City Scale Sludge Treatment Plant in Faridpur, Bangladesh: Plan to Action

Rafiul Islam

Abdullah Al Mamun, Sumon Ali, Hasin Jahan, Uttam Kumar Saha

Practical Action Bangladesh

Background Context

- “Access to Sanitation for All” is a great success for Bangladesh;
- Safe management of human sludge is treated as 2nd generation challenge in the sanitation sector;
- Pits (avg. 2cum capacity) generates 68% and septic tanks (avg. 4cum capacity) generates 32% of sludge and desludging demand generates once every 2 years;
- No scalable FST facility or fixed dumping place for disposal but have sufficient land to establish a FS treatment facility.

Experience of Piloting FSTP in Faridpur

- The unplanted drying technology is piloted and it was successful;
- Pilot experiment facilitated the design of city-scale.

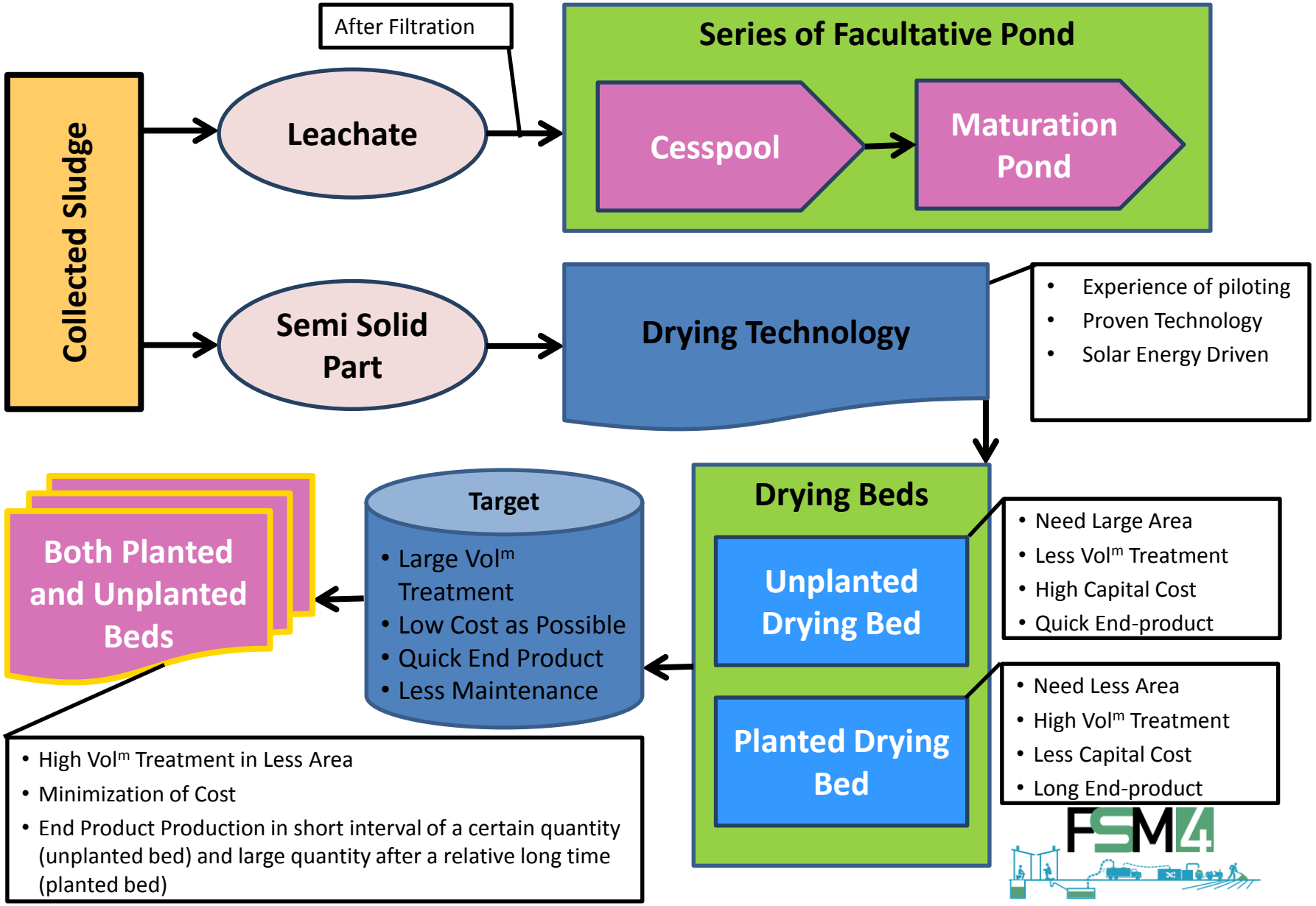
Context of Faridpur

Basic Information	Total Population	150,000
	Area	17.38 sq. KM
	Type of Sanitation Option	On site system (pits and septic tank)
Geographic Information	Flood Situation	Seasonal Flood Prone
	Weather	Tropical
	Monsoon	3 season
	Average Temperature	25°C
	Average Rainfall	1,127 mm

Principles Designing the STP in Faridpur

- The FST plant will be PPP lead;
- The plant will serve FSM services to whole city;
- The options will be focused on a business opportunity using the end-product co-composting with municipal solid waste;
- Zero artificial energy consumption; and
- Scope for future expansion.

