

4.2.4.3 Hospitals

1.0 Subject Matter

(Present a brief historical background on the growth of sector – a bird's eye view picture and analysis of the Sector using the information/ tables) provided in the annexure.

GIS based map depicting location of all the Hospitals - District level

Type and total no. of Hospitals in the State – Central Government, State Government & Private. (Refer Annexure: Table-1)

Time trend of the number (growth) of Hospitals in the state and Water Demand & Supply position. (Refer Annexure: Table-2)

2.0 Details of Water Availability, Supply, Demand, Withdrawal & Consumption for the Hospitals

Water Supply & Demand for all Hospitals in the State

Time trend of total water demand and actual current water supplied to the Hospitals along with growth of Hospitals in the state. (Refer Annexure: Table – 2, 3a, 3b)

Total Freshwater Withdrawal and Actual Water Consumption by Hospitals in the State

Comparative trend of Total Freshwater Withdrawal Vs Actual Water Consumption by Hospitals in the State

State Water Budgeting: Refer Annexure- Table 3(e)

Hospital (district-wise)	Previous Year / Average Annual Demand (MCM)	Previous Year/ Average Annual Supply & Consumptive Use (MCM)		Demand for the present Water Year (MCM)
		Supply	Consumptive Use	
District 1				
District 2				
GRAND TOTAL	xxx	Xxx	xxx	xxx

3.0 Issues and Challenges

Illustrative issues and challenges may include:

- Water demand and supply issues in the Hospital sector in the state, provide details
- Waste water disposal and associated surface and ground water contamination
- Capital investment related issues w.r.to wastewater treatment/recycle/reuse, water conservation interventions etc.
- Issues related to water pricing in Hospital sector
- Technology availability, affordability and efficiency related issues
- Issues related to monitoring and reporting of data

(Supporting data & analysis for above points may also be furnished)

4.0 Problem Tree / Root cause Analysis: Cause, Effect and Interventions

5.0 Governance / Management:

Statute / Law / Policy/ Regulations if any

- State level laws, policy and governance for the Hospital sector in the state on water access, consumption and wastewater discharge.
- Any specific fresh and waste water regulation/ guidelines in state, provide details.
- Has the state notified any regulations including for zero liquid discharge for the Hospitals in the state? Provide details.

Institutions governing / managing / monitoring the resources and Institutional structure.

- Institutions governing / managing / monitoring the water consumption and supply.

Governing body for Hospitals sector	Water allocation & Monitoring authority	Waste water discharge monitoring
<i>E.g. Ministry of Health & Family Welfare</i>	<i>E.g. CGWA/ Water resource department/ Urban or Rural body</i>	<i>e.g. State pollution Control Board</i>

Schemes, Economics & Financing-

Existing schemes and programs along with financial allocations, expenditure etc.

- Water Tariff and procurement cost (*Refer Annexure: Table 6(a) & 6(b)*)
- Expenditure on Water management (*Refer Annexure: Table 6(c) & 6(d)*)

6.0 Measurement, Monitoring and Data Constraints/ Management

- **Water & Wastewater Measurement:**

Shall specify measurement methods and technologies at Raw water source and Waste Water (generation, recycle/reuse & discharge) and Water Quality as per CPCB / SPCB

- **Monitoring** at State Government: Institution/ Agency/ Official responsible for Sustainable Water Management comprehensively for this Sector.
- **Data Management:** Should specify - Frequency of measurement, Frequency of Reporting to centralized agency, Water Quality Parameters monitored, how data is being used to improve Water Use Efficiency and ensure water quality parameters are within the prescribed norms etc.
- **Constraints** with respect to the measurement & monitoring.

7.0 Performance Indicators:

a. Benchmarks on water use (*Refer Annexure: Table-10*)

b. Status of various Performance Indicators– for comparison across Districts/ Plants/ Units/ Products etc.

Category	Indicator	Bench Mark (<i>as applicable</i>)	District- 1	District- 2
Water Quantity Measurement	Water Quantity			
	% of hospitals with water flow meters			
	% of hospitals undertaken internal water audit in the last year			
	% of hospitals undertaken external water audit in the last year			
	% of hospitals Undertaken Third party Water Audit in the last Year			
Water Conservation	% of Hospitals with water harvesting structures?			
	% reduction of total water demand compared to the previous year.			

