

HILLY SANITATION CITY

HILLY
REGION



National Institute of Urban Affairs



NFSSM

Alliance

SCBP

SCBP

SCBP

GAMIFICATION ASSEMBLY MANUAL

URBAN
SANITATION
SYSTEMS



CITY PROFILE

THE LAKE is the largest natural freshwater lake in India. It is ecologically one of the most sensitive areas with a rich biodiversity. It is one of the hotspots for spotting migratory birds in India. Due to this, the lake has been centre of attraction for tourism in the state. The lake is fed mainly by the rivers and streams flowing from the mountains and overflows to forms another river which crosses into another state. Almost 1.5 lakh population is directly dependent on the lake through aquaculture and agriculture. However, lately the deterioration of the water quality of the lake has been a major concern for these people. The lake receives point pollution from rivers and streams carrying domestic wastewater during the dry season. During monsoon, non point pollution in the agricultural runoff brings a large amount of nutrients to the lake.

SETTLEMENT 1 is a medium size town located on the bank of the Lake. As per the Census of India, the population of **Settlement 1** was 57,630 in 2021 with a total households of 12,806.

Access to water is moderate and the main source of raw water is groundwater aquifer. The water after extraction is disinfected and supplied through distribution network in the city. The water supply scheme has been designed for 90 LPD; however, due to losses in the distribution network the water received at the consumer end is less and hence, most of the households also have secondary source of water in the forms of dug wells and bore wells.

Access to sanitation is good and the town became ODF+ in the first phase of SBM in 2019. 92% of the households have Individual Household Toilet and rest are dependent on Community Toilet. There are three community toilets located in the slum and for floating population there are 4 Public Toilets in the public and commercial areas. 94% of the households having IHHT also have a septic tank whereas the remaining 6% of the households have soak pits. Wastewater management is absent in the town and the septic effluent from the septic tanks and grey water from the households is disposed in the stormwater drains running along the roads. The settlement currently

produces approximately 6 MLD of wastewater. There are few drains which are connected to the trunk line running along the highway. Approximately 3.5 MLD of wastewater is collected into the trunkline whose outfall is in the river. The rest of the 2.5 MLD wastewater reaches to the stream and the Lake through network of small and medium size drains.

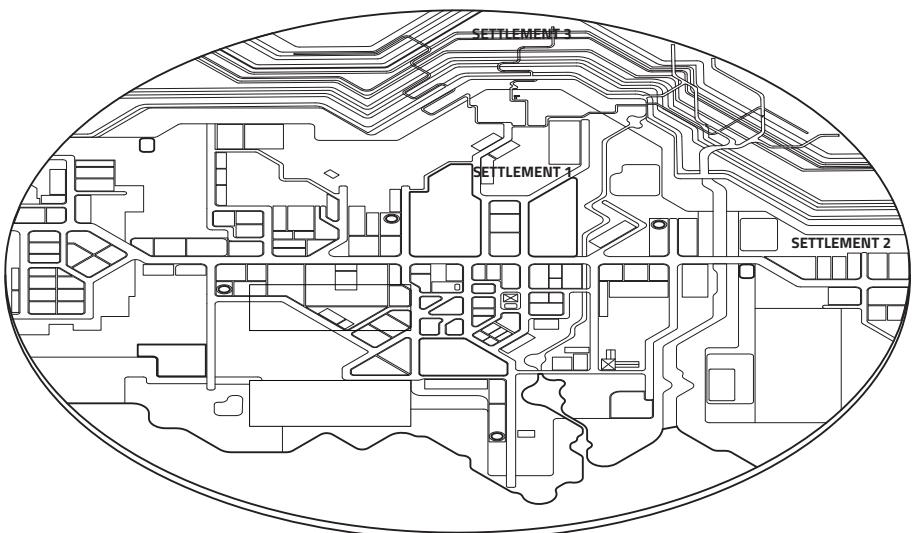
Stormwater management is done using network of lined, unlined, open and covered drains. There is approximately XX km of unlined drains which spatially cover 35% of the settlement area where as XX km of lined drains which spatially cover 65% of the settlement area. **Settlement 1** has a municipal solid waste management plant of 20 TPD capacity. It has a fleet of vehicles which provide a door to door collection services to the households and brings the waste to the treatment facility through transfer / segregation stations. Composting is done of the organic waste whereas the dry waste is segregated packed and sold in the form of pellets to the industry. The recyclable plastics is also managed separately. All the inert and non recyclable waste is currently being sent to dumping site. The settlement is planning to have a scientific landfill in the coming 5 years.

SETTLEMENT 2 is a relatively large town having population of 1,02,560. It has well developed WATSAN infrastructure consisting of Water Treatment Plant. The source of raw water is river water. A well designed distribution network of design capacity of 135 LPCD is also laid across the settlement. Wastewater management is being currently done using sewerage network and a 20 MLD STP. Currently the settlement produces approximately 12 MLD of wastewater out of which 10 MLD is treated at the STP and the balance is not collected as the laying of sewerage network has been postponed due to lack of funds. Stormwater management is done using a network of lined covered and open drains. The stormwater is disposed into the river or the lake without any treatment.

