



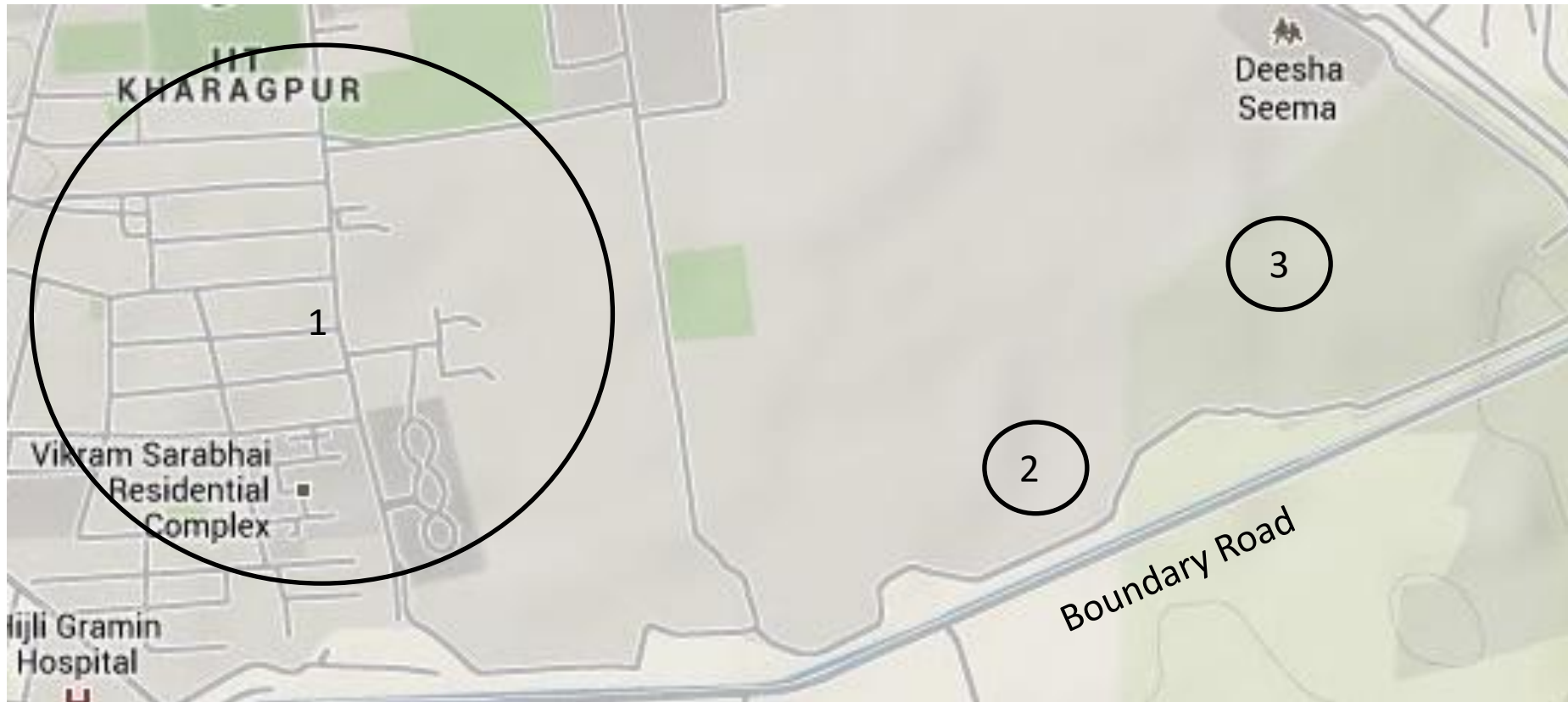
Supporting consolidation, replication and up-scaling of sustainable wastewater treatment and reuse technologies for India

