VISION DOCUMENT

Sewerage and Infrastructural Development Corporation of Goa Limited

(Government of Goa Undertaking)

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❖ INTRODUCTION

The Sewerage and Infrastructural Development Corporation of Goa limited (SIDCGL) was incorporated on 22nd February 2001 under the companies Act 1956. The organization became dormant in the year 2005. Later the organization was reactivated on 14th January 2008. The Hon'ble Prime Minister's vision is **"Swach Bharat Abhiyan"** & to make it successful the mission the SIDCGL plays vital role. The Government is planning to upgrade the Environmental conditions as well as hygienic conditions to achieve the target of **"Swach Bharat Nital Goen".**

The objective of SIDCGL is ***"Zero discharge of waste water into the environment"*** to develop sewerage facilities in the state of Goa. Goa is an international tourist destination which requires utmost care to maintain the hygienic conditions to avoid epidemic (water borne diseases). To attract more tourist as a safe and environmental friendly destination this in turn will boost Goa's, socio economical conditions.

The Composition of Board of Directors & Share Holders of SIDCGL is as listed below:

The following are the Board of Directors:

1. Shri Deepak C. Pauskar (Honorable Minister for PWD) - Chairman
2. Shri. Antonio Fernandes (MLA, Santa Cruz) – Vice Chairman
3. Shri. Umesh kulkarni – Managing Director
4. Shri. Parimal Rai (Chief Secretary) – Director
5. Shri. Punit Kumar Goel (Finance Secretary) – Director
6. Shri. Amar Vazirani – Director
7. Shri. K. R. Shrikant – Independent Director
8. Shri. P. K. Gupta – Independent Director

And the following are the Share Holders of SIDCGL

1. His Excellency, The Governor, Government of Goa, Hon'ble Governor of Goa will be represented by Chief Secretary, Government of Goa.
2. Secretary, Law, Government of Goa.
3. Additional Secretary, Government of Goa.
4. Principal Chief Engineer, PWD
5. Director of Municipal Administration. Directorate of Municipal Administration
6. Managing Director, Goa Waste Management Corporation (GWMC)
7. Director of Industries, Directorate of Industries.
8. Director of Panchayats, Directorate of Panchayat.

❖ WATER SUPPLY & SEWERAGE SCENARIO OF GOA

Goa State is having total Geographical area of 3702 sq.km. Goa State forms part of Coastal tract of West coast of India. The principal Pernnial Rivers are Terekhol, Chapora, Mandovi, Zuari and Galjibagh whereas Baga, Sal, Saleri and Talpona are Emphemeral Rivers.

The State is having Tropical - Maritime monsoonal type climate with distinct aerographic influence. Due to proximity to Arabian Sea, humidity throughout the year is more than 60% and ranges from 80-90% during monsoon period.

The South Western monsoon period is from June to September. 90% of annual rainfall occurs during monsoon period, balance 10% occur during pre and post monsoon seasons.

Average annual rainfall is of the order of 3200 mm. The average annual rainfall in North Goa district is 3160 mm and 3300 mm in South Goa district.

Goa is blessed with abundance of water during Monsoons and also during Post Monsoons; hence there is no demand of additional water. Ground water level in Goa is also sufficient even during non monsoon seasons.

Goa is having various drinking Water Treatment Plants (WTP's) total installed capacities of 601.00 MLD with additional water supply schemes (pressure filters) of 16.50 MLD. The Source of major Water treatment Plants is Surface Source i.e. Salaulim, Anjuna, Amthane Dams and Opa, Chandel, Valvanti rivers.

❖ SEWAGE SCENARIO OF GOA

India is the fastest growing economy in the world with 1.3 billion people. With fast growing economy India is urbanizing at a rapid pace. According to a survey by UN State of the World Population report in 2007, by 2030, 40.76% of country's population is expected to reside in urban areas. Goa is a state on the southwestern coast of India within the region known as the Konkan, separated from the Deccan highlands of the state of Karnataka by the Western Ghats. It is bounded by Maharashtra to the north and Karnataka to the east and south, with the Arabian Sea forming its western coast. It is India's smallest state by area and the fourth-smallest by population. In the last decade, Goa has experienced rapid urbanization, which has been closely linked to their paralleled expansion in the tourism industry corresponding to the largest sector of the state's economy.

With the thrust of urbanization and touristic development Goa, sewage treatment and disposal of waste water is of paramount importance to avoid environmental degradation.

It is necessary that the State of Goa is covered with a well planned sewerage scheme. With this aim, it was proposed to develop sewerage scheme at various cities and other municipal areas for collection, conveyance, treatment and discharge.

Presently the Sewerage coverage is of about 16 % in state of Goa with respect to 28% National Average. Only 3 towns / cities have proper sewerage

system in Goa i.e. Panaji, Margao (part) and Vasco. Works are in Progress in North Coastal Belt, Mapusa, Porvorim, Ponda, South Coastal Belt, Navelim .

The Ongoing Projects in the state of Goa can be seen in **Fig. 1** and detailed project classified in **Table 1**