SETTLEMENT 3 is a small town located upstream of the **SETTLEMENT 1** and **2** on the river bank. It has a population of 26,350. Access to water is better as most of the houses have piped water supply. The water supply scheme is designed to provide 70 LPCD of water. Currently, the settlement produces approximately 1 MLD of wastewater which is collected and conveyed through network of mostly unlined uncovered drains and disposed into the river untreated. The same network of drains also serves as a stormwater drains.

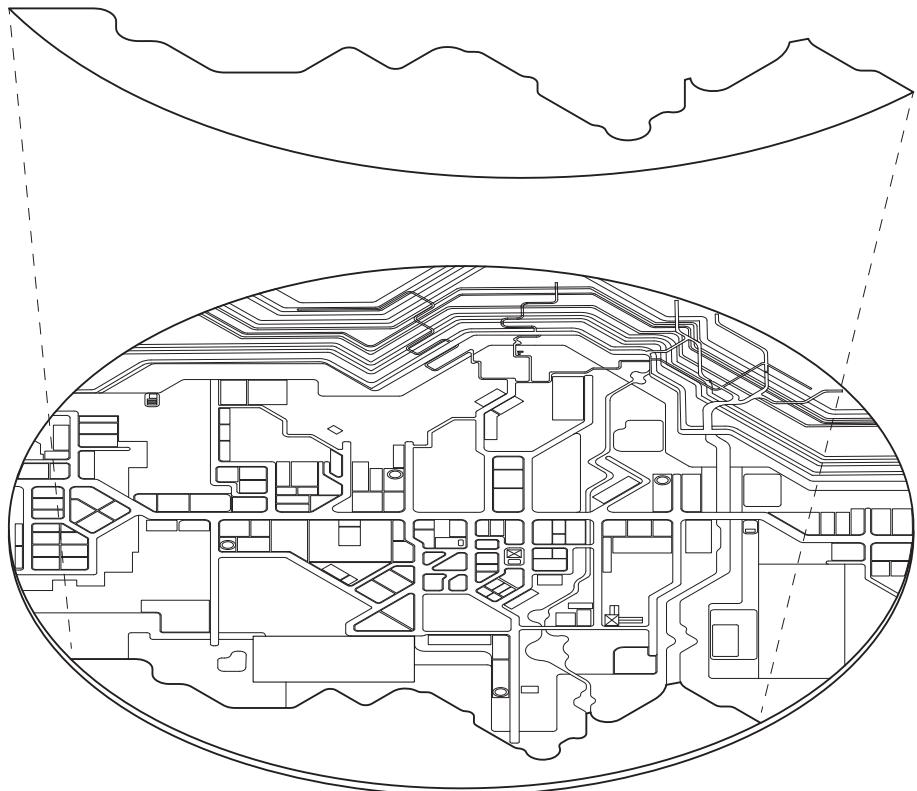
INSERTS

STEP - 01



Following are the steps to assemble the gamification model and get acclimatize with the hilly city.

