

# **Sewerage in Rural Areas – Early Experiences, Challenges and Opportunities**

# Early Experiences

# Rural Punjab (Demographic Profile)

No. of districts	22
No. of inhabited villages	12339
No. of households	32,71,612
Population	1,87,61511
No. of villages having population between 1-1000	7379 (60%)
No. of villages having population between 1001-2000	2784 (22%)
No. of villages having population between 2001-5000	1852 (15%)
No. of villages having population 5001 or more	324 (3%)

# Scenario of Sewerage System in Rural Punjab prior to PRWSS Project

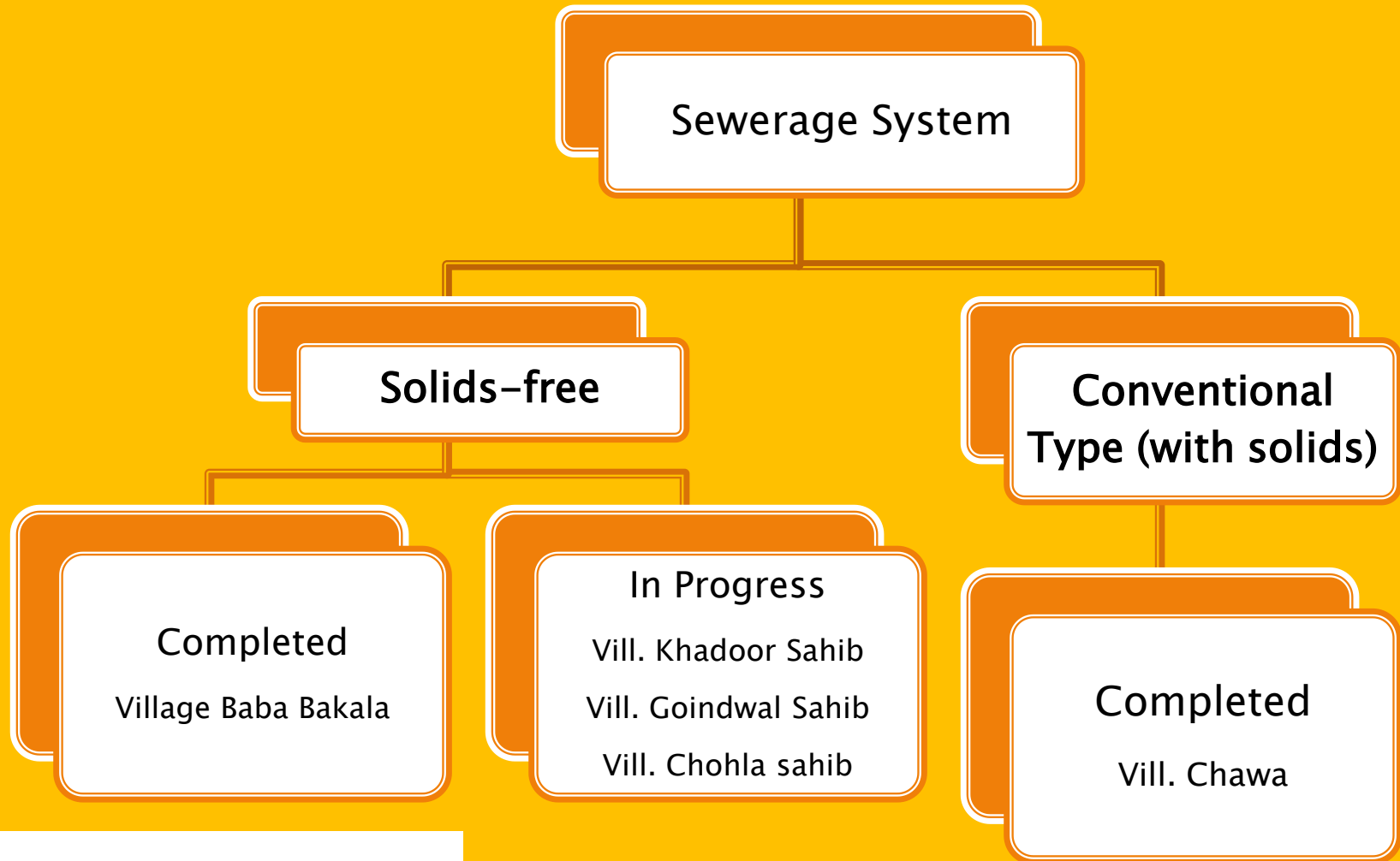
Name of District	No. of Villages covered with Piped Sewer under VDF
Patiala	15
Fatehgarh Sahib	11
Sangrur	14
Barnala	6
Bathinda	6
Ferozepur	16
Faridkot	3
Muktsar	5
Moga	7
SAS Nagar	4
Rupnagar	8
Jalandhar	7
Hoshiarpur	1
Gurdaspur	25
Ludhiana	11
<b>Total</b>	<b>139</b>