Pilot 2

UASB-POND COMBINATION

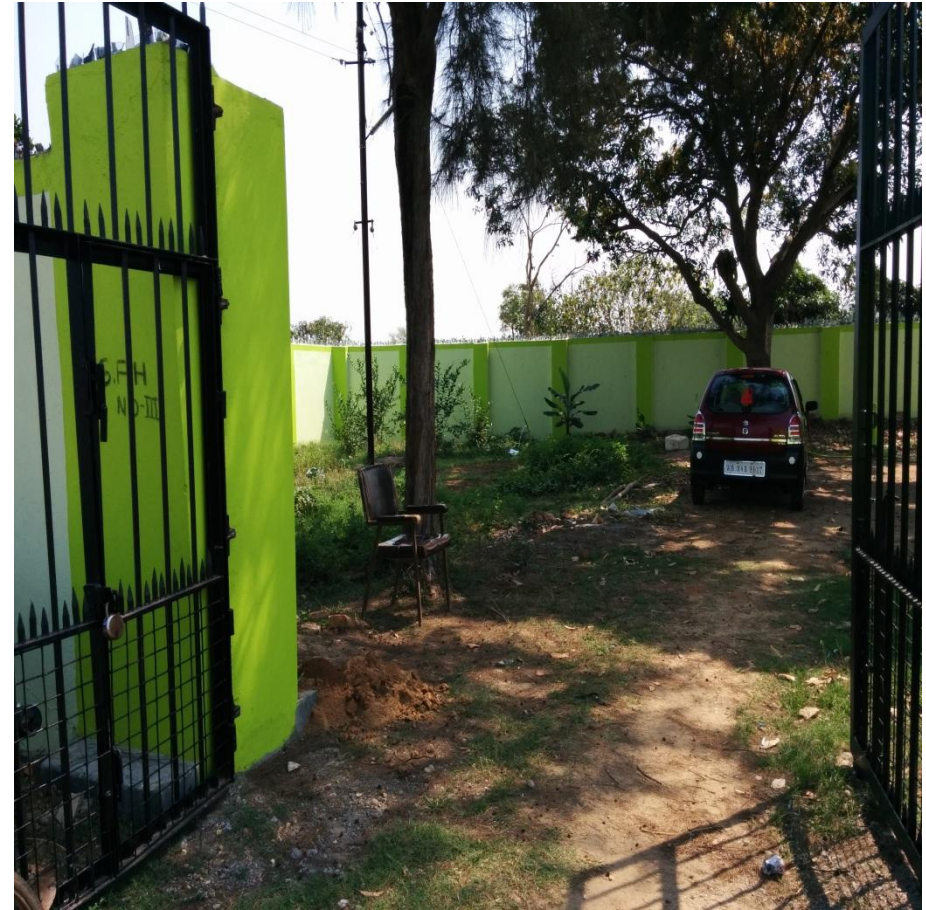
IIT Kharagpur, India and Centa, Spain

SITE



Legend: 1-Residential area, 2-Proposed site near pumphouse 3, 3-Existing helipads

