SURAT MUNICIPAL CORPORATION

SEWERAGE
AND
SOLID WASTE MANAGEMENT

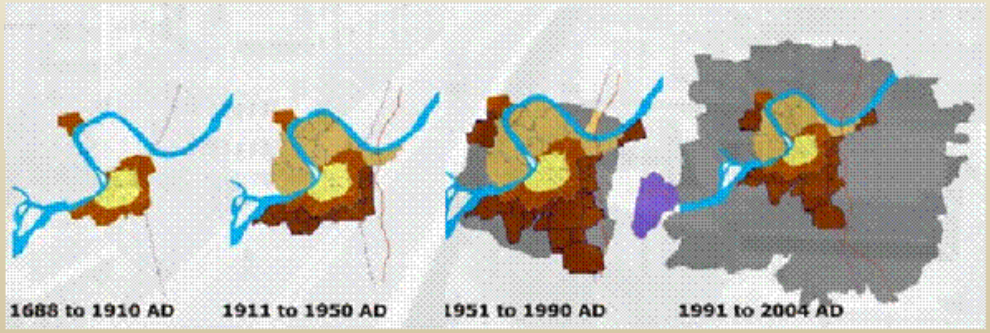
GLORY OF SURAT

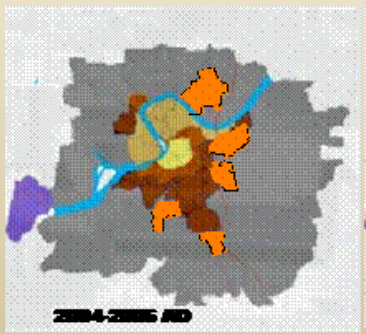
- Economic capital of Gujarat
- Home to Textile and Diamond industry
- 28 % of the nation’s total man made fibre production
- 40% of the nation’s total man made fabric production
- More than 500,000 power looms and 350 process houses
- Traditional Zari and Zardosi work
- 70% of nations diamond cutting and polishing units
- More than 5 lakh workers employed in the industry
- Spin-offs from proximity to Hazira
- Peace-loving, resilient and harmonious environment

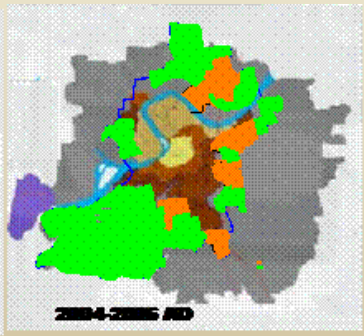
GROWTH OF CITY

- Historical Development Of Surat Dates Back To 300 BC.
- Municipality Established In 1852 AD.
- Municipal Corporation Formed In 1966.

Year	Area in Sq. Km	Population
1951	8.18	2,23,182
1961	8.18	2,88,026
1971	33.85	4,71,656
1981	55.56	7,76,583
1991	111.16	14,98,817
2001	112.27	24,33,785
2001	326.51	28,77,241
2011	326.51	~ 44 Lakhs