1) 139 no. villages being covered with small bore/ solids-free sewer under Village Development Fund (VDF) Programme of State Govt.

2) 15 no. villages have been covered with conventional sewer through efforts of NRIs/State Govt. under PIDB/ Religious groups etc.

3) The remaining villages do not have any planned sewer system and waste water runs through open drains to the village pond(s).

# Physical Progress of Piped Sewer in Rural Punjab under World Bank aided PRWSS Project

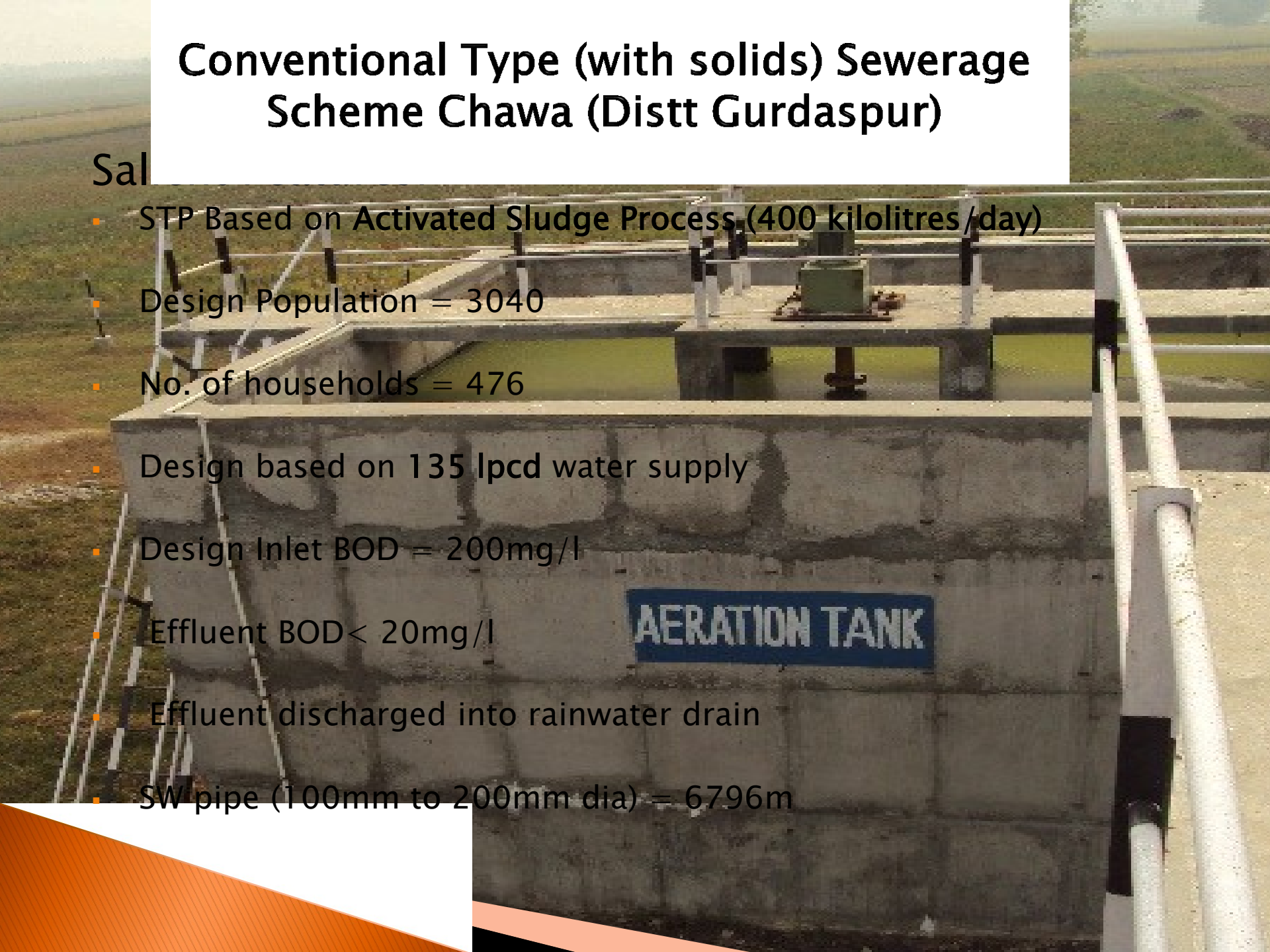


# Conventional Type (with solids) Sewerage Scheme Chawa (Distt Gurdaspur)

Sal

- STP Based on Activated Sludge Process (400 kilolitres /day)
- Design Population = 3040
- No. of households = 476
- Design based on 135 lpcd water supply
- Design Inlet BOD = 200mg/l
- Effluent BOD < 20mg/l
- Effluent discharged into rainwater drain
- SW pipe (100mm to 200mm dia) = 6796m