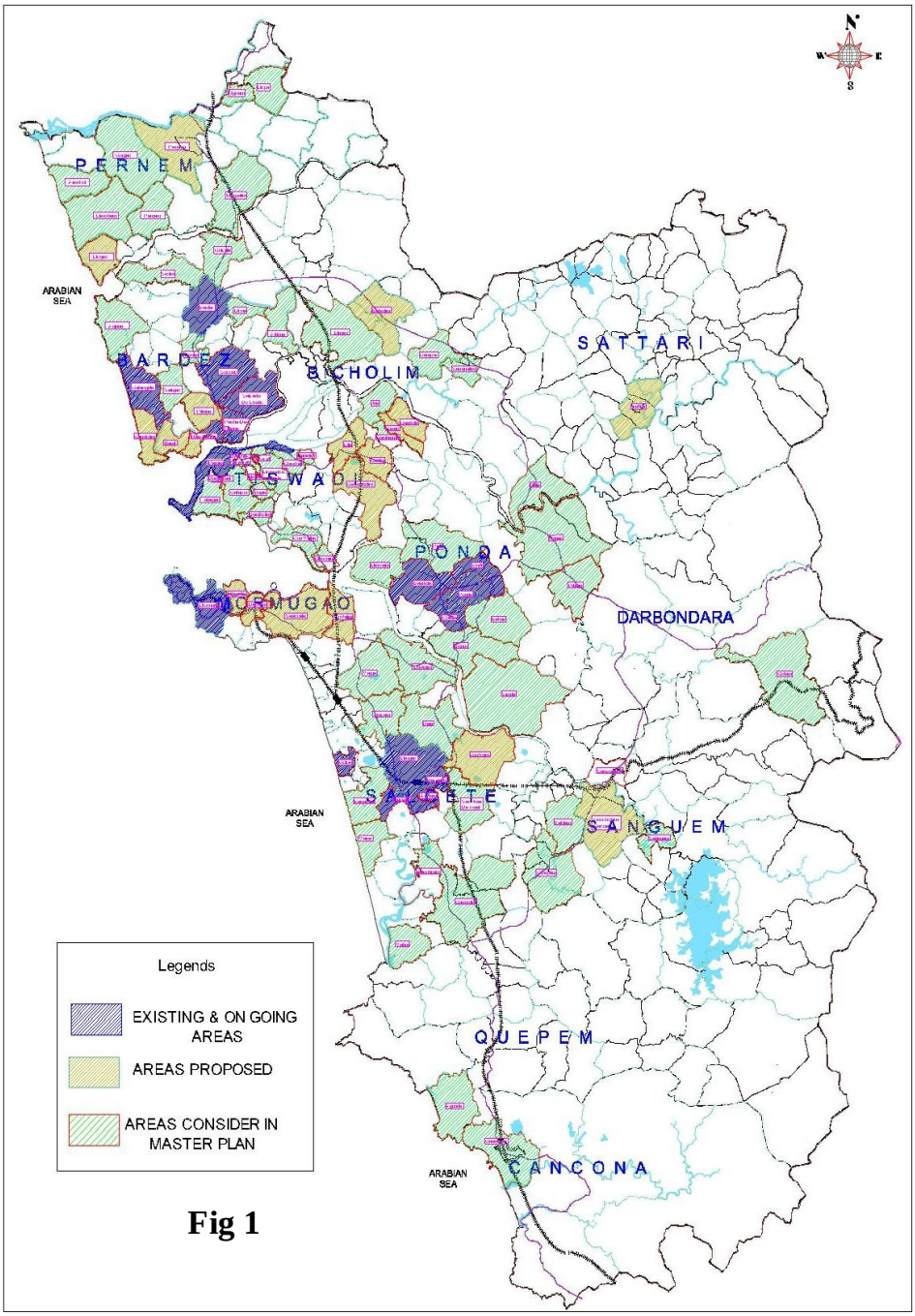


Fig 1

The total installed capacity 78.35 MLD at present against which 30.05 MLD is received at STP. In addition to this, 73.50 MLD cumulative capacity STP's are in progress. As of FY 2019-20, urban & rural areas combined in the state generate 196.88 MLD of wastewater out of which 7 % is treated through the sewerage treatment plant. The balance majority of the population depends on traditional septic tank and soaks pit system for the disposal of wastewater. As per need / requirement for septage management sewage tankers are called by the consumers and same is being treated in nearest STP as part of septage management.

In the near future state intends to improve the sewerage facilities in all uncovered areas. It is also proposed that sewerage facilities are provided to the rest of the state in a phased manner in order to achieve "total sanitation and zero discharge of wastewater into the environment".

All the major Sewage Treatment Plants are based on Sequential Batch Reactor (SBR) technology. The quality of the treated water from STP's is periodically checked to maintain all effluent standards and parameters laid down by Goa State Pollution Control Board. The details of the existing sewerage Schemes and STP's are as listed below:

Total installed Capacity In MLD	-	78.48 MLD
Treatment Done in MLD	-	29.73 MLD
Total Capacity In MLD in progress	-	73.50 MLD

EXISTING SEWERAGE SCHEMES & STP's

Name of the Sewerage Scheme	Installed Capacity in MLD	Treatment done in MLD	Area Covered
1	**2**	**3**	**4**
Sewerage Scheme for Panaji Sewerage Scheme for Taliegao (part)	12.5 + 15 = 27.50	12.00	Panaji City, Mala, St. Inez, Altinho, Miramar, Campal, Part of Taliegao, Caranzalem & surrounding
Sewage Treatment Plant at GMC Bambolim	1.35	0.50	Goa Medical College, Bambolim
Sewerage Scheme for Sanquelim (Part)	0.80	0.30	3 Wards of Sanquelim Municipal area
Sewerage Scheme for Durbhat	1.00	0.30	Durbhat Village
Sewerage Scheme for Vasco	20.00	7.00	Vasco City, Sada, Baina, Mormugao, Mangor Hill, Dabolim Part and surrounding
Sewerage Scheme for Margao	20 + 6.7 = 26.70	8.50	Margao City, Fatorda and surrounding
Sewerage Treatment Plant at Zuarinagar Sancoale	1.00	1.00	Slum area of Zuarinagar Sancoale
NTS Pythorid Plant at Porvorim, Varkhande	0.08+0.05 = 0.13	0.08+0.05 = 0.13	Education Dept & Surrounding, Varkhande
TOTAL	**78.48**	**29.73**	

Note: All the above STP's are commissioned 2015 onwards and are designed for 30 years i.e. for 2045 onwards except 12.50 MLD STP at Panaji.

SEWERAGE SCHEMES AND STP's inProgress and Proposed

Name of the Sewerage Scheme	STP Capacity in MLD	Status	Area proposed to be Covered	Time frame
1	2	3	4	
Sewerage Scheme for Mapusa	5.40	Under construction	Mapusa Municipal area (Part)	Dec 2021
Sewerage Scheme for North Coastal Belt (Calangute – Baga)	5.60	Under Construction	Calangute – Baga and Surrounding	Dec 2021
Sewerage Scheme for Panaji- Patto	2.00	Under Construction	Panaji Patto area, Mala, Fontainhas and surroundings	Dec 2021
Sewerage Scheme for Porvorim	15.00	Network done, STP to be taken up for construction	Porvorim plateau area and surroundings	Dec 2021
Sewerage Scheme for Ponda, Curti, Kavelem & Bandora	8 + 15 + 15 = 38.00	15 MLD STP at Kavelem ins under construction	Ponda Municpal area, Curti (part), Kavelem and Bandora Village	Partial by May 2021
Sewerage Scheme for Colva – South Coastal Belt Phase I	7.50	Under Construction	Colva Village, Gaundalim, Vanelim, Sernabatim (part)	Dec 2021
TOTAL	**73.50**			

❖ ROLE OF SIDCGL

SIDCGL is appointed as nodal agency to develop Sewerage infrastructure / Sewerage facilities in the State of Goa.

The objective of SIDCGL is "**Zero discharge of waste water into the environment"** to develop sewerage facilities in the state of Goa.

Accordingly vision document was prepared for sewerage facilities in Goa; Detailed Project Report were prepared for Margao, Navelim, Cortalim, Ponda, Porvorim, South Coastal Belt, Candolim, Bicholim, Marcela Town, Old Goa Heritage, centre, Valpoi etc.The SIDCGL has also prepared Master plan for the State of Goa including detailed project report for each Taluka. It covers other municipal towns (balance areas) such as Pernem, Bicholim, Valpoi, Sanguem, Quepem, Canacona etc amounting to Rs. 4735.00 Crs. The Sewerage Schemes of Ponda, Porvorim, Navelim are submitted to Ministry of Environment and Forest, Government of India under National River Conservation Directorate (NRCD) to avail the financial assistance.