SITE

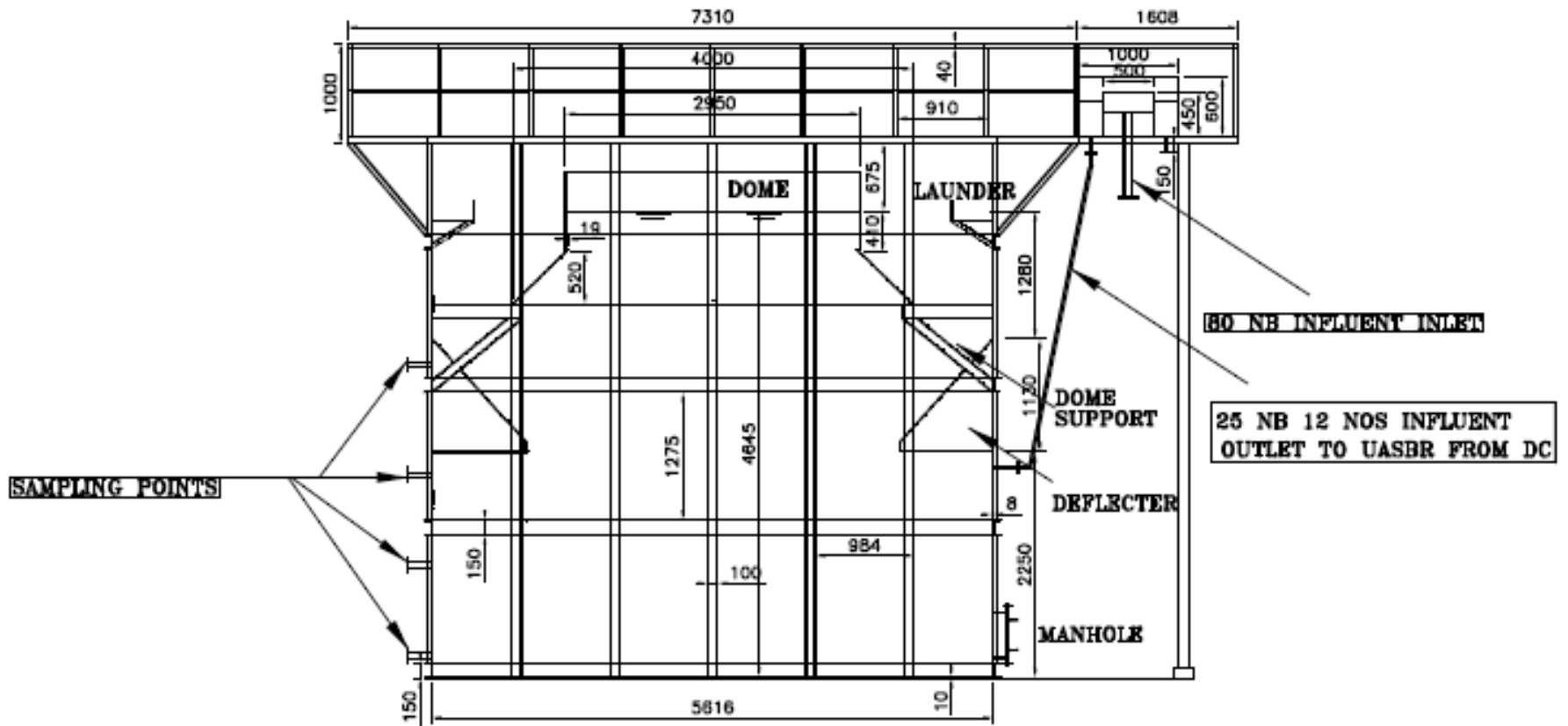


DESIGN DETAILS

Site	Kharagpur, West Bengal
Type of Technology	Anaerobic and natural treatment plant for black-water Treatment
Type of Wastewater	Blackwater
Design Flow Rate	300 m ³ /day
Desired Effluent Quality	BOD < 30 mg/L, TSS < 50 mg/L,
Intended Reuse	Agriculture
No. of Beneficiaries	1500 persons