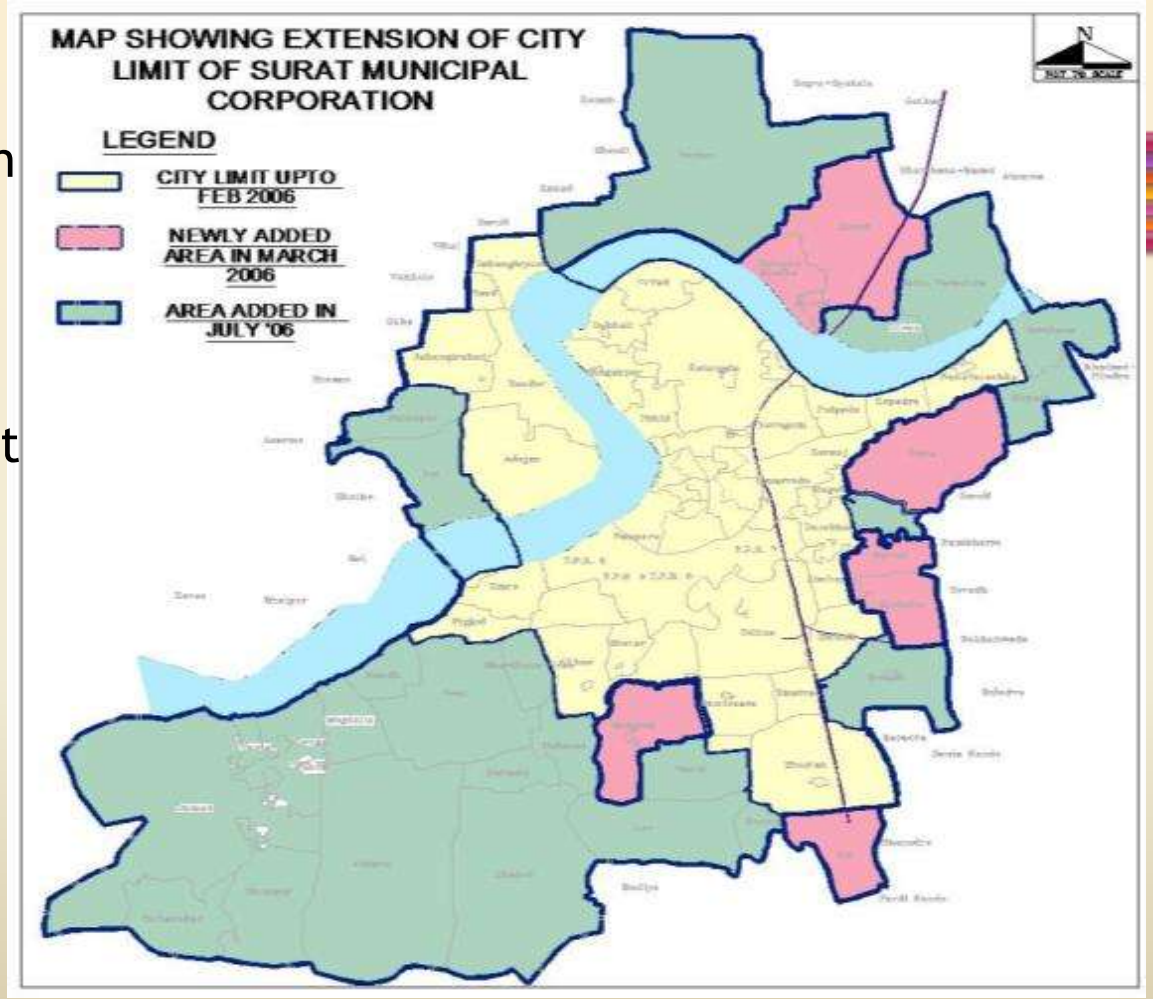






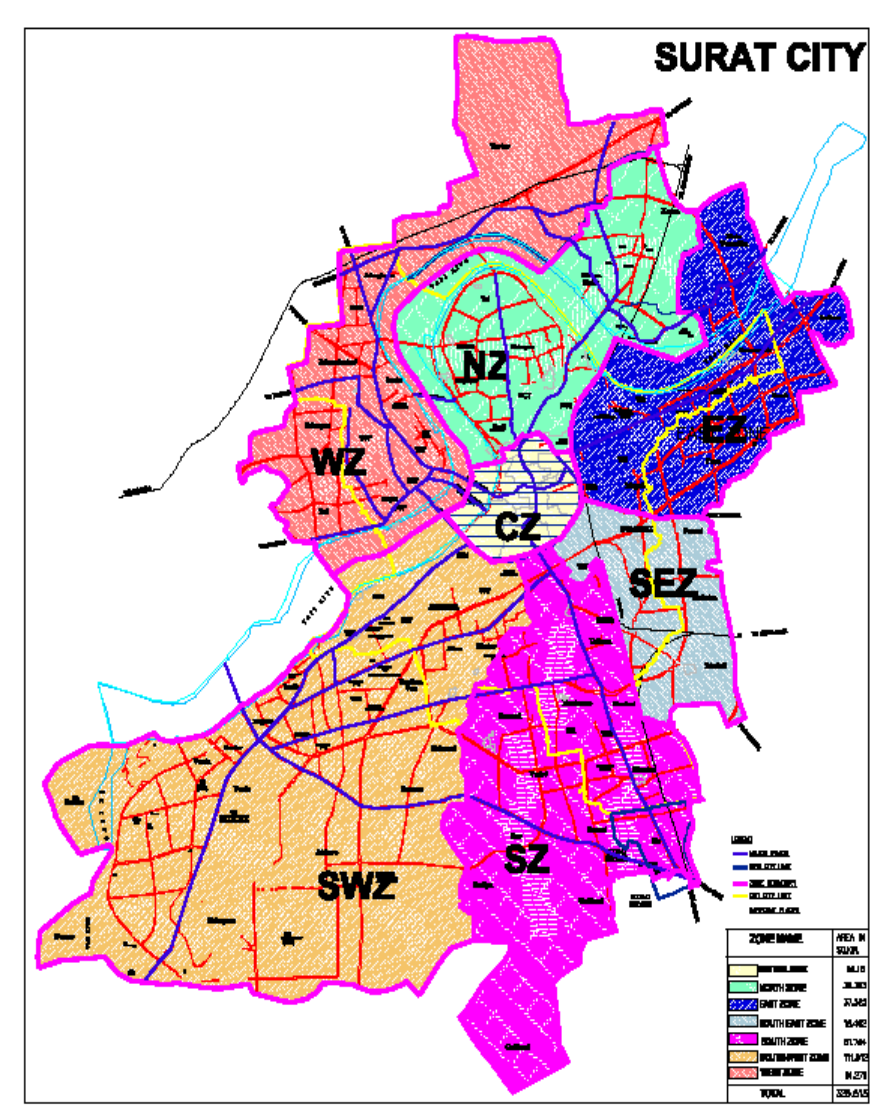
CITY EXPANSION

- Unprecedented growth in last four decades.
- 10-fold population rise.
- Now ranks the 8th largest city in the country.
- Jurisdictional limits extended to 3 fold.



ADMINISTRATIVE ZONES

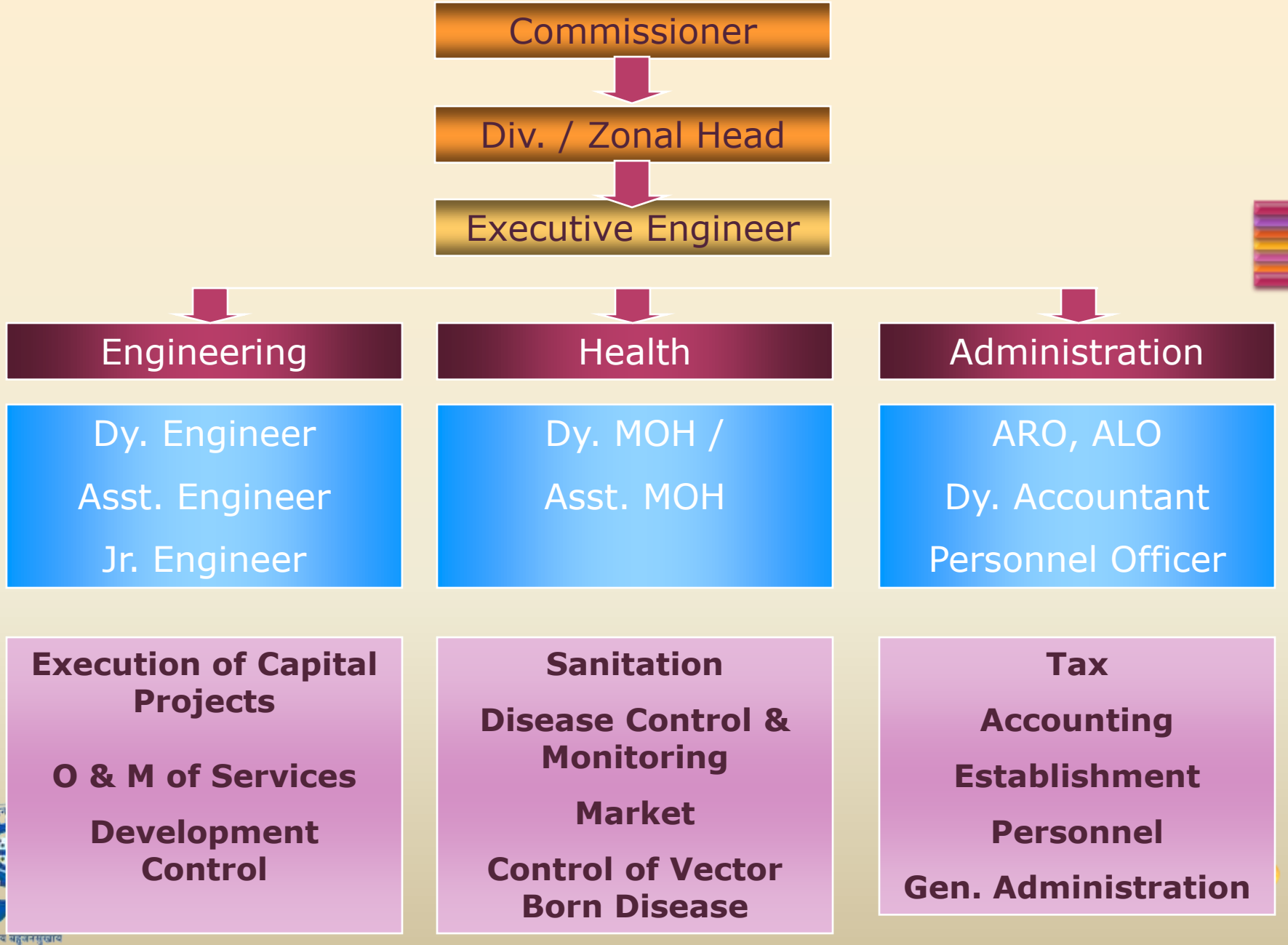
Sr. No.	Zone	City	
		Area (in Sqkm)	Population (Census-2001)
	Central	8.18	4,13,641
	South-West	111.91	2,43,333
	South	61.76	4,07,980
	South- East	19.49	3,19,502
	East	37.52	7,17,271
	North	36.36	4,16,370
	West	51.27	2,87,144
TOTAL		**326.51**	**28,77,241**