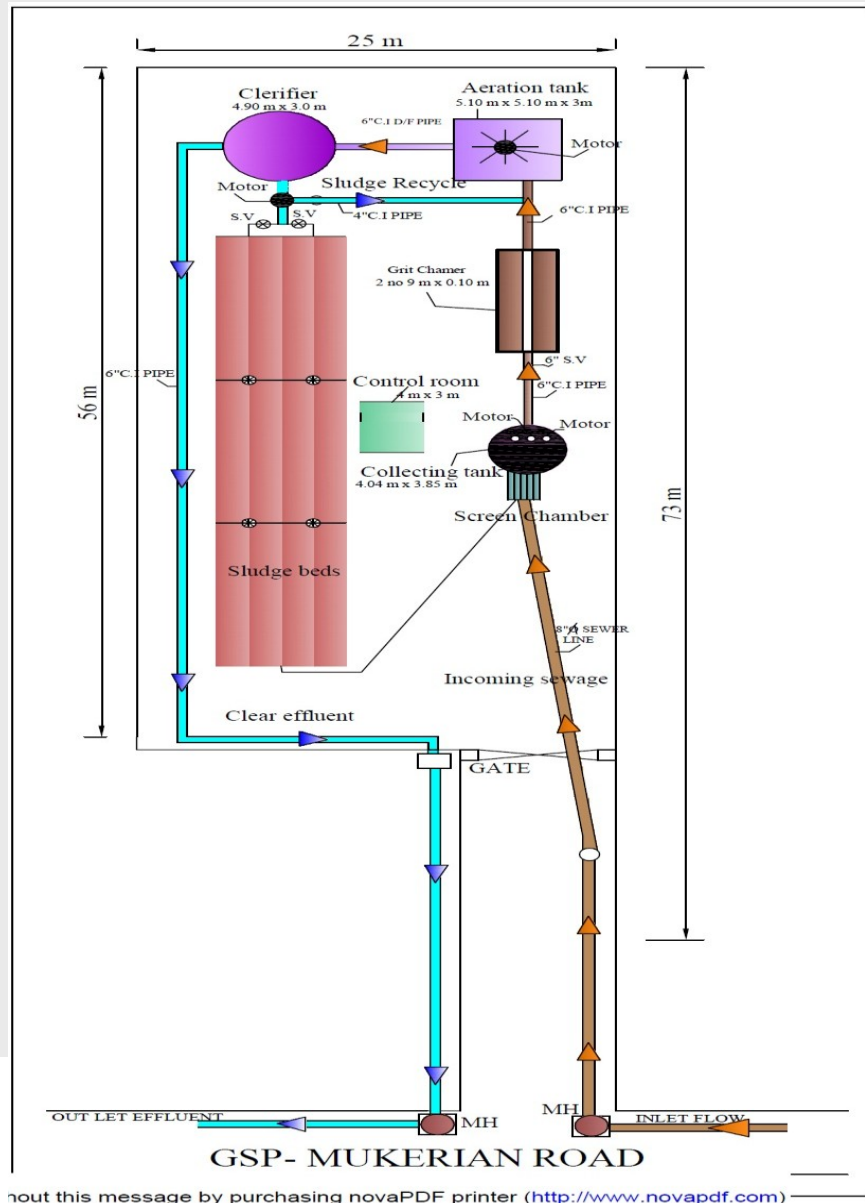
AERATION TANK



# Conventional Type (with solids) Sewerage Scheme Chawa (Distt Gurdaspur)

- Capital Cost= Rs.87.51 lacs
- Construction period 2009/2010
- Est. Annual O&M cost = Rs. 3.24 lacs
- No. of HH sewer connections to-date = 225
- O&M cost per HH = Rs. 120/- pm (with 225 no. connections),  