Place circular base over the poster to begin



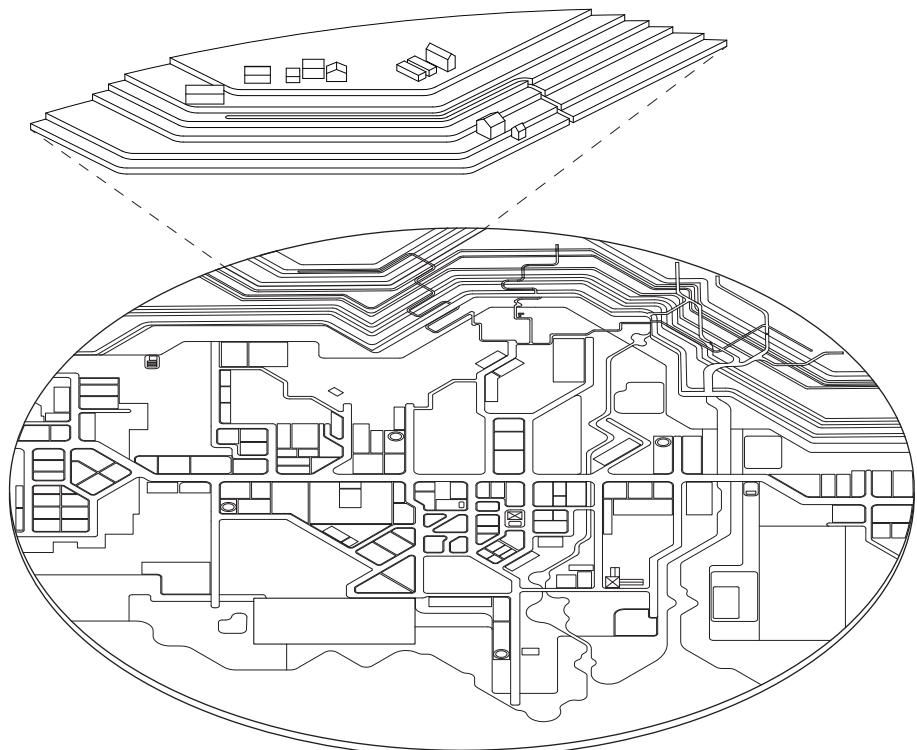
LAKE

The Lake is the largest natural freshwater lake in India. It is ecologically one of the most sensitive areas with a rich biodiversity. It is one of the hotspots for spotting migratory birds in India. Due to this, the lake has been centre of attraction for tourism in the state. The lake is fed mainly by the rivers and streams flowing from the mountains and overflows to form another river which crosses into another state. Almost 1.5 lakh population is directly dependent on the lake through aquaculture and agriculture. However, lately the deterioration of the water quality of the lake has been a major concern for these people. The lake receives point pollution from rivers and streams carrying domestic wastewater during the dry season. During monsoon, non point pollution in the agricultural runoff being a large amount on nutrients to the lake.

INSERTS

STEP - 03 CLUSTERED RESIDENTIAL

Typology - A



TYPOLOGY - A

Population Density - 800 per km²



Area - 3.30 km²



Water consumption - 184.0 m³/d



Treated disposal - Nil



Wastewater generation - 148.0 m³/d



Untreated disposal - 148.0 m³/d (100%)

