

#### 4.2.3.14 Railways & Metro Rail

##### 1.0 Subject Matter

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

GIS based map depicting location of all the Railway & Metro Stations, Railway & Metro Depots, Railway & Metro Colonies/Hospitals/Others-District level

Number of passengers at Railway & Metro Stations in the State (Refer Annexure Table-1).

Time trend of the number (growth) of Railway & Metro Stations. (Refer Annexure Table-2).

##### 2.0 Details of Water Availability, Supply, Demand, Withdrawal & Consumption for the Railway & Metro Stations

###### Water Supply & Demand for Railway & Metro Stations in the State

Time trend of total water demand and actual current water supplied to the Railway & Metro Stations along with growth of Railway & Metro Stations in the state. (Refer Annexure Tables-2, 3)

###### Total Freshwater Withdrawal and Actual Water Consumption by Railway & Metro Stations in the State

###### Comparative trend of Total Freshwater Withdrawal Vs Actual Water Consumption by Railway & Metro Stations in a State

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

Railway & Metro Stations (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				
<b>GRAND TOTAL</b>	xxx	xxx	xxx	xxx

##### 3.0 Issues and Challenges

Illustrative issues and challenges may include

- Waste water disposal and associated surface and ground water contamination
- Water demand and supply issues in the Railway & Metro sector in the state, provide details
- Capital investment related issues w.r.to wastewater treatment/ recycle/reuse, water conservation interventions etc.
- Issues related to water pricing in Railway & Metro Stations
- Technology availability, affordability and efficiency related issues
- Issues & challenges relevant to the water supply & consumption
- 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 Railway & Metro Station 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 Railway & Metro Stations in state? Provide details.

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

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

Governing body for Railway & Metro Stations	Water allocation & Monitoring authority	Waste water discharge monitoring
<i>E.g. Ministry of Railways Metro Corporations</i>	<i>E.g. CGWA/ Water resource department/ Urban or Rural body</i>	<i>e.g. State pollution Control Board</i>

**Areas of Peoples/Private Participation if any**

- Water Projects set up by Railway & Metro Stations for the benefit of neighborhood/ local community/ Environment.

Railway & Metro Station	Any OE <sup>19</sup> or critical block within the watershed	Water Conservation / Waste Water Treatment initiatives if any	Partnership			Sustainability of initiative
			Community Participation	PPP	Others	

Railway & Metro Station	Any OE or critical block within the watershed	Water Reuse/ Recycle initiatives under PPP	PPP Yes/No	Sustainability of initiative

**Schemes, Economics& Financing-**

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

- Water Tariff and procurement cost (*Refer Annexure Tables 6(a) & 6(b)*)
- Expenditure on Water management (*Refer Annexure Tables 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, various processes 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 within the prescribed norms etc.
- **Constraints** with respect to the measurement & monitoring.

<sup>19</sup>Overexploited block of groundwater

**7.0 Performance Indicators:**

a. Benchmarks on water use (Refer table-10)

b. Status of various Performance Indicators– for comparison across Districts.

Category	Indicator	Bench Mark (as applicable)	District- 1	District- 2
<b>Water Quantity Measurement</b>	<b>Water Quantity</b>			
	% of Railway & Metro stations with water flow meters			
	% of water sources of Railway & Metro stations geo-tagged			
	% of Railway & Metro stations undertaken internal water audit in the last year			
<b>Water Conservation</b>	% of Railway & Metro stations Undertaken Third party Water Audit in the last Year			
	% of Railway & Metro stations with water harvesting structures?			
	% of Railway & Metro stations having storm management structures-infiltration basis			
<b>Water Management Plants</b>	% reduction of total water demand compared to the previous year.			
	% of Railway & Metro stations <b>not</b> having water management plants			
<b>Demand Management</b>	% of Railway & Metro stations implementing their water management plans and achieving 90% of desired results			
	% of Railway & Metro stations using automatic valves with built in actuating mechanism			
<b>Water Use Efficiency</b> (Annexure- Table 7)	% of Railway & Metro stations using SCADA based control systems			
	Specific Water Consumption in <b>m<sup>3</sup>/passenger</b> (refer Annexure Table-7(a),(b) & (c))			
	Have specific water consumption norms/benchmarks established	Yes/No		
<b>Waste Water</b> (Annexure-Table 8)	% of Railway & Metro stations with specific water consumption within the norms/bench marks/standards			
	% reduction in wastewater generation as compared to previous year			
<b>Water Quality</b> (Annexure-Table 9)	% of Railway & Metro stations with online water quality monitoring systems installed			
	% of Railway & Metro stations having compliance with the wastewater quality discharge norms.			
	% of Railway & Metro stations discharging wastewater into open area/ earthen nallah /open drain/ municipal sewer?			
	% of Railway & Metro stations notified for violating effluent discharge norms for discharge in natural resources (surface/ground)?			
<b>Economics</b>	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		

**8.0 Reforms undertaken/ being undertaken/ proposed if any****9.0 Road 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

## 1 Total number, types &amp; capacity of Railway &amp; Metro Stations in the State

Total Production from Railway & Metro Stations in the State			
Type of Railways/Metro Rail stations/Depots	No of Railway & Metro stations/Depots	Total Capacity of all the Railway & Metro stations/depots	Daily Average Passengers at all the Railway and Metro Stations
Railway & Metro Stations			
Small			
Medium			
Large			
Railway & Metro Depots			
Others			
<b>Total</b>			