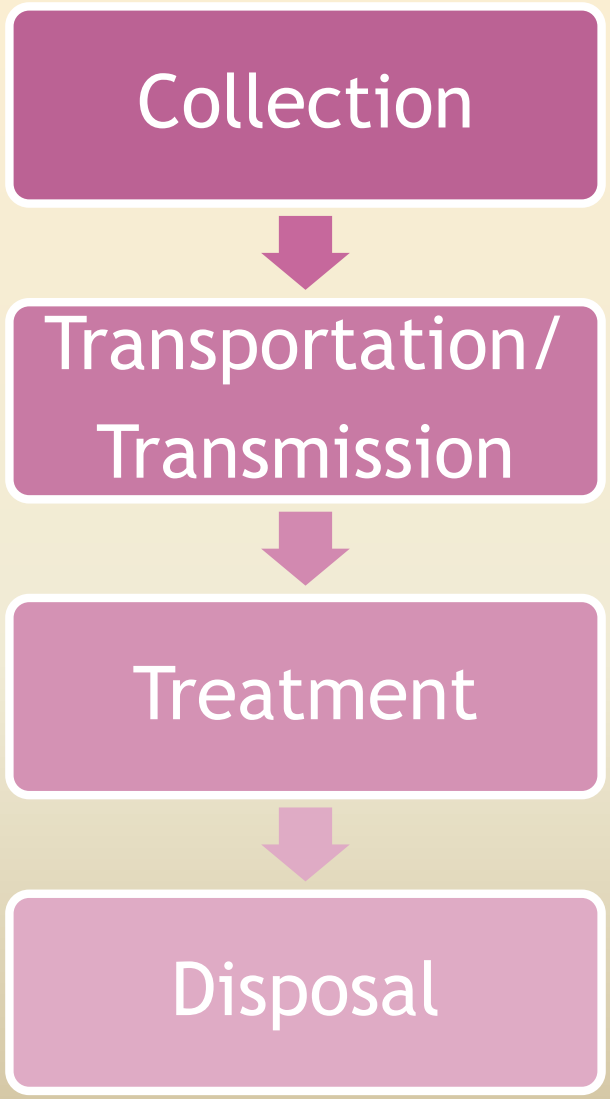
ADMINISTRATIVE OVERVIEW

Municipality	Estd. AD
Corporation	Estd. AD
Area	.51 sqkm.
Population	.47 Million (2001)
	2.88 Million (2001 with extended area)
	~ 4.4 Million (2011)
Density	.4 Persons/Ha (Within 112 Sq Km Area)
	85.9 Persons/Ha on 2001 for 326 Sq Km Area)
	(~122.5 Persons/ Ha as on 2007)
Decadal Growth Rate	
Admn. Zones	
Ward Offices	93
Civic centres	
Election Wards	

ORGANISATION STRUCTURE



LIQUID/SOLID WASTE MANAGEMENT SYSTEM



SUSTAINABILITY

- Environmentally Sustainable
- Financially Sustainable
- Selection of Adequate model (PPP or EPC)
- Selection of Proper Technology
- Financial Support from Government
- Public Participitation

SEWERAGE SECTOR
SMC

FUNCTIONS

- **At Department Level**
  - **Planning, Designing, Estimating, Tendering, Execution and Operation-Maintenance of the sewerage systems, includes sewage pumping stations, sewage pumping mains, sewage treatment and effluent disposal works etc.**
  - **All capital works related to Sewerage System**

- **At Zone Level**
  - **Society drainage connections**
  - **Household drainage connections**
  - **Maintenance of sewerage network**

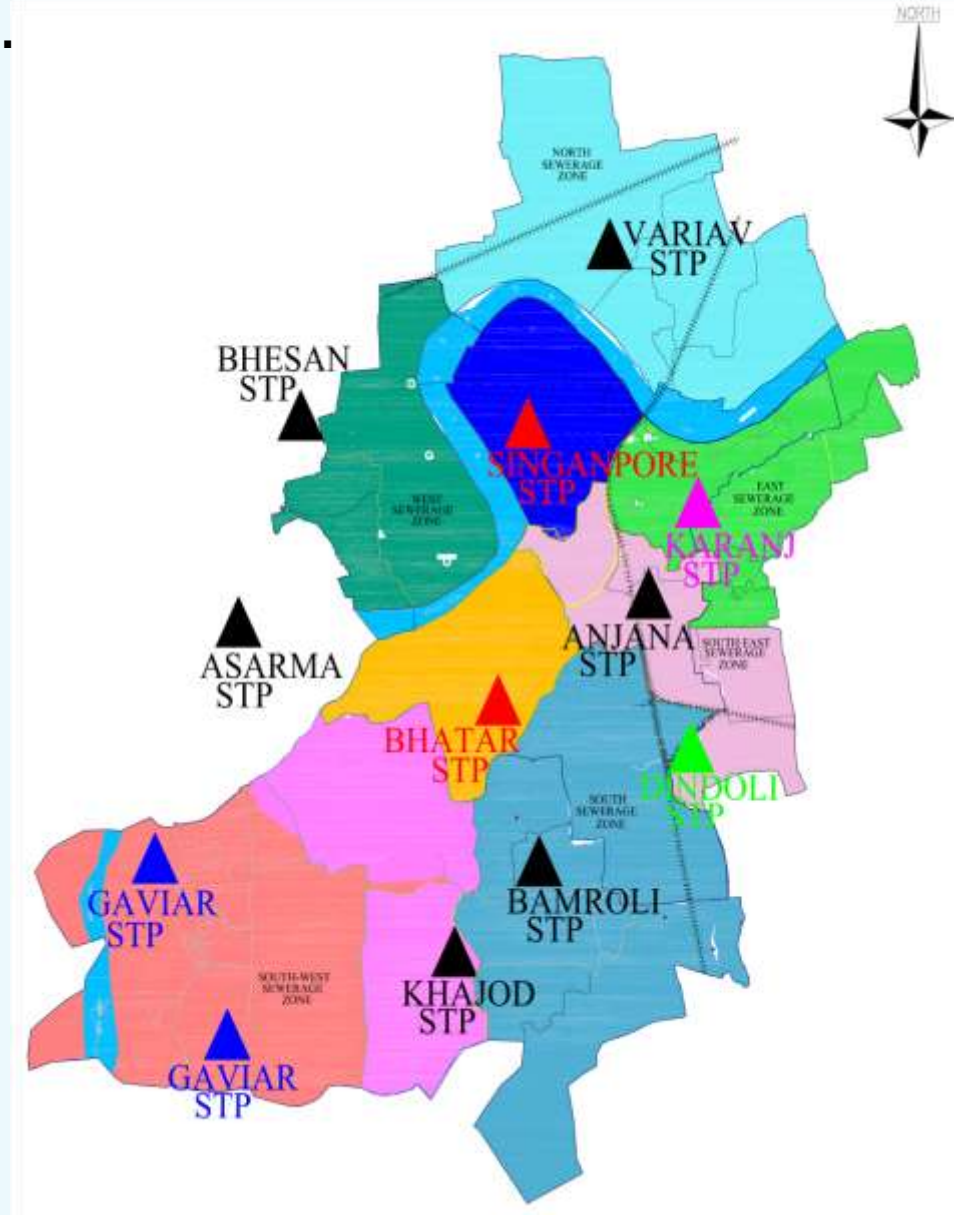
SEWERAGE SCENARIO

Coverage	**: 149 sq.km. (i.e. 74 % of present habitable area of @ 204 sq.km.)**
Population catered	**: 91 % of present population**
Length of sewer network	**: 1501 km**
Nos of sewer manholes	**: > 57,000**
Sewage Pumping Stations	**: 41 Nos (1654 MLD)**
Sewage Treatment Plants	**: 9 Nos (726.5 MLD)**
Cap. Expenditure in Last 7 yrs:	**Rs. 541 Crore**

SEWAGE TREATMENT PLANTS

Total Sewage Treatment Plants 9 nos.