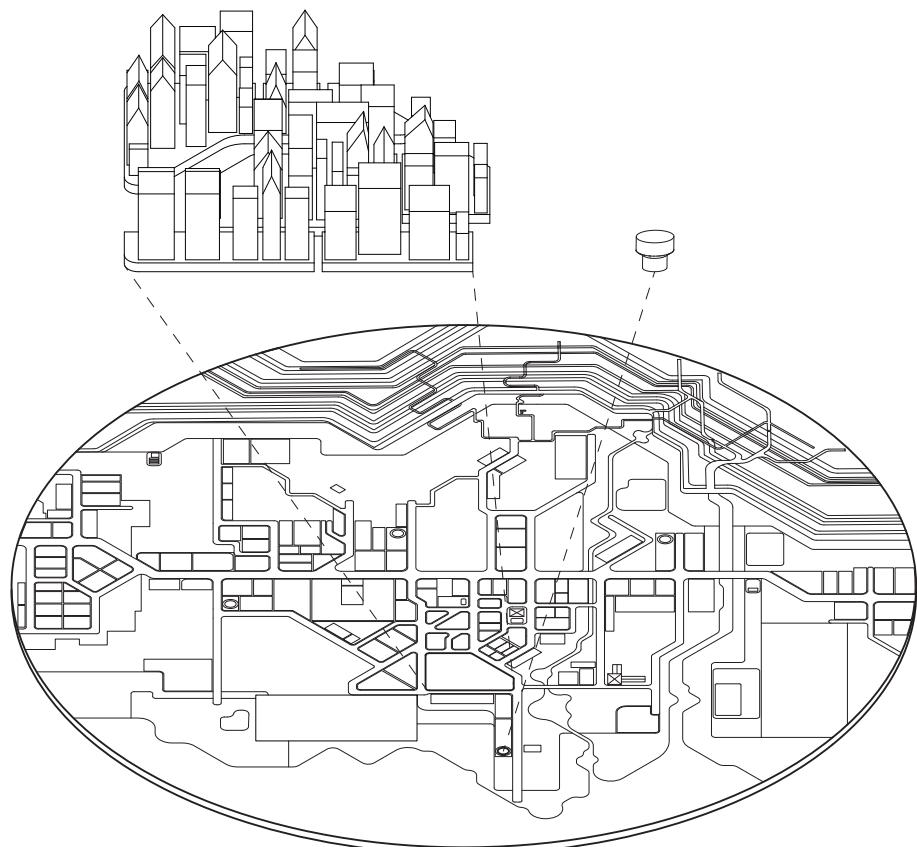


Legend: 1 km² ■ 2000 Population ■ 200 m³/d ■ 06/17

INSERTS

STEP - 04

PUBLIC / SEMI PUBLIC COMMERCIALS



Typology - B

TYPOLOGY - B

Population Density - 1200 per km²



Area - 1.00 km²



Water consumption - 108.0 m³/d



Treated disposal - Nil m³/d



Wastewater generation - 86.0 m³/d



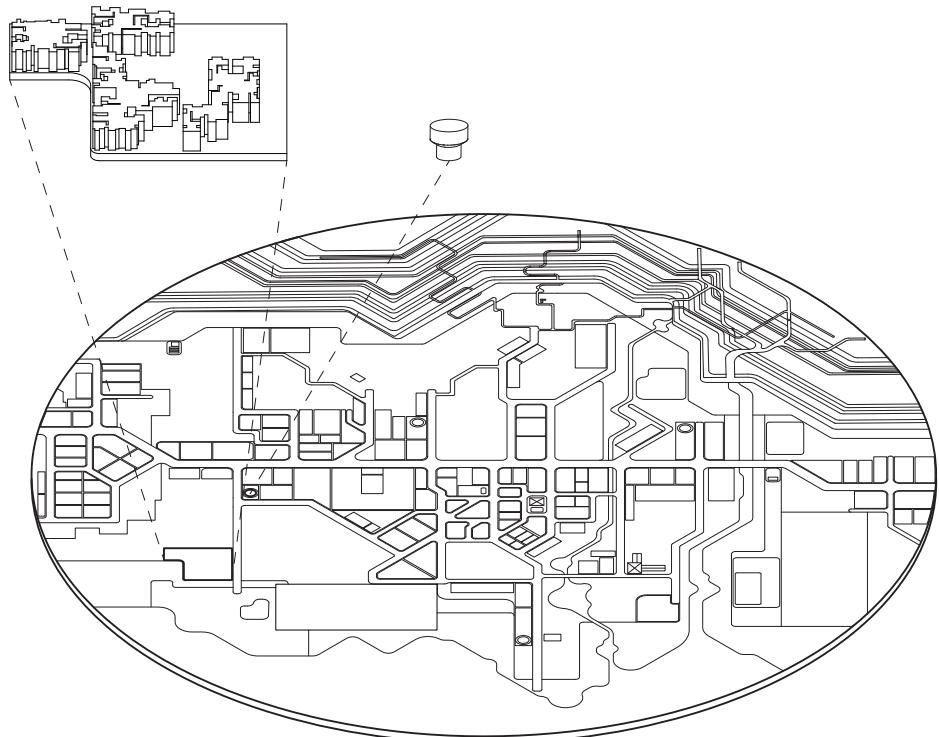
Untreated disposal - 86.0 m³/d (100%)



Legend: 1 km² ■ 2000 Population ● 200 m³/d ▻ 07/17

INSERTS

STEP - 05 SLUM (RESIDENTIAL)



Typology - C

TYPOLOGY - C

Population Density - 8000 per km²



Area - 0.65 km²



Water consumption - 468.0 m³/d



Treated disposal - Nil m³/d



Wastewater generation - 294.0 m³/d



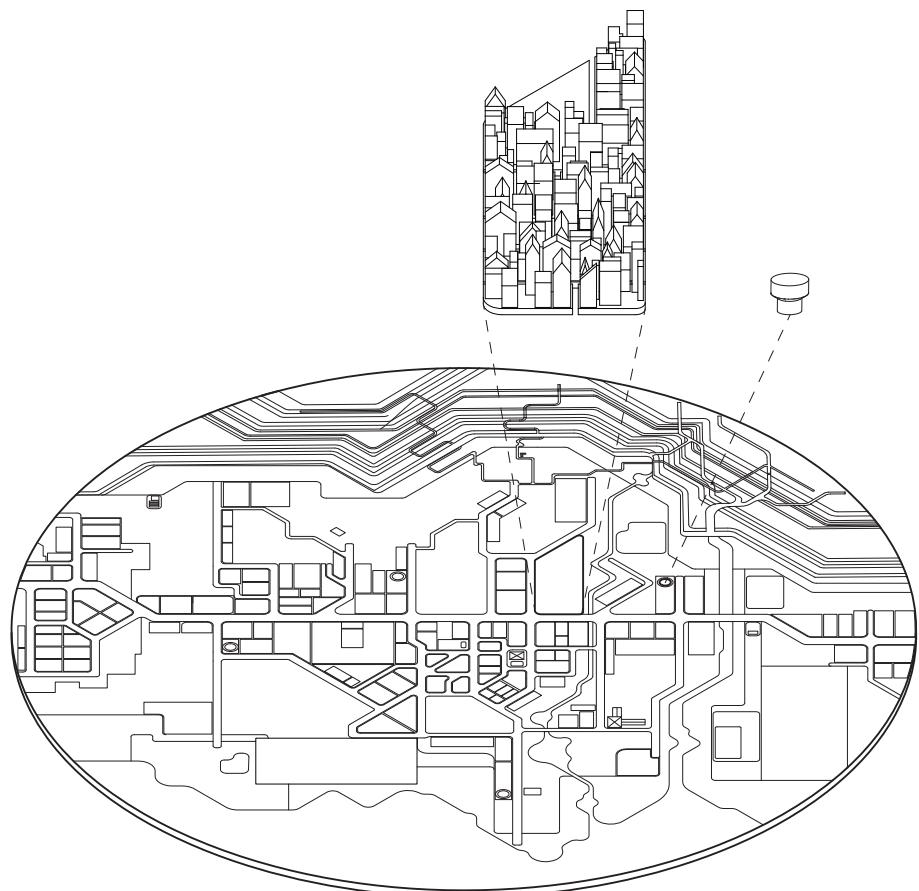
Untreated disposal - 294.0 m³/d (100%)



INSERTS

STEP - 06

PLOTTED (DENSE RESIDENTIAL)



