Chapter IV: Service Delivery

Municipal Infrastructure

The Municipal Corporation Vijayawada (VMC) is responsible for the delivery of variety of functions like Water Supply, Sewerage, Sanitation, drainage, solid waste management, roads and transportation to the citizens and has taken long strides in this regard. It has also been dealing with medical relief, preventive medicine, sanitation and conservancy, maternity and child welfare, control of food adulteration and some other functions under the Public Health regulations.

4.1 Water Supply

4.1.1 Sources of water

In Vijayawada, the drinking water is being supplied to the citizens by tapping water from three different sources - 1) Surface water source 2) Ground water source 3) Infiltration galleries. Vijayawada Municipal Corporation supplies about 191 MLD of water to the city as of 2004. Being located on the bank of the river Krishna, the main source of water for the city has been the river Krishna drawing around 131.66 MLD. The city also depends on ground water resources. VMC draws about 45.4 MLD from bore wells located at different parts of the city. In addition to that, around 13.6 MLD water is drawn from infiltration galleries. The surrounding zones like Mangalagiri, Kanura and Tadepalli draw water from River Krishna and are supplying to the citizens at 110 lpcd per capita supply.

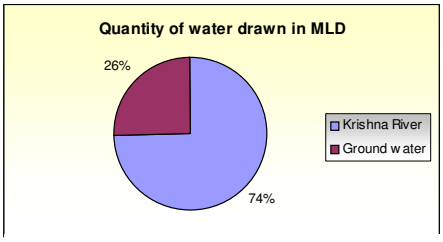

Figure 4.1: Water drawn from different Sources

4.1.2 Storage

Surface water is pumped into the service reservoirs after primary treatment. There are 25 tanks for Krishna river water as source with total capacity of 24 ML. The water from the bore wells is pumped into the OHTs directly. There are 6 OHTs with ground water as source and a total capacity of around 4 ML. The reservoirs have a total supply capacity of around 55 MLD.9 NOs Boosters are used at different places to meet the required pressure.

4.1.3 Service area

The area under Vijayawada Municipal Corporation jurisdiction is around 58 sq km and the corporation is divided into three circles to facilitate efficient delivery of services. The corporation is responsible for providing potable drinking water to all these three circles. The respective local bodies are responsible for water supply in the surrounding zones.

4.1.4 Service Coverage

The total installed capacity of water from the three sources is around 191 mld.. As per the corporation, only 77% of the area is covered with the water supply network and only 30% in the surrounding zones. The piped water supply network in the city is inadequate The city has over 56,000 water connections in the city and around 2300 connections on an average in the surrounding zones. Percentage access to piped water supply is around 50% in general areas

and 20% in slums. In addition to that, the city has 4700 public stand posts for water supply to the weaker sections of the society, who cannot afford individual connections. Majority of the connections are unmetered and the average per capita consumption of water is estimated as157 lpcd. Actual duration of water supply varies from place to place in the city depending on the ground level of location and distance from supply reservoirs. As per the primary household survey, 1% of HHs are supplied for an hour, whereas 63% of HHs get for 2 hrs and 36% for more than 2 hours.

Table 4.1: % Coverage in Three Circles *Length in km*

Circle	Pumping Main	Distribution Line	Length of the Road	% Coverage
I	37.1	364.09	373.39	97.51
II	49	178	210.81	84.44
III	38.4	406.88	656.52	61.98
Total	123.5	948.97	1240.72	76.49

4.1.5 House Service Connections

Water is supplied to the citizens in the form of house service connections, public taps and hand pumps. The houses not served by house service connections and public taps are served by hand pumps provided by the VMC. Though the average water supply in the city is around 157 lpcd, only 27% of the city houses have individual house connections. And the situation is even worst in surrounding zones. The data indicates the requirement for increase in house service connections in the city.

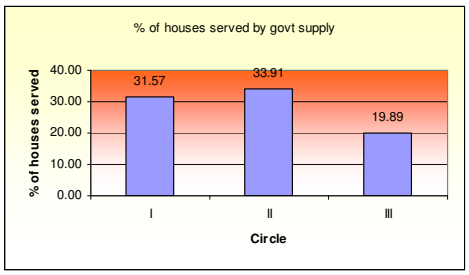

Figure 4.2: Circle wise access to piped supply

4.1.6 Quality of water

Quality of the water supplied by the corporation is maintained as per specifications of CPHEEO manual i.e. turbidity less than 5 NTU, Ph value between 6.5 to 8.5 and residual chlorine will be at 0.20 ppm.