## 2 Growth Trend of Railway &amp; Metro Stations over a period and Water Demand and Supply position

Railway & Metro Stations	Years					
	1990	1995	2000	2005	2010	2017
Railway & Metro Stations						
Small						
Medium						
Large						
Railway & Metro Depots						
Others						
<b>Total</b>						
<b>Water Demand and Supply</b>						
Total Water Demand (MCM)						
Total Water Supply (MCM)	<i>GW</i>					
	<i>SW</i>					
	<i>Total</i>					
Demand-Supply Gap						

## 3 Water Budgeting

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

Railway & Metro Stations: (MCM) Present Water Year: 1 <sup>st</sup> June to 31 <sup>st</sup> May next year									
INDUSTRY (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									
<b>GRAND TOTAL</b>									

\*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

Railway & Metro Stations: (MCM)										
Source	Sub Source	Unit 1	Unit 2	Unit 3	Unit 4					TOTAL
Rain Water	Directly Harvested Rain Water									
<b>Total</b>										
Surface Water	Springs, Nallahs									
	Major Projects									
	Medium Projects									
	Minor Projects									
	Ponds, Tanks									
	Wetlands									
	Sea Water /Desalinated Water									
Inter Basin Transfer										
<b>Total</b>										
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									
<b>Total</b>										
<b>Treated Waste Water</b>										
<b>GRAND TOTAL</b>										

\*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				
<b>TOTAL (MCM)</b>				

**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					
<b>TOTAL (MCM)</b>					

**3(e) Summary State Water Budget for RS**

Railway & Metro Stations 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	
<b>All Districts</b>	xxx	xxx	xxx	xxx

**4 Proportion of Water withdrawal and consumption by Railway & Metro stations against total industries in the State**

Railway & Metro stations – Based on capacity	Total Water Withdrawal by all Railway & Metro stations (%) (Refer Annexure-4(a))	Total water withdrawal by all the Industries in state	Total Water Consumption by all Railway & Metro stations (%) (Refer Annexure-4(b))	Total water Consumption by all the Industries in state
Railway & Metro Stations				
Small				
Medium				
Large				
Railway & Metro Depots				
Others				
<b>Total</b>				

**4(a) Total Water Withdrawal/Abstraction by Railway & Metro Stations (R/MS) in the State as percentage of Total water withdrawal by all the industries in the State**

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

**4(b) Total Actual Water Consumption by Railway & Metro Stations** in the state as percentage of Total water consumption by all the industries in the State

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

**4(c) Total Freshwater Withdrawal by all Railway & Metro stations and Total Actual Water Consumption by all Railway & Metro stations 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 Railway & Metro stations (MCM)												
Total Actual Water Consumption by all Railway & Metro stations (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 Railway & Metro stations (%) (Refer Annexure-5(a))						
Total Actual Water Consumption by all Railway & Metro stations (%) (Refer Annexure-5(b))						

**5(a) Total Water Withdrawal/Abstraction by Railway & Metro Stations (R/MS)** in the State as percentage of Total available freshwater resources of the State

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

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

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

**6 Water Economics & Financing:**

**6(a) Water Tariff (Rs./m<sup>3</sup>)**

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 Railway & Metro stations on water treatment and management (Lakhs)						
Total O&M Expenditure by Railway & Metro stations on water treatment and management (Lakhs)						
Total						
O&M Expense (%)						

## 6(d) Expenditure by Railway &amp; Metro stations 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				
<b>Total</b>				

## 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 Railway & Metro Stations, it can be represented as the total volume of water used/consumed (m<sup>3</sup>) per passenger.

## Specific Water Consumption (SWC) of Railway Stations (R/MS):

$$\text{Specific Water Consumption (SWC); (m}^3\text{/passenger)} = \frac{\text{Volume of water consumed by the R/MS, (m}^3\text{)}}{\text{(Total no. of passengers), (passenger)}}$$

## 7(a) Specific Water Consumption (SWC) for Current Year

	Vol. of Water Consumed(m <sup>3</sup> )	Total no. of passengers (passenger)	SWC (m <sup>3</sup> /passenger)
District 1			
District 2			
District 3			

## 7(b) Average SWC of Railway &amp; Metro stations for the State – time trend (also represent through Graph)

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Average SWC of Railway & Metro stations in State						

## 7(c) Specific Water Consumption (SWC)

Comparative Specific Water Consumption per passenger of the Railway & Metro stations  
Trend of Average Specific Water Consumption (SWC) of Railway & Metro Stations at district level



Percentage of industries having specific water consumption within the norms/bench marks/standards (if applicable)

#### 8Waste Water

	Bench Mark (as applicable)	District 1	District 2	District 3
Total Waste Water Generated from Railway & Metro Stations (m <sup>3</sup> /annum)				
% Total quantum of wastewater discharged after recycling				

#### 9Water Quality

	Bench Mark (as applicable)	District 1	District 2	District 3
% of Railway & Metro Stations with online water quality monitoring systems installed.				
% of Railway & Metro Stations 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.)

#### 10Bench Marks/ Norms/ Standards and deviation from the norms/bench marks/standards currently for Railway & Metro stations in state.

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

	Parameters	Unit	Indian Bench Mark	International Bench Mark
1	Specific Water Consumption	m <sup>3</sup> /passenger		
2	Waste Water generation	m <sup>3</sup> /passenger		
3	Waste Water discharged	m <sup>3</sup> /passenger		