Sanitation Capacity Building Platform

DETAILED PROJECT REPORT 2018

IMPLEMENTATION OF FAECAL SLUDGE AND SEPTAGE MANAGEMENT SOLUTIONS FOR SADULSHAHAR, RAJASTHAN

National Institute of Urban Affairs (NIUA)
Sanitation and Capacity Building Platform (SCBP)

National Institute of Urban Affairs

FAECAL SLUDGE MANAGEMENT : SADULSHAHAR

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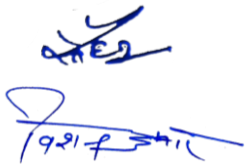
IN ASSOCIATION WITH

National Institute of Urban Affairs

Part A: Sanitation Situation Assessment & Technology Design

1	Proposal	:	Faecal Sludge and Septage Management(FSSM)
2	Name of the State/UT	:	Rajasthan
3	Name of the City	:	Sadulshahar
4	Objectives	:	To assess the current gaps in sanitation in the town of Sadulshahar and suggest sustainable and cost-effective ways to manage the faecal sludge and septage generated within its boundaries. Furthermore, the DPR also estimates the quality and quantity of faecal sludge generated from Sadulshahar and proposes a treatment solution along with transport and conveyance of faecal sludge.
5	Background	:	The Department of Local Self Government Rajasthan is keen on implementing Faecal Sludge Management in 100 towns which are not being funded by state or central schemes such as AMRUT, Smart Cities Mission or UIDSSMT. These are primarily towns with population less than 50,000 and water supply less than 100 LPCD.
6	Present Status	:	No faecal sludge treatment plant available
7	Need for the Project	:	To specifically provide faecal sludge management solutions for Sadulshahar in Rajasthan.
8	Population - As per 2011 Census - Design year	:	 24980 32624
9	Faecal Sludge Generation - Design year	:	2028
10	Project Components i. Details ii. BOQs ready Yes/No iii. Analysis of Rate ready Yes/No	:	FSTP construction, cesspool vehicle requirement. BOQs ready and Analysis of Rate is ready
11	Land Required for Project and status of Land availability	:	4936 m^2 is required and Land is available with the Nagar Palika
12	Estimated cost(proposed)(Rs Lakh)	:	
13	Timelines for implementation of FSTP construction	:	Provided in the report

14	Funding Pattern	:	DLB
15	Whether the project (or part of the project) has been taken up for funding earlier through any other scheme? If Yes, please provide detail of components of the project taken up. Amount sanctioned and expenditure.	:	No
16	Implementing Agency	:	Department of Local Self Government
17	Annual O&M Expenditure(Rs Lakh)	:	
18	Agency responsible for O&M	:	Sadusahar Nagar Palika
19	Revenue generation (Rs Lakh/ year)	:	
20	CPHEEO's Technical	:	Based on CPHEEO guidelines
21	Whether the project is recommended for Sanction or not(Y/N)	:	
22	If not, please mention reasons and area for improving DPR	:	
23	Estimated cost for consideration and approval (Rs Crore)	:	
24	Approval from Sadulshahar Nagar Palika - Executive Officer - Chairman		

Service Level Benchmarking Indicators – Sewage/Faecal Sludge/Septage

Sl No	Indicator	Unit	Baseline before project	Reliability of measurement	After project	Reliability of measurement
1	Adequacy of Faecal Sludge Treatment Capacity	%	0			
2	Quality of Faecal Sludge Treated	%	0			
3	Extent of Reuse of Faecal Sludge	%	0			
4	Cost Recovery Faecal Sludge Management	%	0			

EXECUTIVE SUMMARY

The town of Sadulshahar is situated in Ganganagar district in Rajasthan. The Population of Sadulshahar is 24,980 for the year 2011. Total 20 wards in the towns which are not planned with drainage system are considered in the generation of faecal sludge. The onsite sanitation systems such as pits and septic tanks in these wards are desludged using mechanical equipment such as vacuum trucks and are currently being disposed of in vacant farmlands on the outskirts of the city, which is an unsafe practice considering the associated health and environmental risks.

Consortium for DEWATS Dissemination (CDD) Society, through this DPR, proposes to implement a faecal sludge treatment plant to serve the households not having access to UGD in the city which can handle 6 Kilo Litres per Day (KLD) of faecal sludge emptied. The faecal sludge treatment plant proposes to convert sludge generated from onsite sanitation systems into safe and reusable products.

The technology proposed involves stabilization and dewatering of sludge in planted drying beds. The percolating water is then treated with DEWATS technology using settler, anaerobic filters, planted gravel filter and a polishing pond. The by-products such as biosolids can be reused in agriculture as a soil conditioner and treated water can be used for irrigation or safely disposed into the ground through percolation.

Following is an abstract of the total cost of the project;

Abstract Costing for FSM Project/interventions in Sadulsahar			
Sl No	**Description**		**Actual cost in INR**
1	**Faecal Sludge Treatment Plant(FSTP) - CAPEX**		**₹ 15,200,711**
2	**Cesspool Vehicle(3500 Lts) - CAPEX**		**₹ 2,124,000**
3A	Faecal Sludge Treatment Plant(FSTP) - Operations and maintenance per year		₹ 1,017,695
3 B	**Faecal Sludge Treatment Plant(FSTP) - Operations and maintenance for 10 years**		**₹ 10,176,950**
4A	Cesspool Vehicle - Operations and maintenance per year		₹ 1,084,443
4 B	**Cesspool Vehicle - Operations and Maintenance for 10 years**		**₹ 10,844,430**
	Total Project Cost		**₹ 38,346,091**

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

DEWATS	- Decentralized wastewater Treatment System
PDB	- Planted Drying Bed
SDB	- Sludge Drying Bed
PGF	- Planted Gravel Filter
PP	- Polishing Pond
SSH	- Sludge Storage House
OR	- Operator Room
HH	- Households
ODF	- Open defecation free
EO	- Executive Officer
INR	- Indian Rupees
FSM	- Faecal Sludge management
O&M	- Operation and Maintenance
PT	-Public Toilet
CT	-Community Toilet
IIHL	-Individual Household Laterine
COD	-Chemical Oxygen Demand
BOD	-Biological Oxygen Demand

GLOSSARY

Sewage or Blackwater
The wastewater from toilets in specific that is a mixture of human excreta, urine, anal cleansing and flushing water.

Sullage or Greywater
The wastewater from bathroom, kitchen and other washing areas.

Septage
The sludge (semi solid matter) removed periodically from a scientifically constructed septic tank connected to toilets

Faecal Sludge
Faecal Sludge (FS) comes from onsite sanitation technologies and has not been transported through a sewer. It is raw or partially digested, a slurry or semi-solid, and results from the collection, storage or treatment of combinations of excreta and blackwater, with or without greywater. Examples of on-site technologies include pit latrines, unsewered public ablution blocks, septic tanks, aqua privies, and dry toilets. Faecal Sludge Treatment includes the storage, collection, transport and safe end use or disposal of Faecal Sludge. FS is highly variable in consistency, quantity and concentration.

Pour Flush Toilets
These are the toilets with pedestals, squatting and water seal where the user pours the water in after every use, instead of coming from the flush tanks. Mostly 2 to 3 liters of water is poured into the toilet pan with certain height to flush out the excreta from the toilet.

Cistern Flush Toilet
These are the factory manufactured toilet with a cistern or flush tank attached to the squatting pan where the water is flushed by pulling or pushing the lever of the flush tank which releases the water to flush out the excreta from the toilet.

Biochemical Oxygen Demand
Biochemical oxygen demand is the amount of dissolved oxygen needed by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period. The BOD value is most commonly expressed in milligrams of oxygen consumed per liter of sample during 5 days of incubation at 20°C and is often used as a surrogate of the degree of organic pollution of water.

Chemical Oxygen Demand
The chemical oxygen demand is an indicative measure of the amount of oxygen that can be consumed by reactions in a measured solution. It is commonly expressed in mass of oxygen consumed over volume of solution which in SI units is mg/l. The most common application of COD is in quantifying the amount of oxidizable pollutants found in wastewater.

Single Pit Latrine
A sanitation solution including a superstructure and a pit in which faeces, urine and anal cleansing material (water and/or solids) are disposed. The pit is lined to prevent it from

collapsing and provide support to the superstructure, but the bottom of the pit is permeable to release leachate. The ones that are left unlined in the base and sides are locally called kui.

Twin Pit
The single pit latrine with an additional pit for use, when the first pit is full. It should be possible to dig out a filled pit, after it has stood for a year, without any objectionable smell, whilst the other pit is in use.

On-site Sanitation Systems
A system of sanitation whose storage facilities are contained within the plot occupied by a dwelling and its immediate surroundings. For some systems (e.g. Twin pits), faecal matter treatment is conducted on-site. With other systems (e.g. Septic tanks, single pits) the sludge has to be collected and treated off-site.

Desludging Operator
A person involved in the collection and cleaning of domestic or commercial septic tanks and pits using a vacuum suction vehicle

Desludging
Desludging refers to the process of removing the accumulated faecal sludge or septage from the on-site sanitation systems.

Septic Tank
A septic tank is a combined sedimentation and digestion tank where the sewage is held for one to two days. During this period, the suspended solids settle down to the bottom. This is accompanied by anaerobic digestion of settled solids and liquid, resulting in reasonable reduction in the volume of sludge, reduction in biodegradable organic matter and release of gases like carbon dioxide, methane and hydrogen sulphide. The effluent although clarified to a large extent, will still contain appreciable amount dissolved and suspended putrescible organic solids and pathogens.

Bio-solids
They are nutrient rich organic materials resulting from the treatment of domestic sewage in a treatment facility. When treated and processed, these residuals can be recycled and applied as fertilizers to improve and maintain productive soil and stimulate plant growth.

1 INTRODUCTION

India needs to re-imagine its approaches to waste management and Rajasthan, has a great opportunity to lead such a re-imagination. Traditionally, India has attempted to borrow its sanitation approaches largely from the developed western nations and its immaculate (clean & tidy) cities. In recent years however, new ideologies are beginning to take root. Today, there is greater acceptance towards low power and robust ecological treatment technologies, greater appreciation for more cost-effective decentralised systems and lesser fascination for western state of the art technologies.

There is no other way to reach our goal of Sanitation for all, than by adopting systems that are low on capital & operating costs. Otherwise they would be economically un-sustainable for a significant part of the population in our country. This surely points towards a greater emphasis on treating the faecal sludge as close to the source as possible. Thus well-designed, well-constructed, robust, efficient onsite, community scale systems are an important part of the solution. It also points to more ecological (or environmentally sustainable) methods of treatment that are low in power consumption, requiring negligible operator intervention and skills. It also points to the importance of re-use of all the products and bi-products of treated sewage, as a way of making the overall system very cost-effective. It also points to the importance of shared infrastructure as a way of reducing costs – shared conveyance systems, co-composting, co-treatment and the like.

The Government not only plays a pre-dominant role as a policy maker and a key provider of public health infrastructure but also functions as a custodian for sanitation and health outcomes of the population that it governs.

IMPORTANCE OF FAECAL SLUDGE MANAGEMENT

On-site sanitation systems (OSS) such as septic tanks and pit latrines, are a major pillar for providing access to toilets in rural and urban areas. Despite significant progress under the Millennium Development Goals (MDGs) to increase access to improved sanitation, investments in the subsequent steps, such as safe collection, disposal and treatment of faecal sludge (FS) from on-site sanitation systems, remains a serious challenge. The lack of treatment services often results in unsafe disposal of FS, which poses health and environmental hazards that may undermine improvements in drinking water supply and health services. Therefore, indicator 6.2.2 under Target 6.2 (sanitation and hygiene) of the Sustainable Development Goals (SDGs) emphasizes the importance of “safely managed sanitation services, i.e., faecal sludge management (FSM) beyond the provision of toilets.

There is a need not only for sustained efforts to ensure that households use these latrines and create a community free of open defecation (OD), but also for the provision of sustainable services to empty and transport the waste generated for safe disposal or treatment. As long as

desludging vehicles dispose in the environment, a community should not be referred to as "open defecation free (ODF)."

The management of the generated sludge received increasing attention when it became obvious that neither public funding to expand the piped sewerage network in and around existing city centers nor the water required to flush these pipes might be available. Therefore un-sewered OSSs remain a pre-dominant and cost competitive solution within many regional sanitation portfolios (Kone 2012). On-site sanitation systems and FSM are handled by the informal and private sectors or a mix of public and private operators in many location.

An interesting aspect of faecal sludge (FS) from domestic on-site sanitation is the potential for safe resource recovery from FS. Resource recovery allows for possibilities to apply market based principles at least on parts of the service delivery chain where waste can offer incentives for business development and cost recovery.

The objective of this report is to provide options for sustainable FSM based on an in-depth analysis of the town and its stakeholders.

2 NEED FOR FAECAL SLUDGE MANAGEMENT

India's largest cities have centralized sewerage systems with vast networks of underground pipelines, pumping stations and huge treatment plants. These systems are expensive to build and even more expensive to operate and maintain as they require continuous power, skilled operators and extensive electro-mechanical maintenance and a huge tract of land. It is for this reason that India's 7000+ smaller towns (most urban and peri-urban areas) do not have such systems.

In the absence of proper sanitation, many Indian cities are on the verge of drowning in their own sewage. According to a Central Pollution Control Board report, less than 50% of the urban sewage systems work effectively in India. Sewage has clearly been identified as the leading polluter of water sources in India, causing a host of after effects including diarrhea (which kills 3,50,000 children each year) agricultural contamination and environmental degradation.

Out of the 3.4 million plus households that make up urban Rajasthan, 24% are connected to the underground drainage system, while 67% are still dependent on on-site sanitation systems. 9% of these households do not have access to any form of toilet facilities and thus resort to open defecation or the toilets are directly connected to open drains. Only about 11% of sewage gets transported and effectively treated. The remaining 89% is dumped into water bodies, onto agricultural land or in the domestic environment. The absence of post-toilet infrastructure poses a huge risk to public health and the environment at large.

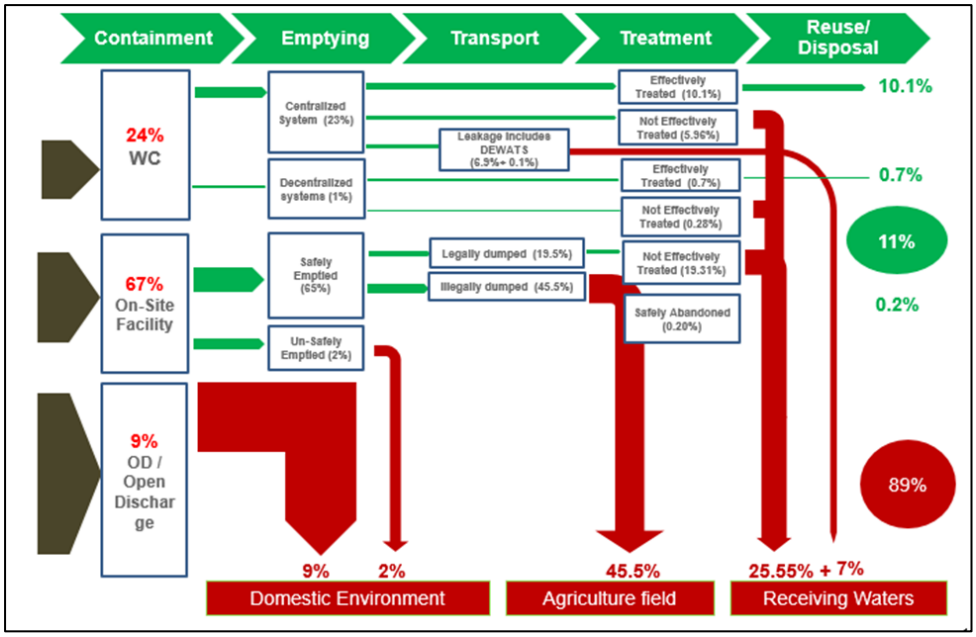


Figure 1: Shit flow diagram Rajasthan (CDD Society, 2017)

CITY STATUS REPORT - SADHULSAHAR

3 SADULSHAHAR: AN OVERVIEW

TOWN PROFILE

Sadulshahar is a town located in north-east of district Sri Ganganagar, 32.9 Km from the city Ganganagar, the divisional headquarters for the district. The closest station to the town is Sadulshahr Nagar Station. The town can be reached by road from Ganganagar and railways, which connect it to Jaipur also. The town is spread over an area of 5 Km^2 situated on the border India and Pakistan. In the 2011 India census, Sadulshahar recorded a population of 24980. Population of Children with age of 0-6 is 3260 which is 13.05 % of total population of Sadulshahar (M). In Sadulshahar Municipality, Female Sex Ratio is of 906 against state average of 928. Moreover Child Sex Ratio in Sadulshahar is around 859 compared to Rajasthan state average of 888. Literacy rate of Sadulshahar city is 74.30 % higher than state average of 66.11 %. In Sadulshahar, Male literacy is around 82.40 % while female literacy rate is 65.41 %.

Sadulshahar Municipality has total administration over 5,015 houses to which it supplies basic amenities like water and sewerage. It is also authorize to build roads within Sadulshahar Municipality limits and impose taxes on properties coming under its jurisdiction. Currently our website doesn't have information on schools and hospital located within Sadulshahar.. The people are mainly engaged in Business, agricultural and industrial works.

Table 1: Town profile, Sadulshahar

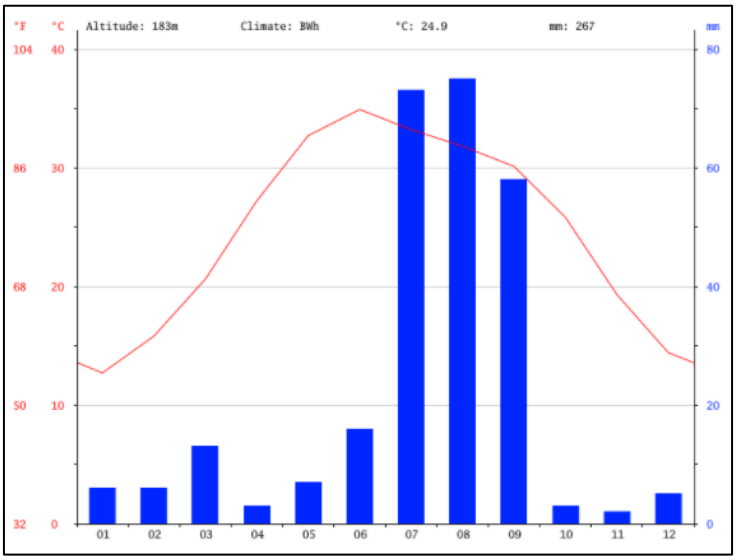
SL.No.	Particulars	Number
1.	Population (2011 Census)	24,980
2.	Population (2028, Projected)	31159[1]
	Population Density	8456 / Km^2
	Average Population Growth	2.4% Annually
	Floating population	Approx. 5% which is 1250
3.	Number of Households	4950
4.	Total Number of Wards	20

[1] Projection as shown in Table 8 under section 8.1

5.	Current Town Area	4.5 Km^2
6.	No. of commercial and institutional establishments	115
7.	% of HH practising Open Defecation	0%
8.	% of HH's dependent use Community Toilets	4.44%
9.	Groundwater Table	200-250 Feet Boring (500-600 Feet)
10.	Major Water Bodies	Bhakra canal
11.	Soil type	Sandy soil/ Dessert Sand
12.	Existing planning Documents and DPR	Sadulshahar Master Plan (2006-2031)

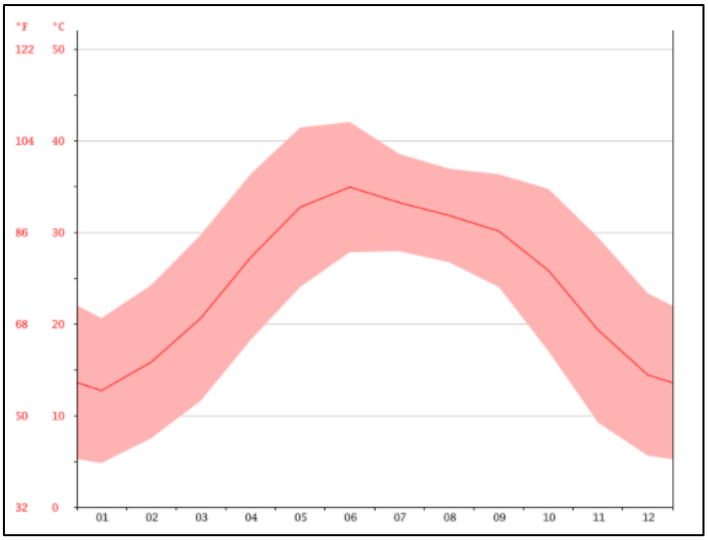
CLIMATE

Temperature varies from 22^0C-47^0C during summers in the months of March to June. During winters from December to January, the temperature is around 3^0C. Rainfall in the region is unpredictable and it is around 30mm annually.