Typology - D

TYPOLOGY - D

Population Density - 4000 per km²



Area - 1.20 km²



Water consumption - 432.0 m³/d



Treated disposal - Nil m³/d



Wastewater generation - 281.0 m³/d



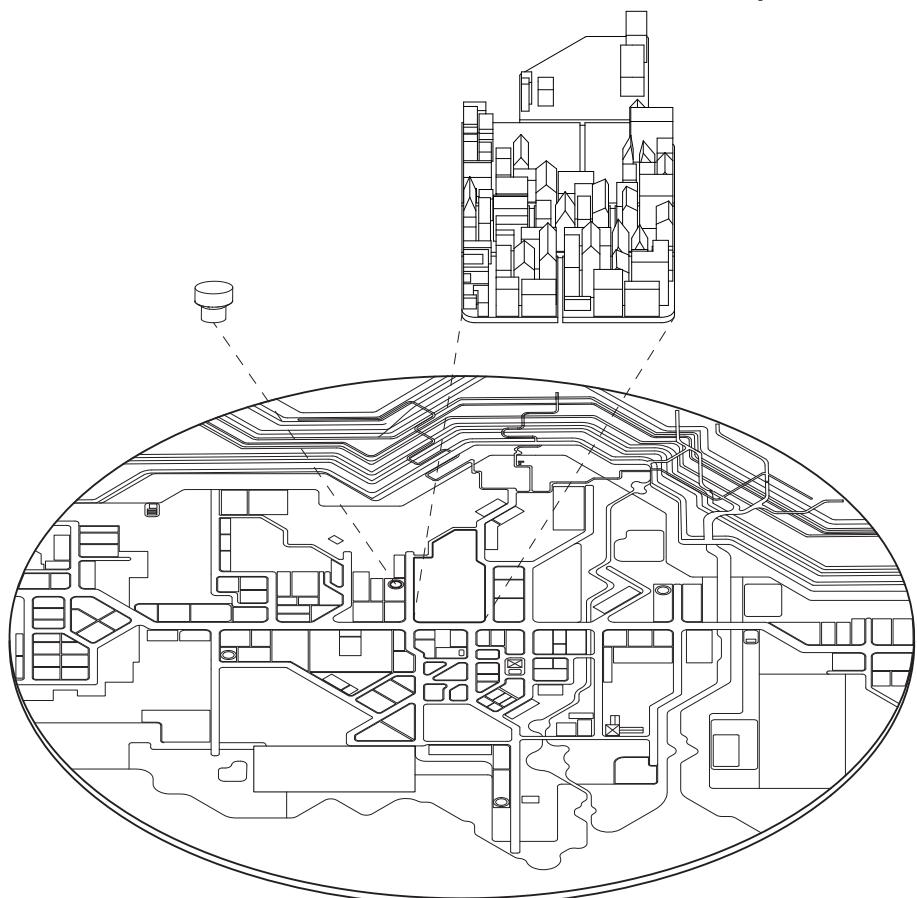
Untreated disposal - 281.0 m³/d (100%)



INSERTS

STEP - 07

HOUSING SCHEME (RESIDENTIAL)