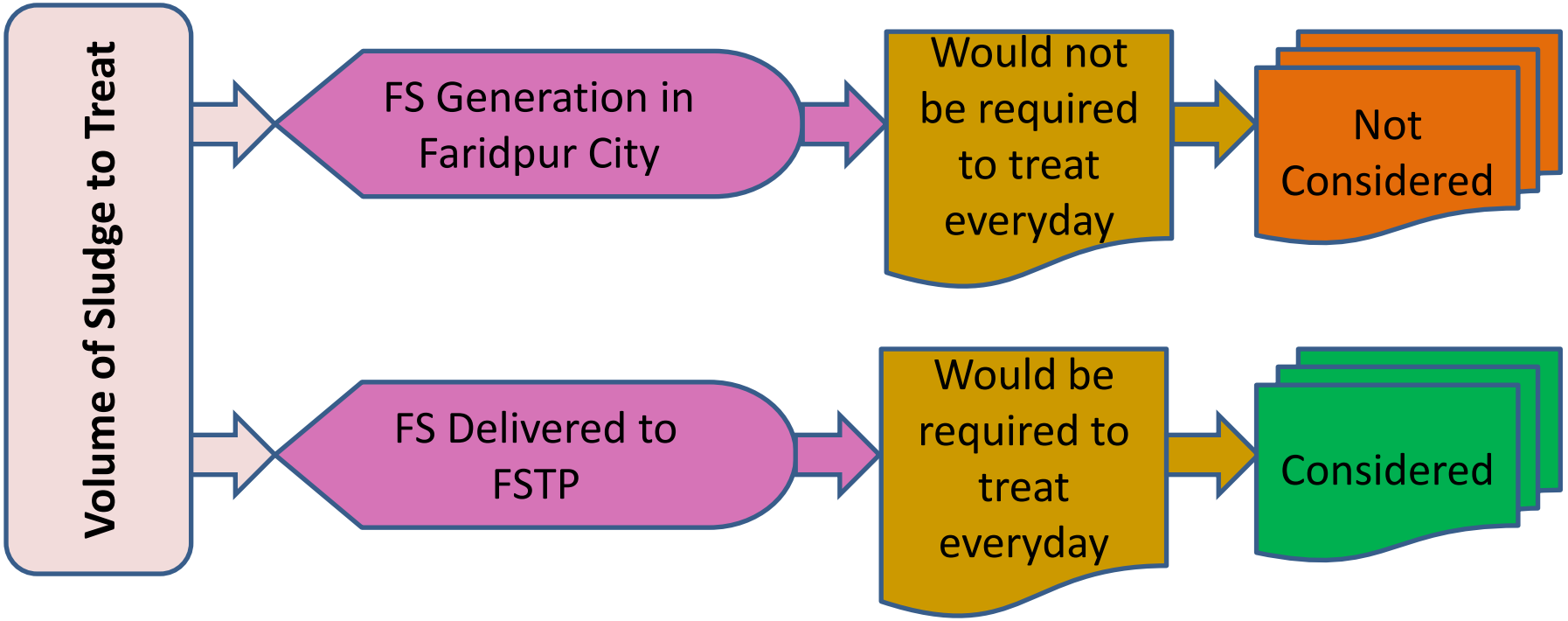
Selection of Technology



Design Criteria: Properties of Sludge

Design Criteria	Treatment system		Comments
	Unplanted	Planted	
Density of raw FS	15 kg TS/m3	15 kg TS/m3	
Moisture content	90%	90%	
Leachate production	0.9m^3 per m^3 fresh FS	0.7m^3 per m^3 fresh FS	Evapotranspiration in Planted Drying Bed
FS Loading Rate	200 KG TS/m^2/year	200 KG TS/m^2/year	
Drying Time	15 days min^m	1 year min^m	Depends on Seasons. May require more time.
Thickness of Sludge	0.2 m	0.2 m	

Design Criteria: Capacity of Plant



02 SCs with **2 vacutug** of capacity **2m^3** each working for **6 hours** in a day and **1 hour time required for a round single trip**, the maximum number of **trips will be 12** that will be delivered to plant. So, the quantity of sludge for designing is considered as **24m^3 in a day**.

Brief of Components

Unplanted Drying Bed

- 6m^3 of Sludge is dumped per day in a single bed;
- Have filtering facility and transparent cover;
- Leachate drains out and semi-solid sludge is heated up to or more than 54.5°C;
- 1 day for preparation and emptying, in total 16 days is needed for full cycle;

Planted Drying Bed

- 18m^3 of Sludge is dumped per day in a single bed;
- Have filtering facility and Antelope grass on top;
- Leachate drains out and Sludge is kept dumping for a year and another for drying;
- 2 setup of 6 beds each is constructed where 1 set up is used for a year and one bed is used everyday;