likely to reduce to Rs. 60/- pm (with 100% i.e. 476 no.connections)
- **Electric Power intensive treatment process**
- Scheme O&M being done by GPWSC

# Flow Diagram for Conventional type Sewerage system at Village Chawa





# Sewerage Scheme Chawa in Photographs

## STP Site Pictures



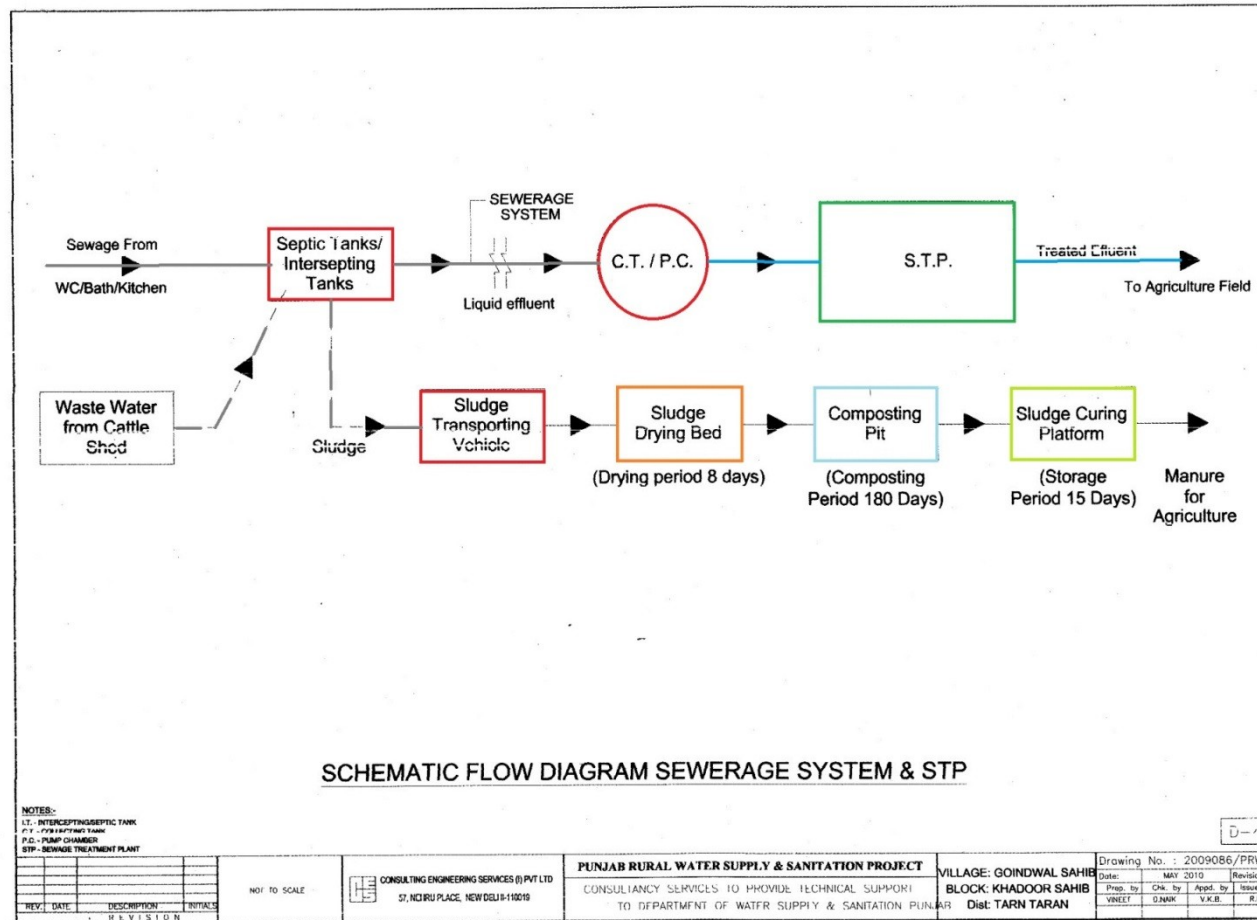
# Solids free Sewerage Scheme Baba Bakala (Distt Amritsar)