The driest month is November, with 2 mm of rain. Most precipitation falls in August, with an average of 75 mm.[2]

[2] https://en.climate-data.org/location/755710/



June is the warmest month of the year. The temperature in June averages 34.9 °C. In January, the average temperature is 12.7 °C. It is the lowest average temperature of the whole year.

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	12.7	15.8	20.6	27.2	32.7	34.9	33.2	31.8	30.1	25.8	19.3	14.4
Min. Temperature (°C)	4.8	7.5	11.6	18.2	24	27.8	27.9	26.7	24	17	9.2	5.6
Max. Temperature (°C)	20.6	24.2	29.7	36.3	41.4	42	38.5	36.9	36.3	34.7	29.4	23.3
Avg. Temperature (°F)	54.9	60.4	69.1	81.0	90.9	94.8	91.8	89.2	86.2	78.4	66.7	57.9
Min. Temperature (°F)	40.6	45.5	52.9	64.8	75.2	82.0	82.2	80.1	75.2	62.6	48.6	42.1
Max. Temperature (°F)	69.1	75.6	85.5	97.3	106.5	107.6	101.3	98.4	97.3	94.5	84.9	73.9
Precipitation / Rainfall (mm)	6	6	13	3	7	16	73	75	58	3	2	5

There is a difference of 73 mm of precipitation between the driest and wettest months. The average temperatures vary during the year by 22.2 °C.

WATER SUPPLY

Sadulshahar is supplied with water from the SDS distributaries of the Bhakra canal. Currently, the water supply is 1800 KL per day. That amounts to around 60 LPCD. But the water supply has to be increased for the increased population. There is a plan for establishing filter plants in North and South planning zones.

Table 2: Water connection details

Sl. No.	Usage	No. of connections
1	Domestic	3615
2	Commercial	241
3	Industrial	62
4	Total	3918

4 SITUATION ANALYSIS

To understand the existing sanitation situation in Sadulshahar city, faecal sludge value chain approach was used. Faecal sludge value chain is the linear linkage of dependent components in the pathway of faecal sludge generated from onsite sanitation system. The value chain has components such as user interface, containment, collection and conveyance, treatment and reuse. Figure 2 shows a schematic representation of the value chain.

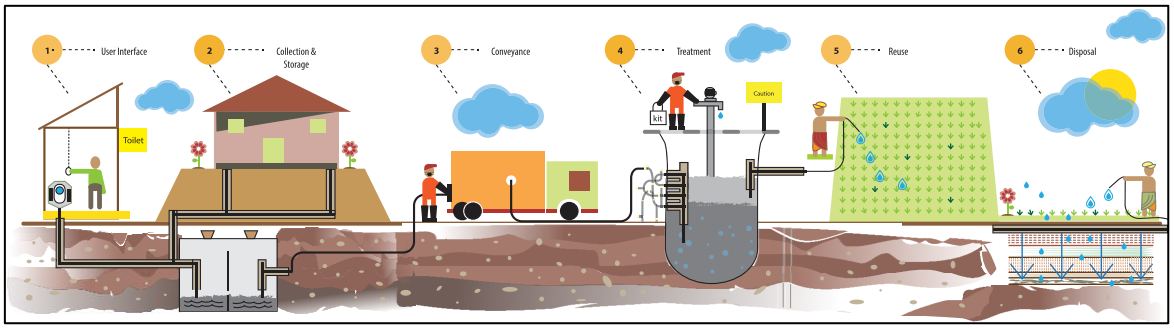


Figure 2: FSM value chain

The management of this value chain is termed as Faecal Sludge Management (FSM). FSM is an important and incremental approach catering to improved sanitation. In the past, faecal sludge management from onsite facilities has not been a major priority for engineers or municipalities and has traditionally received little attention. Several generations of engineers have considered waterborne, sewer-based systems as the optimum, long-term solution to fulfil sanitation needs. Onsite technologies have been looked upon as only temporary solutions until sewers could be built. It is a common perception that onsite technologies fulfil sanitation needs for rural areas, but in reality, around one billion onsite facilities worldwide are in urban areas. In many cities, onsite technologies have much wider coverage than sewer systems. Given that cities are expanding at an incremental rate and that the scope of funding from public sector remains unchanged, the plan to have all households connected to a sewer network remains a distant goal to be achieved. It is the cost and effort involved in constructing sewerage networks and associated treatment plants which lead practitioners and researchers in the field to think about a novel approach, thus mainstreaming FSM.

SADULSHAHAR- EXISTING SITUATION IN SADULSHAHAR

Following is a sanitation situation assessment of Sadulshahar town across the sanitation value chain. It specifically includes the current situation as observed across the following components:

1. User Interface
2. Containment
3. Transportation
4. Treatment
5. Reuse/Disposal

Table 3: Description of FSM value chain

	1.User Interface	2.Storage	3.Transport	4.Treatment	5.Reuse
Description	Faecal sludge from a toilet is captured in either on-site sanitation systems or transported to an STP via UGDs	Faecal Sludge is stored in containment systems like pits and septic tanks to prevent contamination of the local environment.	This stage involves emptying the human excreta from the pits/ septic tanks and then transporting them to the disposal site.	The treatment is done using a wide range of technologies to make the end product safe to be released into the environment.	Utilizing the end products of the sanitation value chain like treated wastewater and dried sludge for a wide range of applications.

Figure 3: Sadulshahar[3] Map

[3] Source : Nagar Palika

4.1.1 USER INTERFACE

Situation before the onset of Swachh Bharat Mission- As per Census 2011, 6.3% of households (316 households) either had no toilets or had access to public/ community toilets. Of this, 6.2% of those households (310) practiced open defecation, 0.1% of the households were dependent on community/ public toilets. Additionally, 57.1% of the households (2,863 households) had insanitary latrines which include single pit latrines (with and without slabs), service toilets (by humans and animals) and toilets directly connected to drains.

Situation after implementation of Swachh Bharat Mission- Post the implementation of the Swachh Bharat Mission, Sadulshahar Nagar Palika based on the data available in Census 2011 estimated and planned for toilet constructions.

In the month of January 2018, Sadulshahar was declared Open Defecation Free. At present four community and one public toilets have been provisioned in total for Sadulshahar.

Figure 4: Toilet seat in a household

4.1.2 CONTAINMENT SYSTEM

The containment systems are mostly septic tanks, with a few single pits. It is estimated that 70% of toilets are connected to septic tanks. The average size of these septic tanks is 8x5.5x6.5 feet, however there is significant variation of the same across the town.

Figure 5: Septic tank in a household

4.1.3 EMPTYING AND TRANSPORTATION

Sadulshahar is serviced by desludging vehicles owned by the private operator. Private operators serve from Sri Ganga Nagar and they operate demand based and provide service as and when they receive a request.

The ULB doesn't own a desludging truck, the people mostly depend on private desludging operators who charge anything between Rs 1000-2000.

Figure 6: Private desludging vehicle operators parking at a nearby marketplace of Sri Ganga Nagar

4.1.3.1 OPERATION MODALITIES

The entire operation of desludging can last for about 15-30 minutes, depending upon the accessibility and thickness of the sludge to be pumped out. After opening the access a crowbar or a stick is inserted into the pit/tank to get an understanding of the thickness of the sludge. If the sludge is thick then water is poured usually through the toilet pan and mixed with the crowbar till it can be pumped out. Vacuum suction is the most prevalent means of desludging in Sadulshahar; operators can empty 3 – 4 M^3 of sludge in 12– 15 minutes (this excludes the time in breaking open the access point). Solid waste such as polythene, condoms, stones was present in the pits/tanks can choke or block the suction pipes, but no choking was observed during the desludging operation.

Post collection, the private operator transported the faecal sludge to areas such as vacant land/ open drains present 2-4 km outside the city. To let out the sludge, the tank is vented and the same valve used for suction is opened, a small hose pipe is attached to this valve to dispose it away from the vehicle.

4.1.3.2 INFRASTRUCTURE

The vacuum suction system and the collection tank are mounted on a tractor with an overall width of 3 meters. Trucks usually were defined based on the capacity of the tank. Suction in these systems is established through vacuum pumps which are powered by a separate arrangement (shaft) from the main vehicle engine. The most common problems associated with the system were that of vacuum pump breakdown which would lead to a few days of non-operation. The pumps usually break down once or twice a year and there is a locally available mechanic to repair these pumps.

4.1.4 TREATMENT

There is no treatment plant in or around the town for faecal sludge or wastewater generated in the city.

4.1.5 REUSE

Currently, faecal sludge is not being reused and most people seem new to the concept of reusing faecal sludge as soil nutrient enhancer. This may be due to the fact that the agricultural activities in the town are very limited.

FSM GAP IDENTIFICATION

From the above situation analysis, gaps across the sanitation value chain as well as in the management framework can be highlighted as mentioned in the table below:

Table 4: FSM gap identification

	1.User Interface	2.Storage	3.Transport	4.Treatment	5.Reuse
Current Situation	Toilets connected to pits/septic tanks or in some instances directly to open drains	The containment systems are mostly septic tanks.	The ULB doesn't own a desludging truck, the people mostly depend on private desludging operators.High time requirement for desludging No protocols or regulation on O&M or safety regulation	Partial Digestion in a septic tank. Direct disposal in the open.	No usage of raw faecal sludge
Corrective Measures	Toilets have to be connected to scientifically designed septic tanks/pits	Training of masons for scientific construction of Septic tanks Build awareness regarding improper design and operational procedures	ULB to provide desludging services by buying appropriate desludging vehicles to access the majority of the lanes in the town. Training for desludging service providers to scientifically empty septic tanks. Post construction of treatment plant, ensure disposal only happens in the treatment plant	Build a faecal sludge treatment plant to effectively treat all the Faecal sludge collected in the town	Spread awareness on the usage of the end product and elimination of stigma regarding usage of treated faecal sludge. Training for farmers using wastewater for safer reuse of treated wastewater and discourage use of raw wastewater

SUB-PROJECT SPECIFIC REPORT

5 PROJECT BACKGROUND

The Department of Local Self Government Rajasthan is keen on implementing Faecal Sludge Management in 100 towns which are not being funded by state or central schemes such as AMRUT, Smart Cities Mission or UIDSSMT. These are primarily towns with population less than 50,000 and water supply less than 100 LPCD.

The prime objective of this report is to understand the sanitation gaps in the town of Sadulshahar and develop Sadulshahar as a pilot town for the same. The activity is to specifically provide faecal sludge management solutions for Sadulshahar in Rajasthan.
Under the Sanitation Capacity Building Initiative that is currently funded by the National Institute of Urban Affairs (NIUA), CDD Society has prepared this detailed project report for faecal sludge management in Sadulshahar.

ABOUT : SANITATION CAPACITY BUILDING PLATFORM

The Sanitation Capacity Building Platform (SCBP) was formed to build capacities of individuals, government and private institutions working in the area of sanitation and ensure improved delivery of sustainable sanitation to the un-served and underserved in India.
The National Institute of Urban Affairs (NIUA), under the Ministry of Urban Development (MoUD), was appointed to build the capacity of governments at all levels and other sanitation actors, on decentralised sanitation. A sanitation capacity building platform was then created in March 2016 at NIUA, which acts as a hub for knowledge sharing, collaboration and training among local organisations and government bodies.
This platform is pivotal to ensure urban local bodies and other actors in the sanitation system obtain the knowledge and skills required to effectively implement decentralised sanitation. The platform will work with cities and states to analyze their situation, and to develop and offer appropriate capacity building activities addressing each area's unique needs and ambitions, walking alongside each urban local body as they plan, implement and maintain decentralised sanitation systems.
The section below discusses the work that the partners engage in:
National Institute of Urban Affairs (NIUA) - National institute of Urban affairs is a premier institute for research, capacity building and dissemination of knowledge for the urban sector in India. It conducts research on urbanization, urban policy and planning, municipal finance

and governance, land economics, transit oriented development, urban livelihoods, environment & climate change and smart cities.

The institute was set up to bridge the gap between research and practice and to provide critical and objective analyses of trends and prospects for urban development. NIUA has assisted in policy formulation and Programme appraisal and monitoring for the Ministry of Urban Development, state governments, multilateral agencies and other private organisations. It contributed to the National Commission on Urbanization, participated in drafting the 74th constitutional amendment of 1992, prepared the Draft National Urban policy and other documents for the roll out of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). It also guided the discourse on municipal finance by framing the Model Municipal Law.

Consortium for DEWATS Dissemination Society (CDD Society) - CDD Society is a not for profit organisations formally registered in 2005 to promote decentralised sanitation across the country. To make more of an impact, we work with a network of like-minded partners. We are the primary implementation partner of BORDA-South Asia in India. CDD society provides decentralised sanitation interventions with emphasis on leveraging existing infrastructure. With exploding populations urban infrastructures are severely challenged. Vertical growth maxes out capacity and horizontal growth results in unserved areas. Decentralised sanitation options complement existing solutions, enable fast implementation and require low investments thus preventing pollution. CDD Society provides solutions across the spectrum from treating the wastewater of communities to remediation plans for drains and lakes to sanitation plans for cities. In order to multiply the impact, CDD Society dedicates considerable resources to training stakeholders - skilled operators, professional practitioners, municipal engineers and decision makers.

SCOPE OF DPR

The scope of this DPR is to assess the current gaps in sanitation in the town of Sadulshahar and suggest sustainable and cost-effective ways to manage the faecal sludge generated within its boundaries. Furthermore, the DPR also estimates the quality and quantity of faecal sludge generated from Sadulshahar and proposes a treatment solution along with transport and conveyance of the faecal sludge generated. It includes the detailed design notes for each part of that treatment module and the cost estimations for implementing the same. It details the technical components of the treatment for the purpose of tendering out for civil construction.

6 CRITERIA TO BE ADOPTED FOR FAECAL SLUDGE COLLECTION & CONVEYANCE

In this section, different technologies for collection of faecal sludge. Apart from excavating the faecal sludge manually, there are semi-mechanized and fully mechanized systems, to help make this a cleaner and easier process. The former still requires manpower to a certain extent, whereas fully mechanized systems are powered by an engine or external power source.

Pit/Septic Tank emptying is a very critical and important part of the sanitation value chain; because it is here that the whole chain gets connected. Clearing the pit goes hand in hand with proper conveyance of faecal sludge.

Conveyance of faecal sludge is closely linked to its collection, because those who collect it are also the ones who transport it and additionally, the desludging technology determines the means of transport.

In any given context, the technology choice for conveyance system generally depends on the following factors:

- Type and quantity of products to be transported
- Distance to cover
- Accessibility
- Topography
- Soil and groundwater characteristics
- Financial resources
- Availability of a service provider
- Management considerations

The options available are:

- Gulper system
- Portable Pump
- Vaccutug (TANK)
- Vaccutug (Tractor)
- Dung Beetle
- Vacuum Tanker
- Human Powered
- Small Volume Transport (Capacity- 1,500 - 3,000 litres)
- Large Volume Transport (Capacity- 3,000 - 10,000 litres)

7 PROPOSED CONCEPT FOR FAECAL SLUDGE COLLECTION & CONVEYANCE

CAPACITY OF THE CESSPOOL TRUCK

Based on the focused group discussion with the ULB officials, exiting cesspool operators, it was found that cleaning of these septic tanks and pits is sporadic, and the faecal sludge (**FS**) is dumped into the environment, untreated, leading to pollution of land and water bodies. While the city plans to introduce faecal sludge treatment plant and dumping, treatment and reuse facilities, the faecal sludge will still be dumped in untreated form, leading to environmental pollution and an unpleasant environment. It was also informed that the town has roads which are inaccessible by the desludging vehicle.

So to fulfil the gap in collection it would be advisable to purchase 1 desludging vehicle. It is suggested to buy a cesspool vehicle of capacity 3.5 m^3. The reason being, the desludging frequency is found to be irregular in the town and the efficiency with which cesspool work is around 75-80%. Also,the proposed treatment plant capacity is 6 m^3 which is around to 2 trips[4] per day. Also, the lanes being narrow in the town, access is limited for the desludging vehicles to enter. Thus a cesspool of 3.5 m^3 is the proposed option.

Following are the links to the relevant suction machine (having various capacities) manufacturers:

Table 5: Suction machine manufactures details

Brand	Link
Kam-Avida	Kamvac Trailer Mounted http://www.kamavida.com/products-details.php?catid=253
Tata Motors	Trailer mounted Suction Machine http://www.tatamotors.com/product/suction-machine/
Maniar	Suction cum Jetting Machine http://maniar.com/suctionmachine/
Ensol	Ensol India http://www.ensol.co.in/product/gully-emptier/

[4] Based on the focused group discussion with stakeholders and also based on the desludging demand in the town.

Figure 7: Trailer mounted Suction Machine

The details of the operations and maintenance costs for operating the cesspool vehicle in the city is mentioned as in section 12.2.

TECHNICAL SPECIFICATIONS OF THE STORAGE TANK AND PUMP OF THE CESSPOOL TUCK

Table 6: Technical specifications for storage tank[5]

The technical specifications for storage tank	
Capacity of tank (litre)	3500 litre
Size of the tank (mtr):	1.27 x 2.9
Weight of the tank (Kg): approx	2000
Shape of tank (shape)	Cylindrical shape
Maximum Pressure the tank can withstand (bar)	1.5Bar ABS
Body material of Tank (make)	IS 2062
Thickness of the tank wall (mm)	5mm
Inlet and outlet pipe material (make)	Kanaflex
Inlet and outlet pipe dia (inches)	4
Technical specification of proposed vacuum pump	
Type:	VANE
RPM Range:	500-1000
Maximum intermittent vacuum: (inches of mercury, psi, kg/cm2)	0.2 Kg/cm2
Maximum intermittent pressure (inches of mercury, psi, kg/cm2)	1.5 Kg/ Cm2
Weight (kg)	Model Specific
Pump capacity (litres per minute) FAD	6500
·Technical specification of motor recommended	

[5] The technical specifications are indicative

Type: 4 Stroke Single Cylinder diesel engines, Air Cool, Auto ignition diesel engine	709
Power:	90hp
RPM:	3000
Fuel: Diesel (2 litres per hour consumption)	9Ltrs/Hr
Maximum operating depth (mtr)	Upto 9m depending on the liquids SG
Estimated time for emptying pit or household small septic tank: 0.5 – 1 hour (depending on the volume of the tank)	Estimated Time will vary depending on site conditions
Persons required for operation: minimum 2 persons	Min 2 persons
Other equipment requirements: shovels and protective gear, which includes masks, gloves and boots	Standard PPE and tools as recommended
In order to carry vacuum tank, it needs to be mounted on either chassis of vehicle or trailer system	Trailer
Estimated cost for procurement of storage tank, pump, motor, accessories and protective gear.	Rs.18,00,000
storage tank with pump, motor and hose pipe	
The above prices should include: · - 2 sets of Ø3" * 15 meter hose pipe with – quick release coupler · - 2 sets of Ø3" Brass ball valve with quick release coupler · - Ø1.5" Pr safety valve · - Ø1.5" De compressor valve · - Vacuum pump and engine	

The estimated cost for procurement of storage tank, pump, motor and accessories comprising the cesspool truck is around Rs 18 Lakh.