The Sewerage System for major towns / cities is already in place i.e. Panaji, Margao and Vasco. SIDCGL has taken up Sewerage Schemes for Margao, Navelim, Colva, Porvorim, Ponda, Sanquelim, Taliegao. Sewerage work for the part city of Vasco been carried out 30 years ago by PWD Goa, and the same work has been upgraded by SIDCGL.

In this context **Completed and ongoing works** in various towns taken up by SIDCGL and the status of the works is as mentioned below by SIDCGL:

I. Sewerage Work in Fatorda Constituency

- Total House Connections released by SIDCGL in Fatorda constituency is around 1000 Nos benefitting around 10000-12000 Souls.
- Presently release of around 250 House Connections is in progress.
- The work of rehabilitation of Old Sewer network from Arlem Junction to Ravindra Bhavan is taken up and around 1.00 Kms of 2.2 kms main trunk is laid and construction of manholes are in progress.
- Rehabilitation of Old Sewer network in Fatorda is done for a length of 7 kms which were laid in 1989 onwards and there was issue of overflow due to choking of sewer line. Old lines of 200 mm & 250 mm dia stoneware / RCC pipes are replaced with 280 and 315 mm dia HDPE pipes respectively

  "This Scheme helps in abatement of pollution caused overflow of sewage through manholes in nallahs and drains leading to River Sal and nearby fields"

II. Margao sewerage scheme is commissioned including South Trunk Main.

- The design Population (2041) of Margao Town is 1, 06,528 souls and Fatorda of around 30,000 souls with sewage generation 11.94 MLD and 3.61 MLD
- Sewerage Network at Malbhat, Khareband, Shirvodem, Pedda is successfully completed and commissioned.
- The sewerage network in Margao town of 40 Km length has been completed 7 commissioned. Around 2400 House Connections are released and release of balance house connections are in progress.
- The South Trunk main from Gogol to STP at Shirvodem of about 7 kms is completed & commissioned which is passing through the Saipem Lake.
- Presently Work for release of around 320 House Sewer connections is in progress in Balance areas of Margao.

III. Sewerage Scheme for Navelim & Surrounding Areas

- The Design Population (2041) of project area is 90,751. The total Sewage generated is 11.01 MLD.
- The Sewerage network in Rumdamol and Davorlim area has been successfully completed and connected to the South trunk main at Margao. Also house connections are completed and Part of Rumdamol and Davorlim areas are commissioned with 630 House Connections.
- The laying of sewer network in Navelim village like Dicarpale, Aquem Baixo, Talaulim, Mandop are in progress.
- Around 95 Kms of Sewer network is laid out of 101.72 Kms. Presently works of balance sewer network and Pumping Stations are in progress and balance work is targeted to be **completed by December 2021**.
- The House Sewer Connections are in Progress in Navelim and presently 842 House Connections are released benefitting around 5000-8000 population.

"This Scheme will benefit in abatement of Pollution caused due to discharge of Sewage in nallahs leading to River Sal."

IV. 20 MLD STP at Margao

- The 20 MLD Sewerage Treatment Plant by SIDCGL is commissioned on 28th June 2017 at Shirvodem Margao.
- This plant is catering the combine flow from the south zone areas of Margao town and Navelim Sewerage Scheme areas. Total Connections done are 4969, benefitting population of 95490.
- The total flow received in STP for treatment is around 9-10 MLD. The Sewage flow is expected to increase as the sewer connections are released which are in progress in Margao and Navelim. In addition to this average 800-900 Sewage tankers are received in STP per month (i.e. around 6-7 MLD)

- **Similarly work is taken up for execution for diversion polluted Khareband Nallah. Khareband Nallah will be diverted and connected to North Trunk Main Sewer Line leading to STP.**

- Shirvodem Nallah which is highly polluted due to Sewage, same is diverted & Connected to South Trunk Main in year 2018, which is further taken into STP for treatment and the treated water is released in River Sal. Presently around 2-4 MLD flow is received from Shirvodem Nallah.

"These works will reduce pollution of River Sal Caused due to Discharge of Raw Sewage in Kharbandh and Shirvodem Nallah's which join River Sal."

V. Colva Sewerage scheme – Phase I

- The Design population (2045) of Project area (Phase I) is 58,764 souls.
- Laying of Sewerage of Network in Colva and areas surrounding the Colva creek is in progress.
- Around 20 kms of Sewer network has been laid out of 25 kms.
- Construction of 7.5 MLD STP is nearing completion and around 90% works are completed. Treated Effluent disposal line is balance to be laid from STP to River Sal.
- The work of Treated effluent line is tendered and it will require 6 months for completion from the date of start of work
- Approximately around 1250 House sewer connections are proposed to be released benefitting around 16000 population.
- Tentative date of completion is December 2021.

"This scheme (Phase I) will benefit the locals and tourist in and around colva. Also will reduce pollution caused due to discharge of Raw Sewage into Colva Creek."

VI. 20 MLD STP at Vasco

- The Design Population(2041) of Vasco, Mormugao & Suburbs (some Part of Dabolim, Chicalim etc) is 1,51,068 souls with Sewage Generation of 18.35 MLD.
- Additional intake well and pumping station in progress.
- The STP is commissioned on 30th September 2017 is operational
- This STP caters Vasco City, Mormugao, New vadem,Sada, baina, Mangoor Hill, Dabolim (Part) and Chikalim (Part) benefitting around 48285 Population and around 4149 House sewer connections are released.
- Presently 5- 8 MLD Sewage is received in STP for treatment.
- Around 150- 200 nos of Sewage Tankers are received per month in the STP (i.e. around 0.8-1.2 MLD)

VII. Sewerage Scheme for Ponda Municipality including Curti, Bandora, Kavlem and other urban agglomerates in Ponda taluka - which include 3 STP totaling 38 MLD capacity

- The Project area includes Ponda Municipal Town, villages of Kavlem, Bandora, Bethora, Curti and surrounding areas. The Design Population (2045) is 1, 93,862.00 souls with sewage generation of 26.42 MLD.
- Around 108 Km of network is completed with 2576 manholes i.e. approximately 75 % works is completed.
- 3 STPs will are proposed under this scheme. 8 MLD STP at Curti, 15 MLD STP at Kavelem and 15 MLD STP Bandora. Work is in progress for 15MLD STP at Queula (Kavlem).
- Presently 90% Civil works of STP units are completed and Electrical – Mechanical units are to be installed.

  "This Scheme after commissioning will reduce pollution of nallah caused due to direct discharge of Sewage which flows from Curti, Ponda, Kavelem and Bandora n Ponda Taluka & further it joins River Zuari.

- Durbhat in Ponda taluka is Peculiar Township / village where entire land belongs to the Society (Pescador De Durbhat) and the settlement is thickly populated.