Performance Indicators

Category	Indicator	Benchmark (<i>as applicable</i>)	District 1	District 2
Water Use Efficiency (<i>Annexure- Table 7</i>)	Specific Water Consumption in Water per in-patient bed days consumption (<i>refer Annexure Table-7(a),(b) & (c)</i>)			
	Specific water consumption in Water per OPD person consumption			
	Have specific water consumption norms/benchmarks established	Yes/No		

	% of hospitals with specific water consumption within the norms/bench marks/standards			
Waste Water (Annexure-Table 8)	% reduction in wastewater generation as compared to previous year			
Water Quality (Annexure-Table 9)	% of Hospitals with online water quality monitoring systems installed.			
	% of Hospitals having compliance with the wastewater quality discharge norms.			
	% of Hospitals discharging wastewater into open area/ earthen nallah /open drain/ municipal sewer?			
	% of Hospitals notified for violating effluent discharge norms for discharge in natural resources (surface/ground)?			
Economics	Whether economic incentives are in place to encourage water efficiency & conservation?	Yes/No		
	Whether economic disincentive mechanisms like penalties etc. are in place to discourage water wastage & inefficient use?	Yes/No		
	Whether water use charges & tariff are revised regularly and are reflective of rational pricing mechanisms?	Yes/No		

8.0Reforms undertaken/ being undertaken/ proposed if any**9.0Road map of activities / tasks proposed for**

- Better governance
- Better source / supply management
- Better demand management /improved Water Use Efficiency
- Water Quality
- Water Economics and Financing
- Sustainable Water budgeting with timelines and agencies responsible for each task/activity.

ANNEXURE**1Total number of Hospitals in the State**

Total Number of Hospitals in the State	
Type – Based on Ownership	
Central Government Hospitals	
- CGHS Hospitals	
- CGHS Dispensary	
- Medical Colleges	
<i>Total</i>	(A)
State Government Hospitals	
- District Hospitals	
- Community Health centers	
- Primary Health centers	
- Medical colleges	-
<i>Total</i>	(B)
Private Hospitals	
- Private Hospitals	
- Clinics	
<i>Total</i>	(C)
Total (A+B+C)	

2 Growth Trend of Hospitals over a period and Water Demand and Supply position

Hospitals – Based on ownership		Years					
		1990	1995	2000	2005	2010	2017
No. of Hospitals							
Central Government Hospitals							
State Government Hospitals							
Private Hospitals							
Total							
Water Demand and Supply							
Total Water Demand (MCM)							
Total Water Supply (MCM)	GW						
	SW						
	Municipal Supply						
	Total						
Demand-Supply Gap							

3 Water Budgeting

3(a) Demand, Supply (Withdrawals) & Consumptive Use:

Hospitals: (MCM) Present Water Year: 1 st June to 31 st May next year									
INSTITUTIONS (within the Basin/ Sub-basin A)	Previous Year/ Average Annual Demand	Demand for Present Water Year	Previous Year/ Average Annual Supply				Previous Year/ Average Annual Waste Water Generated	Previous Year/ Average Annual Consumptive Use	Remarks
			Rain Water	Surface Water	Ground Water*	TOTAL SUPPLY			
Unit 1									
Unit 2									
GRAND TOTAL									

*GW Draft can be calculated from the number of GW abstraction structures & corresponding draft for each Industrial Use/ Process.

3(b) Source Wise: Previous Year/ Average Annual Water Supply

Hospitals: (MCM)										
Source	Sub Source	Unit 1	Unit 2	Unit 3	Unit 4					TOTAL
Rain Water	Directly Harvested Rain Water									
Total										
Surface Water	Springs, Nallahs									
	Major Projects									
	Medium Projects									
	Minor Projects									
	Ponds, Tanks									
	Wetlands									
	Sea Water /Desalinated Water									

	Inter Basin Transfer										
Total											
Ground Water* (Dynamic / Static)	Dug wells (Total No. x Draft)										
	Dug cum Bore well (Total No. x Draft)										
	Bore/Tube wells (Total No. x Draft)										
	Others etc										
Total											
Treated Waste Water											
GRAND TOTAL											

*GW Draft can be calculated from the number of GW abstraction structures & corresponding draft for each Industrial Use/ Process.