4.1.7 Non revenue water

Large amount of water is being wasted at different points in the supply system. The loss is mainly due to leakages from old and improper points and faulty valves and taps from headwork to supply points. Also in the peripheral and fringe areas, the supply is tardy and the wastage is also high. Many of the public taps either leak or are absent, resulting in colossal waste of water during supply hours. Old pipe lines in areas of circle –I and in some parts of circle –II keep leaking. The wastage is estimated at more than 60% in the corporation and surrounding zones.

Non Revenue Water is about 60%, of which 20% of the water is supplied free through public taps and to various Government agencies, and 40% is lost by way of leakages and theft.

4.1.8 Water Tariffs

There are about 60,000 household connections and about 10,000 metered connections of various kinds. The un-metered domestic connections are charged a flat rate, with the Below Poverty Line (BPL) consumers being charged half the rate at which the Above Poverty Line (APL) consumers are charged. The tariff structure is shown in Table below

Sl. No.	Category of Connection	Connection Charges (Rs.)	Monthly Tariff (Rs.)
1a	For Residential houses	5,525/-	80/-
b	Residential houses under NSDP	2,525/-	40/-
c	Residential houses under BPL	1,200/-	40/-
d	Residential houses (Apartments)	¾" – 45,000/- 1" – 60,000/- 1 ¼" – 80,000/- 1 ½" – 1,00,000/-	Rs.100/- + Rs.8.25/- per every additional 1000 Ltrs.
2	For Shops, Restaurants, Clinics etc.,	12,000/-	• Up to 25,000 Ltrs – Rs.100/- + Rs.15.75/- per every additional 1000 Ltrs. • Up to 50,000 Ltrs – Rs.100/- + Rs.18.40/- per every additional 1000 Ltrs. • Above 50,000 Ltrs – Rs.100/- + Rs.21.00/- per every additional 1000 Ltrs.
3	For Corporate office, Hostels, Kalyanamandapam, Cinema Theatres, Educational Institutions and other commercial establishment and Factories, Pharma companies etc.,	¾" – 45,000/- 1" – 60,000/- 1 ¼" – 80,000/- 1 ½" – 1,00,000/-	

Table 4.2: Performance Indicators

Indicators	VMC	Surrounding Areas
Population as per 2001 census	8,51,282	1,59,945
Source	Krishna River	Krishna River
Present Supply	42.00 MGD (190.98MLD)	15 MLD (Avg.)
Water supply network coverage	70%	30%
% Access to Piped water supply conn	27%	15%
Per capita supply as per Norms	140.00 LPCD	140 lpcd
Present Per capita supply	157LPCD	100 lpcd
Frequency of supply	Daily two times (4hrs)	daily
No. of H.S.C.s	56,000	2500 (Avg.)
No. of P.S.P.s	4,700	300 (Avg.)
Non revenue water	~ 60	~ 60

Key Issues and Challenges

- There is no comprehensive master plan in Water supply Scheme for Vijayawada for implementation of the scheme.
- Though the water supply network coverage is more than 70 % , only 27% of the city houses are connected to piped water supply network, which is very low. The situation is worst in surrounding zones.
- High amounts of distribution loses averaging to around 15% due to old distribution network. In addition to that, *unauthorized tapings are enormous.*
- Most of the hand bores are not in working condition.
- Storage capacity is very less, but storage and distribution is simultaneous in operation.
- In some areas Water supply scheme is not in a position to cope up with the demand since rapid increase of the population in vertical direction.
- The treatment facilities has been set up with conventional process and not utilised to the extent of full capacity.
- Due to pipe incrustation and scales it is not possible to deliver the discharge as designed.
- Poor performance of pumping mains due to corrosion, formation of scales etc., resulting load on pumps – needs immediate replacement.
- High pollution in distribution network due to criss-crossing of sewer lines, open drainage, usage of power motors etc.
- Inequitable distribution of supply, ranging from ½ hr to 4 hrs a day.
- Lack of effective communication strategy
- Lack of efficient energy conservation measures
- Lack of commercialization and cost recovery approaches
- There are other gaps in revenue due to insufficient number of connections and low tariff.
- At present no systematic approach is adopted for maintenance of water supply distribution system, which leads to high cost in O & M of the system.