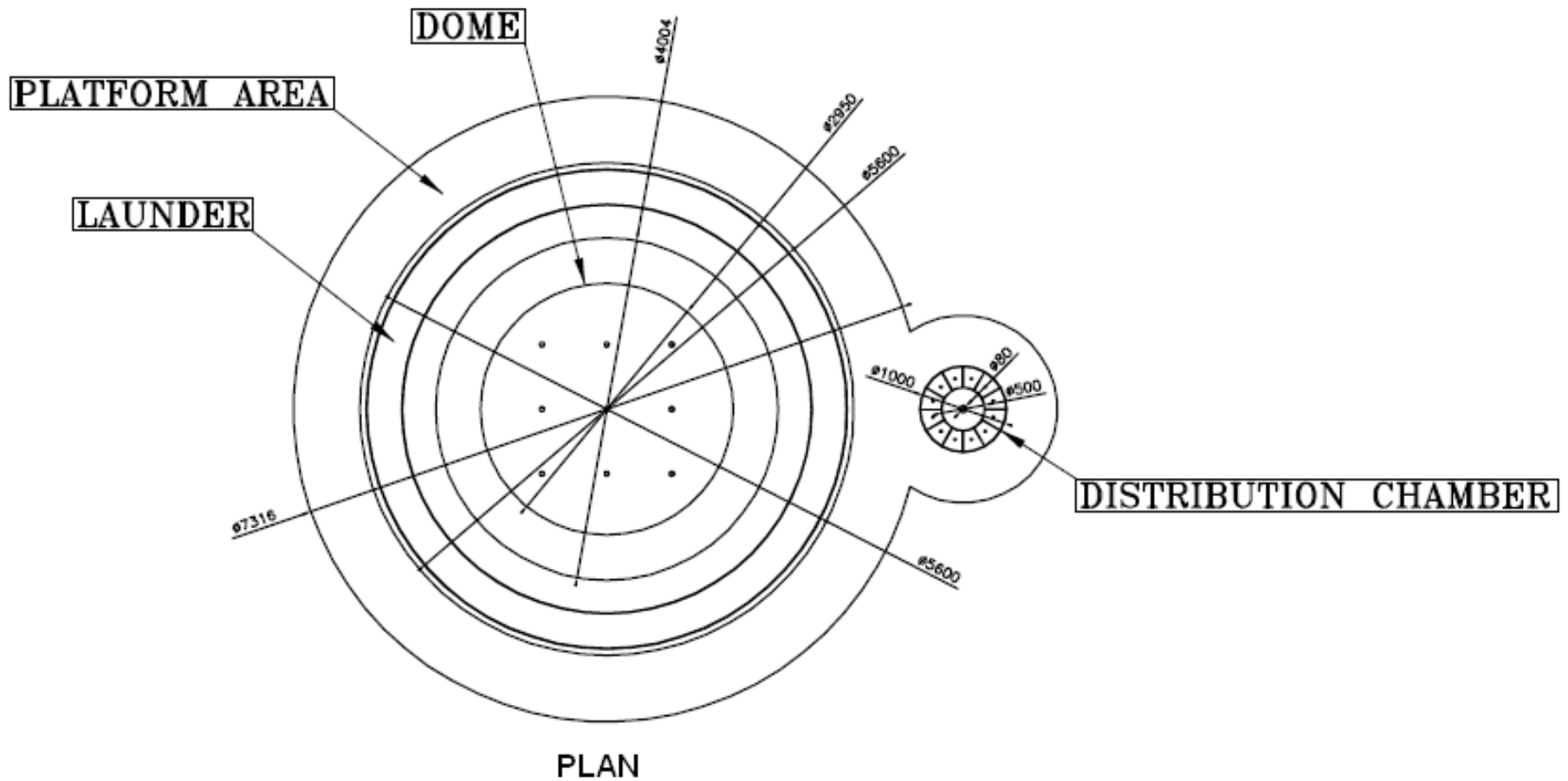
Present Status: Commissioned in October/November 2015

UASB WORKING DRAWING



ELEVATION

UASB WORKING DRAWING



TENDERING FOR UASB REACTOR

- An web based tender was called
- Total number of offers received : 3
- Selection done on low cost basis
- Total cost of tender = Rs 2270000
- Other miscellaneous cost = Rs 200000

CHARACTERISTICS OF RAW WASTEWATER

Parameters	Average value
Temperature	21.9 °C
pH	7.162
Conductivity	1200.8
Turbidity	106.4 NTU
Alkalinity	781.6 mg/L of CaCO ₃
Total solids	1126 mg/L
Volatile solids	1080.4 mg/L
Total suspended solids	148 mg/L
Volatile suspended solids	108 mg/L
COD	187 mg/L
COD soluble	112 mg/L
BOD	104.2 mg/L
BOD soluble	72 mg/L

