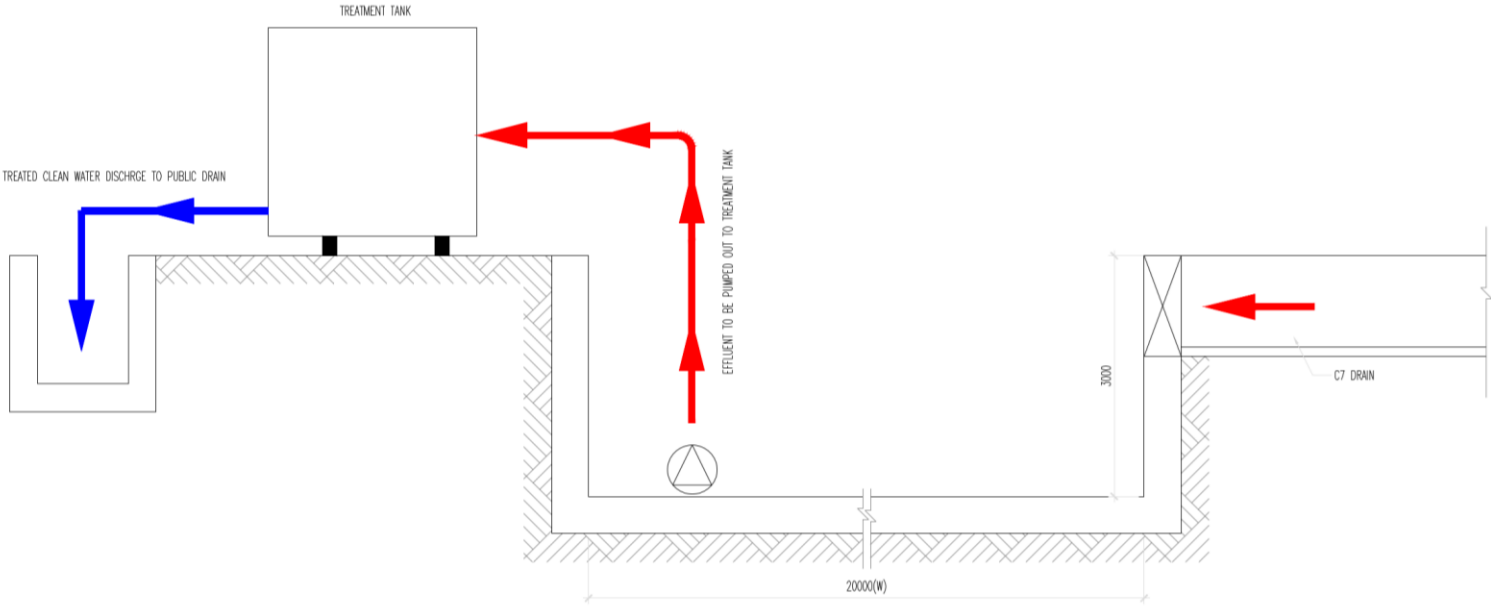


21 Olympic Swimming Pool

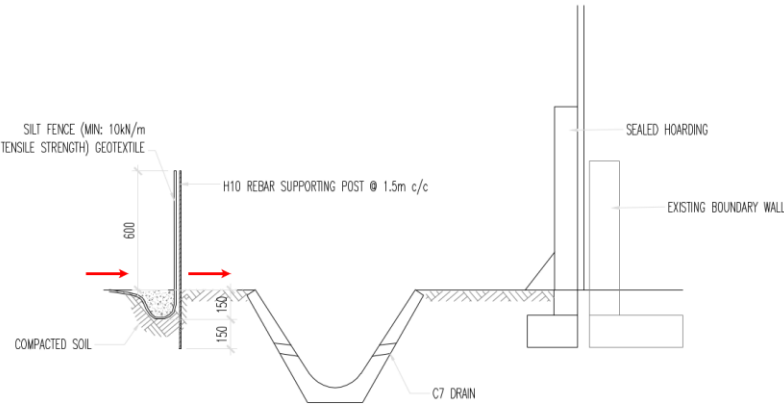


7500 Loads of Dump Truck

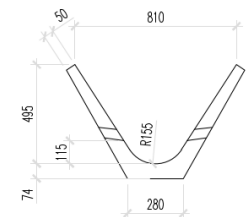
# 2. ECM Design



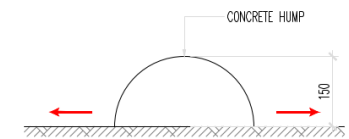
SECTION A-A  
TYPICAL SECTION FOR STORAGE TANK



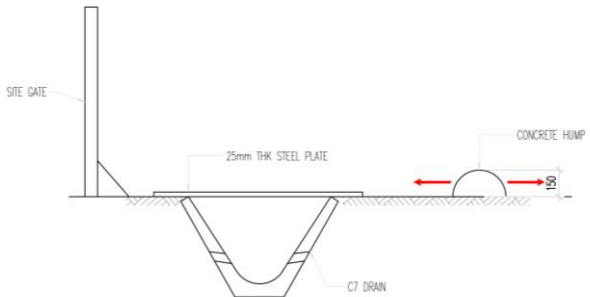
SECTION B-B  
TYPICAL DETAIL FOR C7 DRAIN



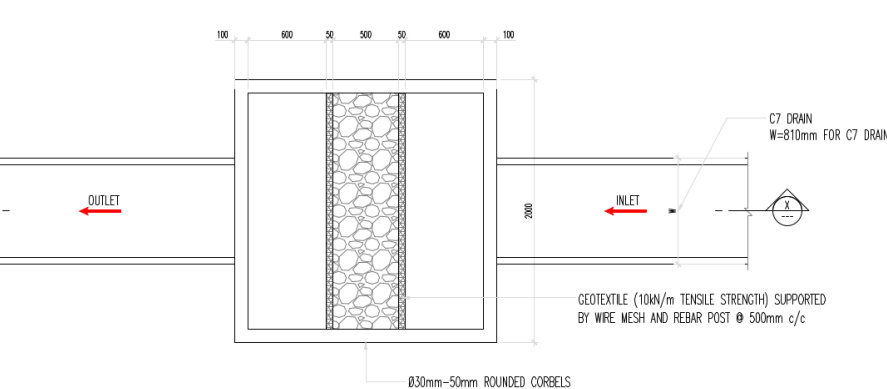
TYPICAL DETAIL FOR C7 DRAIN  
SCALE - 1:20