STANDARD OPERATING PROCEDURE CESSPOOL TRUCK FOR COLLECTION AND DISPOSAL OF FAECAL SLUDGE

The cesspool vehicle has to be operated in a standard procedure and these are recommended for the operations of cesspool truck for collection and conveyance of faecal sludge. These guidelines are recommened to carry out during the operations and the detailed out in the **Annexure 5.**

8 CRITERIA ADOPTED FOR TREATMENT PLANT DESIGN

QUANTIFICATION OF FAECAL SLUDGE

Accurate estimation of faecal sludge is important as it will determine the complete management mechanism right from desludging intervals, collection system, treatment modules, size of treatment unit, area required for treatment to the end-use of the treatment by-products. For the purpose of determining the quantity of faecal sludge receivable at the faecal sludge treatment facility, population based method for calculating faecal sludge generation in the city using sludge accumulation rate (CPHEEO Manual) has been used.

The total population of Sadulshahar in the year 2011, as per census was 24,980. Three different methods have been used to project the population to 10 years from current year of 2018. Considering previous growth rates and estimating population for the year 2028 which is 10 years from 2018, the population of the city would be 32634. This assumes a decadal growth rate of 14.55%.

a) Arithmetical Increase method

This method is suitable for large and old city with considerable development. If it is used for small, average or comparatively new cities, it will give lower population estimate than actual value. In this method the average increase in population per decade is calculated from the past census reports. This increase is added to the present population to find out the population of the next decade. Thus, it is assumed that the population is increasing at constant rate. Hence, dP/dt = C i.e., rate of change of population with respect to time is constant. Therefore, Population after nth decade will be Pn= P + n.C where, Pn is the population after 'n' decades and 'P' is present population.

Sl. No.	Year	Population - Sadulshahar	Increment
1	1991	17702	-
2	2001	22236	4534
3	2011	24980	2744
		Average increment per decade ,C	3639
		Average increment per year	363.9
		No. of years from 2011 till 2028	17
		Population in 2028	31166.3

b) Geometrical Increase Method (Or Geometrical Progression Method)

In this method the percentage increase in population from decade to decade is assumed to remain constant. Geometric mean increase is used to find out the future increment in population. Since this method gives higher values and hence should be applied for a new

industrial town at the beginning of development for only few decades. The population at the end of nth decade 'Pn' can be estimated as: Pn = P (1+ IG/100) n Where, IG = geometric mean (%) P = Present population N = no. of decades.

Sl. No.	Year	Population - Sadulshahar	Increment	Geometrical increase rate of growth
1	1991	17702		
2	2001	22236	4534	26%
3	2011	24980	2744	12%
Geometric mean I_G				18%
No. of years from 2011 till 2028				17
Population in 2028				32623.88

c) Incremental Increase Method

This method is modification of arithmetical increase method and it is suitable for an average size town under normal condition where the growth rate is found to be in increasing order. While adopting this method the increase in increment is considered for calculating future population. The incremental increase is determined for each decade from the past population and the average value is added to the present population along with the average rate of increase. Hence, population after nth decade is Pn = P+ n.X + {n (n+1)/2}.Y Where, Pn = Population after n^{th} decade X = Average increase Y = Incremental increase

Sl. No.	Year	Population - Sadulshahar	Increment	Incremental Increase
1	1991	17702		
2	2001	22236	4534	
3	2011	24980	2744	-1790
		Total	7278	-1790
		Average	3639	-1790
No. of years from 2011 till 2028				17
No. of decades until 2028				1.7
Population in 2028				27058.25

Comparing all the three method, first two methods give fairly a same range of population projection. Higher of these two are considered for further calculation that is Geometrical Increase Method which giver a population projection of 32,624.

Estimations using Primary data – Population Method

Taking Sludge Accumulation Rate = 0.00021m^3/cap/day

Faecal Sludge Generated in a year = 32,624 X 0.00021

Faecal sludge Generated in a day = 6.85 m^3

Considering the factor that FSTP is a batch process, the input load of which depends on truck volume, the decimal value of input load can be rounded-off to 6 m^3. This is because the truck would be expected to haul 3.5 m^3 faecal sludge per trip at a 75- 80% efficiency and per day two truck load of faecal sludge is anticipated at FSTP. Therefore the FSTP design capacity is fixed to 6 m^3/Day and which can be increased by 0.5-1 KL per day without much changes in output and operations.

FAECAL SLUDGE CHARACTERISTICS

Faecal sludge characteristics vary widely from one location to another. This variation is due to several factors, which includes number of users of the septic tank at the household, kind of waste disposed in the septic tank, size of the tank and desludging frequency, climatic conditions and the construction specifications of the septic tank.

Faecal sludge characteristics are very variable even within one town or city as they depend on many factors such as the type of sanitation facility from which the sludge is removed, the intervals of emptying, the technique of emptying, etc. Poor knowledge and lack of maintenance services often results in accumulation of organic sludge which reduces effective volume, lower retention times and affects the system performance. However, desludging of pits or septic tanks is perceived as a burden by many home-owners and hence they postpone cleaning until the tanks start overflowing.

In Sadulshahar, the toilets in the residential households utilise pour flush facility followed by septic tanks. In Sadulshahar, the local population can be classified as washers, therefore water is always used in the toilets. Kitchen wastewater and other grey water do not enter the septic tanks except in cases of a few houses or hotels where the black water and grey water lines are not separated. Cleaning agents used to clean the toilets also end up in containment.

In Sadulshahar, the preliminary survey[6] claims that the septic tanks and pits are water tight structures. But, water may leach out and also storm run-off water may enter during rainy season into the pits or septic tanks. The soil in Sadulshahar is quite permeable. Therefore depending on the season the faecal sludge might be concentrated or diluted.

[6] Conducted by CDD Society and NIUA as part of 100 towns FSM study in Rajasthan

The storage time in the pit or tank also determines the degree of digestion that would have occurred in the storage unit. In general faecal sludge from public toilets is found to be less digested or stabilized, whereas the sludge from household pits or septic tanks is found to be more stabilized as it has been stored for a longer time. The sludge from pits is less stabilized than sludge from septic tanks as it has been stored for a shorter duration in a pit. The faecal sludge at the bottom of tanks or pits is also found to be more compact and better digested than the sludge at the top.

Mechanical desludging is the most common method of desludging in Sadulshahar. In case of mechanical desludging, if the sludge is too thick, water is mixed with sludge to allow for the pumps to suck out the sludge from the pit or septic tank. In case of septic tanks, the sludge at the bottom is usually not removed. Therefore the contents removed are more liquid like than sludge removed from pits. In general faecal sludge characteristics from on-site sanitation facilities have been reported as listed in Table below.

Sl.No	Parameters	Concentration [7]
1	Biochemical Oxygen Demand (BOD), mg/l (average)	~10000
2	Chemical Oxygen Demand (COD), mg/l (average)	~30000
3	Total Solids (TS), mg/l (average)	30000

Table 7 FS characteristics in general[8]

Faecal sludge is in general much more concentrated than municipal wastewater (10 to100 times higher contents of organic pollutants and suspended solids). Faecal sludge in pits or septic tanks with appreciable levels of organics, nitrogen and pathogens, disposed without proper treatment are a cause of concern on account of the organic carbon (measured as BOD_5), nitrogen, phosphorus and pathogens in the effluent.

FAECAL SLUDGE FEEDING (PEAK FLOW)

It is of utmost important to clearly define the rate at which the faecal sludge will be fed into the treatment system. The faecal sludge feeding into the treatment system depends on the capacity and discharge arrangement of the desludging trucks. The treatment modules are designed considering a flow rate generated by discharging 3.5 Kilo litres of faecal sludge being discharged from the truck into the treatment plant in 8-10 minutes time.

HYDRAULIC RETENTION TIME

In order to ensure the effective treatment of sludge as well as sludge water, it is necessary to provide adequate sludge and hydraulic retention time for each of the treatment module

[8] Based on the faecal sludge sample tests conducted in Bagru, Bijainagar, Sambhar-Phulera

proposed. The proposed Solids and Hydraulic Retention Time for each of the treatment modules are explained in the next section.

CLIMATIC CONDITIONS

In order to ensure the effective treatment process, it is necessary to consider the climatic conditions for design of treatment modules, necessarily the temperature to ensure treatment efficiency, rainfall to ensure the drying of solids in the drying beds. The design and detailing of the treatment modules are carried out taking the aforementioned factors into consideration.

ODOURS

The odour problem has been associated with the handling of faecal sludge at the treatment facility. The most characteristic odour of faecal sludge is that of the rotten egg which indicates the presence of hydrogen sulphide and other gases. The real concern with odours is often not recognized during the design and only becomes apparent after the treatment plant becomes operational. Minimization of odour related issues should be addressed in the design details during the designing stage. The same has been considered for this project by providing proper ventilation for all modules of FSTP. It is also utmost necessary to develop good housekeeping practices in the facility operation.

SITE SELECTION

8.1.1 SITE SELECTION CRITERIA

Measures taken while planning for Faecal Sludge/Septage treatment facility[9]

Identification of septage treatment site is crucial for effective implementation of septage management plan. Following parameters taken into consideration before finalization of treatment sites:

Distance of treatment site: Distance from emptying to delivering and accessibility of the treatment site are major issues. The transport of relatively small faecal sludge volumes on congested roads over long distances in large urban areas is financially unfeasible. A site that is too far away implies fewer trips per day, less revenue and more fuel costs to private operators.

Reliability of electricity: It is also important to assess the availability and reliability of electricity if treatment technology has mechanical operated parts; as in case of fluctuations it will increase treatment time and will affect optimal utilization of treatment capacity.

Neighborhood: A treatment site may generate nuisance, especially bad odors. For this reason it should be located at an appropriate distance from the residential areas.

[9] UDD,2016 Guidelines on Faecal Sludge and Septage Management

Land availability: Projects are often delayed because of non-availability or high price of land. ULB should identify the land bank for treatment facility. ULB should also explore the possibility of develop septage treatment facility at solid waste dumping or treatment site.

Geological Parameters: Assessment of existing geological conditions on site like groundwater table, type of soil, prone to flooding is always recommended as it may directly affect selection of technology option.

Below mentioned is the Indicative Decision making framework for Evaluation of Faecal Sludge/Septage treatment site based on UDD,2016 Guidelines on FSSM.

Sr. No.	Particulars	Unit	Treatment location 1	Treatment location 2	Treatment location 3	Treatment location 4
Identification of treatment sites						
1	Distance of existing septage disposal site	km				
2	Distance of SWM treatment or disposal facility	Km				
3	Type of SWM treatment facility					
4	Average distance and duration of emptying trip	Km & mins.				
5	Electricity availability					
6	Neighborhood (Residential/ institutional/commercial/ irrigation/farming areas)					
Land availability						
7	Government or private land					
8	Available/ Non-available for developing site					
Geological parameters						
9	Water table	**mt**				
10	Type of soil					
11	Prone to flooding	**Yes/No**				

Table 8 Indicative list for selection of site for FSTP construction (UDD, 2016)

8.1.2 PROPOSED SITE

The site suggested by the Nagar Palika Sadulshahar is located on South-East side of the city and it is situated next to the railway line passing between Hanumangarh and Sadulshahar. An area of has approximately 13,000 Sqm is available at this particular site. The site is 1.2 km west of Abohar-Hanumangarh main road and currently there is only compound wall all around the site and a land reserved for solid waste dumping. The site is east side of the railway line connecting Sadushahar and Hanumangarh. Railway line is just 10 m away from west side boundary of site. The site is 6-7 km away from the town and currently not being used as faecal sludge dump site. There are two possible routes leading to the site one among which is shorter than other and has been blocked by railway authority as per Nagra Palika Engineer. Nagar Palika is intended to make this route available for accessing site in order to make hauling easier. The second route is longer and has difficulty in accessing site. Nagar Palika has also verbally shown interest in constructing paved road to site in future. **Refer Annexure 6** for detailed site checklist

9 PROPOSED CONCEPT FOR IMPLEMENTATION OF FAECAL SLUDGE TREATMENT SYSTEM

In the presence of only pits and septic tanks as a collection and treatment module for faecal sludge management and the absence of further treatment modules, the collected faecal sludge is disposed without treatment. The faecal sludge collected by the trucks is either disposed on farm lands, forest land, or water bodies. Treatment of faecal sludge is required before it can be safely disposed or used.

At present in Sadulshahar there is no faecal sludge treatment facility available. Faecal sludge has several characteristics that make it difficult to handle. Faecal sludge cannot be discharged into surface waters or be treated like wastewater because its pollutant concentrations are too high. It cannot be used for direct land disposal or treated like solid waste because its moisture content is too high. It cannot be directly used for crop fertilising because its pathogen content is too high. The first stage of faecal sludge treatment thus mostly involves stabilisation of the sludge and separation of the solid phase and the liquid phase. In this way the liquid part can be treated specifically, usually with wastewater treatment technologies. The solid part can further be treated to enhance its characteristics for reuse applications. Based on the characteristics of the faecal sludge from Sadulshahar, the treatment objectives are listed as

i. Solid Liquid separation
ii. Dewatering
iii. Stabilisation
iv. Reuse in agriculture

Sludge treatment involves different treatment steps where available techniques can be combined in various ways depending on the existing constraints and the treatment objectives.

INTERMEDIARY SOLUTION FOR FAECAL SLUDGE DISPOSAL

Faecal Sludge collected from the households in Sadulshahar will be transported and disposed at the nearest Sewage Treatment Plant (STP) which is located in the Sriganganagar district and the decision has to be taken by the Nagar Palika until FSTP is commissioned at the town.

The STP located closest to Sadulshahar Nagar Palika is at Suratgarh in Sriganganagar district.

OPTIONS FOR FAECAL SLUDGE TREATMENT

Faecal sludge can be treated in a variety of ways and there is no single best option considering the widely varying conditions of urban areas. The criteria for short listing options are based on area requirement, treatment efficiency, simplicity in operation and maintenance, reliability and robustness of treatment modules, odour and public nuisance and cost effectiveness of the system at capex and opex levels.

Table 9: Options shortlisted for technologies

Sl. No.	Treatment Stages	Treatment Modules
1.	Pre Treatment	Screen and Grit Chamber
2.	Solid Liquid separation	Feeding Tank Sludge Drying Beds
3.	Solid Stabilization	Biogas Digester Sludge Stabilization Reactor Planted drying beds
4.	Liquid Wastewater Treatment	Settler + Anaerobic Filter Chamber
		Vertical Planted Gravel Filter
5.	Tertiary Treatment	Sand carbon filter and UV treatment

Table 10 below shows comparison between technologies considered. Out of these shortlisted technologies, the optimum combination of treatment technologies selected for

Sadulshahar is presented in the next section. The final detailed project report will have this treatment option along with final drawings and estimations for each module.

Table 10: Comparison of Technologies for Treatment of Sludge

Modules	Function	Area	Cost	Operation & Maintenance	Odour	Reuse
Unplanted Drying Bed	Unplanted Drying beds are simple sealed shallow ponds filled with several drainage layers. Sludge is applied on the top and dried by percolation and evaporation	48 m^2/m^3	2.5 lacs/m^3	Trained staff is required for application of sludge, controlling drainage system and desludging Desludging is required every week	Very less chance of odours and flies	Dried sludge cannot be directly used ,it requires further drying which can be done by storage or composting
Planted Drying Bed	Planted Drying beds are simple sealed shallow ponds filled with several drainage layers and Plants. Sludge is applied on the top and dried by percolation and evaporation. The plants maintain the porosity of the soil and enhance the evaporation by transpiration	105 m^2/m^3	5 lacs/m^3	Trained staff is required for application of sludge, controlling drainage system, desludging , maintaining the plant growth Desludging is required 1.5 to 3 years	Odours and flies may be noticeable	Dried sludge can be used as bio solid in agriculture directly from the PDB
Bio Gas Digester	Wastewater and organic wastes are introduced in an airtight reactor, solids settle to the bottom, where they are decomposed by anaerobic	1.5 m^2/m^3	50,000/ m^3	Trained staff is required for Checking gas-tightness regularly.	Odours may be noticeable	Bio gas can be used for the domestic chores directly from the

	digestion and transformed to biogas and fertilising slurry					digester.
Stabilization Reactor	Stabilisation Reactor has three chamber for mixing, stabilization and separation of solid and liquid of the faecal sludge	6.5 m^2/m^3	1.5 lacs/m^3	Trained staff is required to check the regular flow.	No odour is there	No option for reuse

TREATMENT CONCEPT

The treatment concept proposed for faecal sludge treatment in Sadulshahar has been developed considering mainly

a) Area of treatment plant
b) Reusability of by-products
c) Implementation cost
d) Operations and Maintenance
e) Aesthetics

As manpower and electricity is limited in Sadulshahar the design has taken into consideration minimum energy and minimum operation and maintenance requirement.

9.1.1 TREATMENT STAGES AND MODULES ADOPTED

Table 11: Different Faecal sludge Treatment Stages and Modules

Sl. No	Treatment Stages	Treatment modules
1	Pre-Treatment	Screen Chamber
2	Sludge Stabilisation/ Dewatering	Planted Drying Beds
3	Liquid Wastewater Treatment	Integrated Settler and Anaerobic Filter
		Horizontal Planted Gravel Filer
4	Tertiary Treatment	Polishing pond

9.1.2 FSTP CONCEPT PROPOSED FOR SADULSHAHAR

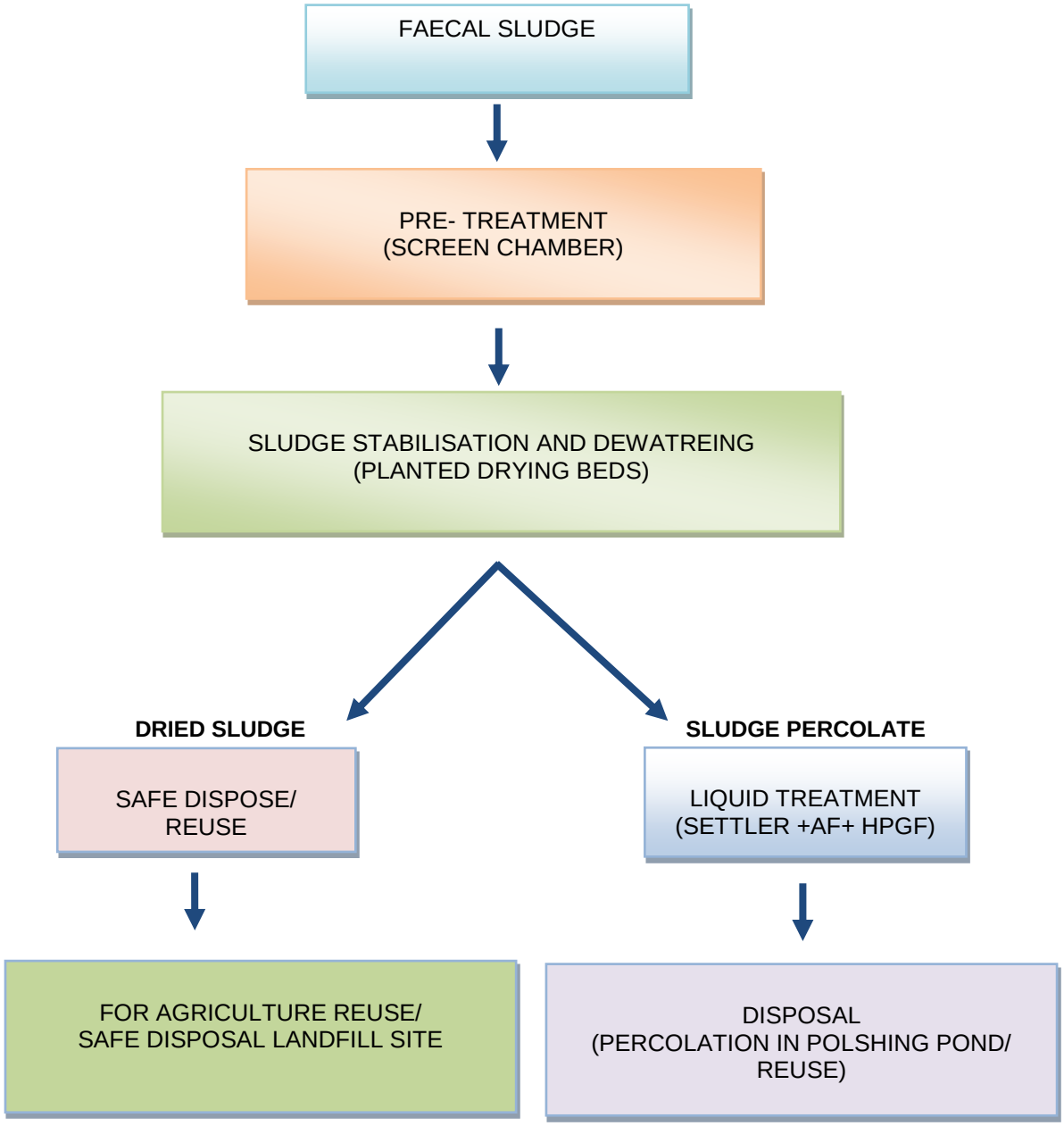
This faecal sludge treatment unit is designed for 6 cum/day capacity. The faecal sludge shall first be made to pass through the screening chambers (6 nos) for the retention of coarse materials/ solid waste present in the faecal sludge. The liquid sludge would be conveyed to

PDBs (6 nos) where they are allowed to degrade naturally with the help of specific plant. The planted sludge drying beds are structures with sloped base for holding graded filter media. The sludge undergoes liquid-solid separation and also drying. The dried sludge from the planted drying beds are removed once in 1 or 2 years depending on rate of feeding and the rest of the part which is the liquid percolate or effluent wastewater is conveyed to the separate treatment units.