- Existing STP – 9 Nos.
  – 726.5 MLD
- STPs under Augmentation- 2 Nos
  - 97 MLD
- STP to be commissioned – 1 Nos.
  – 66 MLD
- STP Under Planning– 3 Nos.
  – 93 MLD



SEWAGE TREATMENT PLANTS

Existing STPs

LOCATION		CAPACITY
Anjana	:	82.50 MLD
Bhesan	:	100.00 MLD
Bhatar	:	120.00 MLD
Karanj	:	100.00 MLD
Singanpore	:	100.00 MLD
Bamroli	:	100.00 MLD
Khajod	:	25.00 MLD
Asarma	:	15.00 MLD
Variav-Kosad	:	84.00 MLD
TOTAL	:	726.50 MLD

Discharge as per GPCB standards

Sr. No.	Parameters	Unit	Treated Effluent
1	PH	-	6.9 to 7.5
2	BOD_5	mg/l	≤ 20
3	COD	mg/l	≤ 100
4	Suspended Solids	mg/l	≤ 30

STPs: Under Implementation

LOCATION		CAPACITY
Dindoli	:	66.00 MLD
TOTAL	:	66.00 MLD

STPs: Under Augmentation

LOCATION		CAPACITY
Siganpore	:	55.00 MLD
Bhatar	:	42.00 MLD
TOTAL	:	97.00 MLD

SEWAGE TREATMENT PLANTS

Factors for Technology Selection

- Characteristic of Raw sewage
- Foot Print area
- Disposal Norms specified by PCB
- Energy Consumption/ Generation
- Trouble shooting
- Efficiency in Process control

SEWAGE TREATMENT PLANTS

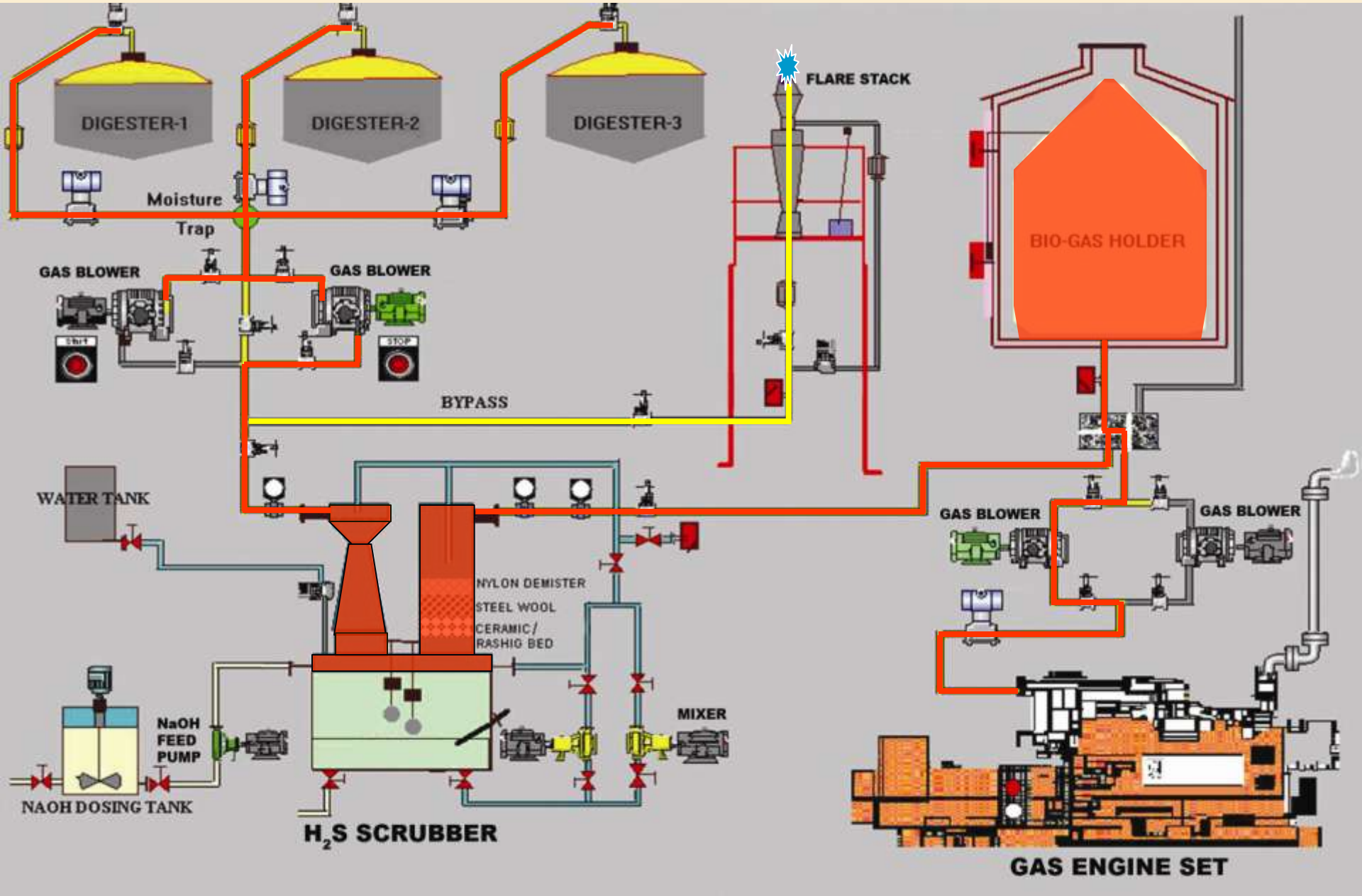
- **Latest technology adopted for Sewage treatment plant**
  - ❖ MBBR (Moving Bed Bio Reactor) for STP at Asharma & Khajod
  - ❖ UASB+MBBR (Up-flow Anaerobic Sludge Blanket + Moving Bed Bio Reactor) treatment technology for New Northern Drainage Zone.
  - ❖ SBR (Sequential Batch Reactor) for STP at Siganpore and Bhatar
- **Use of Mechanical Dewatering System for Sludge Drying**
  - ❖ Belt Filter Press
  - ❖ Centrifuge

ENVIRONMENTAL SUSTAINABILITY

SEWAGE GAS BASED POWER PLANT

- 0.5 Mwe Power Plant at Anjana STP running successfully since 2003.
- 1.0 Mwe Power Plants at Bhatar karanj & Singanpore STP each are operational since 2008.
- Construction work of 0.75 Mwe Power Plant at New East zone area and 0.60 Mwe power plant at New North zone area is recently completed under JnNURM.
- **Construction of 0.5 MW biogas plant at bamroli is under Progress.**
- Planned to establish Sewage gas based Power plant for all forth coming STP.
- Forthcoming STPs will be operated with contractor's responsibility to produce guaranteed power generation.