TYPICAL DIVISION HUMP BETWEEN  
CLEAN AND SILTY WATER  
SCALE - 1:20



SECTION C-C  
TYPICAL DETAIL FOR C7 DRAIN PASSING  
THROUGH SITE ENTRANCE WITH CONCRETE HUMP  
SCALE - 1:20

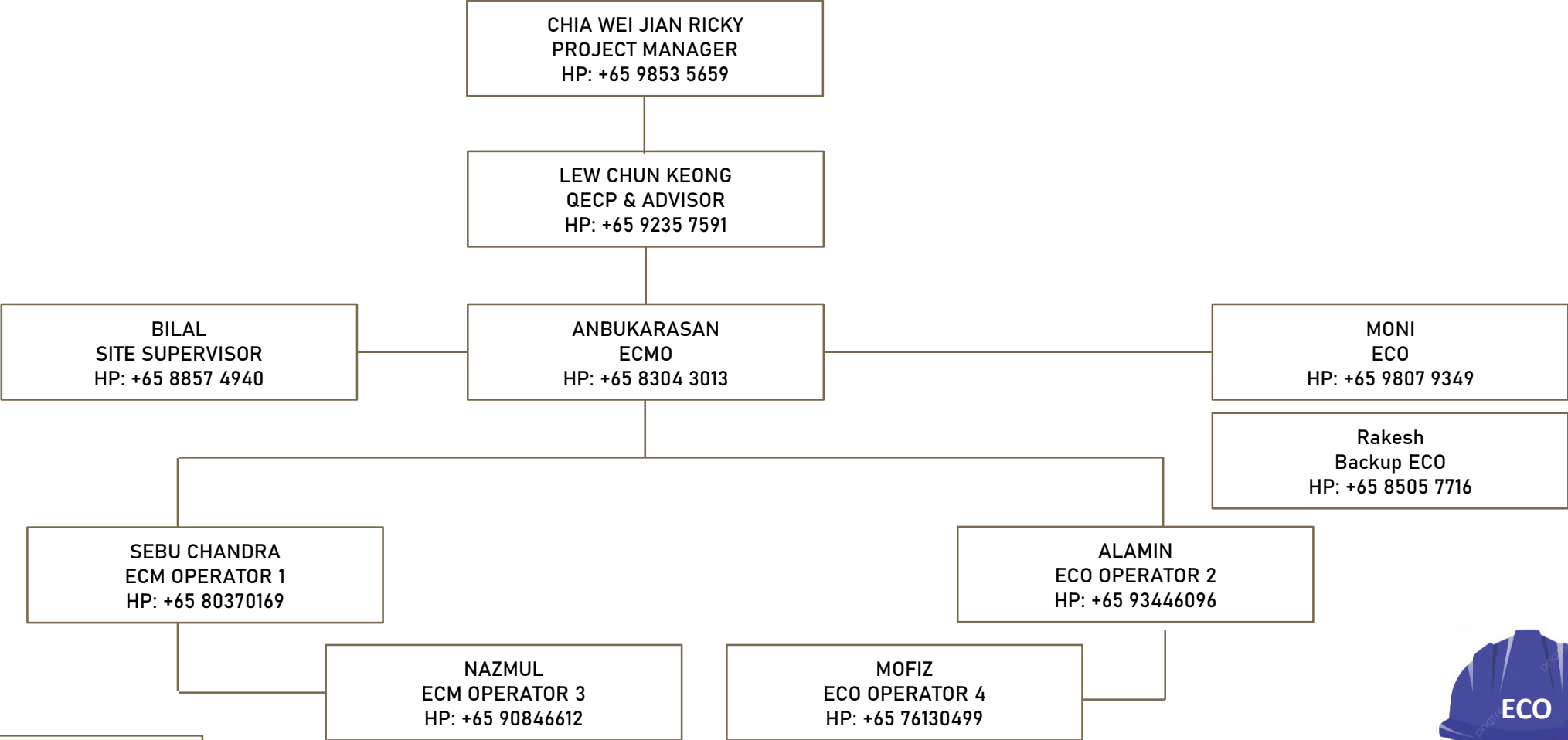


TYPICAL PLAN OF SILT TRAP  
SCALE - 1:30



# 3. ECM Staff Deployment

## ECM ORGANISATION CHART



BACK UP OPERATORS DURING EMERGENCY





## 4. Site Implementation



Silt Fence with Cutoff Drain



ECM Holding Tank



Concrete Hump



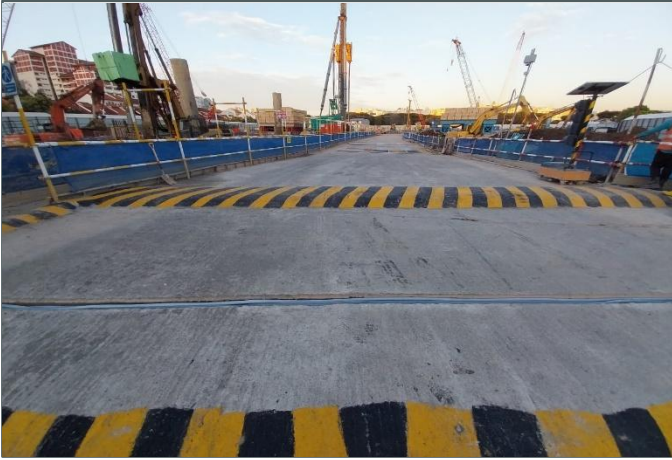
ECM Treatment Plants





## 4. Site Implementation

### Good Practices



Pave up main access



Seal hoarding footing gaps



Adequate holding tank



Pave up office area



Cover bare earth with erosion control blanket



CCTV (SIDS) to monitor discharge  
SILT IMAGERY DETECTION SYSTEM



## 4. Site Implementation

### Initiative - Additional ECM Treatment Plants

Design provision= 200m<sup>3</sup>/hr

Total Treatment capacity= 400m<sup>3</sup>/hr

To ensure no muddy water overflow to public areas during heavy downpour in case 1-2 ECM treatment plants breakdown.