The effluent wastewater is then treated in two stages (primary and secondary stage) in DEWATS modules. The primary stages i.e. Settler is mainly meant for Sedimentation of any solids that have entered the modules along with the percolate. The secondary stage i.e. Anaerobic Filter is for the anaerobic degradation of any dissolved and suspended organic matter. The partially treated wastewater from the secondary treatment unit would be conveyed into the horizontal planted gravel filter takes place. The treated wastewater from the planted gravel filter is allowed to soak into the ground through a polishing pond and it can be reused for agriculture by placing polythene sheet at the bottom of pond to stop seepage into the ground.

In future if the quantity of faecal sludge is expected to increase significantly the same system can be replicated in the selected location to accommodate the extra loads. The area available in the selected location for FSTP is **3.14 acres.**

9.1.3 LINE DIAGRAM SHOWING TREATMENT PROCESS



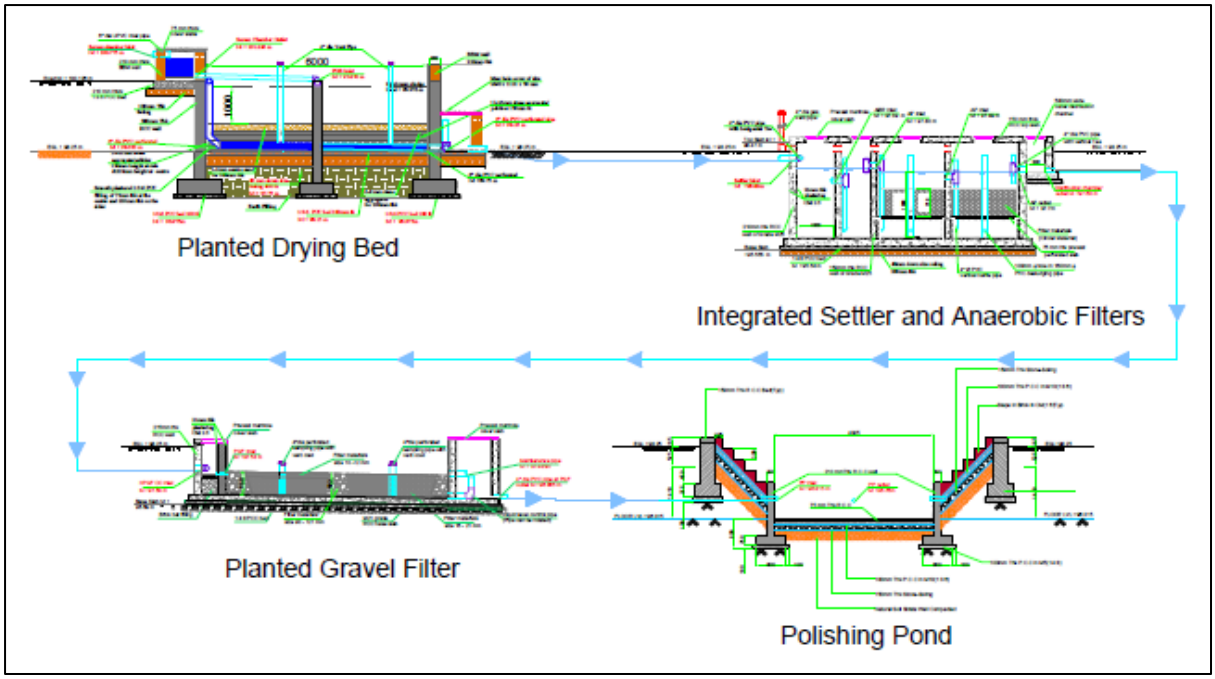


Figure 8: Hydraulic flow diagram

PROCESS FLOW DESCRIPTION

Screen chamber

Figure 9: Screening chamber

It is a physical method for separation of solid waste and inorganic solids like plastic, cloth, sand, slit etc. from the faecal sludge to prevent clogging of subsequent treatment modules and also enhancing the value of treated end products. Screen chamber uses a series of vertical screens made from mild steel and coated with anti-corrosive elements for this purpose. In the screen chamber proposed for this treatment facility there are 2 vertical screens with the first screen having a 3 cm opening between vertical bars and the second screen has an opening of 1.5 cm. The trash is collected by manually scrapping the screen with a rake or similar arrangement.

Planted Drying Bed

Figure 10: Planted drying bed

The screened faecal sludge is applied on to Planted drying beds (PDBs), also sometimes referred to as planted dewatering beds, vertical-flow constructed wetlands and sludge drying reed beds, are beds of porous media (e.g. sand and gravel) that are planted with emergent macrophytes. PDBs are loaded with layers of sludge that are subsequently

dewatered and stabilized through multiple physical and biological mechanisms. FS is repeatedly loaded onto PDBs, with up to 10 cm of FS per loading where it accumulates for several years depending on the loading rate, the capacity of the system and mineralization rates and meanwhile the percolated water is treated separately in DEWATS modules.

The volume of sludge on the PDB reduces continuously (through moisture loss and degradation), and the plants maintain porosity in the sludge layer thereby significantly reducing the need for sludge removal compared to unplanted drying beds (which require sludge removal every two to three weeks).

Integrated settler and Anaerobic Filter (ISAF)

The percolate from the Sludge Drying Bed is further subjected to treatment in settler and Anaerobic Filter (AF). The incoming faecal sludge load has pretty high solids content, therefore it is proposed to provide a settler for sedimentation before it enters into the anaerobic filter. The anaerobic filter is provided with a series of chambered anaerobic fixed bed filters. As wastewater flows through the filter, particles are trapped and organic matter is decomposed by the biomass that is attached to the filter material.

Horizontal Planted Gravel filter (PGF)

Organic load entering into the PGF is already within the required effluent (BOD < 30mg/L) requirement. In order to remove the odour and colour and to enrich the wastewater with oxygen it is necessary to allow the wastewater to pass through aerobic treatment. PGF is made of planted filter materials consisting of graded gravel. The bottom slope is 1% and the flow direction is horizontal. The main plants used in this filter bed are Canna Indica, Reed juncus, Papyrus and Phragmites. The plant selection is mainly based on their ability to grow in wastewater and have their roots spread wide. PGF also aids in reducing the nutrients such as Nitrogen, Phosphorous and potassium present in wastewater.

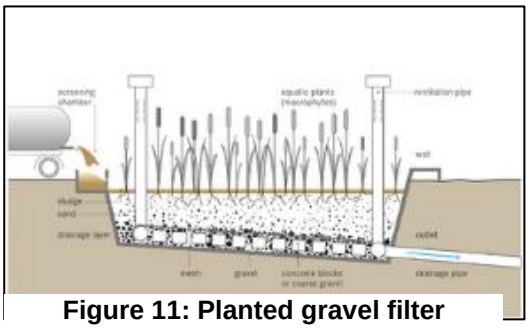


Figure 11: Planted gravel filter

Polishing pond

Polishing ponds are used to improve the quality of effluents from efficient anaerobic sewage treatment plants, so that the final effluent quality becomes compatible with legal or desired standards. The residual organic material and suspended solids concentrations in the digested sewage are reduced, but often the main objective of polishing ponds is to improve the hygienic quality, measured by the concentration of two indicator organisms: helminth

eggs and faecal coliforms (FC). The FC removal is normally the slowest process and for that reason becomes the main design criterion for a polishing pond. The final effluent TSS and BOD concentrations were not very low for retention times of less than 1 week, but this could be attributed to the presence of algae in the final effluent. Filtered effluent BOD and TSS concentrations were very low. For retention times of more than 1 week algae were efficiently removed from the liquid phase by the action of predators and algae flocculation and settling, so that a final effluent with a very low BOD and TSS concentrations was produced. To maximize the FC removal efficiency, the polishing pond was constructed with the objective of approaching a plug flow regime.

Figure 12: Polishing Pond

AREA REQUIREMENT FOR PROPOSED FSTP

Table 12: Area Specifications of Treatment Modules

Sl.No	Modules	Nos	Area (sq.m)	Total Area (sq.m)
1	Screening Chamber	12	2.62	31.44
2	Planted Sludge Drying Bed	12	44	528
3	Settler+AF	1	15	15
4	Horizontal Planted Gravel Filter	1	33	33
5	Polishing Pond	1	52	52
Total area for treatment modules				**658**
Total area for supporting structures(Road and Operator room)				**1627**
Total FSTP Area, Sqm				**4936**

PLAN OF FSTP SITE

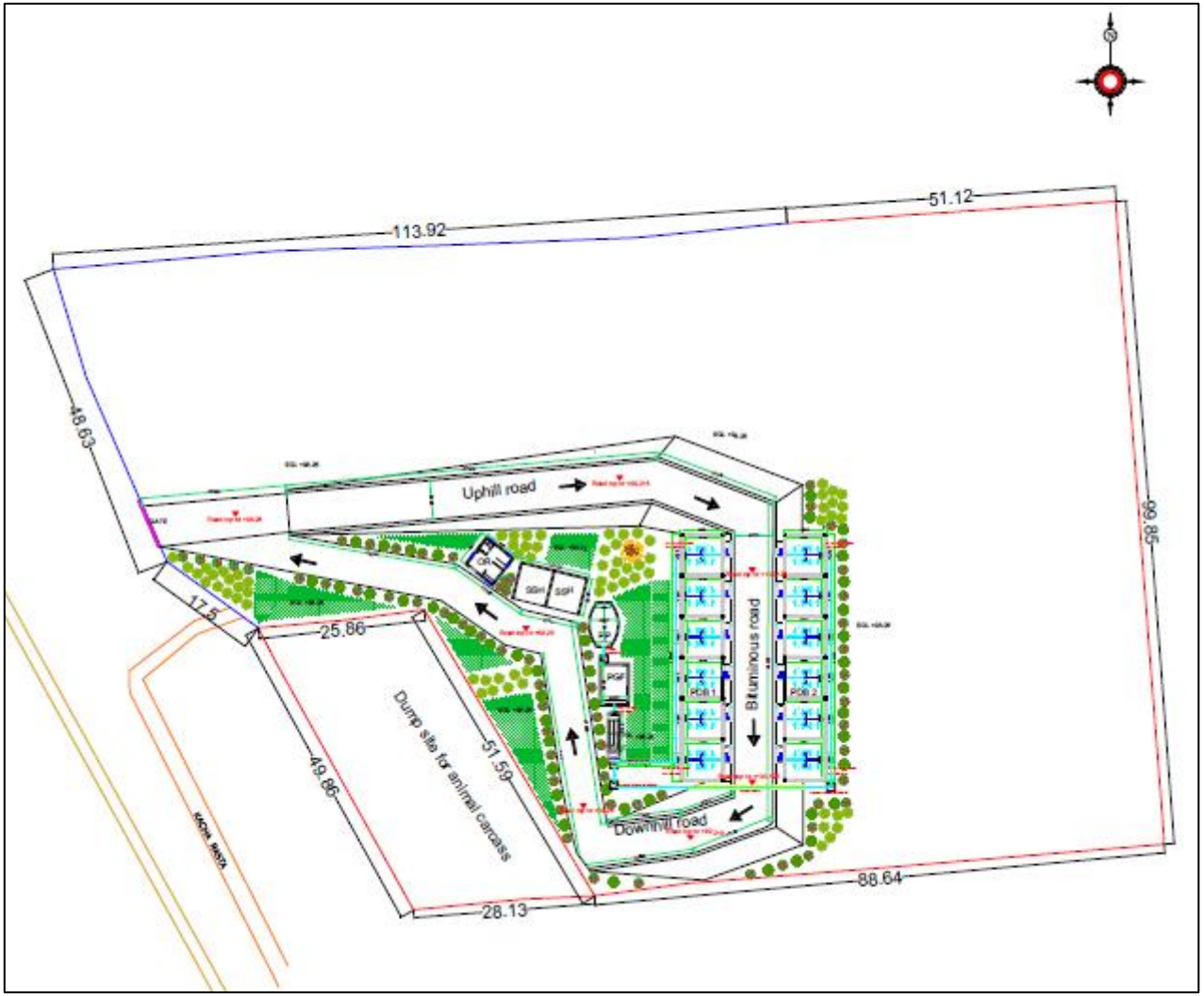


Figure 13: Plan of FSTP at Sadulshahar

10 END PRODUCT SPECIFICATIONS

The treatment system has two end products namely:

a) Bio solids
b) Treated Water

BIO SOLIDS

Bio solids are dried sludge from planted drying beds. Bio solids can be used as a soil conditioner for farming as they are a rich source of Nitrogen, carbon and phosphorous.

Table 13: Bio-solids characteristics

Parameters	Characteristics
P^H at 5 % suspension	5- 7
Moisture %	10 - 30 %
Organic carbon %	10 – 25 %
Organic Nitrogen	2- 5 %
Phosphorous	0.2 – 1%
Bulk Density (Specific gravity)	0.65 – 0.9

Source: Faecal sludge management systems approach for Implementation and Operation, IWA Publications, 2014 and as per FSTP Devanahalli tests

TREATED WATER

Water from liquid treatment modules are stored in a collection tank from where it can be reused for irrigating plantations in nearby farm lands and also can be discharged into a nearby drain. The characteristics of the treated water are as follows:

Table 14 Treated water characteristics

Parameters	Characteristics of treated water
P^H	6.5-9
Temperature	25 -35 degree
BOD at 5 days mg/L	~30
COD mg/L	~250
Total suspended solids mg/L	<100
Faecal coliform, MPN per 100 mL	<1000

Source: Based on FSTP Devanahalli test results

11 PLUMBING SPECIFICATIONS

This Section includes the information on all the pipe material and sizes, registers and their sizes, slope provided for conveying the sludge and Supernatant /filtrate. Ball valves to be used in the conveyance and piping of sludge, i.e total solids in excess of 1%. For conveyance of treated water or percolate, ball/globe valve to be used.

Pipe material and sizes

Table 15: Pipe material

Sl no	Pipe Material	Diameters used	Remarks
1	UPVC	110mm,160mm	None pressurized. i.e. gravity flow pipes
2	HDPE	110mm, 65 mm	For pipes below 1 meter ground filling

Slope

The minimum gradient for the pipes conveying faecal sludge and treated wastewater is provided in Table 16.

Table 16: Slope Details

Sl No	Slope	Remarks
1	1:100	All pipes Conveying wastewater (if not mentioned)
2	1: 50	Bottom slope in sludge drying bed and VPGF
3	1:200	Storm water drain

Registers

The sizes of the register are based on the Depth of the sewer pipe and are provided in the table below:

Table 17: Register Details

Sl. No.	Depth of the Sewer Pipe	Size of the Register
1	0m to 1m	1 m x 1 m

12 DESIGN DESCRIPTION AND SCHEMATIC OF THE PROPOSED TREATMENT MODULES

SCREEN CHAMBER

It is a physical method for separation of solid waste and inorganic solids like plastic, cloth, sand, slit etc. from the faecal sludge to prevent clogging of subsequent treatment modules and also enhancing the value of treated end products.

Table 18 Specifications for Screen chamber

Parameters	Unit	Values
Area required per screening chamber	m^2	2.6
Retention time	Seconds	120 Seconds
Number of screen chambers		12 numbers

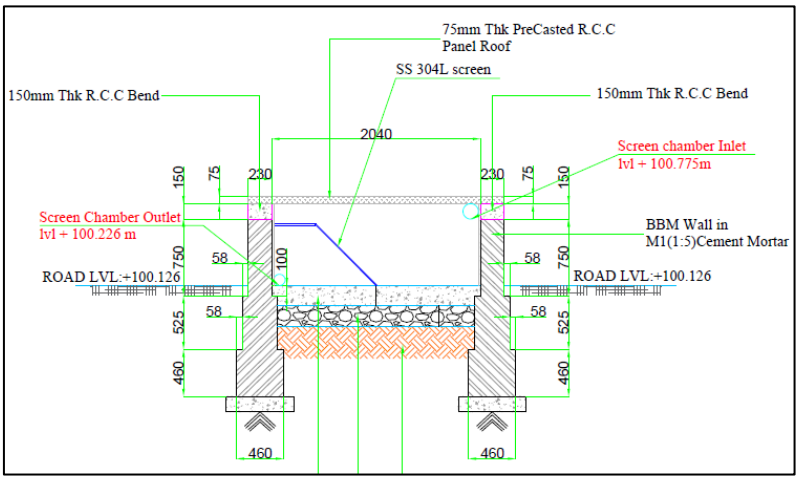


Figure 14: Cross section of Screening Chamber

PLANTED DRYING BEDS

The screened faecal sludge is applied on to Planted drying beds (PDBs), also sometimes referred to as planted dewatering beds, vertical-flow constructed wetlands and sludge drying reed beds, are beds of porous media (e.g. sand and gravel) that are planted with emergent macrophytes.

Table 19: Specifications of Sludge Drying Bed

Parameters	Unit	Values
Total number of beds	No.	12
Treatment volume of each bed /day	m^3	6
Area required per bed	m^2	44
Slurry feeding frequency	days	6 days
Maximum sludge filling height	m	1
BOD outlet (percolate)	mg / L	200
COD outlet (percolate)	mg / L	600

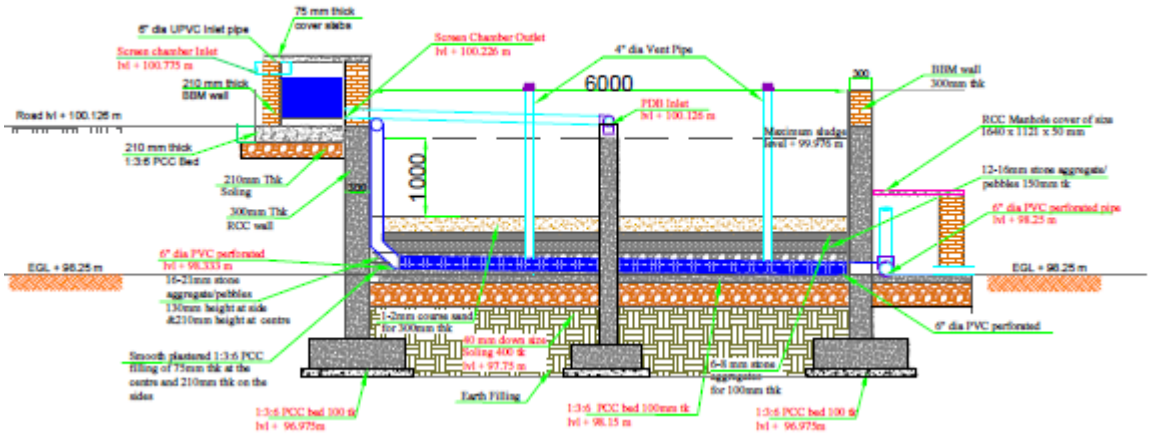


Figure 15: Cross Section of Planted Drying Bed

INTEGRATED SETTLER AND ANAEROBIC FILTER (AF)

The percolate from the Planted Drying Bed is further subjected to treatment in the Integrated Settler and Anaerobic Filter (AF).