SEWAGE GAS BASED POWER PLANTS



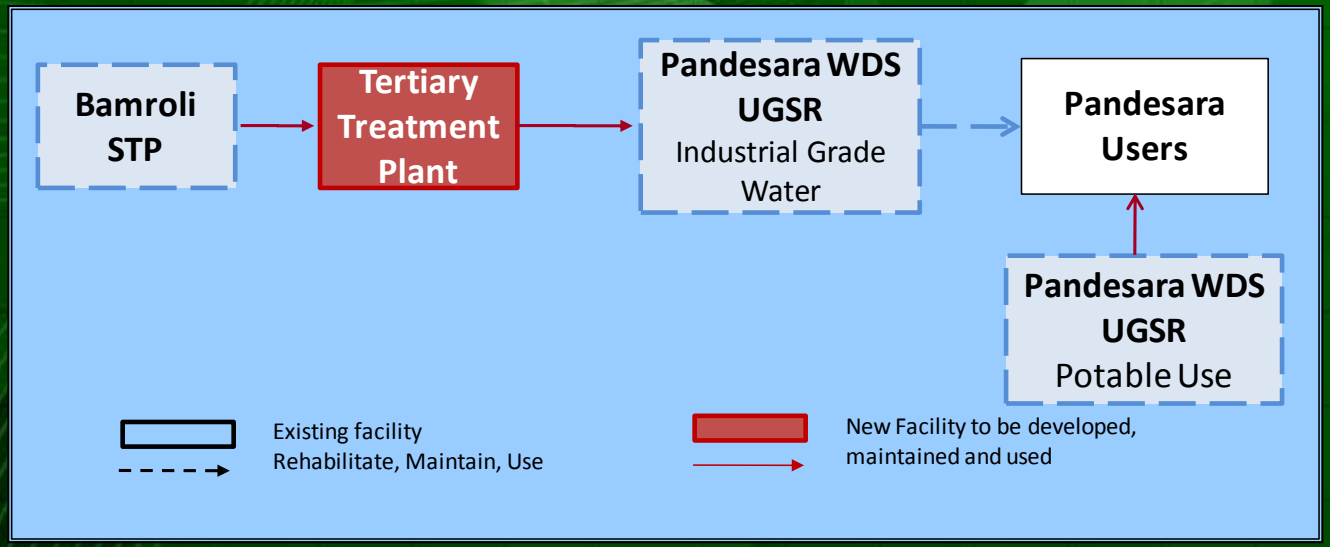
Power Generation till March-13

at various sewage gas based power plant

Sr. No.	Name of STP	Installed Capacity of Power Plant	Year of Commissioning	KWH units generated	Generation (in Rs.)
1	Anjana	0.5 MWe	Oct-03	16179472.00	71627918
2	Singanpore	1.0 MWe	Mar-08	7338832.00	34761513
3	Karanj	1.0 MWe	Mar-08	12101485.00	58511299
4	Bhatar	1.0 MWe	Aug-08	3700482.00	17742772
			Total	**39320271**	**182643500**

ENVIRONMENTAL SUSTAINABILITY
WASTE WATER RECYCLING

- To set up a 40 MLD capacity Tertiary Treatment Plant (TTP) to treat secondary treated water from Bamroli Sewage Treatment Plant (100 MLD capacity) to supply Industrial Grade Water to Pandesara Industrial Estate through Surat Municipal Corporation.
  - Reuse of waste water.
  - Contribution towards reducing the dependency on conventional resources of water.



TERTIARY SEWAGE TREATMENT PLANT

Project Features :

- Capital Project cost : Rs. 85.10 crores
- Project completion time : 18 months
- Capacity of Tertiary Sewage Treatment Plant : 40 MLD
- An option to scale up in a modular fashion to 80 MLD in future
- Payback Period: 4-5 Years
- Present Fresh water cost to industries : Rs. 24 /KL
- Proposed Recycle water cost to industries: Rs. 18/ KL

Technology Used :

- Sand Filtration
- Ultra-filtration
- Reverse Osmosis (RO)

WASTE WATER RECYCLING

- Enable SMC to reduce pressure on water resources in the city
- Potable water presently supplied to Pandesara Industrial area, will be diverted for the drinking water purpose.
- Reduces diversion of drinking water for non-potable purposes.
- Dependence of Pandesara Industrial Units on bore-wells and private tanker operators will be eliminated.
- Conserve valuable ground water resources for future generation.
- Assured resource for Pandesara during scarcity.
- Guaranteed revenue generation for Surat Municipal Corporation
- Facilitates recycling of wastewater - an environmentally sound and progressive advance practice.

SUSTAINABLE APPOARCH:
COMMON EFFLUENT TREATMENT PLANT

- Project Cost : Rs. 119.00 Crores
- Project Components
  - Wastewater Collection Network – 21 km
  - Pumping Station - 140 MLD
  - Conveyance Line - 3.5 km
  - CETP - 100 MLD
- Financial Assistance is provided by SMC to Industrial Association.
- Expenditure for CETP borne by Pandesara Industries with government assistance.
- System Commissioned in January 2011.

INNOVATIVE PRACTICIES

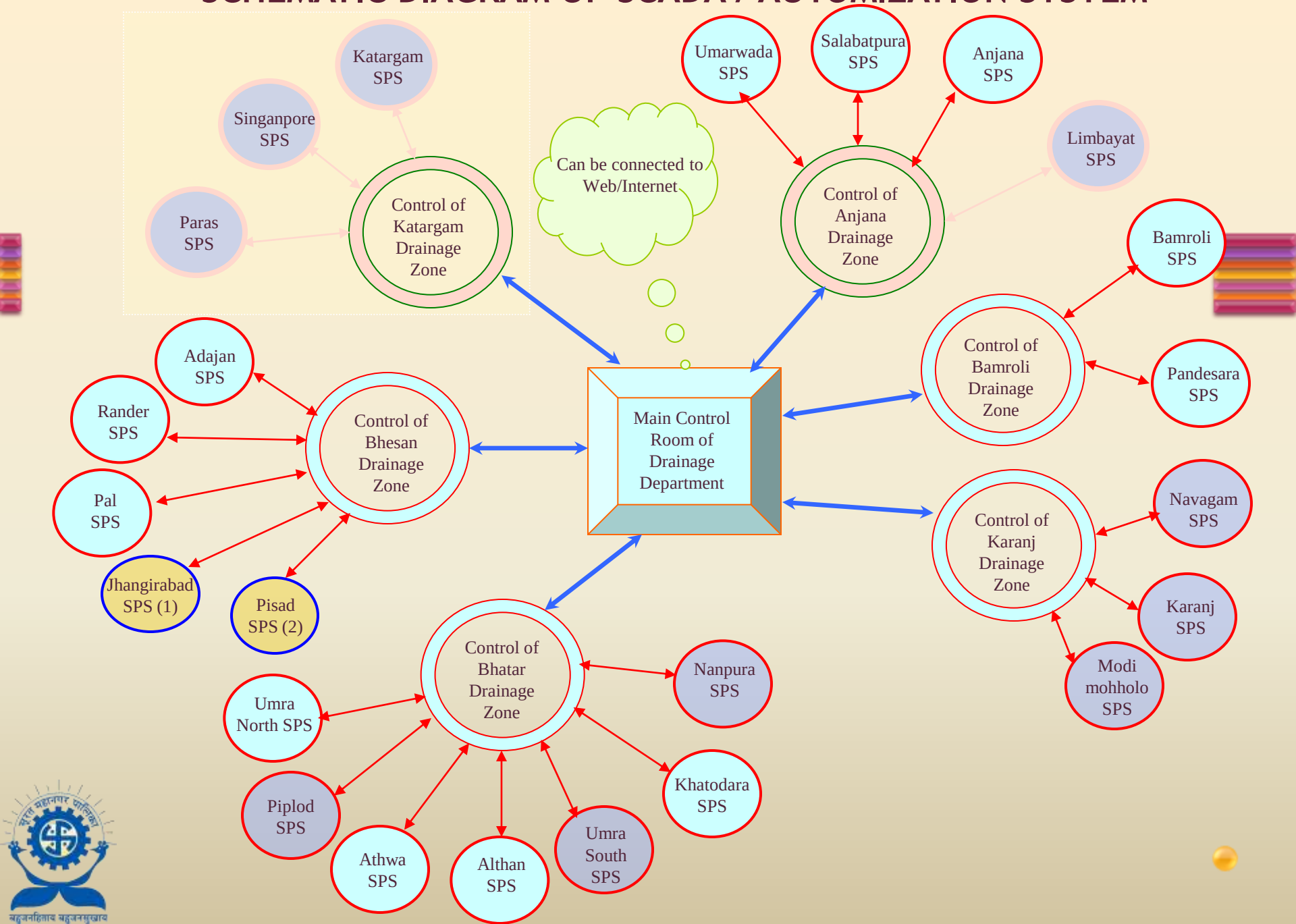
Automation / SCADA of Existing Sewage Pumping Station

& Sewage Treatment Plants.