Brief of Components

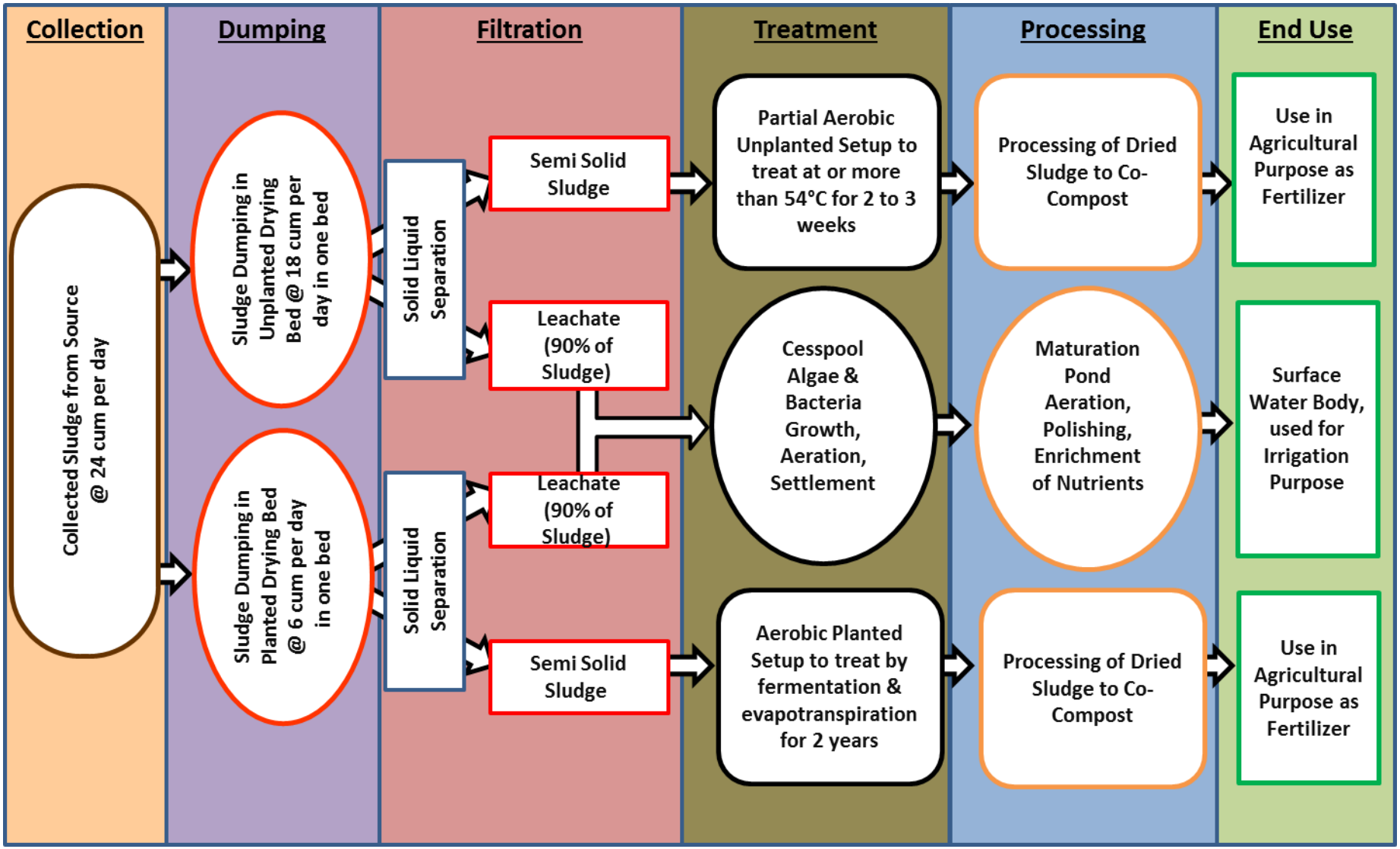
Cesspool

- $18m^3$ Leachate comes in & stays 7 days (retention time;
- There are 6 chambers connected in Baffled system;
- Last 3 chambers is filled with brick bats.

Maturation Pond

- $18m^3$ of leachate comes in from cesspool;
- Retention time is 12 days;
- The setup is automatic that the inlet water push out the same amount of water to outlet.

Process Flow Diagram



Plant Operational Management

Design Criteria	Treatment system		Comments
	Unplanted	Planted	
Number of Working days per week	6	6	Friday is a rest day.
Number of working weeks per year	48	48	
Maximum volume of raw FS delivered	6 m^3 per day	18 m^3 per day	Based on two 2 cum capacity Vacutug making up to 12 deliveries to the FSTP

Plant Operation: Dumping Simulation

Activity schedule						
Process		UPDBs			PDBA	Remarks
Cycle for UPDB	Day	Sludge to UPDB	to compost	Cleaning & preparation	Sludge to PDB	
CYCLE 1	1	UPDB-01			PDB-01	
	2	UPDB-02			PDB-02	
	3	UPDB-03			PDB-03	
	4	UPDB-04			PDB-04	
	5	UPDB-05			PDB-05	
	6	UPDB-06			PDB-06	
	7	REST DAY				
	8	UPDB-07			PDB-01	
	9	UPDB-08			PDB-02	
	10	UPDB-09			PDB-03	
	11	UPDB-10			PDB-04	
	12	UPDB-11			PDB-05	
	13	UPDB-12			PDB-06	
	14	REST DAY				
	15	UPDB-13			PDB-01	
	16	UPDB-14	UPDB-01		PDB-02	
	17	UPDB-15	UPDB-02	UPDB-01	PDB-03	
	18	UPDB-16	UPDB-03	UPDB-02	PDB-04	