The SIDCGL has initiated sewer network including construction of toilets for each house with ***"Vaccum Sewerage System"***, **which is introduced for the 1st time in India.** This technology is adopted there is shortage of road width / land is unavailable for laying of sewer lines and also normal conventional system cannot be adopted in Durbhat village. The Vacuum Sewer Network along with 1 MLD STP is completed and commissioned on 29th September 2017. This Scheme will benefit 7000 souls of Durbhat village and around 170 House sewer connections are done.

VIII. Porvorim Sewerage Scheme including STP of 20MLD capacity

- The Project includes Porvorim and its surrounding villages such as Salvador Do Mundo, Penha Da Franca, Succorro etc. The Design Population (2045) is 1, 34,272 souls with sewage generation of 16.58 MLD.
- As the Phase I is taken on priority for the main plateau areas like Pundalik nagar, PDA colony, Defence Colony and surrounding areas.
- Sewerage Network of 43 km is completed i.e. around 90% work is completed of sewer network. Work of STP is yet to be taken up.

IX. Rehabilitation of Old Sewer network in Vasco city and its surrounding areas of Mormugao Taluka

- The Vasco and Mormugao area has experienced overflowing of sewage in the city and many nearby places. This is mainly because of old network, settlement of ground and increase in population. To overcome this problem the SIDCGL has initiated NEW TECHNOLOGY i.e. PIPE BURSTING for the first time in Goa
- The old pipe is replaced with new HDPE pipe on the same alignment with no excavation to the higher diameter (150mm is replaced by 250mm /300mm diameter pipes). This is successfully completed and commissioned at Prince

Bakery to Government School Sada, areas in city such as near HDFC bank, near Mormugao Municipality, near RTO office, in front of BJP office and also near MPT workshop at Baina. The Total length Completed is around 10 Kms .

X. Providing, Laying, jointing, and Commissioning of sewer pipeline by HDD method and Micro Tunneling including construction of manholes and reinstatement – North Trunk Main Part B & C ,Fatorda

The North Trunk Main Sewer line was laid in year 1985-89 with RCC pipes. This trunk main has completed its life span of 30 years and presently this infiltration and exfiltration at many locations. Also the sewer line has settled at few locations in water logged areas as the North Trunk Main Sewer line runs parallel to River Sal. Due to above the Sewage is flowing in River Sal. Also overflowing is seen at various locations due to choking of sewer line. In view of this the work of North Trunk Main Sewer Line is taken up by SIDCGL.

- The total length of Trunk main is 6.7 kms with diameters ranging from 500 mm to 1200 mm. and branch lines is 2.50 Kms with diameters ranging from 250 mm to 710mm.
- The Network will be laid by HDD method and Micro tunneling for Railway Crossing.
- Presently Trunk Main of 2.56 kms is already laid by HDD and 1.3 kms Micro-tunneling is done for casing pipe. Carrier pipe is balance to be inserted in casing pipes laid.

"Upon completion of North Trunk main Sewer line the issues of overflowing and release of sewage in paddy fields and River Sal will be stopped."

XI. <u>Sewerage Scheme for TaliegaoMarket and left out areas</u>

The work of Taleigao and left out areas was handed over to this office by PWD amounting to Rs. 42.00 Cr. It included 9 Kms of Sewer network and 4 pumping stations. Accordingly 3 works for laying sewer network were tendered in first

instance and awarded. Presently 7.5 Kms network is laid and work of construction of manholes is in progress. Four pumping stations are required to constructed and same balance to be taken up.

"Upon completion of this scheme containment / Pollution of St. Inez creek and part of River Mandovi will be reduced."

XII. Sewerage Scheme for Sanquelim

Sanquelim Sewerage Scheme is handed over by GSIDC for commissioning. The STP is commissioned, however sewer network laid by GSIDC needs to be replaced as there is heavy infiltration in the RCC sewer network at many locations. The Fund requirement for Sanquelim sewerage Scheme is Rs. 2.50 Cr by December 2020.

The STP is commissioned in June 2020 with 130 house connections and presently around 0.8 MLD flow is received for treatment.

Presently only 3 wards of Sanquelim Municipal Council are covered.

Additional 2.5 kms of sewer network can be laid and connected to existing network. Preliminary estimate is prepared.

This scheme benefits in environmental up gradation of Sanquelim Market area and surroundings, also reduces pollution by discharge of raw sewage in drains and nallahs leading to Sanquelim River.

❖ ADDITIONAL SEWERAGE SCHEMES – DPR's Prepared

It is proposed to cover all the major towns with sewerage network using appropriate technology, to take the goal of total sanitation and clean environment in urban as well as rural areas. Provide sewerage network in all low-lying unsewered areas followed by extension of the network to all unsewered areas.

Studies have been done and DPRs have been prepared for sewerage schemes for major cities/coastal areas, which have been listed below along with estimated cost.

Sr. No.	New Proposals	Amount in Cr.	Time Frame
1.	Sewerage Scheme for Curchorem and its surrounding areas	155.88	2021-31
2.	Sewerage Scheme for Siridao Palem village in Tiswadi Taluka	47.84	2021-31
3.	Sewerage Scheme for Saligao, Nerul, Pilerne and Surrounding areas	175.00	2021-31
4.	Sewerage Scheme for Savordem and its surrounding areas	82.51	2021-31
5.	Sewerage Scheme for Candolim and Surrounding areas	254.00	2021-31
6.	Sewerage Scheme for Bicholim and Surrounding areas	185.00	2021-31
7.	Sewerage Scheme South Coastal Belt Phase II	534.36	2021-31
8.	Sewerage Scheme Dabolim and its surrounding areas in MormugaoTaluka – Phase II	275.00	2021-31
9.	Sewerage Scheme for Marcela Town and Surrounding areas	256.00	2021-31

10.	Sewerage Scheme for Old Goa (Heritage Site) and Surrounding areas	284.00	2021-31
11.	Sewerage Scheme for Valpoi Municipal town and Surrounding areas	110.00	2021-31
12.	Sewerage Scheme for Pernem Muncipal area and Surrounding agglomerates	75.00	2021-31
13.	Sewerage scheme for St.Cruz constituency in TiswadiTaluka.	379.00	2021-31
14.	Sewerage Scheme Cortalim and its surrounding areas in MormugaoTaluka – Phase I	265.00	2021-31
	Total	**3078.59**	Time frame as per Availability of funds

Health hazards such as contamination of groundwater or drinking water is observed due to the lack of adequate soaking capacity of the soil in Areas with high ground water table & low lying areas, letting of the wastewater in open drains is growing due to urbanization. Hence In addition to above areas, laying of sewer network for balance and low laying areas is proposed and will incur approximately Rs. 1660Cr.