Salient Features:-

- STP based on Waste Stabilization Process (850kilolitres/day)
- Design Population = 11680
- No. of households = 1628
- Design based on 90 lpcd water supply.
- Design Inlet BOD = 100-120mg/l  
Effluent BOD < 30mg/l
- SW pipe (200mm to 400mm dia) = 9597m
- uPVC pipe (100mm, 150mm dia) = 20623m

# Solids free Sewerage Scheme Baba Bakala (Distt Amritsar)

- Capital Cost= Rs.408.50 lacs
- Const. period 12/2009 to 01/2011 (12months)
- Monthly O&M cost = Rs.35000/-
- No. of HH sewer connections to-date = 1250 (77%)
- O&M cost per HH = Rs. 35/- (at 70% connections)
- O&M cost per HH = Rs. 22/- (at 100% connections)
- Waste stabilization process is natural and minimum electric power is required for treatment
- Scheme O&M being done by Construction Contractor for 3 years under supervision of DWSS/GPWSC



## Layout Plan of Solids free Sewerage System

# Sewerage Scheme Baba Bakala in pictures

Bird's eye view of  
STP



# Sewerage Scheme Baba Bakala in pictures



# Sewerage Scheme Baba Bakala in pictures



Street without sewer



Street after sewer and paver work

# Sewerage Scheme Baba Bakala in pictures



Interaction of World Bank team  
with GPWSC Baba Bakala





# Construction of Sewerage Scheme Khadoor Sahib in pictures



Composting pit  
RCC Walls in progress

Sludge Drying Beds

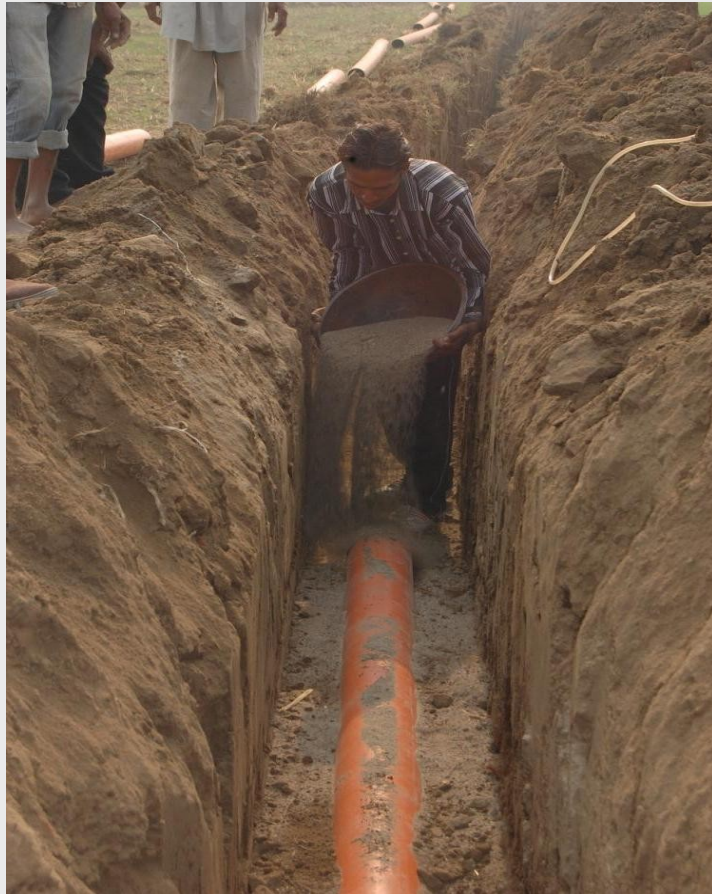


# Solids free Sewerage Scheme Khadoor Sahib (Distt Tarntaran)

## Salient Features:-

- **STP based on Waste Stabilization Process (1400 kilolitres/day)**
- Design Population = 10000
- No. of households = 1650
- Design Inlet BOD = 100-120mg/l Effluent BOD < 30mg/l
- Capital Cost = Rs. 448.66 lacs
- Est. Annual O&M cost = Rs.65000/- pm
- Est. O&M cost per HH = Rs. 60/- assuming 70% connections
- Est. O&M cost per HH = Rs. 40/- assuming 100% connections
- Work in progress and near completion
- Waste stabilization process is natural and minimum electric power is required for treatment
- Scheme O&M to be done by Construction Contractor for 7 years under supervision of DWSS/GPWSC

# Construction of Sewerage Scheme Khadoor Sahib in pictures



Laying of uPVC sewer  
in progress



Interlocking Paver  