Design Provision=  
3No's of 80m<sup>3</sup>/hr

Additional Treatment Plant=  
2No's of 80m<sup>3</sup>/hr





## 4. Site Implementation



ECM Holding Pond



ECM Treatment Plant



SIDS CCTV



Cut off Drain



Concrete Hump



Silt Trip





## 5. ECM Maintenance

### Daily

- Check ECM treatment plant chemical level
- Check silt fences and replace if torn
- Cover up exposed soil with ECB if any
- If raining events, inspect the site surrounding to ensure no water egress from worksite

### Weekly

- Clean C7 drain
- Check and reduce ECM sludge level
- Trial run ECM treatment plants to ensure the workability
- Internal meeting with PM, ECO, ECMO to improve ECM

### Monthly

- QECP inspection
- ECM Submission to HDB
- Clean public drain at discharge point
- Supplier services the ECM treatment plant
- Refreshment Training for ECM Operators

### Quarterly

- Review ECM design with QECP to ensure that the ECM adapted to construction stage



## 5. Daily ECM Checking



Check ECM treatment plant chemical level



Cover up exposed soil



Check silt fence and replace if torn



Inspect site surrounding





## 5. Weekly ECM Checking



Clean C7 drain



Trial run ECM treatment plants



Check and reduce ECM sludge level



Internal meeting to improve ECM





## 5. Monthly and Quarterly ECM Checking



QECP inspection



Clean public drain



Supplier services ECM treatment plants



Review with QECP on ECM design (Quarterly)





