

Impact Assessment of DfT Programme under AMRUT-MoHUA-GOI

(ADV_26_01)

INCEPTION REPORT

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Submitted By:

**AMRUT Centre of Urban Planning for Capacity Building at
School of Planning and Architecture, Vijayawada (SPAV)**

योजना तथा वास्तुकला विद्यालय, विजयवाड़ा

S.No. 4/4, ITI Road, Vijayawada – 520008, A.P., India.

www.acupcb.spav.ac.in

Impact Assessment of DfT Programme under AMRUT-MoHUA-GOI

Project Team:

Prof. Dr. Ayon K Tarafdar (PI)
Prof. Dr. Ramesh Srikonda (Co-PI)
Prof. Dr. Adinarayanane R
Dr. Prasanth Vardhan
Dr. Nitesh Shukla
Ms. Swathikka S
Ms. Debasmita Bhowmik
Ms. Poomail V

This Advocacy Research Inception Report has been prepared by the above-mentioned team under the 'AMRUT Centre of Urban Planning for Capacity Building' at the School of Planning and Architecture Vijayawada (ACUPCB-SPAV) as a part of its core research activities aimed at finding practical solutions to prevalent contextual urban issues. The research project has been commissioned, sanctioned, periodically reviewed, and finalized under the ACUPCB-SPAV and is fully supported and funded by the Ministry of Housing and Urban Affairs, Government of India. This inception report document is an outcome of the research project undertaken by the team. The inception report has been submitted to the AMRUT Division of the Ministry of Housing and Urban Affairs, Government of India, in September 2026.

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4/4, ITI Road, Vijayawada 520008 Andhra Pradesh, India

September, 2026

Foreword

About A-CUPCB-SPAV

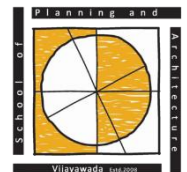
The AMRUT Division of Ministry of Housing and Urban Affairs (MoHUA, Government of India) has recognised SPA Vijayawada as one of the few centres in the country, that shall undertake top-notch, cutting-edge research, projects, and training in the field of urban planning and climate sensitive development. SPA Vijayawada (Under Ministry of Education, Government of India) has entered into a MoU with MoHUA Govt of India, for setting up of the "AMRUT Funded Centre of Urban Planning for Capacity Building" at SPA Vijayawada (ACUPCB-SPAV). This Centre is a hallmark of SPAV's capability, resources and potential in leading the path of research and advocacy in the domain of Urban Planning in India.

The Centre is in the process of initiating cutting edge research and skill development, in the field of Urban Planning and Settlement Design. It has already initiated several projects and trainings in close coordination with some urban local bodies and think tanks in South India and is in the process of expanding its outreach in data driven applications and solutions for urban planning and climate sensitive design.

ABOUT SPAV

The School of Planning & Architecture, Vijayawada (SPAV) is an Institution of National Importance under the Ministry of Education, Govt. of India. It offers UG, PG, and doctoral programs in Planning and Architecture and is ranked among the top technical institutes in India. SPAV fosters quality research, innovation, and critical thinking in architectural and planning education. Its green-rated campus features state-of-the-art infrastructure, including modern labs, ICT-enabled learning, and recreational facilities.

The school has 17 years of excellence in professional education offering courses of B.Arch. (5 years), B. Plan (4 years), nine master's programs, and doctoral studies, advancing knowledge in urban and regional development. It specializes in areas such as Sustainable Architecture, Urban Design, Transport Planning, and Landscape Architecture. With a strong focus on advanced computing and latest technologies, SPAV continues to lead in architectural and planning education.



ABOUT MoHUA

The Ministry of Housing and Urban Affairs (MoHUA) is India's apex body for urban development, influencing policies through funding, coordination, and national programs. Established in 1952 as the Ministry of Works, Housing & Supply, it became MoHUA in 2006. The ministry supports urban projects via Centrally Sponsored Schemes and financial institutions, shaping urbanization and real estate investment. A key initiative, AMRUT, enhances urban infrastructure by ensuring tap water, sewerage, green spaces, and sustainable transport in 500 cities. Through policies and programs, MoHUA drives sustainable urban growth, improving quality of life and fostering climate resilience across India.



Ministry of Housing and Urban Affairs
Government of India

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1. BACKGROUND OF THE PROJECT

The **Ministry of Housing and Urban Affairs, Government of India**, has entrusted the **AMRUT Centre of Urban Planning for Capacity Building, School of Planning and Architecture Vijayawada (ACUPCB-SPAV)**, with the advocacy research of Impact Assessment of DfT Programme under **AMRUT-MoHUA-GoI (ADV_26_01)**, in recognition of the Centre's established expertise in urban research and its continued engagement with the AMRUT 2.0 mission.

The project started with a review meeting held on 18th August 2026 between **Ms. Grace P., IAS, Deputy Secretary, MoHUA, Government of India**, and senior representatives of ACUPCB-SPAV, namely the Head and Deputy Head of the Centre. This meeting served as the preliminary forum in which the scope and intent of the proposed impact assessment studies were discussed, and the possibility of engaging SPAV for the research was deliberated upon. Following this deliberation, formal communication was received on 19th August 2026, when an email from the Deputy Secretary, AMRUT-MoHUA, Government of India, conveyed the official Project Order, thereby formally initiating the assignment and establishing the mandate under which ACUPCB-SPAV was to proceed.