after laying of sewer  
in street

# CHALLENGES

# Various factors at interplay:

- ▶ Technology
- ▶ Cost
- ▶ People's aspirations
- ▶ People's participation
- ▶ Land
- ▶ Holistic Approach
- ▶ Water availability for proper functioning of sewer system
- ▶ Waste vs Storm Drainage

# Comparative Analysis of Sewer Technologies:-

S.No.	Parameter	Conventional (With Solids)	Solids Free	Effect
1	Excavation	Deeper	Shallow	+ve for Solids free
2	Water Supply	More w/s (100lpcd) required for self-cleansing	Less w/s (40lpcd) is sufficient	+ve for Solids free
3	Land for STP	Less land required*	More land required	+ve for Conventional
4	Capital Cost	Very high	Low	+ve for Solids free
5	Power consumption in STP	Very high	Low	+ve for Solids free
6	Individual Septic tanks	Not required	Required	+ve for Conventional
7	O&M cost	Very high	Very low	+ve for Solids free
8	Convenience	Better tolerance of Solids	Solids not allowed beyond septic tanks	+ve for Conventional
9	People's perception	More preferred	Less preferred due to 3,6,8	+ve for Conventional

\*Assuming mechanised treatment process (such as ASP) for conventional type sewerage system

# Challenges: Technology, Cost and Users

1. Villagers' desire is to have a sewerage system in which the solid waste (human excreta etc.) generated in the household can directly be discharged.
2. This leads to sludge generation in the STP and necessitates costly power-intensive treatment process adding heftily to recurring O&M bill (electric as well as wear/tear).
3. As the O&M has to be done by GPWSC, more electric bills add to the woes of fund-crunched GPWSC and may lead to frequent breakdown of the system.
4. **On the contrary, solid-free sewer STP, based on waste stabilization technology requires lesser initial capital cost, shallower excavations for sewer laying. The treatment process, being natural, requires minimum electric power and is O&M friendly.**

# Challenges: Storm water vs Waste water

- Storm water drainage has to be simultaneously addressed otherwise sewerage system gets overloaded and that too illegally. Infact, surface drainage and sullage need to be tackled in unison and holistically.