❖ TECHNOLOGIES ADOPTED

Trenchless Technologies adopted in SIDCGL for laying of Sewer Line as listed below:

1. Horizontal Directional Drilling (HDD)

2. Micro Tunneling (MT)

3. Rehabilitation of Sewer line by Pipe Bursting.

In addition to above technologies adopted for STP's are as below:

1. Sequential Batch Reactor (SBR)

2. Membrane Bio Reactor (MBR)

3. Natural Treatment System – Pythorid

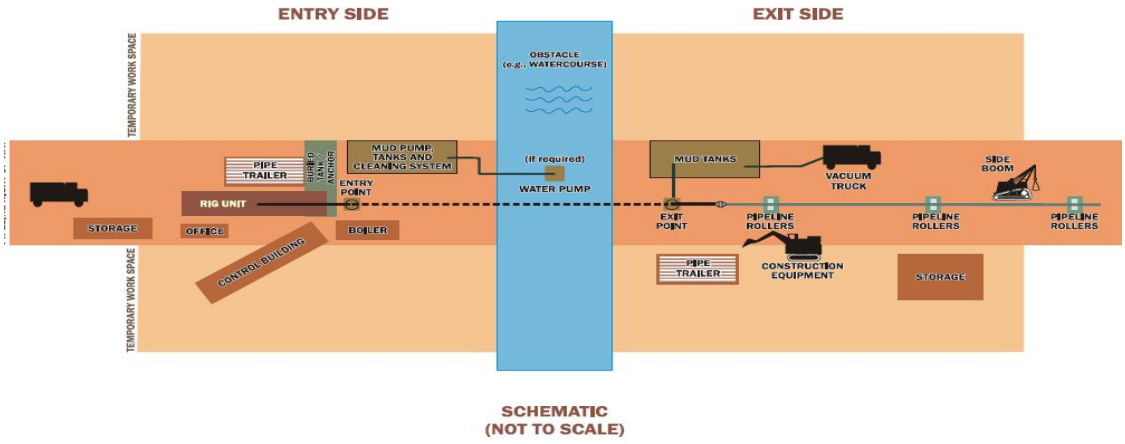
4. Vaccum Sewerage System

Horizontal Directional Drilling (HDD)

- This technology was first introduced in Goa for sewerage works. Initial project at Margao with this latest technology was initiated at Shirvodem, Khareband, Pedda and successfully completed and commissioned benefitting more than 5000 population.

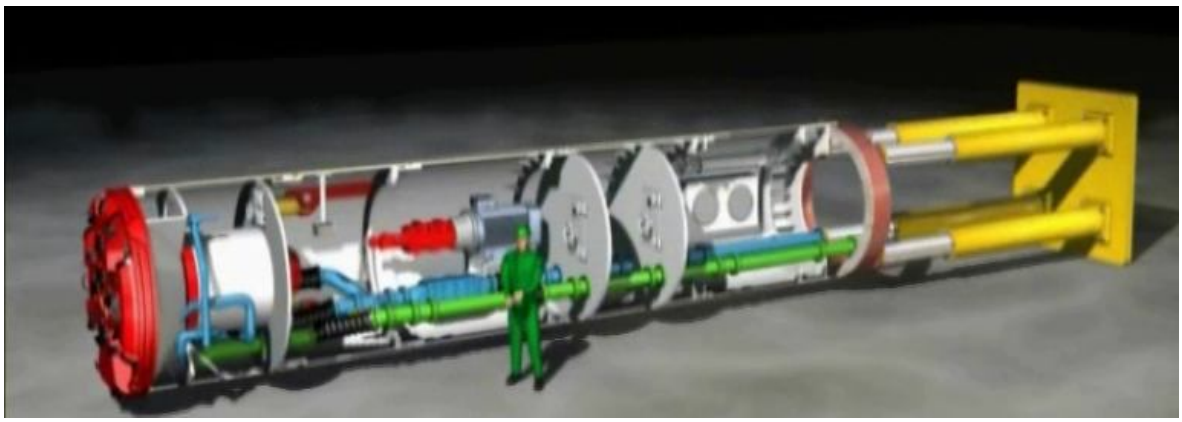
- HDD is essentially, a larger-scale, higher- technology version of guided boring, usually with computerized remote control over the drilling head. In fact, some vendors refer to a guided boring rig as a “mini HDD”.HDD can traverse large distances horizontally and work at greater depths. It has better guidance and tracking system. It is using radio-driven locator technology to track the drilling head.

Figure 2 Horizontal Directional Drill Set-up

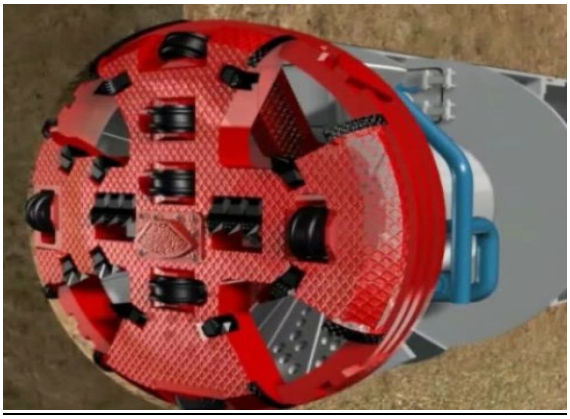


Micro Tunneling (MT)

Micro Tunneling is another technology introced for the first time for laying of Sewer network in Goa by this Corporation. Microtunneling installs pipe using a microtunnel boring machine (MTBM). The term “microtunneling” refers to the fact that person-entry is not required (in fact, it is usually not possible) during tunneling. The term “microtunneling” is frequently misunderstood and misused because it refers to the remote control aspect of the method (i.e., no person-entry needed), not the size of the tunnel. In fact, microtunnels can be quite large. MTBMs typically use pipe jacking to insert pipe just behind the cutting head (the jacked pipe continuously supports the tunneling operation), but in self-supporting strata (especially rock), pipe pullback is an alternative.



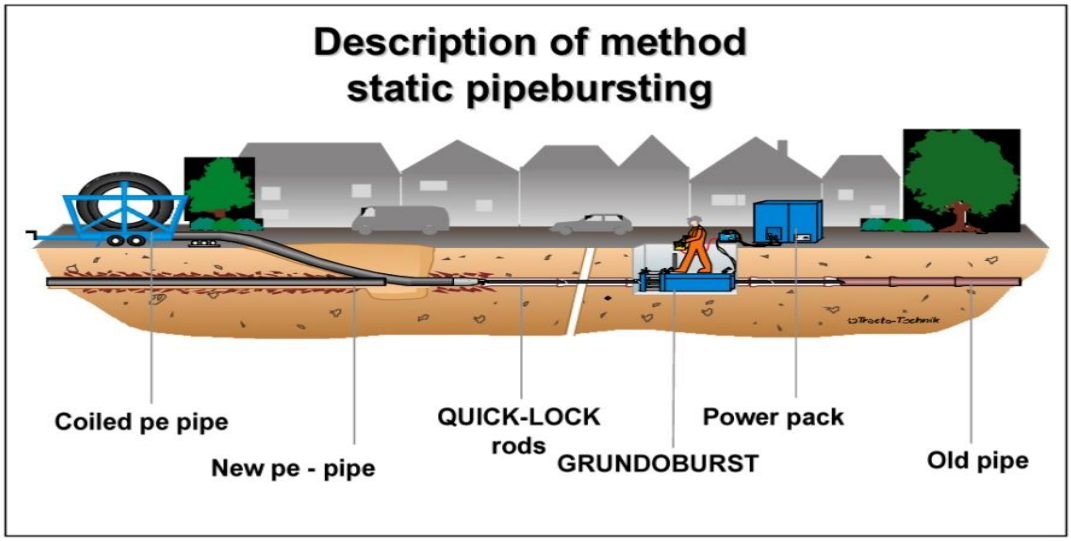
Micro tunneling Machine with Hydraulic Jack