4.2 Sewerage:

For the purpose of providing and maintaining the sewerage system, Vijayawada City is divided into four zones namely, central zone, western zone, eastern - southeastern zone and northern zone. The existing UGD system mainly covers the central zone of the city. The numerous natural and man-made canals along with the major railway lines traversing the city essentially determine the boundaries of each sewerage zone.

4.2.1 Network coverage

The central area is divided into 7 blocks. Vijayawada city is divided into three circles and, for easy maintenance these circles are further divided into four zones. These zones are further divided into simpler blocks. According to primary sources, the sewerage connections at

individual house level are very less in the city. Circle I have no under ground sewerage system and the sewage is led into open drains.

The existing sewerage scheme serves around 2.50 lakh population with scientific method of treatment. The sewage schemes for the entire central area has been functioning with 18000 sewerage connections, covering only around 10% of the population. However, in slum areas the access to sewerage connections is very low around 2%. And in case of surrounding zones, sewerage network is absolutely not existing.

4.2.2 Sewerage Distribution Network

The Central area in the corporation is divided into seven drainage blocks in consideration of the railway lines and irrigation canals alignments. The sewage from these seven blocks are collected by gravity and pumped to pumping station. From this pumping station the sewage will be pumped to the treatment works.

4.2.3 Sewage Treatment Plants

The total sewage generation in the corporation limits is estimated to be 148 MLD. The two existing STPs has utilizable capacity of around 20 MLD are put in to operational, which is very low. The treatment plants has been devised based on the conventional method of treatment with oxidation ponds and the digester. The final treated wastewater will be let out in to the Budameru after achieving the desired effluent standards . Out of the total sewage generated, only 10% of it is treated and disposed. There is a necessity to commission additional STP in the city to treat the remaining 128MLD of sewage before disposal. By 2011 and 2021, the quantity of sewage generated is estimated to be 94 MLD and 131 MLD respectively.

4.2.4 Sewerage Tariffs

The tariff for individual household closet is Rs 25 per month. The tariffs for sewerage connections is indicated in the table below

Sl. No.	Category of Connection	For First Water Closet (Rs.)	For Every Additional Water Closet (Rs.)	Monthly Tariff (Rs.)
1	For Residential houses	2,500/-	1,250/-	25/-
2	For Shops, Restaurants, Clinics etc.,	8,000/-	8,000/-	75/-
3	For Corporate office, Hostels, Kalyanamandapam, Cinema Theatres, Educational Institutions and other commercial establishment	10,000/-	8,000/-	125/-
4	Factories, Pharma companies etc.,	20,000/-	20,000/-	150/-

Table 4.3: Performance Indicators

Indicators	VMC	Surrounding Areas
Sewerage Network Coverage	40%	NA
Access to sewerage connections	10%	NA
Treatment Plant capacity	20 MLD	-
% sewerage treated	10%	-
% wastewater recycled and reused	0%	-
Method of Treatment	Conventional Treatment	-

Key Issues and Challenges

- There is no comprehensive master plan in under ground drainage scheme for Vijayawada for implementation of the scheme.
- The present sewerage system is serving for the 40% of the population only.
- Majority of the Corporation area is not covered with this facility.
- The existing units are underutilised due to in-sufficient number of connections.
- In some areas sewerage scheme is over loaded due to rapid increase of the population in vertical direction.
- In central area, the entire units are in dilapidated stage which requires immediate replacement.
- Due to pipe incrustation and scales it is not possible to deliver the discharge as designed.
- The pumping mains are showing poor performance due to corrosion, formation of scales etc., resulting load on pumps.
- Pumps and all other mechanical parts needs replacements as they are corroded due to age.
- The life of treatment works for central area is exhausted and it requires new treatment works.
- There are huge gaps in revenue due to insufficient number of connections and low tariff.

4.3 Sanitation

For every citizen a town is a place to work in and a place to live in. Of all the improvements that are needed, cleanliness and ordinary sanitation are the simplest and the most important for any town. Vijayawada is badly in need of them. Absence of proper drainage system and proliferation of slums all over the city have adversely affected the hygienic environment in the city in general. It is the obligatory function of the civic body to keep the city clean and healthy by providing proper sanitation.