***It is of utmost importance that the existing open drainage system in the village be strengthened and restored when new sewer gets laid in the village.***

- Inter-departmental planning and simultaneous execution is necessary in this regard.



# Challenges: Land vs Electric Power

- ▶ Waste Stabilization Pond requires 2–3 acres of land. Land being scarce and getting scarcer day-by-day, Gram Panchayats are under pressure not to give their limited holdings **free of cost** for waste stabilization ponds
- ▶ State Govt. has embarked upon multi-village sewerage schemes such as Badal-Gaggar in Distt. Muktsar, so that land for STP can be shared thereby ensuring optimum utilization of resources.
- ▶ Other treatment processes (mechanical) are power intensive, have huge capital costs and add to recurring O&M cost, making them unaffordable.

# Challenges: Solids-free vs With Solids

- ▶ **Solids-free sewer system**, which is designed for running on less water is **suitable** for Punjab villages as the treatment process consumes minimum energy thereby resulting in low O&M cost ensuring future financial sustainability.
- ▶ However, rural people in Punjab, presently, are not very receptive to this type of sewer.
- ▶ Therefore, it is a **major challenge** to change the psyche of the villagers in this regard through **focused upfront IEC activities**.

# Challenges:

The challenges emerged from the early experiences in providing piped sewer system in rural Punjab may be summed up as:

- *To fulfill the people's aspirations of having functional sewerage system by adopting a technology that uses optimum land, water and power resources and is environment-friendly.*
- *Villagers have to be educated about the individual costs including cost of modification of their houses to route all the wastewater through septic tank / I.C.*
- *At the same time, storm water conveyance (existing open drains in the village) and disposal system (existing village pond) be used for rainwater.*
- *Effective & thorough IEC is the need of the time.*

**OPPORTUNITIES**

# Why Sewerage in Rural Punjab

- ▶ Habitations are very compact owing to geographical and historical reasons.
- ▶ Agriculture being the mainstay for livelihood, land scarcity for habitations has made the settlements highly congested, requiring off-site disposal system.
- ▶ Western culture exposure owing to higher rate of emigration and rapid urbanization have catalyzed desire for more comfort, dignity and better lifestyle including sewerage facilities.

# The Facts

- ▶ Punjab has a total of 12339 villages.
- ▶ Rural Sanitation is need of the hour.
- ▶ Punjab has taken a leap by adopting **two-pronged strategy**:
  1. To provide piped sewer system in villages
  2. To provide 1,80,000 no. Individual Household Latrines in nearly 4000 villages at State's cost (Rs. 250 crore already being invested) so as to make these villages open-defecation free.
- These two concrete steps will ensure better sanitation in rural Punjab.
- Infact by providing piped sewer system in rural areas, Punjab has become the first state in India to take such a lead for sanitation in villages.

# The Facts (..Contd)

- ▶ For achieving this end, State Government had approved following plan with assistance from World Bank:

Year	No. of villages proposed to be covered with piped sewer facility
2010-11	10
2011-12	35
2012-13	37
Apr 2013 – Dec 2013	18

- ▶ A total of 100 villages with a total outlay of Rs. 142.41 crores are going to be covered with piped sewer facility.
- ▶ Besides, work for sewerage schemes in several villages is also underway under Punjab Infrastructure Dev. Board funded projects

# Opportunities

- ▶ Huge opportunities are available to provide piped sewer facilities in villages of Punjab.
- ▶ 100 no. villages are being targeted in 1<sup>st</sup> phase of PRWSS Project.
- ▶ 2176 no. villages, constituting 18% of total Punjab villages, have population size of 2000 or more which makes providing sewerage facilities for them an economically viable proposition.
- ▶ An investment of Rs. 5000 crores is required to cover these villages with sewerage system and it would take 15–20 years at a rate of coverage of 100–150 villages per year.
- ▶ Outcome so far is pointing towards the need of better technological–policy solutions/alternatives and decisions commensurate with the users' realistic needs.
- ▶ Investment and time are precious and need to be used carefully.
- ▶ **A more holistic and long term approach for this sector at level of States as well as at national level is need of the hour.**



**THANK YOU.**