## 6. Calibration of ECM System



TSS Sensor should be calibrated once a year



Supplier calibrating ECM treatment plants



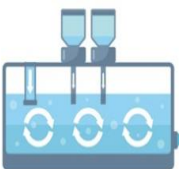
## 7. Treatment of Silty Water



Silty water ppm color chart



ECM in operation





## 8. Monitoring System



Internal Monitoring- TSS Monitoring

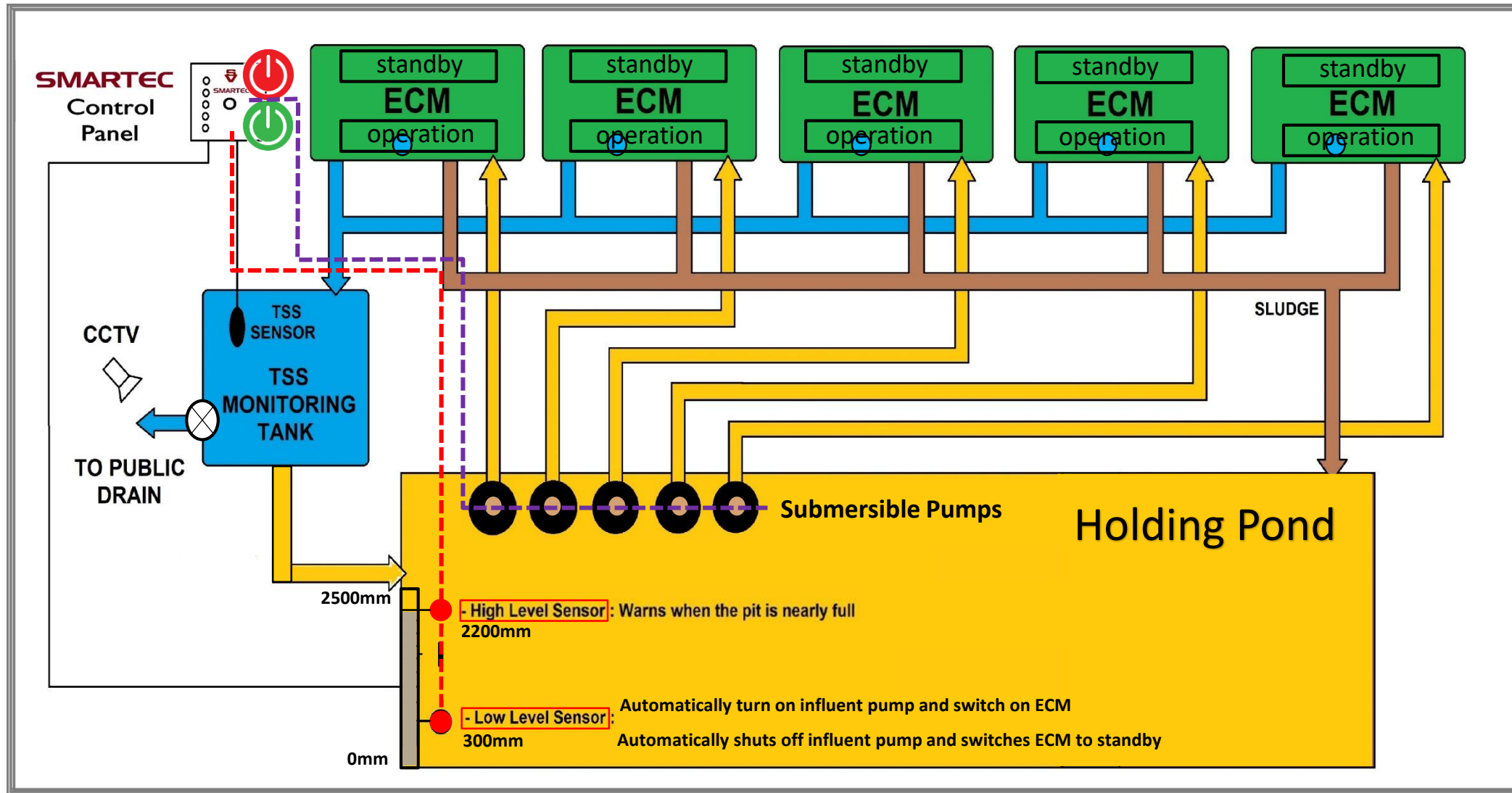


External Monitoring- SIDS CCTV