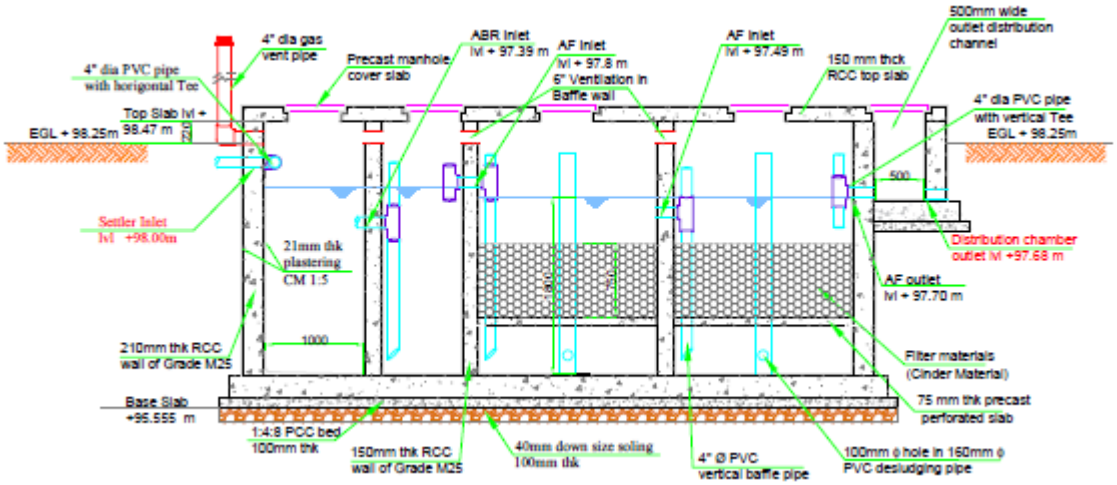


Figure 16: Cross section of Integrated Settler and Anaerobic Filter

Table 20: Specification for Settler Design

Sl No	Particulars	Unit	Values
1	Discharge (Q daily)	m^3/d	4
2	Time of peak flow (peak)	Hrs	4
3	Max. Chemical Oxygen Demand (COD in)	mg/l	600
4	Max. Biological Oxygen Demand (BOD in)	mg/l	200
5	Hydraulic Retention Time (HRT)	Hrs	4
6	Area required	m2	5

Table 21: Specifications of Anaerobic filter design

Sl No	Particulars	Unit	Values
1	Discharge (Q daily)	m^3/d	4
2	Time of peak flow (t peak)	Hours	4
3	Chemical Oxygen Demand (COD in)	mg/l	420
4	Biological Oxygen Demand (BOD in)	mg/l	130
5	Min. Temperature (T minimal)	°C	28
6	Type of filter material	Construction	Gravel, Cinder

		or corrugated pipes	
7	Volume of filter material	m3	2.025
8	Area required	m2	10
9	Chemical Oxygen Demand (COD out)	mg/l	110
10	Biological Oxygen Demand (BOD out)	mg/l	20

HORIZONTAL PLANTED GRAVEL FILTER

The Planted Gravel Filter is used as an aerobic tertiary treatment unit where the pollutants (mostly nutrients) present in the wastewater are degraded aerobically. In order to remove the odour and colour and to enrich the wastewater with oxygen it is necessary to allow the wastewater to pass through aerobic treatment. HPGF is made of planted filter materials consisting of graded gravel bed. The bottom slope is 1% and the flow direction is horizontal. The main plants used in this filter bed are Canna Indica, Reed juncus, Papyrus and Phragmites. The plant selection is mainly based on their ability to grow in wastewater and have their roots spread wide. The horizontal planted drying beds also aid in reducing the nutrients such as N, P and K present in wastewater.

Table 17: Specifications of PGF

Parameters	Unit	Values
Percolate treatment quantity	m^3/Day	4
Total number of PGF	No.	1
Hydraulic Retention Time per PGF	Days	3.41
Area required per PGF	m^2	33
BOD outlet	mg / l	10
COD outlet	mg / l	50

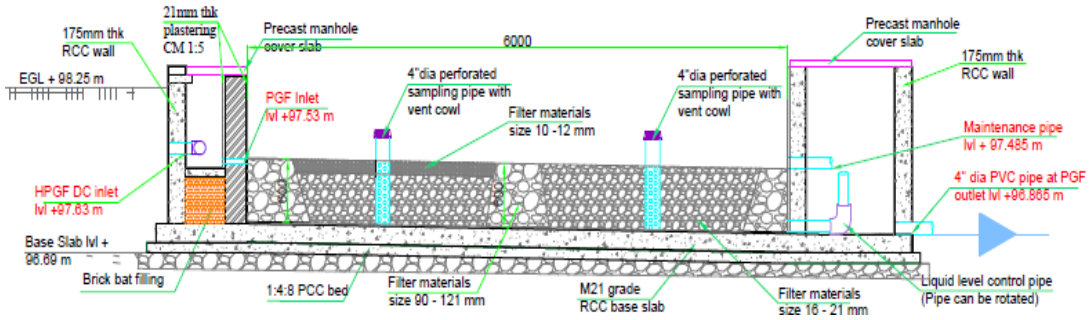


Figure 17: Cross section of Planted Gravel Filter

POST TREATMENT/ POLISHING POND

The treated effluent from the PGF is good to reuse by the neighbouring farmers. But this cannot be assured as farmers reuse water depending on crop season. Therefore it is proposed to have a safe disposal mechanism in place to avoid any problems in future. In this particular FSTP, polishing pond with an unlined bottom surface is proposed for collection and disposal of effluent. Pond has a holding capacity of 4 cum. If necessary, interested farmers can place polyethene sheet as impermeable layer for holding water in pond from percolating.

Table 22: Specification of Polishing Pond

Parameters	Unit	Values
Area of Pond	m2	52
Depth of the water in pond	m	0.5
Bottom filtering material	-	40mm downsize gravel soling

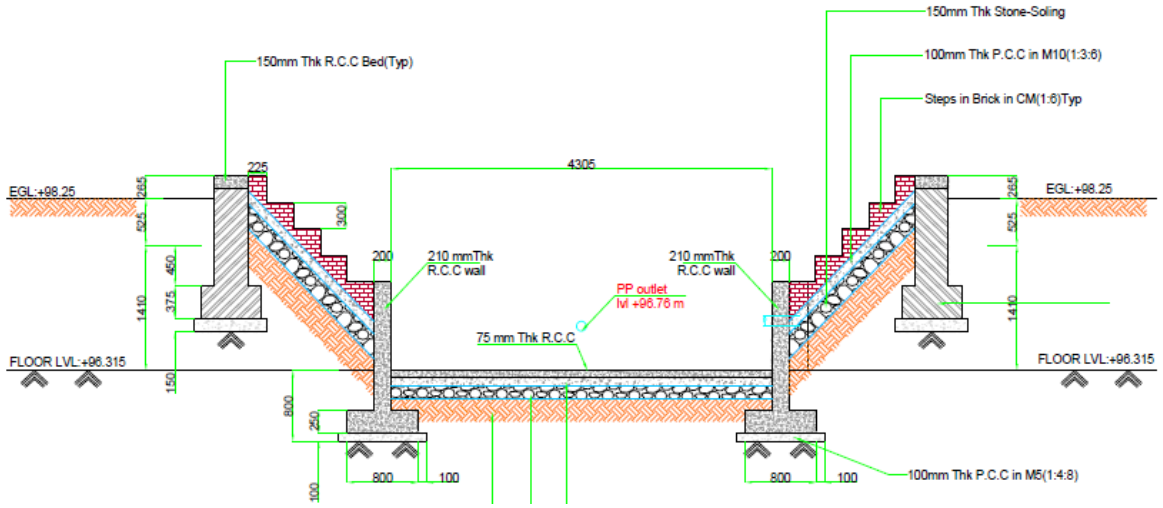


Figure 18: Cross section of the polishing pond

TIMELINES FOR IMPLEMENTATION OF FSTP

S. No	Item	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11
1	Excavation											
2	Screen chamber and PDB											
3	Settler and Anaerobic Filter											
4	Planted Gravel											

	Filter											
5	Polishing Pond											
6	Road and Compound Wall											
7	Operators room											
8	Commissioning, trail runs , site clearance											

13 OPERATION AND MAINTENANCE OF PROPOSED FSTP SYSTEM

Operating procedures

It is essential to regularly operate and maintain the FSTP treatment system for its smooth function and improved life span. It is necessary that all sanitation officials/ engineers of Sadulshahar Municipality have a copy of the O&M activities and familiarize themselves with the standard operating procedures. The operator must be familiar with the operating procedures before he starts to operate and maintain the faecal sludge treatment system. It is a must that the operator undergoes a training program dedicated to O&M of FSTP from the service provider.

Table 23: Regular O&M

Activities	Frequency	Details	Responsibility
Daily monitoring procedures	Daily	1. Check for strong odour. The presence of strong odours even after 48 h of sludge disposal is a sign of leakages, or clogging or an overcharged system. 2. Check for colour and turbidity of the treated water that is discharged into the lake 3. The FSTP site must be maintained clean, free from garbage	Operator
Manholes (DEWATS Modules)	Weekly Yearly	1. Manholes should be opened from time to time to check, if there are obstructions preventing the free flow of the water 2. To prevent odours, the air tightness should be assured, by applying silicon or grease	Operator

		on yearly basis or according to the occurrence of odours.	
Check for obstacles in inlet, outlet pipes to the treatment system and gas vents	Weekly	1. Check to see if the inlet/outlet pipes to the treatment system (Planted drying bed, Settler, Anaerobic Baffle filters and Collection tank) and gas vent are clear from any blockage. 2. In case of any blockage, clear the obstacles immediately	Operator
Screening Chamber	Daily/Immediately after feeding of FS Once in 3 to 4 years/when necessary	1. Removing of screened solid waste from faecal sludge and disposing it properly 2. Checking the gaps between screening bars and replacement of screening plate if necessary (If any screening bars are damaged)	Operator Operator
Planted Drying Bed	Once in 1 year per bed As and when required	1. In the planted drying bed, the sludge is dried during 2years. While the sludge is drying the percolate flows to the DEWATS modules. The sludge has to be removed manually after a year and placed at the foreseen area. During start up stage the beds should be irrigated with untreated wastewater or diluted faecal sludge. Dead leaves, debris and other junk from PDB has to be removed periodically. PDB filter material has to be washed and cleaned once in five years, and if necessary replacing them.	Operator
Monitoring of sludge level in settler	Monthly	1. Monitor sludge level to predict and perform desludging at the correct time	Operator
Desludging of the settler	Once a year	1. According to the fill up level of the settler compartments, desludging is determined 2. After desludging, the desludging area must be cleaned properly to ensure cleanliness and hygiene	ULB (may use a private desludging service) Operator

Desludging of AF **Filter Materials In AF**	Once a year (or as per O&M calendar) Once a year	1. There should be no thick sludge layer or floating scum layer in AF 2. After desludging, the desludging area must be cleaned properly to ensure cleanliness and hygiene 3. Filter material in AF should be back washed properly	ULB (may use a private desludging service) Operator
Horizontal Planted Gravel Filter	Daily Once in 3 years	1. Ensuring of treated wastewater disposal from VPGF 2. Cleaning of Filter Media	Operator Operator
Polishing pond	Once in a week Once in 6 months	1. Cleaning of any foreign particles from the polishing pond, such as dry leaves, garbage etc. 2. Desilting of the polishing pond for settled solids	Operator Operator
Waste water analysis	Once in a month	1. Regular sampling and analysis of chemical and biological parameters through a certified laboratory should be done (all parameters required by PCB should be tested and recorded) 2. Maintain a log of all test results with the dates to study the efficacy of the treatment system	Operator

Table 24: O&M responsibility

Type of key activity	Responsibility
Desludging	ULB (may use a private desludging services)
Treated waste water sample analysis	ULB (should use an authorized lab for testing)
Replacement of PDB and PGF filter material	ULB (may use an external agency on a contract basis)

Repair of internal pipe connection system	ULB (may use external agency on a contract basis)
Replacement of manhole covers	ULB(could be facilitated through a tender process)

Table 25: Key O&M challenges

Issues	Measures/recommendations
Smooth functioning of FSTP treatment unit	• Hiring of skilled operator for operating the treatment unit • Proper training to the operator from service provider is must
Clogging/damage of Inter connected pipes • **Can occur due to solid waste** • **Can occur due to damaged screening chamber**	• Responsible personnel from ULB should ensure that all damaged pipes are replaced with new ones • Operator should ensure that no solid matter enters treatment unit • Replacement of screening plate periodically
Irregular desludging of treatment modules • **Sludge may enter into subsequent modules resulting in reduced efficiency of treatment** • **Clogging of the filter media in AF and PDB**	• Responsible personnel from ULB should ensure that regular desludging schedule is followed • The responsible personnel from ULB should ensure that periodic backwashing or replacement of filter materials
Charging activated sludge into AF • **Clogging of the filter materials**	• At the time of commissioning of the system and transferring sludge from one chamber to another, this must be avoided.
Clogging of filter media in PDB • **Can be due to leaves and solid waste entering the PDB**	• Sign boards must prominently display this message in local languages and English

Table 26: Tools requirement for O&M

	Costing of tools				
Sl.no.	**Description**	**Unit**	**Quantity**	**Rate**	**Amount**
A	Gum boots	Nos	4	1,000.00	4,000.00
B	Plastic drums	Nos	2	500.00	1,000.00
C	Rakes	Nos	3	200.00	600.00
D	Tarpaulin sheet: 9x9 ft size	Nos	6	300.00	1,800.00
E	Broom	Nos	4	50.00	200.00
F	pH meter	Nos	1	700.00	700.00
G	Mask	Nos	5	100.00	500.00
H	Spanner	Nos	1	200.00	200.00
I	Gloves	Nos	4	200.00	800.00
J	First Aid box	Nos	1	400.00	400.00
K	Hose pipe	m	80	35.00	2,800.00
L	Shovel	Nos	2	2,000.00	4,000.00
M	Wheel barrow	Nos	2	5,000.00	10,000.00
O	Plant trimmer	Nos	1	200.00	200.00
P	Sludge measuring device	Nos	1	4,000.00	4,000.00
				Total	**31,200.00**

14 QUALITY CONTROL DURING CONSTRUCTION OF MODULES

Table 27 below lists out the teste needed to be done during construction of FSTP Modules. An Implementation Plan is also provided which details out the construction activities with a timeline.

Table 27: Testing for quality control

Lists of tests		
Sl No	**Description**	**Frequency of the test**
A	**Cement**	Every Batch
i	Initial setting time	
ii	Final Setting Time	
iii	FINENESS BY DRY SEIVING % (90 MICRON)	
iv	COMPRESSIVE STRENGTH N/mm^2 at 3 days, 7 days and 28 days	
B	**Sand**	Every Source
i	Bulkage of sand	
ii	Silt and clay Content	
iii	Specific Gravity	
iv	Sieve Analysis	
C	**Coarse Aggregates**	Every Source
i	Bulk Density-12.5mm	
ii	Bulk Density-20mm	
iii	Specific Gravity-12.5mm	
iv	Specific Gravity-20mm	
v	Sieve Analysis-12.5mm	
vi	Sieve Analysis-20mm	
vii	Impact Value	
viii	Abrasion test	
ix	Flakiness and Elongation index	
D	**Cement Concrete**	Every Concrete Activity
i	Slump Test	

ii	Compressive Strength (7 days and 28 days in N/mm^2	
E	**Cement Concrete Block Test**	
i	Compressive Strength	Every Load
F	**Reinforcement Steel**	**Manufacturers Test Certificate**
G	**uPVC and PVC pipes**	**Manufacturers Test Certificate**
H	**Paver Blocks**	
i	Water absorption test	Every Source
ii	Compressive strength test	
iii	Abrasion Resistance Test	
iv	Breaking load/ flexural strength	
I	**Subgrade**	
i	Gradation or sand content	1 test
ii	Standard Proctor test	1 test
iii	Moisture Content	
iv	Density test after rolling	1 test/500 cum
K	**Wet Mix Macadam**	
i	Aggregate impact value	1 test/200 cum of aggregate
ii	Flakiness and Elongation Index	1 test/200 cum of aggregate
iii	Waterberg limit for binding material	1 test/25 cum of binding material
iv	Density of compacted layer	1 test/500 cum

L	**Water quality test for construction**	One time
M	**Water tightness test for structure**	Every Structure
N	**Soil test for foundation**	
i	Density test	all structures

15 OPERATION PLAN

The below section details out the proposed operational plan for the sustainable operation of the faecal sludge management system at the ULB level. The operational plan is divided into two components a) Collection and conveyance, b) treatment. Each component lists down the proposed plan, the agencies involved, their roles and responsibilities and other supporting systems to be established.

It is decided in consultation with the Department of Local self Government, Government of Rajasthan, that the CAPEX and OPEX for 10 years including the cost of truck operations and treatment plant maintenance shall be provided as a grant from the state finance commission. The proposed plan below discusses the set up to be established at the ULB level during the period of 10 years and also measures to be taken to sustain the FSM operation over and after the 10 year grant period.

COLLECTION AND CONVEYANCE

15.1.1 PROPOSED PLAN: 10 YEAR PERIOD

General plan

- A new truck purchase is proposed under this DPR. The truck shall be registered under the name of the Urban Local body and shall be under the ownership of the same.
- The proposed truck operation shall be outsourced to a private operator, who in return shall desludge households in the ULB limits and also maintain the truck for its usage. The private operator shall pay to ULB as fixed rent for using this truck, in addition to an advance that shall be remitted at the beginning of the contract.

- The contract between the ULB and the private truck operator shall be for a period of 2 years. After 2 years, the ULB shall seek for fresh bidding from eligible and interested private participants.
- Households shall be charged a maximum fee of Rs.500 per desludging. This fee is tentatively fixed for 2 years to encourage desludging practice by households. However this fee shall be modified or changed by the ULB on passing of relevant resolutions at the council meeting.
- Since the Households are to be encouraged to desludge once within 5 years, it is proposed that ULB shall provide a subsidy of Rs. 500 per desludging to the private operator. This subsidy shall be a part of the O&M estimation for FSM and shall be provided for a period of 5 years, till all households complete one cycle of desludging.
- The subsidy is only eligible per household for desludging once in the 5-year period. In case of demand from a household for desludging more than once in the 5 year cycle, then the private operator can charge a fee of Rs. 1000 per desludging.
- The ULB shall have a dedicated number for desludging services. Households shall call on this number to register for a desludging service. The number shall be owned by the ULB, but operated and serviced by the private desludging operator.

Role of the ULB

- Urban local body shall address any grievances raised by households with regards to pricing and quality of service provided by the empaneled private operator. The ULB shall be eligible to levy penalties on the private operator and in worst of cases, terminate the license to operator, and thereby seek new operators.
- Urban local body shall on a periodic basis (proposed 6 months) inspect the truck and issue fitness certificate. Any damages or intentional wear and tear shall be bought to the notice of the private operator and relevant penalties and sanctions shall be imposed for its repair and upkeep.
- The Urban local body shall make it mandatory for every household in the town limits to desludge their onsite containment units once in 5 years. Failing which a penalty of Rs. 100 per month shall be levied to the household. Households shall submit the receipt of desludging as a proof in case of grievance redressal.