Typology - E

TYPOLOGY - E

Population Density - 2000 per km²



Area - 2.00 km²



Water consumption - 540.0 m³/d



Treated disposal - Nil m³/d

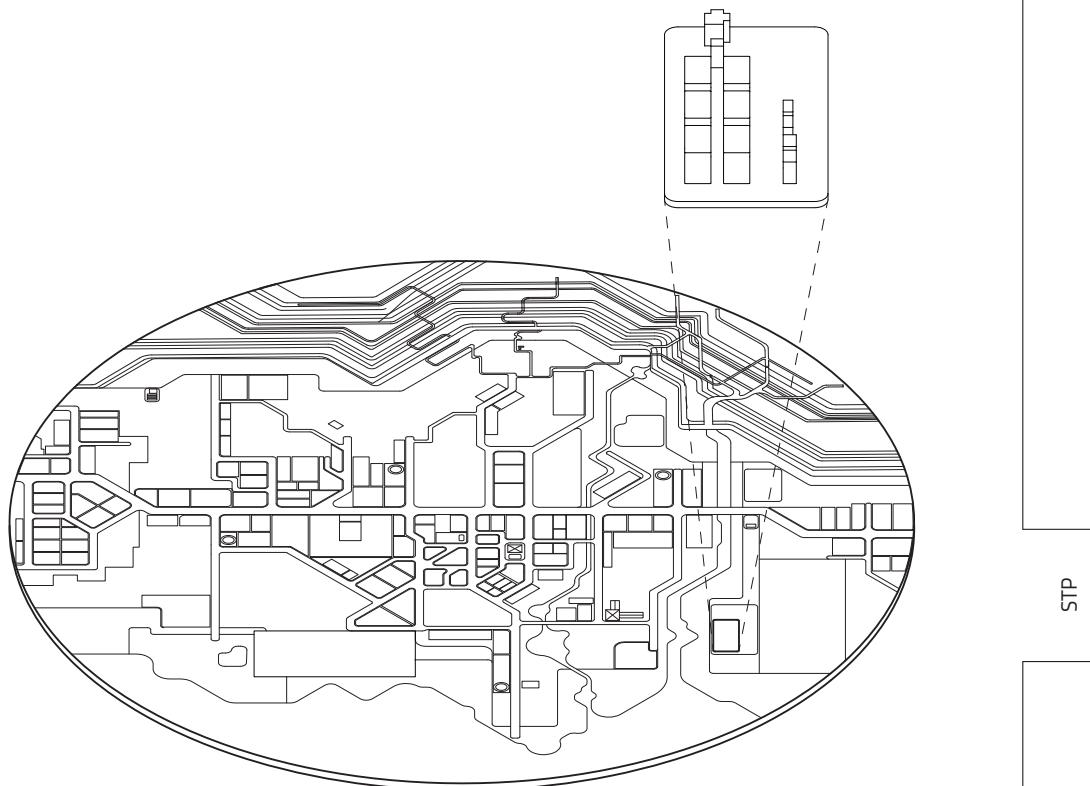


Wastewater generation - 432.0 m³/d



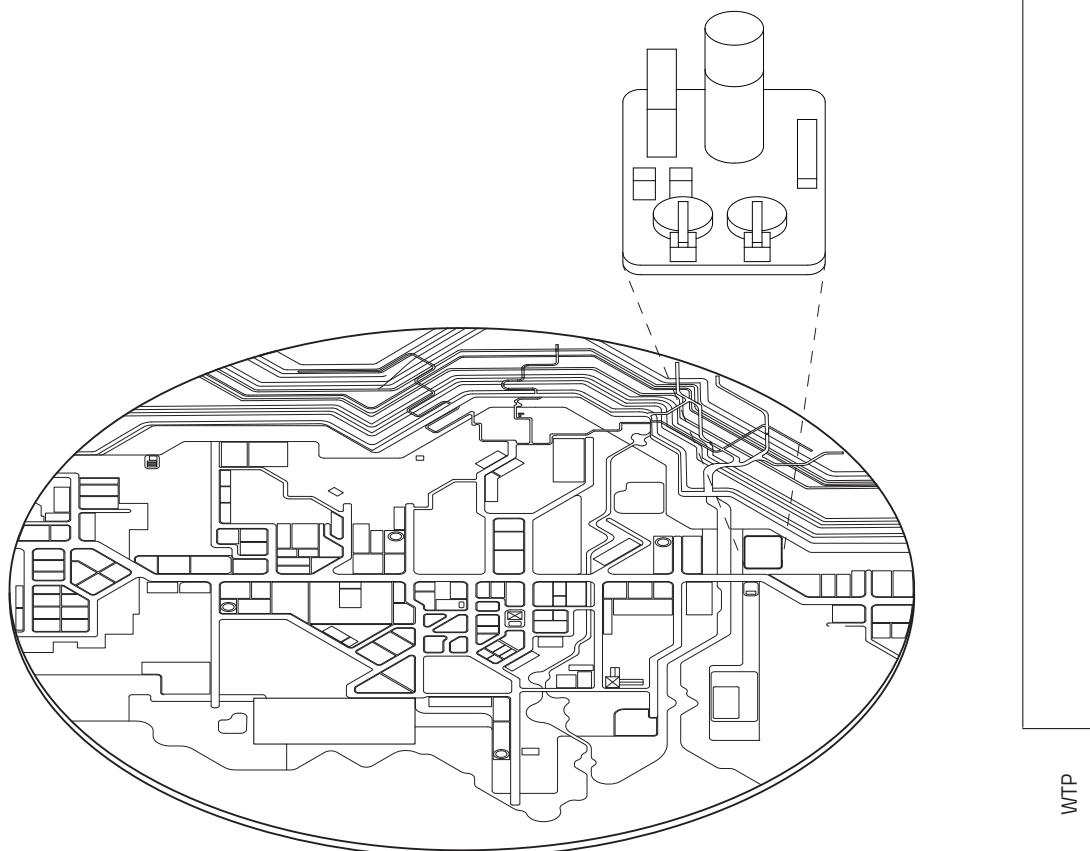
Untreated disposal - 432.0 m³/d (100%)