SCADA project for existing 23 Sewage Pumping Stations and 6 Sewage Treatment Plants approved under JNNURM scheme.

- On line Data Monitoring and Controlling.
- Advance Planning for preventive maintenance and reducing break down period.
- On line electrical data to be use to improve energy efficiency and energy audit.
- Optimization of establishment cost.
- Reduced plant equipment maintenance cost in the long run.

SCHEMATIC DIAGRAM OF SCADA / AUTOMIZATION SYSTEM



SCADA SYSTEM - BENEFITS

- Better management of Sewerage System through remote monitoring & operation of Sewage Pumping Stations and Treatment Plants.
- Energy Saving through Efficient and optimum Operation of pumping machineries.
- Energy Saving at treatment plant through operation of machineries according to process requirement.
- Better Protection of environment through online monitoring of inlet & outlet parameters, process reliability and effective disposal of domestic sewage, solids and bio-gas.
- SCADA process tools improves the efficiency & effectiveness of manpower.


UDLT


TOC


Flow

SCADA SYSTEM - BENEFITS

- Measurement and data storage of all process parameters can be utilize for analysis & study, which will help for better process operation and R&D.
- Equipment availability and process reliability achieved through advance planning for maintenance.
- EHS condition improves at work place by installation of automatic mechanical screen, chlorine leakage detection system, fire detection system, CCTV system, etc.
- Customize Management Information System (MIS) Report can be generated

OUTCOMES

SERVICE LEVEL BENCHMARKS

Sewerage Indicator	Benchmark	Achievement FY 2012-13	Target FY 2013-14
Coverage of Toilets	100%	97%	97%
Coverage of Sewerage network services	100%	90.10%	91.82%
Collection efficiency of Sewerage network	100%	97.48%	97.75%
Adequacy of Sewage treatment capacity	100%	100%	100%
Quality of Sewage treatment	100%	92.28%	96%
Extent of reuse & recycling of treated Sewage	20%	2.29%	2.5%
Efficiency in redressal of Customer Complaints	80%	93%	95%
Extent of cost recovery in Sewage management	100%	100%	100%
Efficiency in collection of sewerage charges	90%	90%	90%

SOLID WASTE MANAGEMENT
SMC

SCENARIO OF SOLID WASTE MANAGEMENT SYSTEM

The situation of alleged plague after the flood compelled us to take many initiatives related to hygiene of Public at large. Major initiatives taken after the plague are listed as under

- Scraping ; Brushing activities on major and minor route with concept of zero garbage road.
- Privatization of MSW lifting activities along with augmentation of refuse transfer station.
- Paved platform at container spot.
- Cleaning of paved platform with spraying of insecticide.
- Infrastructure development of final disposal site.
- Capacity building of MSW management system.
- Campaign against use of plastic bags with thickness less than 40 microns.
- Complainants Redresel System

ACTIVITIES AT A GLANCE

- Daily collection of over 1400 MT
- Night brushing and scraping on around 200 routes
- Door to door garbage collection from more than 12 lakh households
- Acceptance of Solid waste from adjoining villages/ Town of Surat city.
- Centralized Bio medical waste collection and disposal
- 6 Modern transfer stations are operational in different zones
- Sanitary landfill site under utilization
- Waste to Energy project of capacity 1000 TPD under execution in addition to 400 TPD compost plant.

PRIMARY COLLECTION SYSTEM

(Door to Door & Container lifting)

Door to Door Garbage Collection System.

- It was introduced in the year 2004
- Closed body vehicles equipped with VTS to be purchased by operator.
- Payment is made on per M.T. base of MSW brought to Transfer Station with provision of 5% escalation every year.
- Average daily D to D collection is around 55% of total collection.
- Separate agencies are working in different Zones.

Container Lifting System

- Quantity of MSW lifted through container : 450 MT/Day

	By SMC	By Agency
No. of trips	525	65
No. of dumper	65	5
% of Waste collected	89 %	11%

- Average waste collection through container is 40% of total collection.

PRIMARY COLLECTION SYSTEM

(Night Brushing - Scraping & Hotel Waste Management)

Night Scraping - Brushing

- Introduced in 1996 and carried out under departmental supervision.
- Major routes > 200
- Area Covered: 5,00,000 Sq.mt.
- Manpower engaged: around 2000 (on daily wages)

Hotel Kitchen Waste

- Introduced in 2000
- Hotel kitchen waste is collected and transported by the hotel association
- Total no. of hotels & restaurants- 300
- Vehicles deployed by the hotel association- 25

"Anudan Scheme" For Urban Dweller Units

- Minimum Rs. 1200/- per society, Maximum not more than Rs. 4200/- paid by SMC
- Total activity organized by president of housing colonies
- Area considered for grant in aid : 25% of lay out area.
- More than 600 societies

MORDEN CONCEPT OF SECONDARY TRANSPORTATION:

Refuse Transfer Station- 6 nos.

Facility at Transfer Station	All the primary collecting vehicles from Door to Door Garbage collection and sweeping activity reaches to transfer station from where secondary transportation vehicles are loaded for the purpose of transferring it to disposal site.
Concept of Modern transfer station	• Primary collecting vehicles sent to the Elevated Platform through Ramp. • Chutes are provided at Elevated Platform to receive the MSW from where it is unloaded by primary collection vehicles. • Secondary transport vehicle is kept underneath the chutes. • MSW unloaded from primary collection vehicles is transferred into the closed container provided with compactor system. • The chute portion of transfer station is covered on the top with FRP sheet and whole structure is kept closed with concrete louvered blocks. • Transportation of container is carried out on Hook lifting vehicles. • Containers are fully closed with leak proof door opening system

MORDEN CONCEPT OF SECONDARY TRANSPORTATION:

Refuse Transfer Station

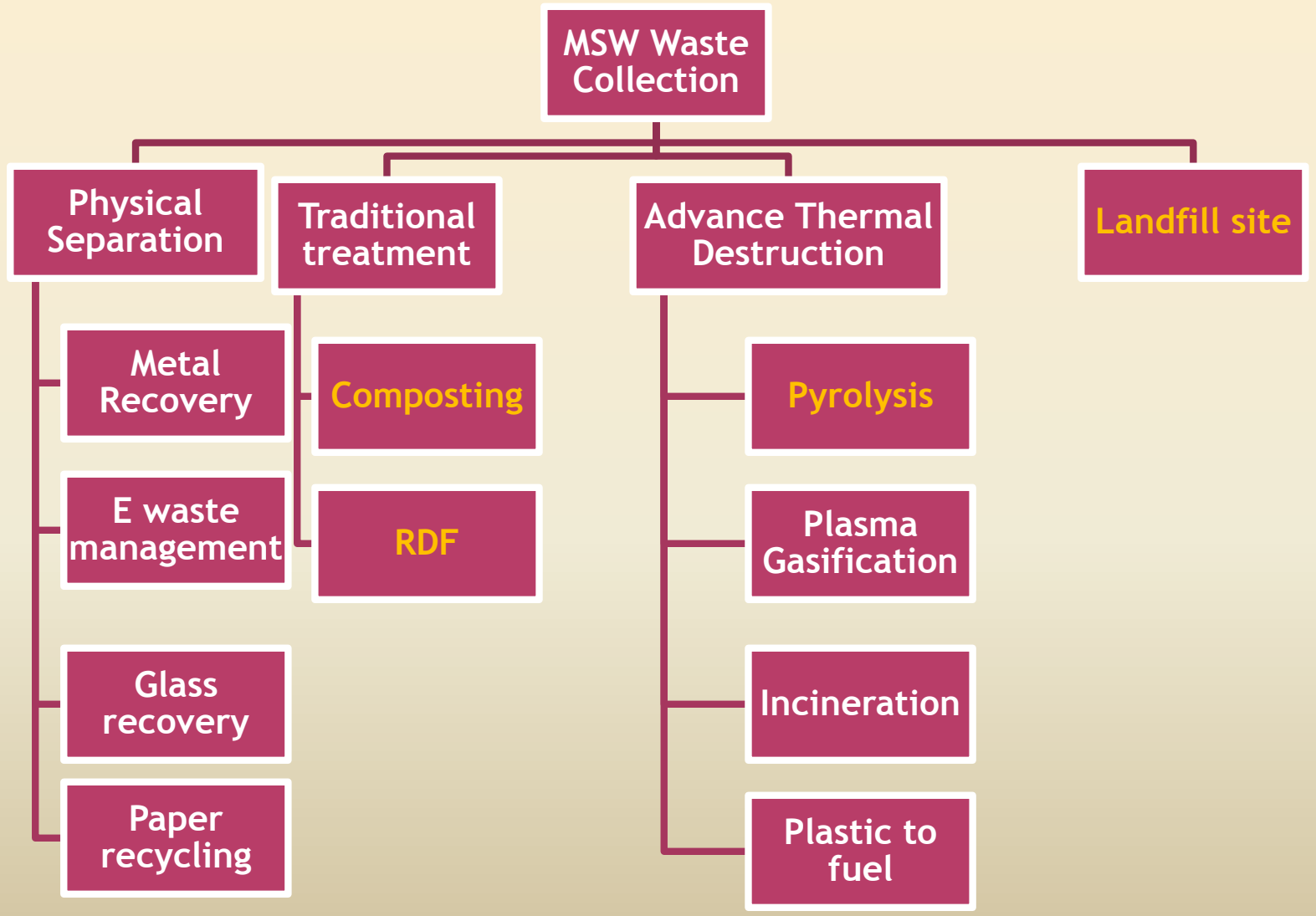
Results Achieved

- MSW received through closed vehicles are dropped to closed containers without secondary handling.
- Covered leak proof container prevents spillage of garbage on the road.
- No foul Smell, as transfer station is semi-closed and transport containers are fully closed.
- No MSW storage, permanently or temporary, at transfer station as it is directly transferred to containers without secondary handling.
- Prevention of Animal entry, flies nuisance
- Creates hygienic conditions in surrounding area

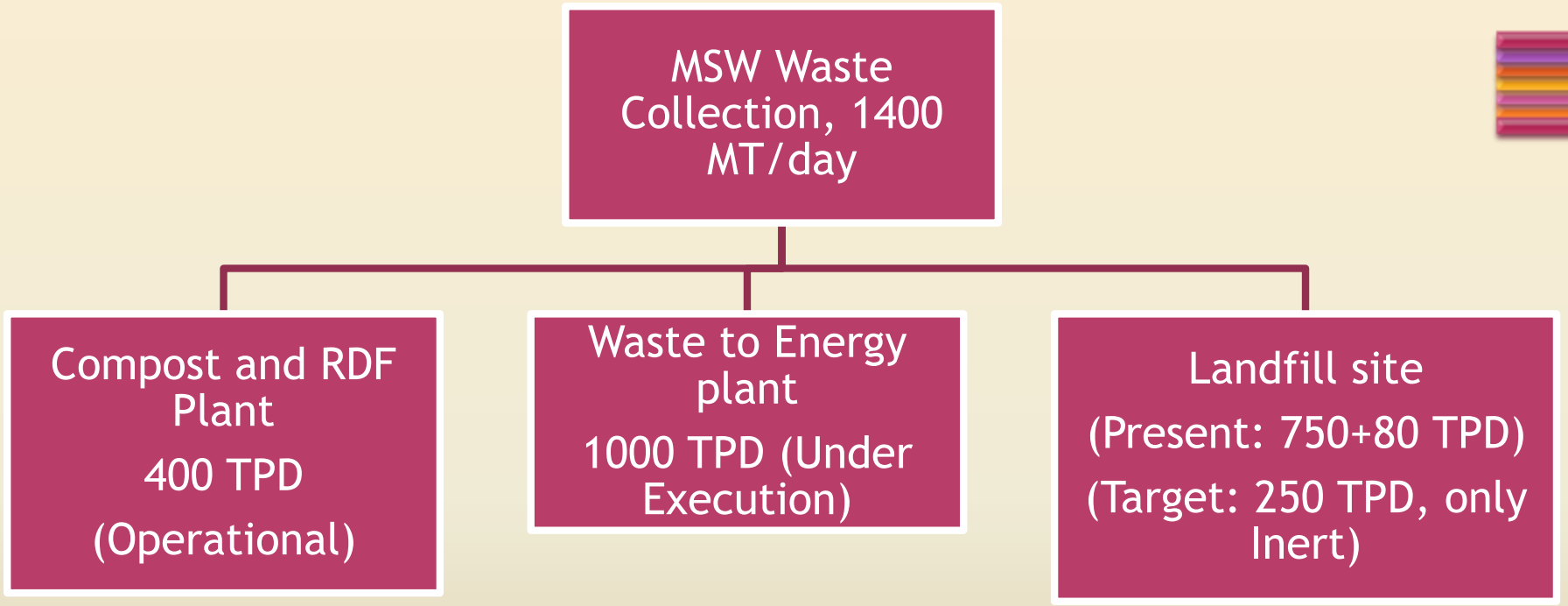
Operational Methodology

- Civil work of transfer station facilitated by municipal corporation
- Investment for machineries, equipments and vehicles to be born by operator
- Two separate agency have been entrusted work each for 3 transfer station
- Concession period for BOO contract is 10 year
- Provision for price escalation @ 5%
- To safeguard interest of operator clause of min guaranteed quantity.

TREATMENT OF MSW- OPTION AVAILABLE



OVERVIEW OF MSW TREATMENT, SMC



MSW TREATMENT

Compost and RDF plant (Operational)

- Surat has opted for multiple waste processing technology for treatment of MSW.
- Segregation of incoming heterogeneous waste.
- Converting in to compost & RDF pallets.
- RDF on burring will emit less quantity of NOX, SOX, CO & CO2 as compared to coal.
- Opted for BOOT base with concession period of 30 yrs.
- Return to SMC in form of lease rent.
- All the permissions, NOC, Consent to follow up the prevailing Rules and regulations is with the agency.