- Urban local body shall on a timely basis carry out any major maintenance work on the truck and if need by arrange for a new truck.
- Urban local bodies shall make it mandatory for all households within the administrative boundary to have onsite containment systems as per guidelines provided by the state government.
- Urban Local bodies shall monitor the operations of the desludging service with regards to safety of operators, quality of service, financial transactions and disposal of the faecal sludge. If any violation is noted, the ULB shall appropriately penalize the private operator.
- In addition to the empaneled private operator, the ULB can provide license to operate to other private operators who are interested. This shall be done to maintain competition and provide better quality of service to the household. However, the licensing shall be regulated by certain conditions of fee collected from household and discharge of faecal sludge.
- The ULB shall provide a subsidy of Rs. 500 per household per desludging (eligible only once per household). This subsidy shall be paid to the desludging operator on provision of a receipt of fee collected from the household.

Role of Private Operator

- Provide desludging service to households, at rates below the maximum prescribed rate by the ULB. The operator shall provide to the household a receipt of the fee collected using a point of sale machine. The operator shall provide proof of the receipt to the ULB on timely basis and collect the subsidy allocated per household.
- Discharge the collected faecal sludge into treatment plants.
- Maintain a database of households, which have desludged and update the status to ULB on quarterly basis.
- The operator shall maintain the truck for at least 95% of its availability. Any major repair works shall be upraised to concern official of the ULB and shall be borne by the ULB.
- The private operator shall maintain vigil of other private operators in providing service in the administrative area and appraise the same to the ULB officials.

Financial forecasting

This section details a pro-forma income and expenditure statement (Year 1) for both the ULB and the Private operator with regards to the proposed model.

Private operator - finances

S.no	Particulars	Amount (per annum)	Remarks/Assumptions
	Income statement		
A	Revenue from desludging operations	Rs 5,40,000	Rs. 500 per household x 20% of 5400[10] households
B	Revenue from Tipping fee	Rs. 60,000	Rs. 100 for full load x 600 loads per annum
C	Subsidy from ULB per household	Rs 5,40,000	Rs. 500 per household
D	Revenue from non scheduled desludging[11]	Rs. 54,000	5% of all household desludge per annum
1	**Total income (Sum A to D)**	**Rs. 11,94,000**	
	Expenses		
A	Rent to ULB	Rs. 1,20,000	Rs.10,000 per month
B	Labour	Rs. 2,40,000	Rs. 10,000 x 2 persons
C	Fuel expenses	Rs. 1,40,400	10 km per household desludged, Rs. 65 per litre of diesel. Fuel efficiency is 5 Km per litre
D	Miscellaneous costs for vehicle maintenance	Rs. 1,20,000	
E	Cost of safety equipment	Rs. 24000	Rs. 1000 per person per month
F	Data base maintenance and GPS mapping of truck operations	Rs. 3,00,000	Rs. 25000 per month (included cost of computer operator, electricity and misc. items related to database management)

[10] Taken into consideration of 27000 Population currently and 5400 Households as in 2018

[11] This is from household who demand desludging more than once in the 5 year period.

2	**Total Expenditure (Sum A to F)**	**Rs. 9,44,400**	
	Gross Surplus (1-2)	**Rs. 2,49,600**	

ULB finances

S.no	Particulars	Amount	Remarks/assumptions
	Expenditure		
A	Maintenance of Truck	Rs. 1,80,000	10% of CAPEX per annum
B	Subsidy to households	Rs 5,40,000	Rs. 500 per household
C	Salary of FSM inspector[12]	Rs. 2,40,000	Rs. 20000 per month
D	Admin overheads	Rs. 96,000	10% of total expenditure
	Total Expenses	**Rs. 10,56,000**	
	Receipts		
A	Income from rent of vehicle	Rs. 1,20,000	
B	Receipt for truck operations and subsidy from State finance commission	Rs. 9,36,000	
	Total Receipts	**Rs. 10,56,000**	

After a period of 5 years, the ULB shall start charging Rs. 1000 per desludging from every household. Thus, from the 6 year onwards there shall be no receipt of subsidy from the state finance commission to ULB.

TREATMENT AND REUSE

15.1.2 PROPOSED PLAN: 10 YEAR PERIOD

General Plan

- The treatment plant of 6 KLD capacity shall be outsourced for construction, operation and maintenance for a period of 5 years to a private plant operator.
- After a period of 5 years the ULB can extend the contract with the existing operator or can call for new proposals.

[12] Hired as a consultant by the ULB to monitor the FSM interventions and for awareness generation activities by the ULB

- The CAPEX and the cost of 10 year OPEX shall be provided by the state finance commission grant.
- A subsidy of Rs. 100 shall be provided for a period of 5 years as a tipping fee to any desludging operator discharging faecal sludge in the treatment plant.
- The plant operator shall adhere to certain performance benchmarks as mentioned in the bid document. Payments shall be made on the basis of performance.
- The plant operator is permitted to sell the end products after certification from statutory bodies. The proceedings of the sale will be a bonus revenue source for the plant operator.

Role of the ULB

- ULB shall monitor the operations and infrastructure of the FSTP and shall rate the performance of the plant operator. The ULB shall thereby disburse funds for O&M of the treatment plant on the basis on the measured performance.
- The ULB shall document the performance of the treatment plant efficiency on a quarterly basis and send the same to state pollution control board for statutory fillings.
- ULB shall timely carry out technical evaluation of the plant performance and undertake changes in the design and operation as required for increasing the efficiency or capacity.

Role of the Plant Operator

- The plant operator in addition to creating the infrastructure shall operate and maintain the system as prescribed by the design consultant.
- The plant operator shall carry out testing of the end products every month and shall report the performance of the plant to ULB.
- The plant operator shall engage in creating awareness of the treatment plant to desludging operators and shall incentivize them to discharge in the facility. For every discharge a payment of Rs. 100 shall be made to the desludging operator. As an incentive to carry this out, an additional incentive of Rs .50 shall be provided to the plant operator.
- The plant operator shall get the required compliances for sale of end products and carry out the sales and marketing of the same to interested stakeholder groups.

Performance level measurement framework

The below framework can be used by the ULB to rate and provide suggestive penalties to the faecal sludge treatment plant operator. This framework is only indicative and can be modified after council discussion at the ULB. It is however suggested that this filled framework be sent to SFC (State finance commission to request for funding of O&M of FSTP)

S.no	Parameters	Unit of measurement	Benchmark	Financial implications
1	Treatment capacity	Average kilo litres treated per day (Total input of FS into treatment plant/ Number of operational days in a year)	1 year – 4 KLD 2 year onwards – 5 KLD and above	Less than benchmark – 75% of Operation expenses. Benchmark and more – 100% of budgeted O&M expenditure
2	Treatment efficiency	Number of samples where the results are satisfactory (out of 12 samples per annum)	12 /12	Penalty of Rs.10000 per month for 2 months in case of non-conformity. In case of more than 2 months, the penalty shall be Rs. 1000 per day.
3	Cleanliness of the facility	Independent observations carried by ULB staff	Compliant during every observation	Rs. 1000 fine per day
4	Safety during operations	Independent observations carried by ULB staff	Compliant during every observation	Rs. 1000 fine per day

Finance forecasting

The section forecasts the income and expenditure for the private faecal sludge plant operator for Year 1.

S.no	Particulars	Amount	Remarks
	Expenditure		
A	Operation and Maintenance cost of the Treatment plant	Rs. 6,50,133	
B	Tipping fee to desludging operator	Rs 60,000	Rs. 100 per load
1	**Expenses**	**Rs 7,10,133**	
	Receipts		
A	Subsidy from ULB	Rs 90,000	Rs. 150 per load
B	Operation and maintenance receipts from ULB	Rs. 6,50,133	
C	Sale of end products	Rs 2,70,000	Rs. 1 per kg of biosolids and Rs. 200 per KL of treated water. Sale efficiency: 75%
	Income receipts	**Rs 10,10,133**	
	Surplus	**Rs 3,60,000**	

15.1.3 PROPOSED PLAN – AFTER 10 YEARS

For the first 10 years after commissioning the sustainability of the FSM is financed by state finance commission (SFC). However post this period the following long term action points are suggested for ensuring a sustainable and seamless transfer of O&M financing from SFC to ULB.

- The ULB from 6th year onwards can charge an FSM tax of Rs. 10 per month per household. The accumulated tax receipts for a period of 5 years can be used for enhancing the capacity of the treatment plant at the end of design period.
- The tax collected after 10th year onwards could be used for financing the operation and maintenance of the treatment plant.
- The quantum of tax collected per household, list of exclusions and method of collection can be further detailed by the ULB.

16. FAECAL SLUDGE MANAGEMENT REGULATIONS

After having successfully built and commissioned the FSTP, the municipality will have to work on making the plant operations self-sustainable.

There are 3 main components of FSM services:

1. Desludging Vehicles – they require regular scheduling, tracking and customer service, maintenance and optimized operations management.
2. Faecal Sludge Treatment Plant- They require technical management, operator training and monitoring
3. Reuse Facility – they require proper maintenance, technical assistance and monitoring.

To meet the costs incurred for maintenance of the FSTP and desludging vehicles, a strategy needs to be put in place which requires robust protocols and bylaws. This section focusses on the potential solutions and respective methodology for implementation of FSM in terms of 4 key policy resolutions that need to be passed by the Sadulshahar municipality.

Table 28: 4 Key Policy Resolutions

Policy Resolution #1 **Tendering of O&M to 3rd Party** Outsourcing the O&M of FSTP and desludging vehicles to a 3rd party through tendering	**Policy Resolution #2** **Sanitation tariff part of the Tax being collected** Cost incurred by tendering the O&M, can be met by levying additional property/water tax/Solid waste collection at household level
Policy Resolution #3 **NOC for new property constructions** New OSS to be constructed as per CPHEEO standards & Municipality to validate the plan and certify with NOC before commencement of construction	**Policy Resolution #4** **Formalization of Private Operators** Private desludging service providers to be licensed and monitored by the municipality, formation of regulations for disposal at FSTP

16.1. TENDERING OF O&M TO 3RD PARTY

16.1.1. NEED FOR TENDERING/OUTSOURCING O&M

State Government and ULB must plan the entire FSM process effectively to achieve success. Procurement of the right desludging vehicles or building a FSTP is only part of the solution. Proper O&M is critical for success. The major problem in Faecal Sludge Management is as below:

1. Faecal sludge is disposed by the desludging operators at unsafe locations, typically into water bodies and open land instead of taking it to a treatment facility.
2. Either treatment facilities are non-existent or if present and not properly operated and are unable to adequately treat the FS.
3. Treatment plant particularly if close to urban centers creates nuisances like smell.
4. ULBs do not have the bandwidth or technical skills to run these operations efficiently both for the FSTP and desludging vehicles, which leads to financial losses.

Some of the best FSM systems in the world such as Manila Water in Philippines and Indah Water in Malaysia, operate integrated services including desludging, transport and treatment. Integrated services help address the severe problems mentioned above.

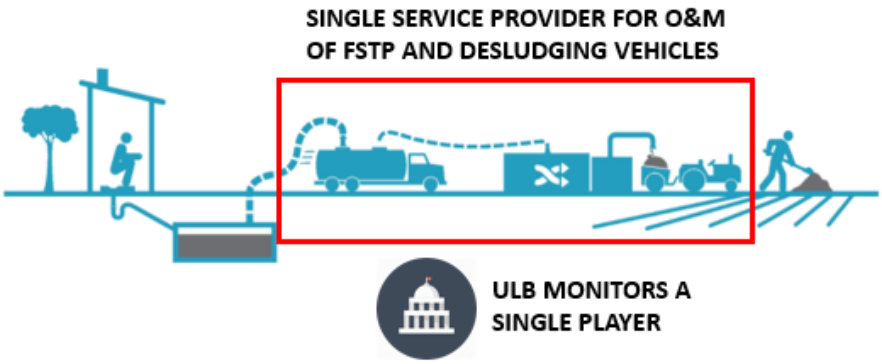


Figure 19: Work Bifurcation - Integrated service contract

Following are the salient features of the integrated service contract:

1. There will be a common service provider for the O&M of the FSTP and desludging vehicle operations.
2. Since the single entity has oversight of the entire system, they can invest in technology and monitoring/reporting systems.
3. If different entities operated the FSTP and the desludging vehicles, there can be disputes over whether all the sludge is being brought to the FSTP. The ULB will be arbitrating disputes while the environment may suffer.
4. ULB monitors only a single entity and can thus perform the task more effectively ensuring that service is provided as per standards.

16.1.2. OPERATIONAL DETAILS FOR THE RESOLUTION

This sections highlights the operational details of the resolution on tendering the O&M of the FSTP and Desludging vehicles to a single 3rd party.

1. Sadulshahar should outsource the O&M of the entire FSM system to capable 3rd party and establish rigorous criteria for providing services:
    a. Selection of service providers based on technical capabilities and operations experience.
    b. Payment should be based on proper service being delivered to citizens.
2. Sadulshahar Municipality and elected council should jointly determine the tender cost.
3. Tender to be a joint tender in which all the three elements of FSM to be covered.
4. Tendering to be done following the state government guidelines
5. Time frame of tendering is subject to the discretion of the Sadulshahar municipality and council members.

16.2. TARIFF INCLUSION IN PROPERTY TAX/ WATER TAX/SOLID WASTE COLLECTION TAX

To meet the costs incurred and effective operation and maintenance of treatment facility, one viable option is to levy additional property tax to the existing tax rate.

Figure 20: Slab based Tariff structure in Property Tax/Water Tax/Solid Waste Collection Tax

16.2.1. OPERATIONAL DETAILS FOR THE RESOLUTION

This section highlights the operational details of the resolution on inclusion of FSM tariff in property tax/water tax.

1. Town council to levy additional tax at per capita household level.
2. Type of properties exempted from this taxation structure are as follows;
    a. Government offices/ Government run offices and institutions (schools, colleges, hospitals) for both central and state government also vacant lands and unspecified
    b. All residential, commercial, institutional (except government run) will come under this new property tax structure.

3. Calculation of property tax to be slab based.
4. Municipality is to ensure that the new slabs are disseminated to the residents of the town.
5. Municipality will be responsible for collection of these new taxes.

16.3. NOC (NO-OBJECTION CERTIFICATE) FOR NEW PROPERTY CONSTRUCTIONS

With new households coming up at a rapid pace, there is an immediate need for proper monitoring for these household units and ensure that the onsite sanitation systems are built as per the CPHEEO guidelines or the state specific norms. This section discusses the need and operational details for the introducing the system of NOC for new property constructions. The resolution is needed for the following reasons:

1. Pits and septic tanks are not built as per CPHEEO standards.
2. No existing guidelines or rules at the ULB level to ensure effective monitoring.
3. Threat to the environment since waste water directly enters the open drains or percolates into soil.

16.3.1. OPERATIONAL DETAILS FOR THE RESOLUTION

This section highlights the operational details of the resolution on the issuance of NOC for all new property constructions.

Figure 21: NOC for new property constructions

1. All new property to be constructed should have their sanitation systems designed as per CPHEEO guidelines.
2. If plan does not adhere to the standards suggested, Municipality to furbish the owners with the guidelines.
3. Municipality to issue an NOC certificate post proper validation of construction plan.

4. Municipality to track and monitor these new construction facilities by inspecting them on regular intervals.
5. The new resolution would be applicable to all properties irrespective of their type i.e. Commercial, institutional, residential, mixed, hostels, religious centers etc.
6. Sadulshahar municipality shall strictly follow the standard guidelines issued by CEEPHO and NBC for construction standards of toilets and septic tanks/ pits.
7. Sadulshahar Municipality to ensure these standards are well communicated to the relevant stakeholders.
8. Guidelines should be followed for both toilets and septic tanks/ pits construction and should be strictly sanitary in nature.
9. Post completion of construction, the residents despite of the type of household type would have to acquire a certificate of occupancy issued by Sadulshahar Municipality, post inspection of the facility.
10. Any property or households building without proper approval will be subject to penalties.
11. Municipality may take support from external agencies whenever and as in required by Municipality
    a. Draft guidelines and procedures for successive implementation of the same.
    b. Training of staff and engineers in regards to the same.

16.4. FORMALISATION OF PRIVATE OPERATORS

Currently the excreta collected from households is dumped at farmlands and water bodies there by posing a potential threat to the health and wellbeing of the residents of Sadulshahar. Under the directives to be prescribed on regulating disposal of faecal sludge and formalization of private desludging service providers in Sadulshahar, Municipality should regulate the dumping of faecal sludge collected from pits and septic tanks across Sadulshahar. The major problems are listed below:

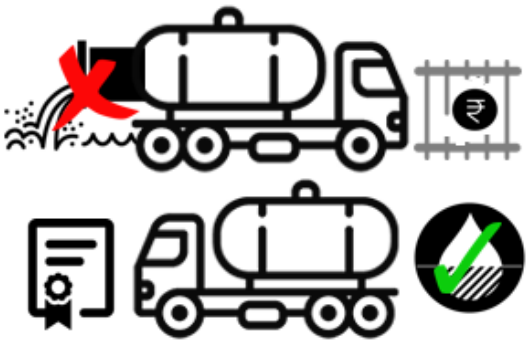


Figure 22: Formalisation of Private desludging service providers

1. Municipality has no provisions for formalization of private desludging service providers.
2. Disposal of FS at undesignated locations and water bodies.
3. Low awareness amongst the residents on desludging of pits and septic tanks at regular intervals.
4. Health risks due to unsafe disposal practices.

16.4.1. OPERATIONAL DETAILS FOR THE RESOLUTION

This section highlights the operational details of the resolution on the formalisation of the private desludging service providers.

1. Disposal of faecal sludge in nay undesignated location will be considered illegal and calls for legal action and penalty or cancellation of operations license.
2. Prior notification to the municipality has to be done in case of disposal on farm land.
3. All sludge collected is to be dumped at the new FSTP facility.
4. Private desludging service providers to be identified and summoned to register/license with Sadulshahar Municipality, by filling in a registration form**(Annexure 2)** and paying licensing fee**(Annexure 3).**
5. Private desludging service providers to be provided with license, which would need renewal once in 3 years.
6. Private desludging service providers to be sensitized about the disposal of FS at the FSTP.
7. Any private player not registered with Sadulshahar Municipality, or not holding the license to desludge will not be allowed to do any desludging at household/ property level within the premises of the Sadulshahar town council wards.
8. Any private player having not registered with Municipality will attract penalty of Amount Rs 5000 which is again subject to discretion of Municipality.
9. Upon signing the registration the private operator will be given a manifesto from**(Annexure 4)** which will contain details of pits/ septic tanks and owner details, which they will submit at the Municipality office at a periodic time interval and any noncompliance to this will lead to cancellation of license.