SEWAGE TREATMENT PLANT

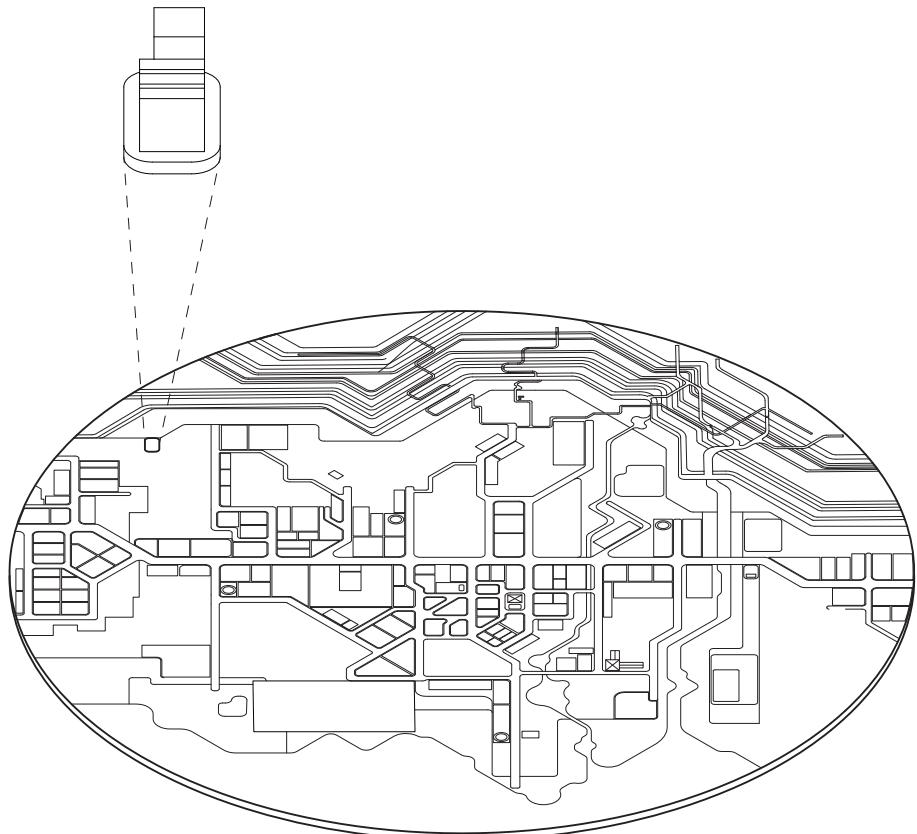
A sewage treatment plant operates by circulating air to encourage the growth of bacteria to break down sewage. The goal being to deliver much cleaner, more environmentally friendly effluent. Sewage treatment generally involves three stages, called primary, secondary and tertiary treatment. The **settlement B** has a 20 MLD capacity of STP on back of River. Currently the settlement produces approximately 12 MLD of wastewater out of which 10 MLD is treated at the STP and the balance is not collected as the laying of sewerage network has been postponed due to lack of funds.



WTP

WATER TREATMENT PLANT

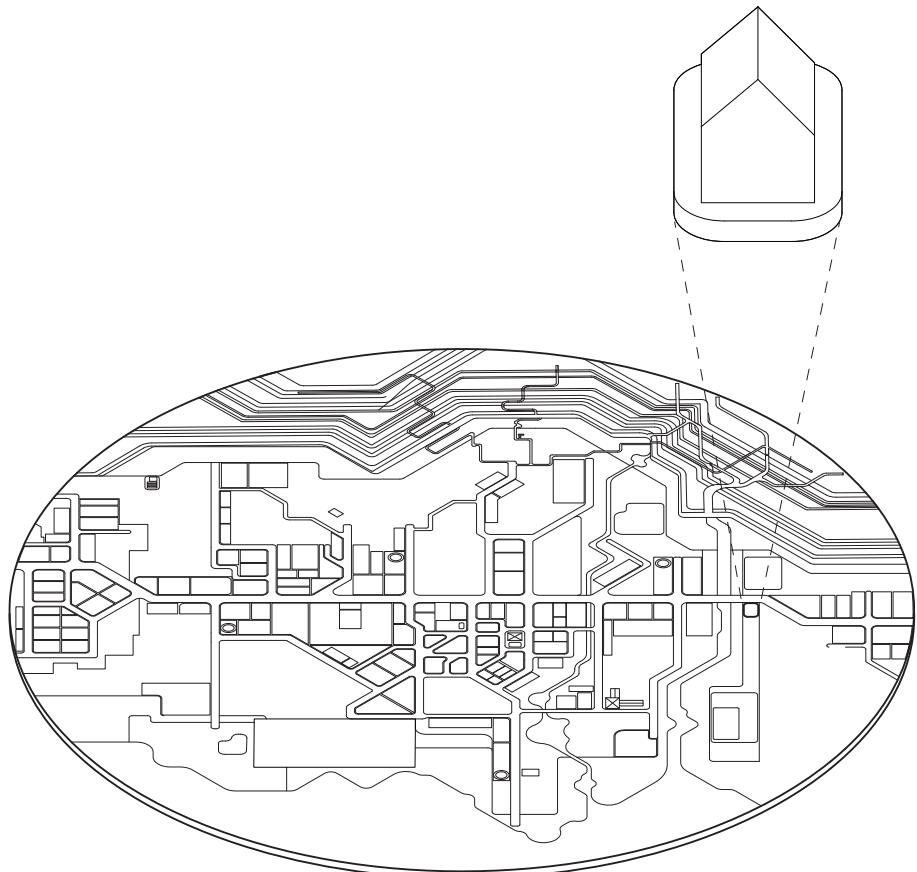
Conventional surface water treatment plants consist of several steps in the treatment process. These include: (1) Collection ; (2) Screening and Straining ; (3) Chemical Addition ; (4) Coagulation and Flocculation ; (5) Sedimentation and Clarification ; (6) Filtration ; (7) Disinfection ; (8) Storage ; (9) Distribution.