4.3.1 Public Toilets

The VMC and SULABH, an NGO, have provided a total of 78 public toilets with 850 seats at 78 locations. These are mostly located in slum areas, commercial areas, markets, railway station and bus stand. The maintenance of, particularly public toilets, is much to be desired. According to the primary household survey, 95% of households use their private toilets, only 2% use public toilets, and others use open spaces for defecation. In surrounding zones, majority of the households do not have individual toilets and are dependent on public toilets which are not maintained properly, especially in slums.

Key Issues and Challenges

- As of 2004, 110 slums have been identified with 106 of them notified in Vijayawada. More often, the slums lack sanitary facilities particularly like the individual toilets.
- Most of the public places and activity centers like markets, bus stands, railway stations, public offices and recreational places also lack adequate toilet facilities.
- The existing public toilets provided in slum area and public places are not maintained properly and most of the toilets are in un- hygienic condition.

4.4 Storm Water Drains

Vijayawada's wastewater is getting drained through all the existing number of systems of drainage. These drainage systems empty their waste loads into water bodies, watercourses, most of them outside the city and some within. Largely, these recipient bodies are government owned, may be by Revenue department/Irrigation department/PWD/ULBs. For using them for installation of the mini-treatment units, only permission for 'right to use' is required. In this context, it is to be realized that these very places are being used as waste disposal bodies for years.

4.4.1 Current Scenario

The city has an undulating topography characterized by small and large hillocks scattered in the city. The entire southern part of the city slopes down towards the river Krishna in the south while, the central part slopes down towards the north and, the northern areas have a downward slope towards south. Apart from the river Krishna three major irrigation canals namely Eluru canal, Ryves canal and Bandar canal, all originating from Prakasam barrage, flow across the town. A major water course, Budameru channel, also flows north-east in the northern part of the city. All these water channels contribute in draining the surface run off from the city and hence have been referred as the major drainage areas of the city.

In most part of the city, there are no separate systems to carry the sewage, sullage and, storm water separately. Except for 390 km length of the roads, where UGD exists, the rest of the road side drains also serve as sewers round the year. In fact, except during the monsoon months spread over July-September, the rest of the year, the drains carry only the sewage. Also during the monsoons, the wastewater from the kitchen and toilets get diluted with the storm water. But in the rest of the year, the sewage with high BOD necessitates treatment.

Table 4.5: Existing Drain Length (both open and UGD) *Length in km*

Road length in km	Roads with open drains on one side	Length of Roads with open drains on both sides	Total length of Roads with open drains	% of roads with drains	Open drain	UGD length in km
1240.72	86.68	517.88	604.5605	48.73	1122.4	392

Drains are provided on one or both the sides of the roads and streets depending upon the widths of the road/streets, and also intensities of development with corresponding quantum of storm water / sullage generate. In the city, all the roads, streets and lanes including those in the slum areas account for a total length of 1241 km, out of which around 605 km (ie) around 49% of the total lengths of roads /streets has open drains. As per VMC, UGD is laid over 392 km length of roads mostly in the central zone serving 21% of the zonal area.

For a drain length of 1130 km, there are around 896 cleaners in the city, of which divisions 2, 5-9, 11, 20, 21, 24, 26, 32, 33, 35 and 38 have more than required workers. For a total road area of 6.5 sq km, there are 1339 sweepers, in divisions 4 -11, 15, 19, 21, 24, 28, 32 and 42.

In the surrounding zones, less than 30% of the area is covered with storm water drains. Majority of the drains are kutcha with poor maintenance leading to frequent flooding.

Key Issues and Challenges

- The existing UGD system covers only 21 % of VMC central zone area and other drainage systems cover 49%. Rest of the 30% of the city area lacks proper drainage system.
- As of 2004, there are around 1120 km of drains in the entire city and 896 drain cleaners work for the operation and maintenance, which is in adequate resulting in poor quality of maintenance of drains.
- Majority of the drains are kutcha.
- Storm water drainage network is inefficient and inadequate in almost all the wards of the city and very narrow in few wards.
- Few areas are prone to flooding during heavy rains because of Budamerru stream.
- Frequent flooding of roads by sewage due to encroachment, silting and solid waste dumping on the drainage channels.
- The drains empty themselves into the canals polluting the canals and also the environment along the canals.