Cutting Head

Rehabilitation of Sewer Network with Pipe Bursting Technology

- The Vasco and Mormugao area has experienced overflowing of sewage in the city and many nearby places. This is mainly because of old network, settlement of ground and increase in population. To overcome this problem the SIDCGL has initiated NEW TECHNOLOGY i.e. PIPE BURSTING for the first time in Goa.
- The old pipe is replaced with new HDPE pipe on the same alignment with no excavation to the higher diameter (150mm is replaced by 250mm /300mm diameter pipes).



Pipe Bursting Equipment

Sequential Batch Reactor Technology.

- Sequential Batch Reactor (SBR) is a CYCLIC ACTIVATED SLUDGE TREATMENT process. It provides highest treatment efficiency possible in a single step biological process.
- The System is operated in a batch reactor mode this eliminates all the inefficiencies of the continuous processes. A batch reactor is a perfect reactor, which ensures 100% treatment. Two or more modules are provided to ensure continuous treatment. The complete process takes place in a single reactor, within which all biological treatment steps take place sequentially.

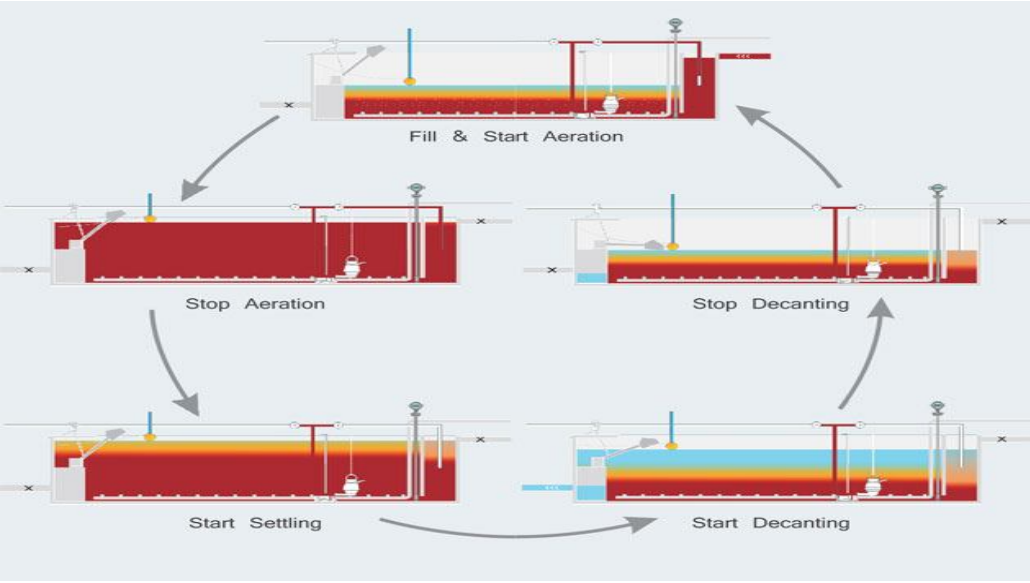
- No additional settling unit, secondary clarifier is required.
- The complete biological operation is divided into cycles. Each cycle is of 3 – 5 hrs duration, during which all treatment steps take place.
- Explanation of cyclic operation:

  A basic cycle comprises:

  •Fill-Aeration(F/A)

  •Settlement(S)

  • Decanting (D)



- These phases in a sequence constitute a cycle, which is then repeated.
- A Typical Cycle:
- During the period of a cycle, the liquid is filled in the SBR Basin up to a set operating water level. Aeration Blowers are started for a pre-determined time to aerate the effluent along with biomass. After the aeration cycle, the biomass settles under perfect settling conditions. Once Settled the supernatant is removed from the top using a DECANTER. Solids are wasted from the tanks during the decanting phase.

Pythorid Technology

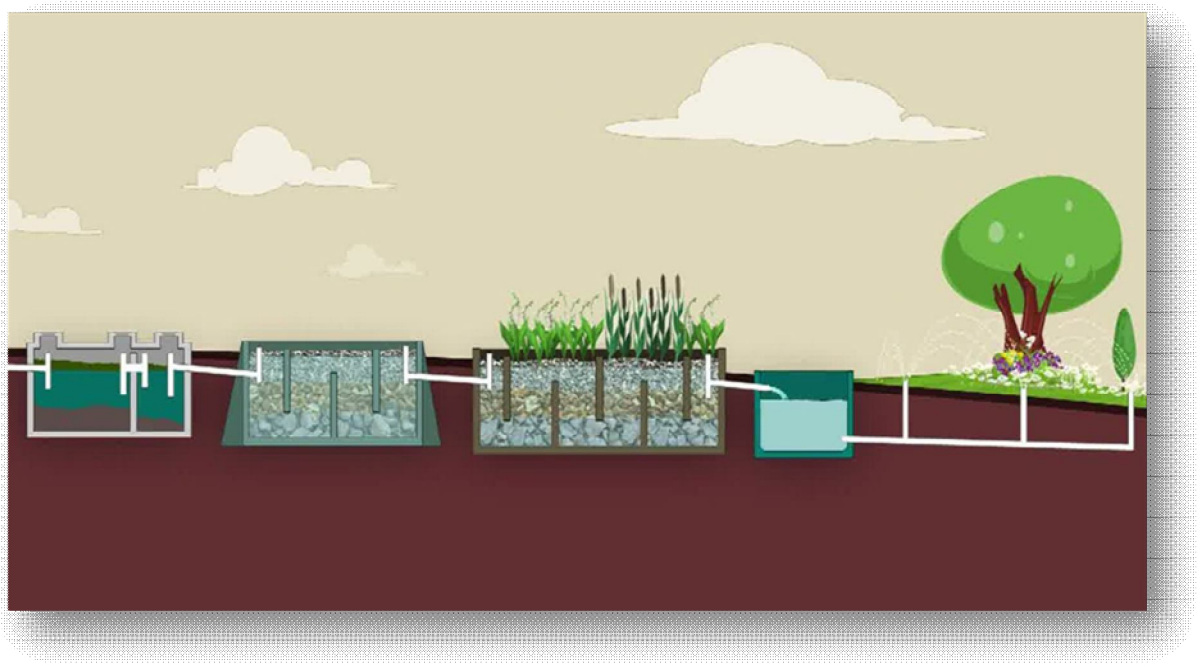
- The technology is patented by Indian, Australian as well as European countries. The NEERI (National Environmental Engineering Research Institute) and Council of Sceintific and Industrial Research have authorized this technology. This is natural water purification process which does not use electricity / power, chemical dosing, heavy maintenance to purify water. It uses natural resources like plants, stones, pebbles etc. for purification of water.