UASB REACTOR



UASB REACTOR

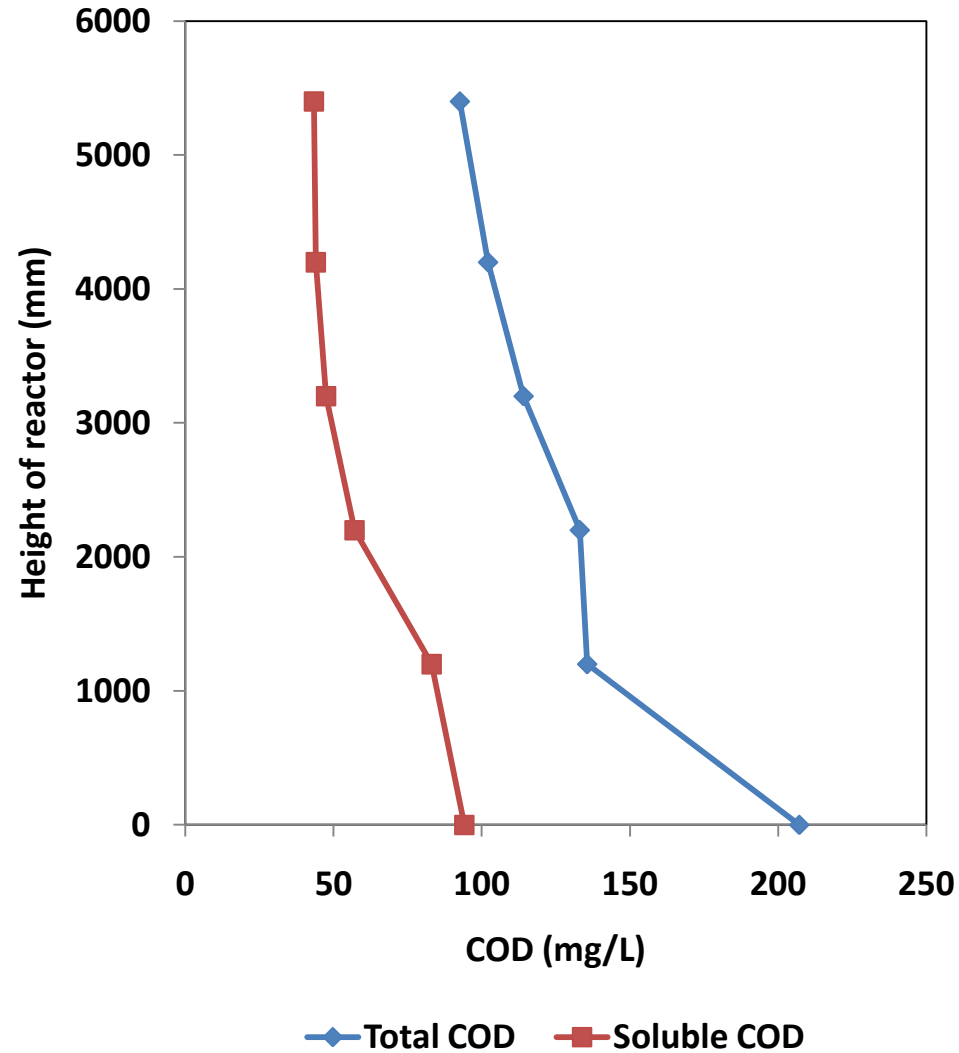


UASB.mp4

PERFORMANCE DATA

Month	COD inlet (mg/L)	COD outlet (mg/L)	% removal	Soluble COD inlet (mg/L)	Soluble COD outlet (mg/L)	% removal	Remarks
November	167	123	27	110	77	30	Reactor getting commissioned
December	162	79	49	94	35	63	Performance improved
January	193	98	49	93	38	59	Sludge washout due to reduced temperature and performance instability
February	265	79	56	78	33	57	Performance getting stabilized
March	250	100	58	101	35	63	Improving Performance