17 CAPACITY BUILDING DEVELOPMENT PLAN

An important component for successfully implementing the above FSSM Plan would be augmenting existing capacities of various stakeholders. This would include workshops, trainings, live on-site demonstrations, interactive focus group discussions, continuous handholding assistance, education and awareness programs along with distribution of operative manuals and guidelines customized for target audience.
Following is the breakup of the target audience and the subject on which the capacities are supposed to be developed:

S.No.	Stakeholder	Subject	Modality
1.	**ULB Officials**	Concept and need of FSSM, FSSM Process across the sanitation value chain, Issues and Challenges, Statutory Provisions, Roles and Responsibilities, State level Operative Manuals and Guidelines, City FSSM Plan and regulations, scheduled desludging approach, post cleaning inspection,	***Interactive Workshop***

		management of finances- revenue and expenditure, redressal of grievances, monitoring and evaluation of the work, maintaining records and database.	
2.	**Survey Team**	HH level Containment system data collection and database preparation	***On-on-one training***
3.	**Households**	Awareness regarding containment systems, scheduled desludging, health and safety hazards of open discharge, adverse impacts of open defecation, proper usage of public toilets and urinals, proper desludging services, incentives and penalties, payment of user charge, applying for emergency desludging request, registering complaints and grievances, filling up the records in the manifest forms with the desludging operators.	***Focus group discussions, public announcements and pamphlets***
4.	**Masons and plumbers**	Proper containment size, specifications and designs, Proper techniques to construct a septic tank, pit latrine, soak pit, toilet superstructure, various construction materials to be used and its sources	***On-site demonstrations***
5.	**Desludging Operator**	Safe procedure of desludging, importance of wearing safety gear, equipment maintenance, filling up the job card, penalties in case of non-compliance	***On-site demonstration***
6.	**Treatment Plant Supervisor and operator**	Treatment technology, detailed procedure of operations and maintenance, keeping records and manifests, storage and sale of compost generated from the plant	***Training***
7.	**Public and Community toilet operators**	Regular cleaning and maintenance of public toilets/urinals, keeping log of users, collection of user charges	***On-site demonstrations***
8.	**Farmers**	Adverse impacts of disposal of untreated sludge on farmlands, benefits of the compost generated from the treatment plant along with the ways to procure it.	***Public announcements and pamphlets distribution***
9.	**Ward Councilors**	Concept and need of FSSM, FSSM Process across the sanitation value chain, Issues and Challenges, Statutory Provisions, Roles and Responsibilities, scheduled desludging approach, passing of town level resolutions for effective implementation of FSM.	***Interactive Workshop***

18 IEC CAMPAIGNS

IEC Campaigns play an important role in the strengthening of faecal sludge management and in the creation of awareness around faecal sludge management issues in the town.

The IEC Campaigns are necessary in bringing in the behaviour change among the stakeholders which would act in creating the sustainability of the project.

IEC FRAMEWORK

Recommendation on the IEC component required for FSM has been proposed in this section. The causal linkages of sanitation with public and environmental health need to be made more explicit to citizens, communities and institutions. In addition to the provision of facilities, sustained improvements in quality of life are possible when supplemented by hygiene behavior changes. Thus, it is recommended that the Sanitation Strategy provide strategies for sustained communication and behavior change. The aim of awareness and knowledge building is to establish the link between appropriate faecal sludge management with health and environment and also to clearly define the role of different stakeholders across the sanitation value chain. The time frame for the suggested IEC campaign should be during the planning and implementation stage followed with refresher campaigns after the implementation of the technology intervention. The framework may be developed as described in Table 36 below:

Table 29: IEC Framework for Sadulshahar

Target audience	Needs	Communication elements	Method	Campaign stakeholder	Type of Approach
▪ **Local leaders** ▪ **Nagar Palika, EO**	▪ To sensitize all stakeholders towards appropriate faecal sludge collection and treatment ▪ To provide information regarding benefits and business opportunities ▪ To inform the need of regular O&M of the sanitation	▪ Video ▪ Power Point Presentations ▪ Information handouts	▪ Workshop ▪ Exposure Visit	▪ Technical experts from local NGOs ▪ Local NGOs working in the sector	▪ Advocacy ▪ Education

	infrastructure ▪ To ensure ownership, relevance and sustainability of the sanitation infrastructure				
▪ **Nagar Palika engineers** ▪ **Health Officers, engineers** ▪ **Social facilitators**	▪ To sensitize about technology options and design steps ▪ O&M procedures ▪ Monitoring tools	▪ Guidelines ▪ Standard Operating Procedures ▪ Manuals	▪ Training programmes ▪ Exposure visits	▪ Technical experts from local NGOs ▪ Local NGOs working in the sector	▪ Education and skill enhancement
▪ **Households or beneficiaries of the service of faecal sludge collection and treatment**	▪ To sensitize the beneficiary community towards appropriate faecal sludge collection and treatment • To sensitize the community about advantages of regular desludging • To highlight the cost savings from safety, health, time perspective • To create awareness about the process of FS collection and treatment	▪ Leaflets ▪ Posters ▪ Local radio and television ▪ Mobile messaging	▪ Door-to-door campaigns ▪ Community meetings ▪ Mass communication	▪ Local leaders (political/ religious) ▪ Local NGOs ▪	▪ Personal and mass communication

19 NATIONAL POLICY ON FAECAL SLUDGE AND SEPTAGE MANAGEMENT

VISION

All Indian cities and towns become totally sanitized healthy and livable and ensure sustenance of good sanitation practices with improved on-site sanitation services together with faecal sludge and septage management to achieve optimum public health status and maintain clean environment with special focus on the poor.

SCOPE

Only on-site sanitation facilities and area served by such facilities would fall under the purview of this FSSM policy. It does not seek to cover network or conventional sewerage system of wastewater/sewage management. However it will address synergies between FSSM and sewerage systems or municipal solid waste management e.g., co-treatment of faecal sludge and septage at sewage treatment plants or co-treatment and management of faecal sludge and septage and MSW.

LEGISLATIVE AND REGULATORY CONTEXT

The legal context for FSSM includes the municipal acts, the Environment Protection Act 1986, the Water (Prevention and control of Pollution) Act 1974, the Solid Waste Management (SWM) Rules 2016, the Building Code of India, the Model Building Bylaws (MBBLs) 2016 and the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013.

ROLES AND RESPONSIBILITIES

The Ministry of Urban Development (MoUD) Government of India (GoI) will be responsible for the overall guidance, coordination and interpretation of this policy. It will disseminate the Policy among the state and the ULB governments as well as dovetail it with the ministry's urban development programmes and schemes. It will provide the necessary technical and planning support to the states and ULB's and will also design, lead and implement a national awareness campaign on this issue.

Each state will further need to formulate its own FSSM strategy and integrate the same in their respective state and city sanitation plans in overall conformity to the National Policy.

Several other stakeholders to have a critical role to play in the achievement pf safe and sustainable FSSM services for all.

IMPLEMENTATION STRATEGY

Currently FSSM Services are provided by a mix of formal public service providers, contractual operators and informal local service providers, but with very little supervision and control to ensure compliance with environment, health, safety and laws prohibiting manual

scavenging. Rules, bylaws, regulations and operative guidelines for faecal sludge and septage management will address the following:

1. Design of septic tanks, pits etc. (adapted to local conditions) including siting and methods of approval of building plans, or retro fitting existing installations to comply with rules and byelaws.
2. Delineation of private (individual houses, group housing, institutions etc.) and public responsibilities (urban local bodies and other local authorities) in relation of faecal sludge and septage management.
3. Details of the planning and implementation process for carrying out safe and sustainable management of all faecal sludge and septage. This may be integrated with overall city land use planning, with the timelines for holistically addressing waste water management via onsite Decentralized or centralized systems.
4. Special provisions for medium and large format real estate developments.
5. Frequency of desludging, and O&M of installations and the responsibilities of householders (owner/occupant)
6. Operating procedures for desludging including safety procedures with an emphasis on the safety, health and dignity of sanitation workers.
7. Licensing, record keeping, monitoring and reporting arrangement for faecal sludge and septage service providers.
8. Methods and locations of transport (conveyance) treatment and safe disposal.
9. Tariffs or cess/tax etc. for septage management in the city.
10. Penalty clauses for untreated discharge for households as well as desludging agents and unsafe emptying and handling of faecal waste.
11. Regular monitoring and evaluation of the entire process of FSSM.
12. Training, accreditation, education and awareness programs.

It is important that all ULB's make provision of land and other infrastructural facilities required for safe treatment and disposal/reuse of human waste generated in their areas. This should go hand in hand with strict enforcement of disposal by cesspool operators as well as recognition and partnership with such service providers. Desludging should be carried out in an organized manner y taking into account of each and every septic tank and its cleaning frequency through a registered agency. Cesspool operators should be asked to register with the municipal bodies and there should be a string partnership and disincentive to unsafe disposal.

FINANCING PLAN

The Government of India may provide assistance for funding projects proposed as part of the FSM Plan through its ongoing urban development schemes. The state governments

should prioritize funds to implement the FSSM plan at City level. They should promote engagement of private sector participation across sanitation service chain and should encourage ULB's to start levying sanitation tax/user charges to meet the O&M cost for effective FSSM operations at city level. They should also facilitate the involvement of private sector participation through and easy and amenable PPP relationship framework, to ensure financing and sustainability of FSSM Projects.

MONITORING AND EVALUATION

At the national level the GOI is adopting the Sanitation Benchmark Framework for the assessment of the performance of the city. State government will be responsible for monitoring and evaluation of the cities' performance and hence needs to devise data collections and reporting systems for the same. ULBs in turn need to develop database, registry of certified on-site sanitation systems, robust reporting format to track compliance of HHs with outcomes and process standards.

CAPACITY BUILDING AND TRAINING

GOI will make effort to integrate the FSSM components in ongoing capacity building programs. The State Government will identify agencies that will train its state level and ULB personnel and orientation of elected representatives on aspects related to FSSM. ULBs will need to provide training on sanitation to their own staff. They will need to utilize ongoing Government of India and State government schemes for training and capacity building in order to achieve this.

20 ANNEXURES

ANNEXURE 1: OPERATIONS AND MAINTENANCE

It is essential to regularly operate and maintain the FSTP treatment system for its smooth function and improved life span. It is necessary that all sanitation officials/ engineers of ULB have a copy of the O&M activities and familiarize themselves with the standard operating procedures. The operator must be familiar with the operating procedures before he starts to operate and maintain the faecal sludge treatment system. It is a must that the operator undergoes a training program dedicated to O&M of FSTP from the service provider.

O&M ACTIVITIES AT FSTP

Truck arrival and sludge disposal

The truck arrives at the FSTP and follows the street to the screening chamber. The truck connects to the screening chamber with a pipe and discharges the faecal sludge into the

screening chamber. The truck disconnects from the pipe and leaves the treatment facility.

Screening chamber

After every discharge of faecal sludge by the trucks, the screening chamber has be cleaned. The solid waste and the grit has to be removed from the grid manually and disposed in an appropriate manner. The operator should wear protective equipment such as gloves and make sure not have skin contact with the faecal sludge. For safety reason, a water source for personal cleaning in case of accidental spillage has to be provided. The sludge will flow from the screening chamber to the PDB by gravity. No external action is needed for this step.

Planted sludge drying bed

In the Planted sludge drying bed, the sludge is stabilized and dried during 2-2.5 year. While the sludge is drying, the percolate flows to the DEWATS modules. The sludge has to be removed manually after 2.5 years and placed at the foreseen area or to the Co-Composting yard. As there is a risk of presence of helminths eggs, the operator should wear respiratory protection and gloves with usual protective clothing.

Settler

In the settler, the particles moved from the PDB in the percolate will settle and be digested. This module does not require any external operation as the flow works by gravity. The settled solids have to be removed once a year.

Anaerobic filter

The anaerobic filter reduces the organics content further by filtration and biological process. This module does not require any external operation as the flow works by gravity. The settled solids have to be removed once in two years.

Polishing pond

The pond is the dispoal system for effeluent water. Since the pond is open to sun light there is chance of algae growth on the walls of the pond which is in contact with water. So these walls need to be cleaned from algae once in 6 months for better visual appearance.

OPERATIONAL AND PREVENTIVE MAINTENANCE CHECK LIST

Operational and Preventive Maintenance	Frequency						
	Daily	Weekly	Monthly	3 Month	6 Month	Yearly	As Necessary

	Check List							
1	**PLANT AREA**							
	a. Check fence damage	**X**						
	b.Check plant area	**X**						
2	**PRE-TREATMENT**							
	a. Clean inlet, screens, and properly dispose of trash	**X**						
	b. Check inlet flow	**X**						
	c. Remove and dispose of rags and accumulation from bar screen	**X**						
	d. Check for rock or metal objects in channel	**X**						
4	**PLANTED DRYING BED**							
	a. Check the solidification of the sludge	**X**						
	b. Cleaning of the Vent pipe							**X**
	c. Removing dried sludge							**X**
5	**DEWATS**							
	a. Check if all maholes re	**X**						

	closed							
	b. Check inlet flow	**X**						
	c. Desludging of chambers						**X**	
6	**HPGF**							
	a. Checking of swivel pipes					**X**		
	b. Trimming of Plants							**X**
	c. Removal of weed			**X**				
7	**POLISHING POND**							
	a. Check for debris		**X**					
	b. Cleaning of inlet and outlet pipes of modules			**X**				

ANNEXURE 2: REGISTRATION FORM FOR PRIVATE OPERATORS

Operator Registration Form, Sadulshahar Nagar Palika **Form Number:** **Date:**	
Owner Details:	
Name of the operator service:	
Name of owner:	
Address:	
Contact number details:	
Email ID	
Business Details:	
Year of starting business	
Number of vehicles in fleet	
Number of employees:	
Region of operation:*(localities where in you offer your services)*	
Driver details	
Name of driver:	
Age:	
DL number:	
Mobile number:	
Vehicle Details:	
Vehicle Registration Number:	
Vehicle type: (model description)	
Vehicle chassis number:	
Vehicle year of purchase:	
Vehicle of year of manufacture:	
Vehicle capacity:	
Insurance details: (vehicle insurance number, copy of the same to be submitted)	

Road tax paid : (Y/N)	
Signature of owner:	
Office purpose only	
Sadulshahar Nagar Palika Authorised signatory	
Date:	

Along with the form following details need to be furbished to the Nagar Palika:

- *Copy of the vehicle registration with RTO:*
- *Copy of photograph of vehicle, operator and owner*
- *Insurance copy of the vehicle is to be submitted along with the form*

ANNEXURE 3: FORMAT FOR LICENSE FOR PRIVATE OPERATORS

Septage Transporter Permit , Sadulshahar Nagar Palika

In accordance with all the terms and conditions of the current municipality rates, rules and regulations the special permit conditions accompanying this permit, and all applicable rules, laws or regulations of the Government of Rajasthan, permission is hereby granted to:

Name of Permit holder:

Address:

Permit Number issued:

For the disposal of septate/faecal sludge from domestic septic tank or commercial holding tank at the ----------STP/SWM site or agricultural fields.

This Permit is based on information provided in the **Septage/Faecal sludge Transporter Permit** application which constitutes the Septage/Faecal sludge Management Hauled Transporter Permit.

This Permit is effective for the period set forth below, which may be suspended or revoked for Permit Condition Non-Compliance and is not transferable. The original permit shall be kept on file in the Permit holder office. A copy of this Permit shall be carried in every registered vehicle used by the permit holder.

EFFECTIVE DATE:

EXPIRATION DATE:

__ CHECK IF RENEWED PERMIT

Permit is liable to be cancelled in case of violations of any Acts, Rules and Regulations relating to the operation of Septage/Faecal sludge System or in cases of safety protocols not being adhered to or in case of non-permitted disposals.

Sadulshahar Nagar Palika Authorised Signatory

ANNEXURE 4: MANIFESTO FORM FORMAT FOR COLLATION OF HOUSEHOLD LEVEL DETAILS ON ONSITE SANITATION SYSTEMS

General Details	
1. Date	
2. Time of desludging	
3. Property type(mark ✓)	☐ Household ☐ Industry ☐ Institution ☐ Commercial ☐ Wastewater treatment plant
4. Volume of Sludge	
Details of Owner	
1. Name	
2. Property No.	
3. Address	
4. Ward No.	
5. Contact No.	
6. No of people in house/Institute	
Geographical data	
1. Type of soil in the area	
2. Ground water table	
Containment system details	
1. Age of sludge collected	
2. Is the containment system plastered on the inside?	
3. Type of containment system(mark ✓)	☐ Single pit ☐ Twin pit ☐ Septic tank
4. Type of construction(mark ✓)	☐ Ring ☐ Stone masonry ☐ Concrete structure
5. If rings,	No. of rings: Ring height: Ring diameter:

6. If not rings,	Length: Breadth: Depth:
7. Is vent pipe available?	
8. If sludge was hard, how did you dilute it?	☐ Water ☐ Crow Bar ☐ Detergent
9. Operator's name: Vehicle name: Vehicle no.: Contact no.: Operator's signature:	10. House Owner's signature:

ANNEXURE 5 COLLECTION AND CONVEYANCE MECHANISM

20.1.1 OPERATION GUIDELINES - COLLECTION

The following steps are recommended for the operation of vacuum trucks:

1. Park the truck as close to the system as possible. The maximum distance is determined by the length of hose and elevation rise from the bottom of the pit or septic tank to the vacuum truck tank inlet. This should typically be no more than 25 meters in linear distance and 4 meters in elevation gain. Further distances or elevation differences may require intermediate pumps.

2. Inform the occupant of the pending service and note any concerns or issues.

3. Inspect the site for possible hazards, such as clearing the area of people, or identifying high groundwater that could cause a tank to 'float' if emptied.

4. Secure the truck using wheel chocks.

5. Lay out and connect the hoses from the truck to the tank or pit to be emptied.

6. Open the tank or pit by removing the access ports or covers over the storage system.

7. Engage the vacuum equipment by using a power take-off from the truck's transmission.

8. Increase the vacuum to the proper level with the valve closed by watching the vacuum gauge, then lowering the end of the hose into the storage system, and open the valve sufficiently such that the FS is drawn out of the tank or pit. Closing the valve periodically re-builds the vacuum to enable the removal of further FS.

9. Continue this process until the job is complete.

10. Break up FS that has agglomerated into a solid mass, either by making use of a long handle shovel and adding water when necessary to reduce the viscosity of the F8; or by reversing the direction of the flow and forcing the contents of the vacuum truck tank back through the hose and into the sanitation system in order to use the high pressure stream to break up the sludge. The direction of the flow is then returned to normal and the contents

removed. It is essential to ensure that the hose is in sound condition, and that the hose connections are locked into place prior to using this method;

11. Operators should remove between 90% and 95% of the contents. It is recommended that this is verified by management through periodic spot checks.

12. Identify any abnormal conditions, such as high concentration of non-biodegradable materials, oils and grease. The colour and odour of the FS can provide clues as to how the occupants are using the system, and if excessive chemicals are being discharged down the drain.

13. Inspect the system once empty. In the case of a septic tank, the following checks should be carried out by the operator:

a. Listen for water running back from the discharge pipe, which could indicate plugged leach lines (if present);

b. Check to make sure that inlet and outlet tees are properly in place. Frequently, these structures break off and can sometimes be found at the bottom of the tank;

c. Inspect the tank for cracks or damage;

d. Verify that the tank is properly vented;

e. Ensure that the tank lids are properly attached when the pumping is complete and that they are properly secured;

f. Prepare a written report indicating:

- how much waste was removed;
- the condition of the tank or pit;
- any recommendations for repairs or maintenance;
- any recommendations for proper use of the system.

14. Secure the tank lid and pack away the hoses;

15. Clean up any spillage using proper sorbent materials;

16. Inform the client that the work is complete, and give them the final report. In some instances, payment is received immediately for the service however, payment is often made directly to the service provider through some type of billing system. During this final interview, the operator informs the client of the findings and any recommendations;

17. Remove the wheel chocks and drive the truck to the next site or to the nearest approved disposal Site.

a. Operations guidelines – Disposal at treatment plant

20.1.2 OPERATIONS GUIDELINES – DISPOSAL AT TREATMENT PLANT

Independent of the delivery method of Faecal Sludge to the treatment plant or transfer station, operators should adhere to the following safety guidelines:

1. Check in with facility guard or operator.

2. Carefully following instructions regarding the sampling of FS. Some FSTPs have designated sites for residential septage, and others for commercial sludges. Plant operators may request samples of the FS prior to allowing discharge if it is suspected that the FS may contain materials hazardous to the plant.

3. Position the truck in the designated location for sludge removal, park and take the truck out of gear, apply the parking brake, and chock the wheels.

4. Remove the hose and make the connections.

5. Engage the power take-off or other mechanism for unloading the tank and complete the offloading process.

6. Obtain the necessary authorisation and access to the transfer station prior to transporting FS, as some transfer stations have locked inlets.

7. Ensure sufficient water is available for washing the solids as some transfer stations have screens to remove non-biodegradable solids.