Plant Operational Status

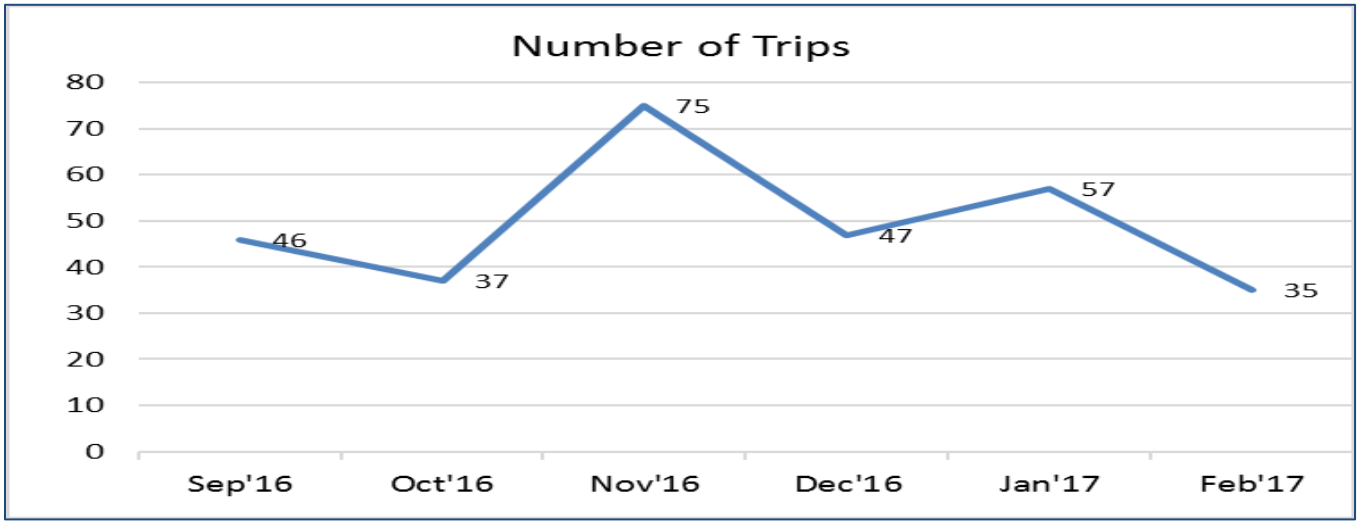
3D View

Plant Operational Status

- 1 set of Planted Drying Beds (6 beds) are operational from August, 2016 and 4 Unplanted Drying Beds are under operation from February, 2017

Plant Operational Status

Status of Dumping		
UPDB	**Trip**	**Volume**
1	43	86
2	46	92
3	52	104
4	48	96
5	50	100
6	58	116
Total	**297**	**594 cum**



Till 15th February' 17

Plant Operational Management

- Faridpur Municipality signed PBC agreement with Society Development Committee (SDC) for FSTP Operation (Quality control & compost marketing).

- Practical Action will provide technical assistance to SDC and Municipality will monitor & facilitate the overall service.

End with Points to Remember

Challenges:

- Lack of standard of treated Faecal sludge treatment in Bangladesh;
- Bringing common consensus and understanding among stakeholders;
- Natural calamities (heavy rain & flood) during short construction period;
- Capacity constraints of local workers; and
- Unavailability of technical performance monitoring equipment in Bangladesh.

End with Points to Remember

Recommendation:

- Long term assessment on the performance of the treatment operation in different quality of sludge is needed.

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Thank You!