- The process involves following steps:
- Primary Settling Cell: in this water is stored and sedimentation process is allowed to take place.

- Secondary Advanced Filter Cell: It consists of pebbles / stones of different sizes arranged in the form of layer through which waste water is allowed to pass. Thus it acts like natural filter. It consists of various baffles that allow the passage of water through the chamber.

- Tertiary biological Wetland Cell (TBWC): It consists of layer of gravel/stones/pebbles and layer of mud with plants planted like Elephant grass (Pennisetum purpurem), Cattails (Typha Spp.), Reeds(phragmites Spp.), Cannas pp.,Yellow flag iris(iris pseudocorus) that are normally found in natural wetlands with filtration and treatment capability. Furthermore some ornamental as well as flowering plants species such as Golden Dhuranda, Bamboo, Nerium, colosia etc. can be used for treatment.

- The process involves biological, physical and chemical action of plants on the waste water. The plants supply oxygen from atmosphere through plants to root zone where particles of effluent / waste water get attracted towards the roots and are absorbed by roots as nutrients. Thus the process of aeration that is aerobic reaction takes along with anaerobic in a natural way. The processed water is later collected after passing through various baffles to the collection tank. This collected water is later used for purposes like municipal gardens, fountains, irrigation etc. as non potable water.



Graphical Representation (Pythorid)

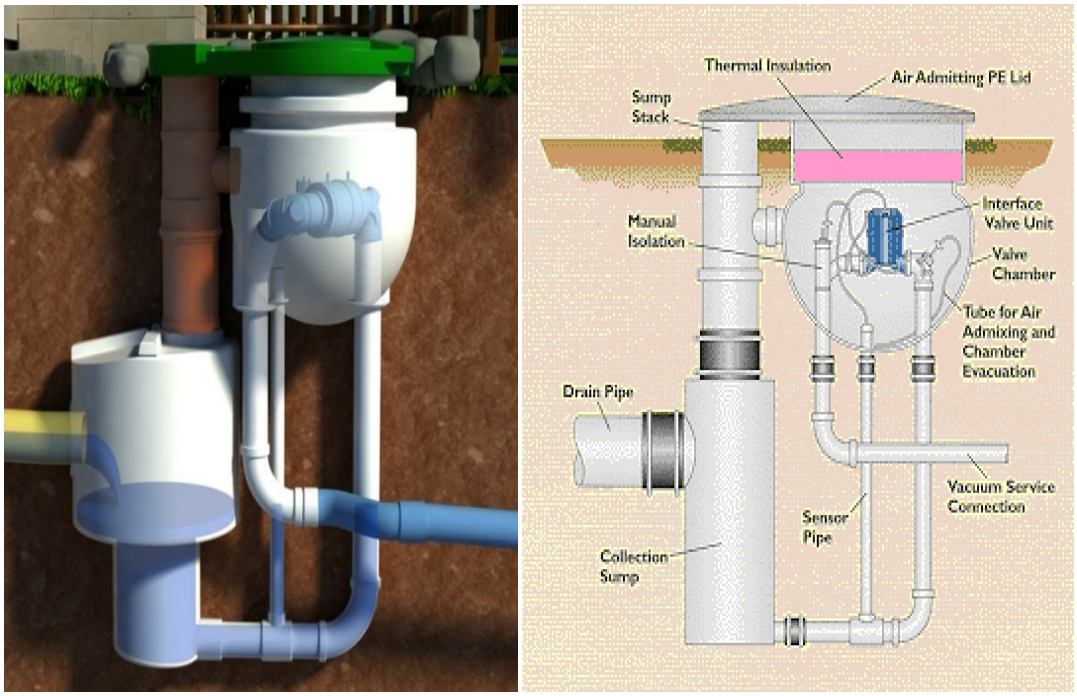
Vaccum Sewer Systems

This is the Latest Technology introduced by this corporation. The Methodology involves Collection of waste water and sewage from houses in Collection Sump by Gravity flow and as the level is raised the valve opens up and the waste water is evacuated from Collection sump to the Main Collection tank as negative pressure is maintained in the line. Further the waste water is pumped to the STP. The Vaccum valve is pneumatically operated, hence no electricity is required.

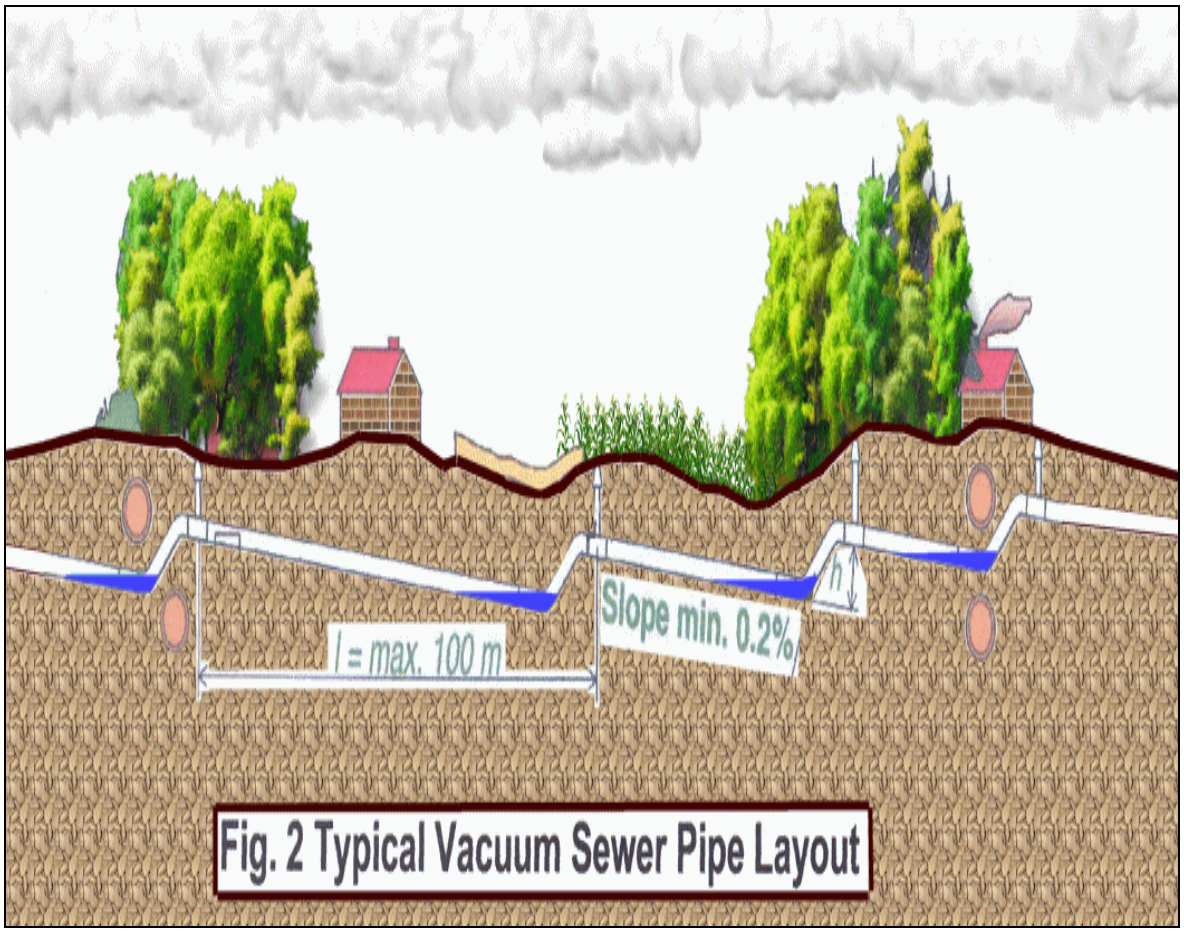
Vaccum Sewer system is useful in areas where topography is not uniform. In this Sewer lines are laid at a depth of 1.2 metres. The basic concept this technology is Air based transport of liquids (2 phase flow).