WASTE TO ENERGY: 1000 TPD
(Under Execution)

Salient Features:

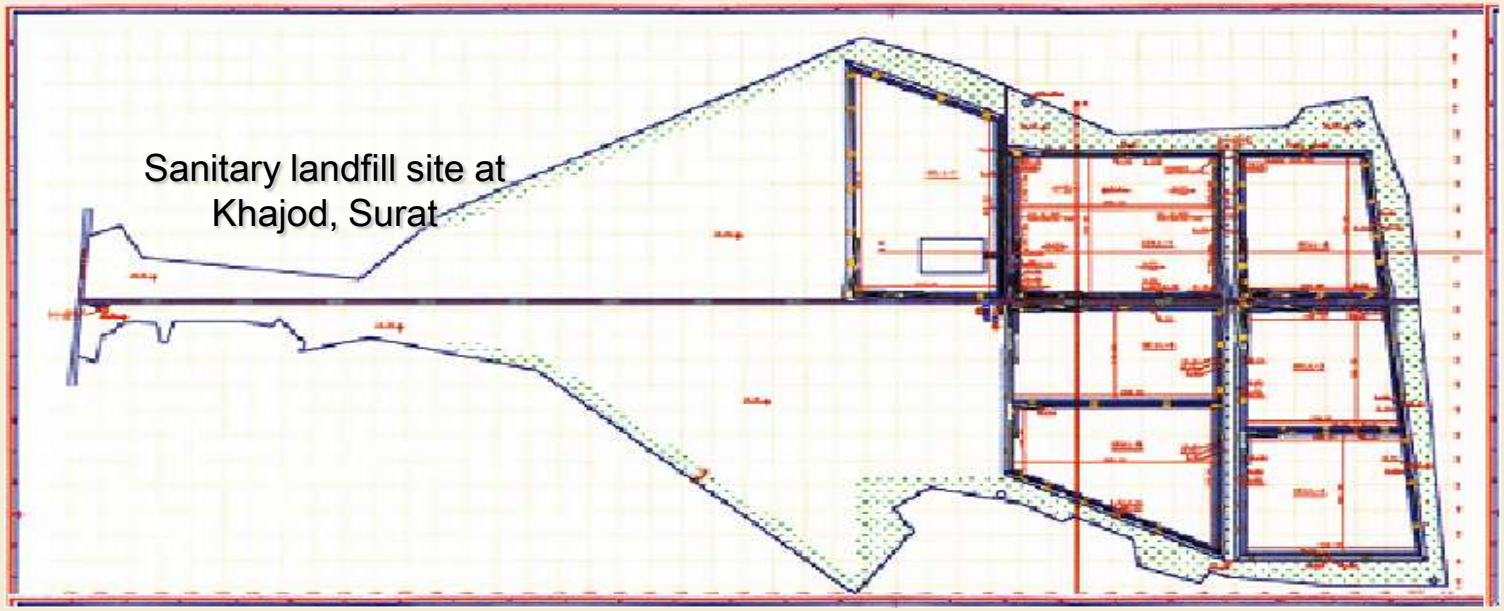
Total Waste to be treated per day	:1000 TPD
Total Concession Period	: 25 years
Technology	: Pyrolysis (Concorde Blue reactor)
Net Electric Power generation(Mwe)	:13
Royalty to be paid to SMC	:Rs. 30/Tonne (for first year) (with 5.24 % increment every year)

Advantage:

- Completely sealed storage unit
- No smell
- No Oxidation/ Burning of waste
- Complete leachate control by RO system
- Safe Disposal of Plastic including PVC
- No Air Pollution only phase change from Solid to Gas
- Clean green hydrogen rich gas from waste for power production
- Least amount of space required for system
- Minimal rejects to landfill-Increases its life.

FINAL DISPOSAL OF MSW

Sanitary landfill site at Khajod, Surat



- Municipal solid waste (MSW) collected from various transfer stations is disposed to Final disposal site located at Khajod.
- The area of Final disposal site is about 200 hectors
- Sanitary landfill site of 1.25 lac cumts available for receiving inert residues.
- Sanitary landfill site with 6.25 lac cmt capacity under construction at same site.

CENTRALIZED BIOMEDICAL WASTE COLLECTION, TREATMENT & DISPOSAL FACILITY

- BOOT Contract
- Introduced in Jan 2003
- Land (4000 sq. mt.) provided by SMC at token rent
- Facility to be in strict adherence to BMW (M & H) Rules.
- Collection of waste – 4000 Kg./Day
- Capacity of plant 6500 kg / Day
- Population: 44 Lacs
- Hospitals – 723
- Beds – 5780
- General dispensaries 1954
- Pathological laboratories-220
- Others – 291
- Collection Centres – 31

DUBAI INTERNATIONAL AWARD

DUBAI INTERNATIONAL AWARD

For Best Practices To Improve The Living Environment

جـائـــزة دبـــي الـدولـيـــة

لأفضل الممارسات في مجال تحسين ظروف المعيشة

شـــهادة أفـضـل ممـارســة

Best Practice Certificate

The Dubai Municipality, Dubai- United Arab Emirates & the United Nations Human Settlements Programme hereby certify that

Installation of Centralized Bio-medical Waste Treatment Facility on BOOT Base. – INDIA

was selected as a Best Practice by an International Independent Jury for the Dubai International Award for Best Practices in the year 2006 for its outstanding contribution towards improving the living environment.

Mr. Hussain Nasser Lootah
Acting Director General
Dubai Municipality

Mrs. Anna K. Tibaijuka
Under-Secretary General
Executive Director UN-HABITAT

INNOVATIONS / IMPROVISATIONS

- Computer reports for effective monitoring & evaluation
- Wireless and mobile phone facility for communication
- Delegation of financial and administrative powers
- Complaint Redresel System
- Automated complaint lodging and monitoring system
- Cradle type dust-bin for pedestrian
- Zero-garbage road system
- Retired sweepers engaged for maintenance of public urinals and toilets.

OUTCOMES

SERVICE LEVEL BENCHMARKS

Indicator	Benchmark	Achievement FY 2012-13	Target FY 2013-14
Household level Coverage of SWM Service	100%	92.18 %	95 %
Efficiency of Collection of MSW	100%	86.53%	92%
Extent of Segregation of MSW	100%	11.57%	17%
Extent of MSW recovered	80%	22.16%	32%
Extent of Cost recovery in SWM Service	100%	100%	100%
Efficiency in Collection of SWM charges	90%	90%	90%

FINANCIAL SUSTAINABILITY

- Infrastructure for liquid and solid waste management has been strengthen with financial grant under JnNURM scheme.
- Reforms has been implemented for cost recovery as per JnNURM guideline.
- User charges structure accepted by public as well as elected wings.
- Recovery of O&M cost is being met from user charges since year 2008-09.
- User charges for Sewerage: @ 50% of the Water Charges

Over all O & M Expenditure and User charges (FY 2012-13)			
Water supply, Sewerage and Solid waste management	**User charges (Rs. in Crore)**	**O&M Exp (Rs. in Crore)**	**Cost Recovery (%)**
	271.25	**273.44**	**99.20%**

OUT COME ASSESSMENT

Independent Impact assessment shows that

- Improved and efficient Liquid and Solid waste management system
- Improvement in Public Health
- Reduction in water borne diseases
- Increase in Trust and Good relationship with public
- Increase in user charges recovery

LOOKING AHEAD-
LIQUID & SOLID WASTE MANAGEMENT

- 100 % Coverage of Sewerage network including newly added area by Dec-2014.
- Waste Water Recycling Plant- Towards Zero Discharge
- Segregation of waste at source.
- Centralized monitoring system through SCADA in SWM
- Energy generation from MSW.
- Minimizing utilization of Landfill Sites.
- Solar based power plant for closed landfill site.
- Carbon management system to obtain carbon credit in Liquid and Solid waste sectors.

Surat....

..... future global city

....GREEN CITY

....CLEAN CITY

....VIBRANT CITY

....SAFE CITY

....CULTURED CITY

....PROSPEROUS CITY