8. Store any screened non-biodegradable solids in a safe location to drain and dry prior to containment and/ or proper disposal either through incineration landfilling.

9. Use proper lifting techniques when discharging drums into a transfer station such as standing on a stable surface, and ensur all protective equipment is worn.

10. Clean up any spillage in the area around the inlet after completing the discharge of FS into the transfer station and re-seal the inlet.

11. Use personal protective equipment such as gloves and hard hats, and do not smoke during the entire collection and discharge operation.

12. Replace hoses and equipment, following adequate hygiene practices (e.g. hand washing), and completing the required paperwork.

ANNEXURE 6: FSTP SITE CHECK LIST

Date of site visit: 09/10/2017

GPS location of site: 29.881989, 74.198124

Location: Abhohar-Hanumangarh Road, Sadulshahar

Town/City/District: Sadulshahar, Sri Ganganagar

State: Rajasthan

Proposed treatment capacity (m^3 per day): 6

Approach

1. What is the distance between the centre of town/cluster (place around which most household that require desludging services are located) and the proposed site?

   6- 7 km

2. Does the approach road to the site have a width of less than 3 metres? Can the desludging vehicle ply freely on the approach road?

   Paved approach road ends 2km before site. Last 2km are unpaved and very undulating and difficulty is expected in truck hauling towards site.

3. Condition of the approach road

   ☐ Concrete ☐ Tar road ☒ Mud ☐Stone/gravel

   ☐Others (Please specify)

4. Can the road be used during rains?

   No

5. Does the approach road lead into the property?

   ☐ Yes ☒ No, it stops at a distance of 2 km metres after which there is mud road

Property details

1. What is the total area available for construction of FSTP? (also mention the units)

   13,000 Sqm
2. Does the property have any other system/ infrastructure? If yes, what is it?) (Check if the manpower can be shared for FSTP operation)

   Facility of dump site for animal carcasses
3. Does the property have a boundary wall? (to prevent trespassers and animals)

   Yes; A portion at west side is open
4. What is the distance to nearest habitat (household where people live)?

   1-2 km
5. What is the terrain of the proposed site?

   ☐ Rocky ☐ Sandy ☒ Mud ☐ Wetland ☐Plantation – manmade ☐ Plantation natural ☐others,

   specify _____
6. What is the depth of water table?

   More than 50 feet
7. Is there an open well/ bore well/hand pump/tube well nearby? If yes, at what distance from the property?

   None
8. Is there a natural drain/river/canal/pond nearby? If yes, at what distance from the property?

   No
9. Is portable water available at the property? If yes, what is the source and frequency?

   No
10. Does the property have access to electricity? If yes, please specify the number of hours in a day it is available and the phase (3 phase or single phase)

    No
11. Is there a provision for an operator room/house?

    Space available
12. Is the place located on the lower regions of natural drainage basin? Is the area flood prone?

No

13. Details of neighbouring land parcels

Direction	Mention the usage of the land
North	Farm land
East	Farm land
West	Railway Line
South	Farm land

14. Does the land have a natural slope? (if yes please mention in the sketch)

    No

15. Does the land require felling of big trees for FSTP construction?

    No

Reuse

1. Is there a provision for reuse of Biogas? If yes, what and where?

   No

2. Is there a provision for reuse of treated water? If yes, what and where? If no, what are the means for disposal?

   Yes, for agriculture if neighbouring farmers are interested

3. Is there a provision for reuse of bio solids? If yes, what and where? If no, what are the means for disposal?

   As of now no possible usage in agriculture. More awareness among farmers needed.

General details

1. What is the size of desludging truck? (express in M^3 , capacity of sludge holding tank of the truck)

   3000 m^3 (Private vehicles)

2. Distance between sludge outlet from the truck/vehicle and the ground level? (in meter)

   Minimum 0.3 m

3. Does the site have adequate incidence of sunlight? (check for shadow regions or regions covered under natural/man made cover)

   Yes

4. Is there a solid waste management yard in the vicinity? (If yes, please specify, the type of SWM, distance and quantity handled per day)

No

5. Who is the current owner of land? Is any transfer proposed? If yes, to whom and when?

   Nagar Palika, Sadulshahar

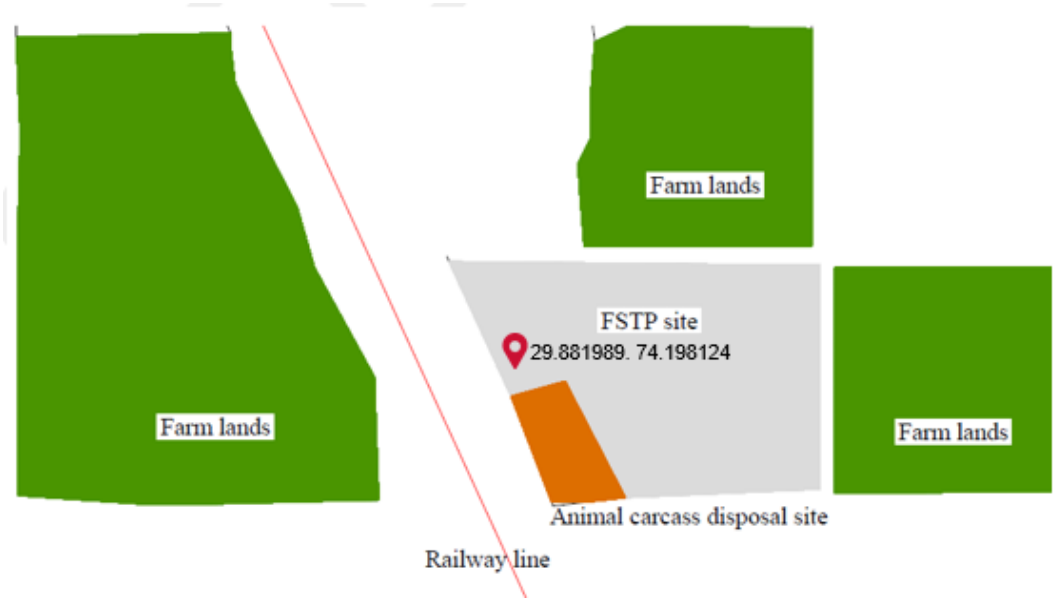
6. What is the proposed development in the surrounding region for the next 10 years? (Are there any layouts, institutions, etc. planned)

   No big development expected

Schematic

In the next page make the following markings along with a detailed sketch of the site

a. Detailed boundary map
b. Topography details on the schematic map (mark slopes)
c. Wind direction
d. Location of other infrastructure (SWM centres, well, tank etc.)
e. Location of ponds, stream, river etc.
f. Location of surrounding human habitation.



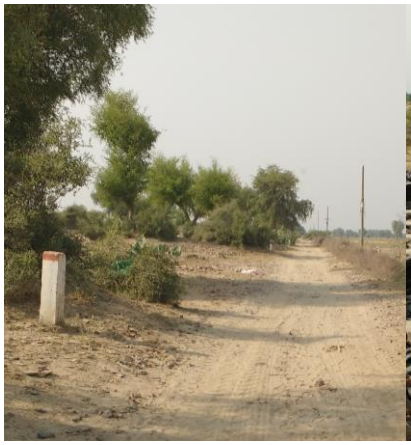


Figure 23: Approach road

Figure 24: Railway track on westside of site

Figure 25: Existing compound wall at site

Figure 26: Landscape of the site

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Consortium for DEWATS Dissemination Society

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श्रीमान निदेशक महोदय,
स्थानीय निकाय विभाग,
जयपुर।

विषयः एफ एस टी पी के सर्वेक्षण एंव निर्माण कार्य के लिए अनापति बाबत।

उपरोक्त विषय में निवेदन है कि आपके प्रोजेक्ट सलाहकार के लिए लगभग एक हेक्टेयर अविवादित सरकारी भूमि पर निर्माण कार्य करने की मांग की गई है। वर्तमान में पालिका के पास 24 पी.टी.पी. सादुलशहर में जमाबंदी 2062–63 में कुल खाता 10.31 हेक्टेयर में से पत्थर न. 84/138,मुरब्बा न. 6 किला 1,2,9,10 कुल 1.012 व पत्थर न. 83/138 मुरब्बा न. 7 किला न. 5/.253 व 6/.177, 15/.076 कुल 1.518 यानि 6 बीघा भूमि नगरपालिका की है। उक्त भूमि ठोस कचरा प्रबन्धन के लिए आरक्षित है। जिसमे से 4 बीघा 1.012 पर एफ एस टी पी परियोजना के सर्वेक्षण एंव निर्माण कार्य के लिए अनापति दी जाती है।

उक्त समस्त भूमि का स्वामित्व नगरपालिका का रहेगा। जमाबंदी सलग्न है।

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नगरपालिका सादुलशहर

सादर!

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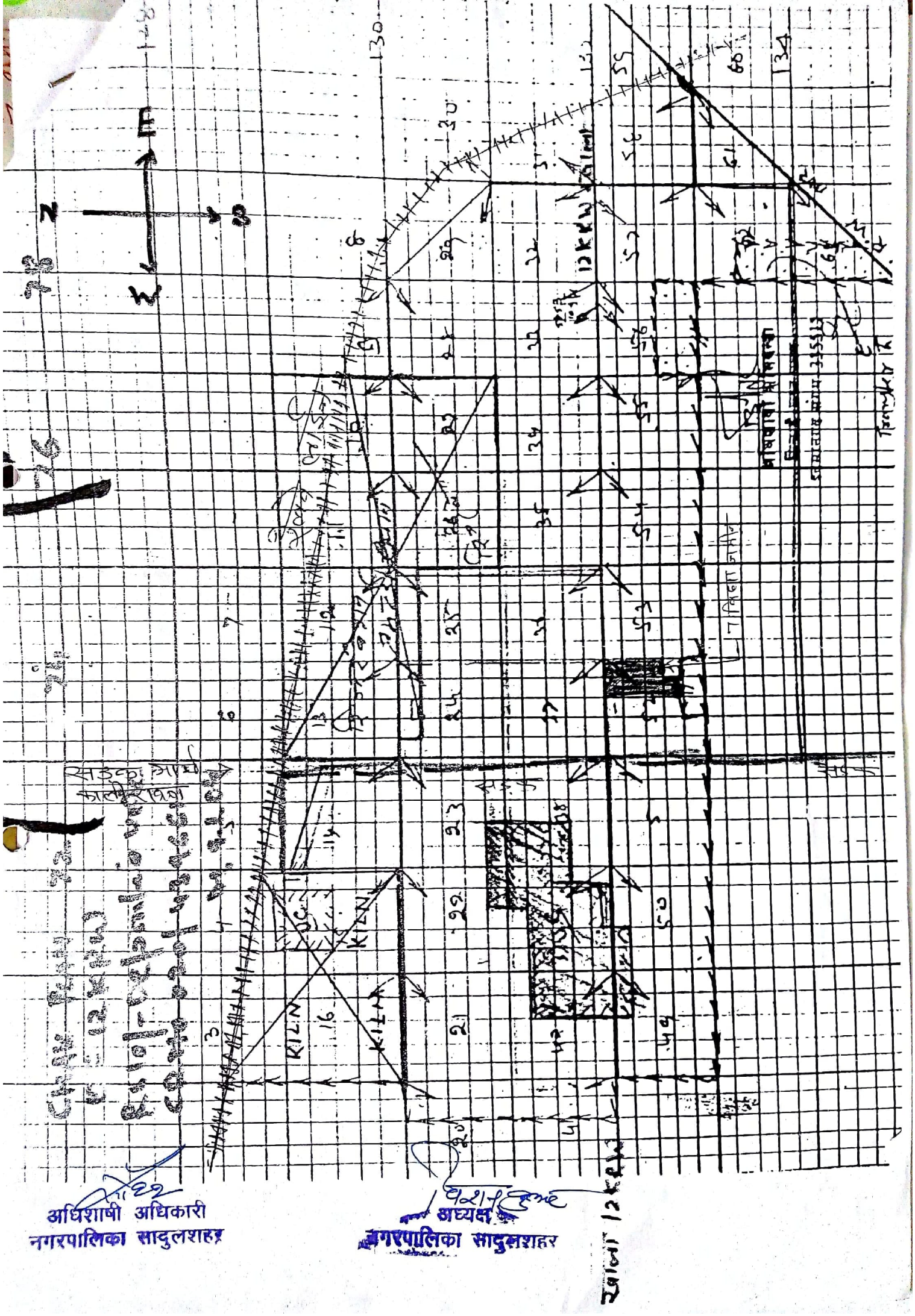

अधिशाषी अधिकारी
नगरपालिका सादुलशहर

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नगरपालिका सादुलशहर

सादुलशहर नगरपालिका मंडल
नीति संकल्प

हम सादुलशहर नगरपालिका के सदस्य, वर्ष 2018 में जनवरी महीने की तारीख 24/11/2018 ..... के इस दिन, निम्नलिखित का पालन करने का संकल्प लें:

1. सादुलशहर जिसकी आबादी 2017 में 27000 थी, एक शहर के तौर पे उन्नत हो रही है। बढ़ती आबादी को ध्यान में रखते हुए, नगर कि स्वच्छता को विशेष सुधार कि आवश्यकता है। आने वाले दिनों में स्वच्छता के लिए हमें ऐसी नई प्रणाली लानी होगी जो छोटे शहरों में कम लागत में हि लागू हो सके, जिस्का परिचालन भी किफायती हो और जिससे नगर निवासियों को आपत्ति भी नहीं होगी। विकेंद्रित प्रदूषित जल प्रबंधन और मल गाद प्रबंधन ऐसी कुछ प्रणालियाँ हैं।
2. मल गाद प्रणाली के तहत, हम निम्नलिखित का पालन करेंगे :-
    - 2.1 सादुलशहर को खुले में शौच से मुक्त घोषित किया जाएगा
    - 2.2 यह सुनिश्चित किया जाएगा कि हर नए शौचालय का सेप्टिक टैंक SBM में लिखित प्रणाली से बनाया जाए
    - 2.3 हर शौचालय का सेप्टिक टैंक या पिट कम से कम पांच साल में एक बार खाली कराया जाए
    - 2.4 यह सुनिष्चित किया जाएगा कि वैक्यूम ट्रक से खाली किया गया मल गाद केवल उपचार संयत्र में डाला जाएगा
    - 2.5 सादुलशहर के लिए एक मल गाद उपचार संयत्र स्थापित किया जायेग
    - 2.6 हम प्रत्येक वार्षिक बजट में यूजर फीस के लिए प्रावधान और उपयुक्त आवंटन के जरिए उपचार प्रणाली की स्थिरता सुनिश्चित करेंगे।
3. एक मल गाद उपचार संयंत्र स्थापित करने के उद्देश्य के लिए, हम वार्ड / ग्राम 24 PTP में भूमि का 1 एकड़ (4 बीघा) निर्धारित करें। इस उपचार संयंत्र का संचालन और रखरखाव किफायती और सरल होगा, इससे अतिरिक्त उपचार संयंत्र दुर्गंध मुक्त और सौंदर्यशास्त्रिक रूप से आकर्षक होगा।
4. राज्य वित्त आयोग से उल्ल को धन का उपयोग मल गाद उपचार संयंत्र के निर्माण के लिए किया जाएगा जो कि ₹ **104.85** लाख की लागत का है।
5. इस तथ्य के बारे में जागरूकता रखते हुए, कि शहर के अपशिष्ट जल खुले नालों में शहर से गुजरते हुए सादुलशहर बीड में मिलता है, इस मुद्दे को हल करने के लिए हम एक व्यवहार्यता अध्ययन करने और उचित समाधान तलाशने का संकल्प करते हैं।

6 हम मल गाद और अपशिष्ट जल प्रबंधन के बारे में समुदाय में जागरूकता फैलाने के लिए आईईसी अभियानों को पूरा करने का संकल्प लें।

उपरोक्त प्रस्ताव नगरपालिका सादुलशहर के सभी वार्ड काउंसलर्स, उपाध्यक्ष, अध्यक्ष और कार्यकारी अधिकारी की उपस्थिति में लिया गया है और तत्काल प्रभाव से इसकी पुष्टि की जाएगी।

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अधिशासी अधिकारी
नगरपालिका सादुलशहर

Ashok Meghwal
Priyanka
ममता रानी
Sunita Rani

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क्रमांकः– 2692

दिनांकः– 24-1-18

श्रीमान निदेशक महोदय,

स्वायत शासन विभाग,

राजस्थान, जयपुर।

विषयः– FSSM DPR समीक्षा एवं तकनीकी मंजूरी बाबत।

प्रसंगः– आपका पत्रांक एफ 55 ( ) Engg./CE/DLB/17/4199 दिनांक 15.01.18 के सन्दर्भ में।

महोदय,

उपरोक्त विषयान्तर्गत निवेदन है कि प्रोजेक्ट सलाहाकार द्वारा एफएसटीपी के संबंध में निकाय मण्डल के सदस्यो के समक्ष DPR प्रस्तुत की गई संदर्भानुसार निकाय स्तर पर तकनीकी एवं वितिय विश्लेषण के आधार पर सर्वसम्मति से यह निर्णय लिया गया कि FSSM प्रोजेक्ट के लिए आवश्यक राशि की व्यवस्था FFC/SFC तथा निकाय के स्वयं के स्त्रोतों से की जावेगी। श्रीमानजी को उक्त डीपीआर समीक्षा हेतु प्रस्तुत की जा रही है।

अतः आप से अनुरोध है कि उक्त डीपीआर की समीक्षा करके शीघ्र तकनिकी मंजूरी प्रदान करवाने की कृपा करावें।द जिसके उपरान्त अग्रिम कार्यवाही की जा सके।

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क्रमांकः– 2693 दिनांकः– 24-1-18

बैठक कार्यवाही विवरण

आज दिनांक 24.01.2018 को श्रीमान निदेशक एवं संयुक्त सचिव महोदय, स्वायत शासन विभाग, राजस्थान जयपुर की पालना में नगरपालिका कार्यालय सभागार में निम्न महानुभाव उपसिति हुये। जिसमें **FSSM** की डीपीआर सी.डी.डी. सोसायटी द्वारा तैयार कर बैठक में प्रस्तुत की गइ सिमें स्वीकृत करने का प्रस्ताव सर्वसम्मति से पारित किया गया।

क्रमांकः–

दिनांकः–

प्रतिलिपि सूचनार्थ :–

1	स. गुरजन्ट सिंह बराड़	माननीय विधायक (विधानसभा क्षेत्र सादुलशहर)
2	श्रीमान उपखण्ड अधिकारी महोदय, सादुलशहर	
3	श्री विशन कुमार	अध्यक्ष
4	श्री रामअवतार यादव	उपाध्यक्ष
5	श्री नरेन्द्र कुमार खीचड़	पार्षद
6	श्री जसविन्द्र सिंह	पार्षद
7	श्री दौलत राम	पार्षद
8	श्री भोजराज शर्मा	पार्षद
9	श्रीमति प्रियंका रानी	पार्षद
10	श्री सुनील कुमार यादव	पार्षद
11	श्री श्यामस्वरूप जांगु	पार्षद
12	श्रीमति मिनाक्षी	पार्षद
13	श्रीमति ममता रानी	पार्षद
14	श्री अमन कुमार मक्कड़	पार्षद
15	श्रीमति चंचल	पार्षद
16	श्री महेताब गुरिया	पार्षद
17	श्री अशोक कुमार वधवा	पार्षद
18	श्री पृथ्वी सिंह	पार्षद
19	श्रीमति जसवीर कौर	पार्षद
20	श्री ललित कुमार	पार्षद
21	श्रीमति सुनीता देवी	पार्षद
22	श्री सुरेन्द्र कुमार	पार्षद
23	श्री बद्रीविशाल शर्मा	मनोनीत पार्षद
24	श्री जसपाल सिंह	मनोनीत पार्षद
25	श्री मनोज मोदी	मनोनीत पार्षद
26	श्रीमति कमलेश सिंघल	मनोनीत पार्षद