

Assessment of Capacity of STP at Patiala City (Punjab)

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Abstract The assessment the existing Sewerage Treatment Plant involve weather the enhancement in capacity of STP (in MLD) is required for the intermediate design period 2030 for the city. It includes review of all policy documents, scheme documents, master plan, municipal boundary, population growth trends etc. of the city and holding discussions with M.C. officials and citizens.

Based on assessment of existing infrastructure available at the STP and ongoing / sanctioned projects, calculate estimated demand of city for intermediate design period 2030 for sewerage network. Based on the demand for intermediate design period and gap assessment, objectives shall be evolved to achieve to bridge the gaps and enhancement in capacity of STP is proposed in this paper.

Keywords — Estimated demand, capacity of STP (MLD), intermediate design period, base year, census year.

I. INTRODUCTION

The sewerage facilities have been provided in 98% of the city area as per State Level Implementation Plan. The area has been divided into two zones of sewerage collection system covering 504 km of varying sizes. 48020 households have taken sewage connections and 10270 households have constructed their own septic tanks.

The road network density and population densities are very high in old city area (walled city). The system in the dense old city is working properly though it is very old. Zone I is the area where sewerage system is covered in about 90% of the area and zone II is the area in the northern portion of the city.

Two Sewage Treatment Plants of capacity 46 MLD at Sher Majra in zone-I & 10 MLD STP in Zone-II at Ablowal exist in the city for both sewerage zones. Treated waste is not reused or recycled as there is no arrangement for these services at present. The treated effluent is disposed off in Jacob Drain and Model Town Drain, passing nearby to the STPs.

Presently sewage generated in the city is about 56 MLD. BOD of incoming sewage to STP is 220-250 mg/l and BOD of effluent at outlet of STP is 3-8 mg/l

II. POPULATION PROJECTION AND ESTIMATION OF DEMAND

Decadal Growth trends in population for Patiala City, recorded during 1951 to 2011. Higher growth figure seen in case of 2011 decade is because of increase of Patiala Municipal limits.

TABLE 1: Population Growth Trends from 1951 to 2011

Year	Population
1951	97869
1961	125234
1971	151041
1981	206254
1991	253706
2001	302870
2011	406192

(Source: Census of India)

1. Population Projection by various method

As per best engineering practices, population projections for Base year (2019), Intermediate design Period (2030) and Ultimate Design Period (2045); have been carried out by Arithmetical increase Method, Geometric Increase Method, Incremental Increase Method.

TABLE 2: Comparison of Population Forecasted by Various Methods

Year	A.I Method	G.I Method	I.I Method	Average Population
2011	406192	406192	406192	406192
2019	447302	489149	458239	464897
2021	457579	512411	472770	492591
2030	503827	631564	545678	588621
2045	580908	894845	694537	794691

3. Final Proposed Population for Various Design Horizon

The assessment of sewage generation for the town, would be done for different design horizon years of 2019, 2030 & 2045. It shall be done by considering per capita sewage generation prescribed in the CPHEEO manual.

TABLE 3: Final Population Adopted

Design Year	Year	Population
Census Year	2011	406192
Base year	2019	464897
Intermediate Design Period	2030	588621
Ultimate Design Period	2045	794691

4. Sewage Generation Anticipated For Various Horizon Years

The assessment of sewage generation for the town, would be done for different design horizon years of 2019, 2030 & 2045. It shall be done by considering per capita sewage generation prescribed in the CPHEEO manual. The following assumption is used.

TABLE 4: Per Capita Sewage Generation

Per capita domestic water demand(lpcd)	135
Sewage generation (80% water demand) (lpcd)	108
Ground water infiltration (5% of Sewerage generation) (lpcd)	5.4
Total per capita sewage generation (lpcd)	113.4

Table 5: Year wise Population and Sewage Generation Expected

Year	Year	Population	MLD
Census Year	2011	406192	46.06
Base Year	2019	464897	52.71
Intermediate Design Period	2030	588621	66.75
Ultimate Design Period	2045	794691	90.11

III.CAPACITY CALCULATION OF PROPOSED SEWERAGE TREATMENT PLANT

Considering floating population @ 5% of average of population calculated by arithmetic, geometric and incremental increase method.

$$\text{i.e. } 5\% \text{ of } 66.75 \text{ MLD} = 3.34 \text{ MLD}$$

So total capacity requirement of STP for intermediate design period (2030)

$$= 66.75 + 3.34 = 70.09 \text{ MLD.}$$

At present available capacity of STP

$$= 46 + 10 = 56 \text{ MLD}$$

So required capacity of STP for intermediate year = $70.09 - 56 = 14.09 \text{ MLD}$

Let's consider 15 MLD capacity of STP at the premises of existing 46 MLD STP

Following facilities available in the premises of existing 46 MLD STP

- About 10,000 sq.m. of areas has been kept for future expansion.
- Existing MPS is sufficient to take care of proposed 15 MLD STP capacity.
- There are 2 pedestals in pump house for future pumps requirement for STP.

IV. CONCLUSIONS

The existing capacity of 46 MLD Sewage Treatment Plant is insufficient to cater the need of the city for Intermediate Design Period 2030. It is proposed to install one more Sewage Treatment Plant of 15 MLD Capacity at existing 46 MLD STP boundary at Sher Majra to have coverage of 100% sewerage network in the city and to improve the living conditions of the city.

V. REFERENCES

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