Negetive pressure is maintained in line with creation of waste water pockets. Manholes are not required in this system. In vaccum sewer systems sewer lines are self cleansing due to high velocity and pressure maintained in the lines. Vaccum sewer lines are laid in Saw Tooth Profile with minimum slope of 0.2% for maximum length of 100 mts. as shown in Fig. 2. Hence excavation of deep trenches as required for gravity sewers are eliminated with this system.

Graphical Representation (Vaccum Sewer System)



Vaccum Valve Unit



❖ COMPLETED PROJECTS

1) 20 MLD STP at Margao (Commissioned in June 2017)

2) 20 MLD STP at Vasco (Commissioned in September 2017)

3) 1 MLD STP at Durbhat (Commissioned in September 2017)

4) 0.8 MLD STP at Sanquelim (Commissioned in November 2020)

5) STP’s based on Natural Treatment System (Pythorid)

Before

After

At Vrundavan Society, Varkhande - Ponda

Directorate of Education at Porvorim

Zuarinagar Sancoale

❖ WORKS IN PROGRESS:

1) 7.5 MLD STP at Colva




2) 15 MLD STP at Kavelem

❖ KEY ACTIVITIES:

- **Septage Management:**

The majority of the population is still dependent on traditional septic tank and soak pit system for the disposal of wastewater. Appropriate fecal sludge management or alternate management strategies to be developed and implemented. Most of the places being isolated or sparsely populated, providing of sewer network becomes uneconomical hence more number of Night soil tankers can be deployed for proper and prompt septage management which shall be treated at the nearest STP's. It is proposed that Night Soil Tanker / Sewage Tankers may be deployed on Hire Charges (outsourced) or number of Sewage tankers may be increased (by procurement). At present sludge produced at the STPs run by Government are treated sludge and given to desired famers/individuals free of cost.

- **Implementation of Sewerage Act and Policy for Mandatory House Sewer Connections**

It is necessary to enforce various measures to make the residents avail sewerage connections in serviced areas. In order to enforce measures to ensure that residents avail sewerage connections in serviced areas proposal is already underway for policy decision by the Government for making House Sewer connections mandatory.

- **Reuse of Treated Water from STP's**

Due to Sufficient rainfall, availability of surface water as well potable water from WTP's, availability of ground water at safe levels there is no shortage / short fall of water in the State of Goa.

The treated water generated in the STP's after treatment of Sewage in the State at present is to the tune of 24.73 MLD. However due to above briefed facts there is no demand for the treated water from the STP's for reuse.

At present, Industrial water requirement in the State is nominal i.e. 6- 8% and also Industrial clusters scattered all over Goa State and also there is no thermal power plant in the state of Goa. In addition to this Major Industries, Hotels etc are having their own independent STP's and treated water is being utilized by individual industries and Hotels.

Presently, water is being used by local bodies for municipal gardens, social forestry, Areca nut and banana plantations etc, however the utilized water is nominal. Hence treated effluent is released in nearby water bodies for flushing for maintaining eflow and keeping nallah clean. Similarly 8 MLD water is used for flushing of St Inez Nallah / creek.

Continuous efforts are being made for utilization of this water and also DMA has already issued directives to local bodies to utilize the treated water from STP's for non potable uses. Accordingly pumping arrangements are made at STP's for filling up of tankers.

Undertake a pilot on wastewater recycling and reuse before scaling it. Laying of conveyance lines from nearest STP's involves financial implications and requires time frame of 1-5 years. Similarly laying of conveying treated waste water line from Tonca STP to ICAR ELLA of around 14 Km costing to the tune of Rs. 12 Crores has been proposed.

However due to no demand & high financial implications for treated waste water / recycled water from STP's and facts mentioned at para's above, the recycling becomes non practicable & economically unviable at present stage.

- **Online Management of Sewerage Infrastructure with implementation of GIS based mapping.**

GIS based mapping of the sewer lines of Panaji, Vasco and Margao Sewerage system has already been done. Since Sewerage schemes in Navelim, Colva, Ponda, Mapusa (Part), Calangute baga are in progress mapping of same is not done. Once the schemes are completed mapping will be done in due course of time.

- **Increase sewerage coverage in State of Goa and achieve goal of Zero Discharge of waste water in the environment**

- **To achieve the Sustainable Development Goal (SDG) number 6 which focuses on Clean Water and Sanitation and to achieve its goal i.e to Ensure availability and sustainable management of water and sanitation for all.**

Sewerage at a Glance

State Sewerage Coverage	-	16%
Sewerage Generation	-	388 MLD
Total installed Capacity in MLD (Designed)	-	78.48 MLD (8 major STP's)
Treatment Done in MLD (present)	-	24.73 MLD
Total Capacity In MLD in progress	-	73.50 MLD (8 major STP's)
DPR's prepared	-	Rs. 3078.59 Cr
Additional Coverage of balance areas	-	Rs. 1660.00 Cr
Time Frame Required for Sewerage Scheme	-	5-10 Years (As per availability of Funds)

❖ ACTIVITIES & GOALS

- Septage Management.
- Public awareness for availing House Sewer Connections.
- Implementation of Sewerage Act and Policy for Mandatory House Sewer Connections
- Reuse of Treated Water from STP's.
- Online Management of Sewerage Infrastructure with implementation of GIS based mapping.
- Increase sewerage coverage in State of Goa and achieve goal of Zero Discharge of waste water in the environment

- To achieve the Sustainable Development Goal (SDG) number 6 which focuses on Clean Water and Sanitation and to achieve its goal i.e to Ensure availability and sustainable management of water and sanitation for all.