SOLID WASTE MANAGEMENT PLANT

Settlement 1 has a municipal solid waste management plant of 20 TPD capacity. It has a fleet of vehicles which provide a door to door collection services to the households and brings the waste to the treatment facility through transfer / segregation stations. Composting is done of the organic waste whereas the dry waste is segregated packed and sold in the form of pellets to the industry. The recyclable plastics is also managed separately. All the inert and non recyclable waste is currently being sent to dumping site. The settlement is planning to have a scientific landfill in the coming 5 years.

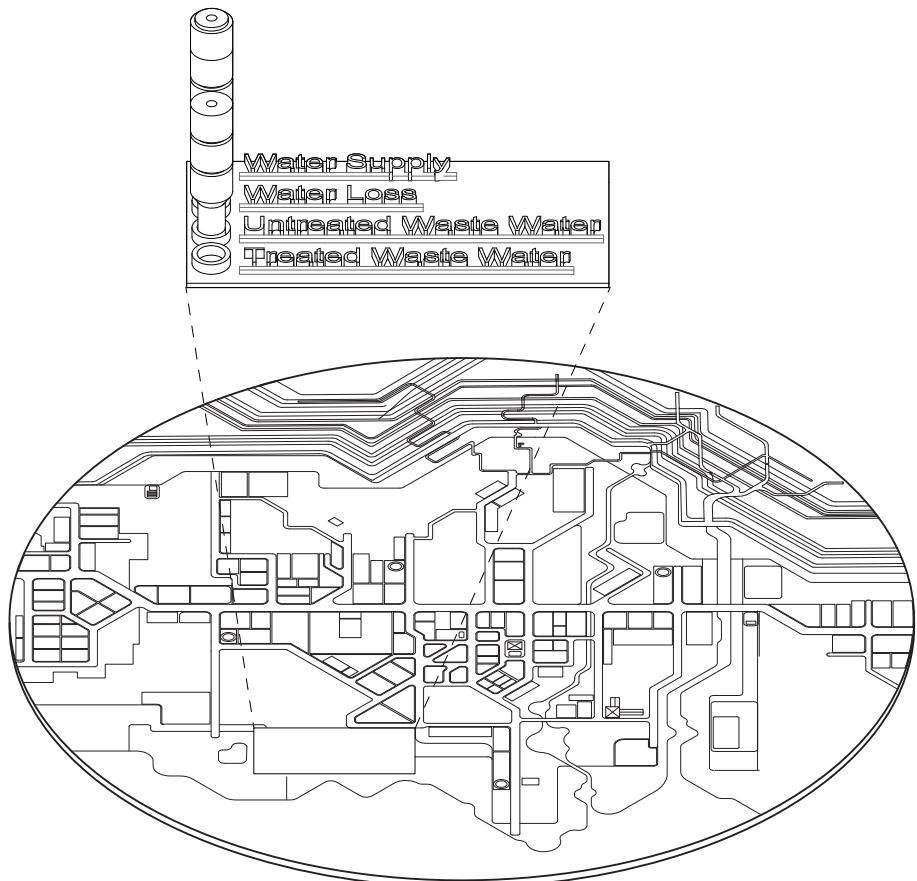
SWMP



SEWAGE PUMPING STATION

In wastewater transport, pumping stations are designed to collect and transport wastewater to a point of higher elevation. Pumping stations are also known as lift stations. A pumping station is typically designed to handle wastewater that is fed from underground gravity pipelines and stored in an underground pit or wet well.

SPS



INFOGRAPHICS

At present, the city water supply is 7 MLD out of which is water loss 1 MLD. City produces around 6 MLD of waste water. Through several small and medium open and closed drains, waster water reaches the river untreated.

Infographics

CENSUS DATA

Census Data (2021)		Settlement Name
		Settlement 1
Demographic Information	Population	57630
	Households	12806
Water Demand (including losses)	Water Demand (MLD)	7
User Interface and Containment Systems	HH Practicing Open Defecation (%)	0%
	Individual HH Toilet Coverage (%)	92%
	Community Toilet Coverage (%)	8%
	Total Community Toilet Blocks (No.)	3
	Total Public Toilet Blocks (No.)	4
	On-site containment systems at Individual HH	
	Septic Tanks	94%
	Twin Pits	6%
Conveyance and Treatment	Sewerage Connections Coverage (%)	0%
	Area covered by lined drains (%)	56%
	Lined drains	65%
	Unlined drains	35%
	Wastewater Generated (MLD)	6

LEGENDS

 Existing centrelised sewer system

 Green fields

 Open grounds

 Individual septic tank

 Community septic tank

 Individual treatment plant

 Proposed sewer system

LIST OF ACRONYMS

%	Percentage
°C	Degree Celsius
°F	Degree Fahrenheit
CT	Community Toilet
m³	Meter cube
MLD	Million liter per day
FSM	Faecal Sludge Management
FSSM	Faecal Sludge & Septage Management
km	Kilometer
lpcd	Liter per capita per day
kld	Kilo Liter per day
Lts	Liters
FSTP	Faecal Sludge Treatment Plant
PT	Public Toilet
SBM	Swachh Bharat Mission
WTP	Water Treatment Plant
STP	Sewage Treatment Plant