3(c) Previous Year/ Average Annual Demand, Supply (Source wise) and Consumption for Basin/ Sub-basin A:

Source of Water	Demand of all Units in Basin/ Sub-basin A	Supply/ Withdrawal for all Units	Consumptive Use of all Units	Gap/Remarks
Rain Water (Directly Harvested)				
Springs, Nallahs				
Major Projects				
Medium Projects				
Minor Projects				
Ponds, Tanks				
Wetlands				
Desalinated Water/ Sea water				
Inter-Basin Transfer				
Ground Water (Dynamic)				
Treated Waste Water				
TOTAL (MCM)				

3(d) Previous Year/ Average Annual Demand, Supply (Source wise) and Consumption for Whole State:

Source of Water	Demand of all Units in the State	Supply/ Withdrawal for all Units	Consumptive Use of all Units	Gap/Remarks
Rain Water (Directly Harvested)				
Springs, Nallahs				
Major Projects				
Medium Projects				
Minor Projects				
Ponds, Tanks				
Wetlands				
Desalinated Water/ Sea water				
Inter-Basin Transfer				
Ground Water (Dynamic)				

Treated Waste Water				
TOTAL (MCM)				

3(e) Summary State Water Budget for Hospitals

Hospitals in state (district-wise)	Previous Year / Average Annual Demand (MCM)	Previous Year/ Average Annual Supply & Consumptive Use (MCM)		Demand for the present Water Year (MCM)
		Supply	Consumptive Use	
All Districts	xxx	xxx	xxx	xxx

4 Proportion of Water withdrawal and consumption by Hospitals against total industries in the State

Total Water Withdrawal by all Hospitals (%) (Refer 4(a) below)	Total water withdrawal by all Industries in state	Total Water Consumption by all Hospitals (%) (Refer 4(b) below)	Total water Consumption by all Industries in state

4(a) Total Water Withdrawal/Abstraction by Hospitals in the State as percentage of Total water withdrawal by all the industries in the State

$$\text{Total water withdrawal by Hospital Sector (\%)} = \frac{(\text{Total water withdrawal by all Hospitals in the State}) \times 100}{(\text{Total water withdrawal by all industries in the state})}$$

4(b) Total Actual Water Consumption by Hospitals in the state as percentage of Total water consumption by all the industries in the State

$$\text{Total water consumption by Hospital Sector(\%)} = \frac{(\text{Total actual water consumption by all Hospitals in State}) \times 100}{(\text{Total water consumption by all the industries in the state})}$$

4(c) Total Freshwater Withdrawal and Total Actual Water Consumption by all Hospitals in the State

	CY -11	CY -10	CY -9	CY -8	CY -7	CY -6	CY -5	CY -4	CY -3	CY -2	CY -1	CY / 2017
Total Fresh Water Withdrawal by all Hospitals (MCM)												
Total Actual Water Consumption by all Hospitals (MCM)												

5 Total Water Withdrawal (Abstraction) and Actual Water Consumption as percentage of total renewable freshwater resources

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Total Fresh Water Withdrawal by all Hospitals (%) (Refer 5(a) below)						
Total Actual Water Consumption by Hospitals (%)						

(Refer 5(b) below)						
--------------------	--	--	--	--	--	--

5(a) Total Water Withdrawal/Abstraction by Hospitals in the State as percentage of Total available freshwater resources of the State

$$\text{Total water withdrawal by Hospital Sector (\%)} = \frac{(\text{Total water withdrawal by all the Hospitals in the State}) \times 100}{(\text{Total available freshwater resources of the state})}$$

5(b) Total Actual Water Consumption by Hospitals in the state as percentage of Total available freshwater resources of the State

$$\text{Total water consumption by Hospital Sector (\%)} = \frac{(\text{Total actual water consumption by all Hospitals in State}) \times 100}{(\text{Total available freshwater resources of the state})}$$

6 Water Economics & Financing:

6(a) Water Tariff (Rs./m³)

Source	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
GW						
Urban body						
Treated Waste Water for reuse						
Others						

6(b) Procurement Cost of Water (in Rs)

Year wise cost of procurement of Water				
CY-5	CY-4	CY-3	CY-2	CY-1

6(c) Expenditure on Water including Treatment and Management-Time trend at State level

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Total Capex by Hospitals on water treatment and management (Lakhs)						
Total O&M Expenditure by Hospitals on water treatment and management (Lakhs)						
Total						
O&M Expense (%)						

6(d) Expenditure by hospitals at district level for the Current Year- CY

District	Capital Expenditure (Lakhs)	O&M Expenditure (Lakhs)	Total	O&M Expense (%)
District 1				
District 2				
District 3				
District 4				
Total				

7 Water Use Efficiency:

Water use efficiency in terms of Specific Water Consumption (SWC) viz. amount of water used/consumed per unit. In case of Hospitals, it can be represented as the total volume of water used/consumed (litres) per in-patient bed days consumption or litres per OPD person consumption.