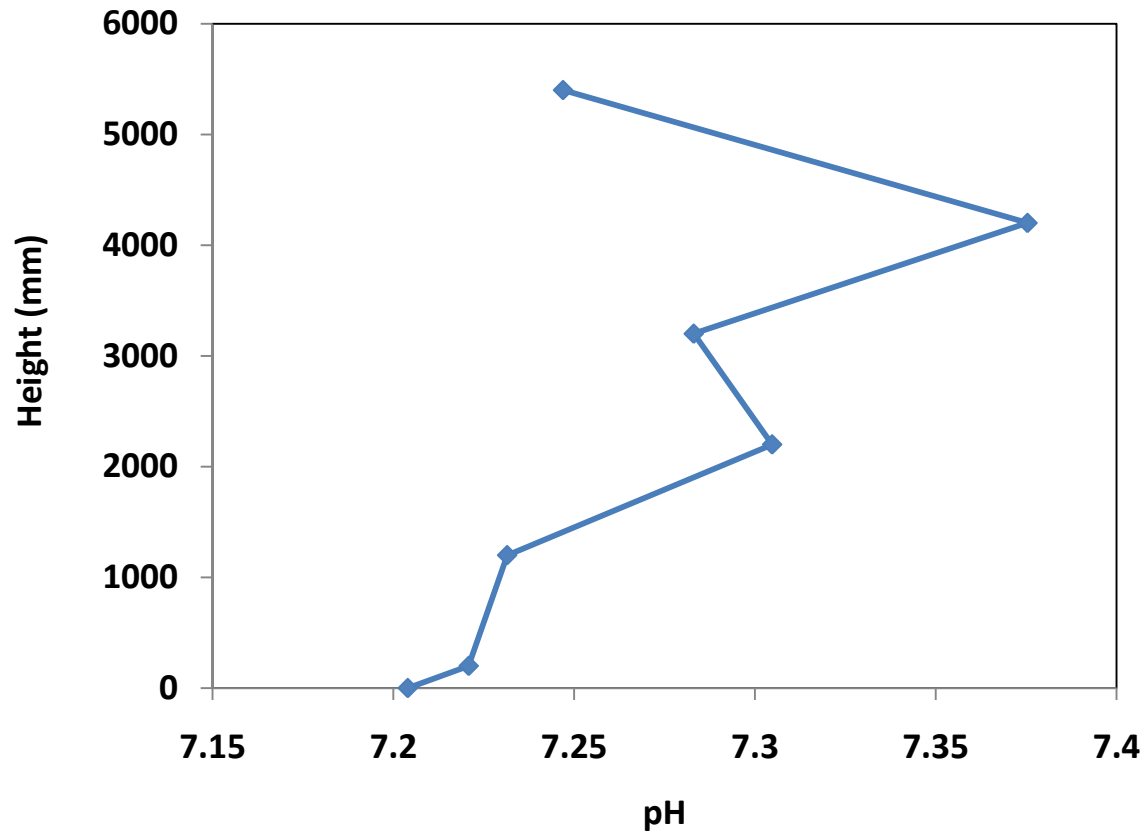
ORGANIC MATTER REMOVAL



PERFORMANCE DATA

Month	VFA inlet (mg/L)	VFA outlet (mg/L)	Outlet VSS (mg/L)	Sludge VSS (mg/L)	Outlet TSS (mg/L)	Inlet Alkalinity (mg/L)	Outlet Alkalinity (mg/L)
November	111	122	12	--	150	242	231
December	198	145	9	--	56	230	192
January	186	172	45	--	94	225	200
February	140	130	29	7700	39	325	345
March	140	90	31	12105	35	210	245

PERFORMANCE DATA



FUTURE PLANS

- Operate the reactor at increasing organic loading rates

ALGAL POND

- Web based tender called
- Total number of offers received : 3
- Selection done on low cost basis
- Total cost of tender = Rs 700000
- Other miscellaneous cost expected

ALGAL POND CONSTRUCTION



ALGAL POND PERFORMANCE

Parameters	March	April
Chlorophyll a (mg/L)	0.5	0.6
Chlorophyll b (mg/L)	0.53	1.5
Biomass (mg/L)	19	51
Carbohydrate (mg/L)	9.3	11.5
Total COD removal	—	—
Soluble COD removal	—	—
Protein (mg/L)	0	0.022
Lipid (mg/L)	0	1.3
pH	8.3	8.8
TKN removal	70%	83%
Phosphate removal	83%	91%
MPN removal	86%	97%

FUTURE PLANS

- Monitor lipid, carbohydrate and protein build-up in algal cells to decide on future reuse of algal cells
- Monitor disinfection ability of pond.