# ECM Innovations

## Automated ECM Treatment Plant- (Smart Level Sensors)

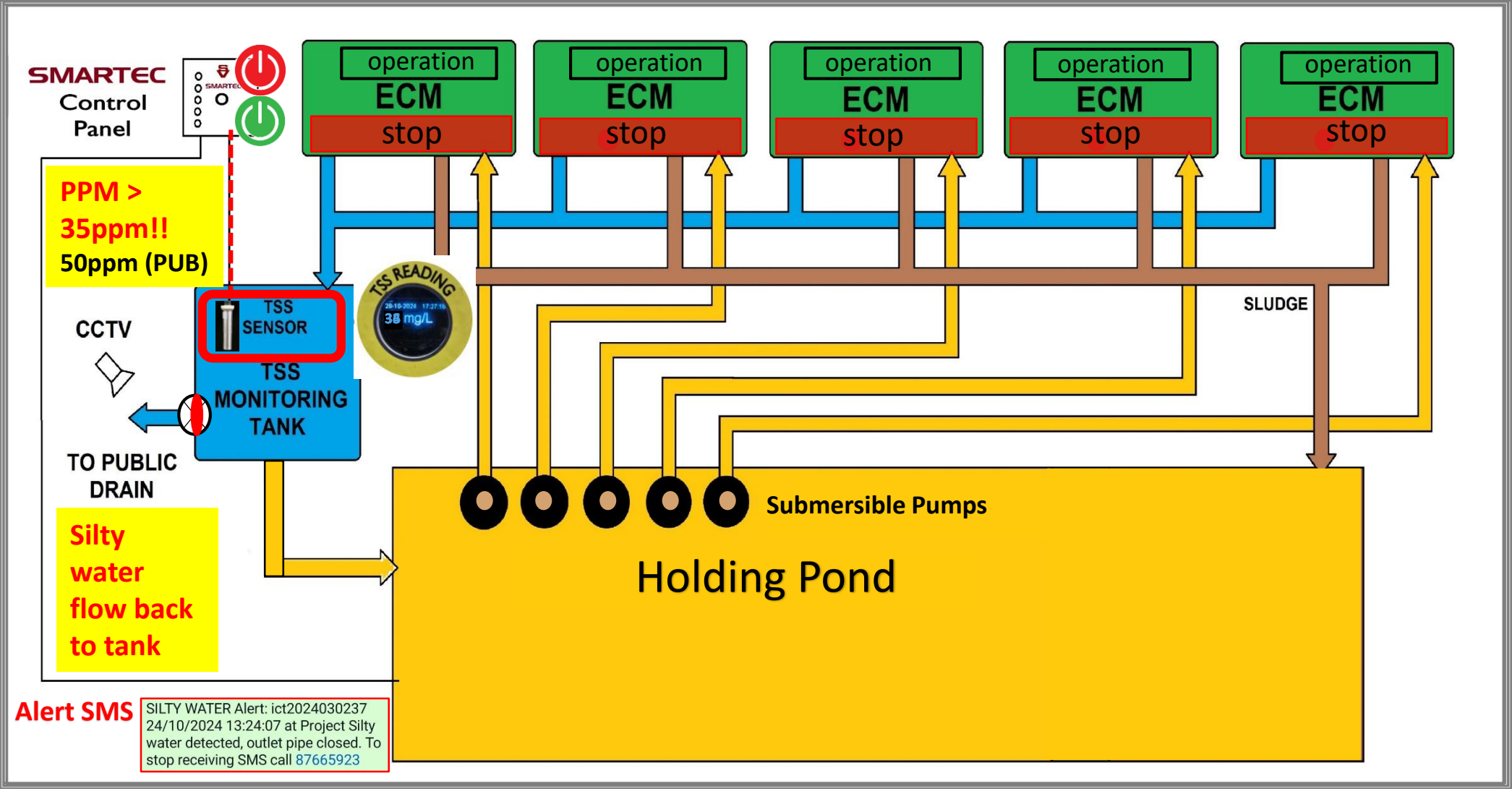




# ECM Innovations

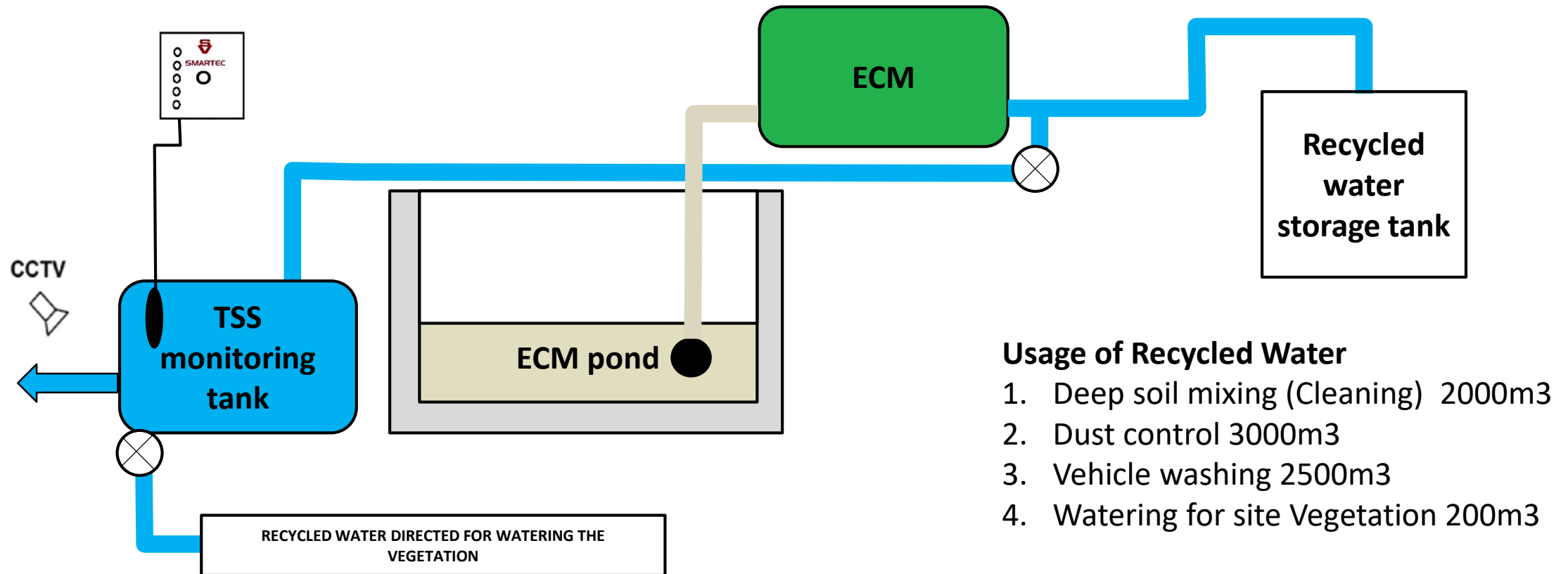
## Automated ECM Treatment Plant- (Smart TSS Sensor)

Trigger Level	Smart TSS Sensor	35ppm
	PUB	50pmm



# ECM Innovations

## Recycled Use of ECM Treated Water



**Estimated Total Water Saving for the Project = 7,500 M3**

**3** Olympic Swimming Pool





# ECM Innovations

## Recycled Use of ECM Treated Water



Recycled water tank used for deep soil mixing (Cleaning)



Recycled water used for watering the plantation



Recycled water used for Washing Vehicles



Recycled water used for Daily Dust Control (watering)







Clean and Beautiful  
Thank You