Specific Water Consumption (SWC) of Hospitals:

Specific Water Consumption; (**Litre/in-patient bed days**) =
$$\frac{\text{Volume of water consumed by the Hospital, (Litre)}}{\text{Total no. of in- patient bed days}}$$

Specific Water Consumption; (**Litre/OPD person consumption**) =
$$\frac{\text{Volume of water consumed by the OPD (Litre)}}{\text{Total no. of persons}}$$

7(a) Specific Water Consumption (Water Consumption per In-Patient or Persons visiting OPD) for Current Year

	Vol. of Water Consumed (Litres)	Number			SWC	
		In-patient bed days	Persons visiting OPD	Total	Litre/patient bed days	Litres/OPD person consumption
District 1						
District 2						
District 3						

7(b) Average Water Consumption per In-Patient or Persons visiting OPD in Hospitals for the State – time trend (also represent through Graph)

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Average Water Consumption per In-Patient or Persons visiting OPD in Hospitals of State						

7(c) Specific Water Consumption (Water Consumption per in-patient bed days or OPD person)

- Water Consumption per in-patient bed days or OPD person of Hospital Sector in the State in
 - Litres per in-patient bed days
 - Litres per OPD person consumption
 - Trend of average water consumption per in-patient beds or OPD person in Hospitals at district level
- c) Percentage of Hospitals having specific water consumption within the norms/bench marks/standards (**as applicable**)

8 Waste Water

	Bench Mark (as applicable)	District 1	District 2	District 3
Total Waste Water Generated from Hospitals (m ³ /annum)				
% Total quantum of wastewater discharged after recycling				

9 Water Quality

	Bench Mark (as applicable)	District 1	District 2	District 3
--	----------------------------	------------	------------	------------

Water Quality	% of Hospitals with online water quality monitoring systems installed.				
	% of Hospitals with compliance of wastewater regulatory quality discharge norms.				

Water Quality Time trend- Graphs: Compliance to Waste water discharge Quality norms (E.g. BOD / PH /COD / TSS etc.)

10 Bench Marks/ Norms/ Standards and deviation from the norms/bench marks/standards currently for each industrial sector in state.

10(a) Benchmark for Water Consumption, Waste Water Generation etc.

	Parameters	Unit	Indian Bench Mark	International Bench Mark
1	Specific Water Consumption	Litres/in-patient bed days		
		Litres per OPD person consumption		
2	Waste Water generation	Litres/in-patient bed days		
		Litres per OPD person consumption		
3	Waste Water discharged	Litres/in-patient bed days		
		Litres per OPD person consumption		

10(b) Existing benchmarks/norms in Hospital sector for reference

*Indian Norms for water use in hospitals in Litres/patient bed per day
(as per Bureau of Indian Standards)*

S. No.	Category	Unit	SWC
1.	No. of beds <100	Litres per bed	340
2.	No. of beds >100	Litres per bed	450

*International Benchmarks for water use in hospitals in litres/patient bed days
(as per Audit Commission U.K., NHS Occupational Paper No. 5)*

Acute Hospitals with more than 100 beds		
Litres per patient bed day	1138	Very Poor
	711-1137	Poor
	<520	Good
Long Stay Hospitals with more than 25,000 patient days per annum		
Litres per patient bed day	>690	Very Poor
	412-689	Poor
	331-411	Average
	<330	Good
Long Stay Hospitals with less than 25,000 patient days per annum		
Litres per patient bed day	>380	Very Poor
	218-397	Poor
	<217	Good

*International Benchmark for water use in hospitals in Litres/bed/day
(as per US Department of Energy- Water Use Indices)*

SWC	in Litre/bed/day	in gallons/bed/day
Range	303-568	80-150
Typical	454	120