Subsequent to the receipt of the Project Order, coordination mechanisms were put in place to operationalise the assignment. An online meeting was convened on 22nd August 2026 with the Nodal Person designated for the study, Mr. Aritra Das from KPMG, during which the modalities of data sharing, coordination, and reporting were discussed. The following day, 23rd August 2026, the relevant database was received from the Nodal Person to commence the assessment. With the requisite inputs in hand, the Director of ACUPCB-SPAV, on **24th August 2026**, sanctioned the constitution of a dedicated research team and formally approved the Advocacy Research Study pertaining to the Impact Assessment.

Table 1-1 Background of the project

Date	Milestone
18th August	Review meeting held between Ms. Grace P., IAS, Deputy Secretary, MoHUA, Government of India, attended by the Head and Deputy Head, ACUPCB-SPA Vijayawada.
19th August	Email received from the Deputy Secretary, AMRUT-MoHUA, Government of India, along with the Project Order.
22nd August	Online meeting held with the assigned Nodal Person, Mr. Aritra Das, KPMG.
23rd August	Project database received from the Nodal Person, Mr. Aritra Das, KPMG.
24th August	Team formation and Sanction of the Advocacy Research Study on Impact Assessment, approved by the Director, SPA Vijayawada.

2. ABOUT THE PROGRAMME – DRINK FROM TAP (DfT)

Drink from Tap (DfT) is one of the key interventions under the **AMRUT 2.0 (Atal Mission for Rejuvenation and Urban Transformation 2.0)** mission, launched by the Hon'ble Prime Minister on 1st October 2021 for a five-year period spanning **FY 2021-22 to FY 2025-26**.

It seeks to transition Indian cities from intermittent to continuous, pressurised 24x7 water supply, with water delivered at the household tap meeting potable standards and requiring no additional treatment such as boiling or filtration. Guidelines issued by MoHUA in October 2021 require every AMRUT city to implement at least one such project within a municipal ward or District Metered Area (DMA), covering a minimum of 2,000 contiguous households, with the twin objectives of eliminating household-level storage and pumping and reducing dependence on bottled water. The rationale for the programme stems from the vulnerability of intermittent water supply systems to contamination since gaps in pressure allow sewage and other pollutants to enter distribution pipelines as well as the burden that unreliable supply places on households, particularly women, who spend considerable time managing water storage and collection. Continuous pressurised supply is also expected to reduce Non-Revenue Water (NRW) through better leak detection and metering, while lowering household-level costs associated with private storage tanks, pumps, and filtration systems. As of the latest available data, over 407 Drink from Tap projects have been approved nationally for the provision of this facility. However, implementing such an ambitious programme also requires overcoming entrenched household practices such as storage, use of stand posts, and reliance on domestic filtration that have developed in response to decades of intermittent supply, making public trust and behavioural adaptation as central to the programme's success as the physical infrastructure itself.



2.1. Purpose of the Programme

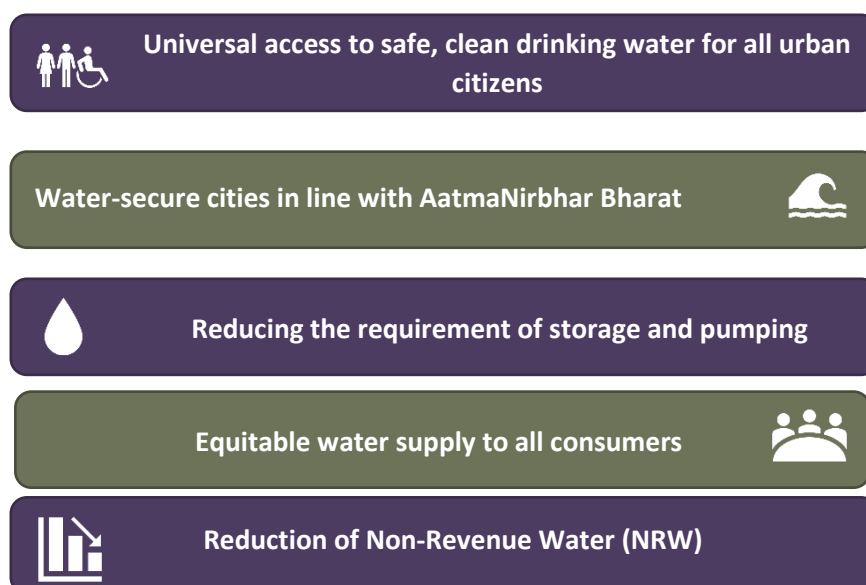
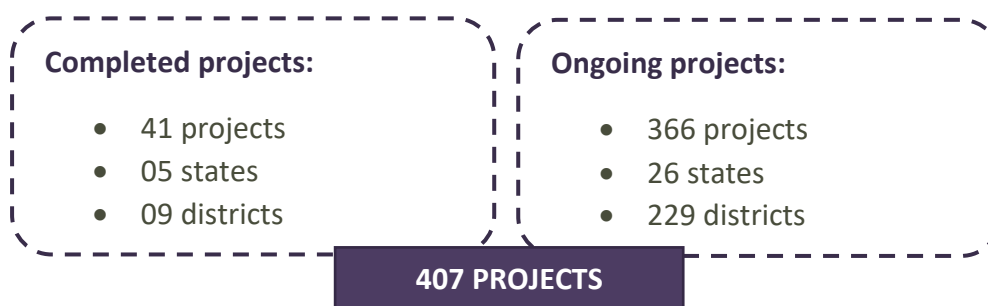


Figure 2-1 Purpose of the research

2.2. Programme Performance & Implementation Progress

Under the DfT programme, a total of 407 projects have been sanctioned across 27 States and 234 Districts, reflecting the pan-India scale of the intervention. This wide-ranging coverage underscores the Programme's commitment to ensuring assured tap water access across urban India.



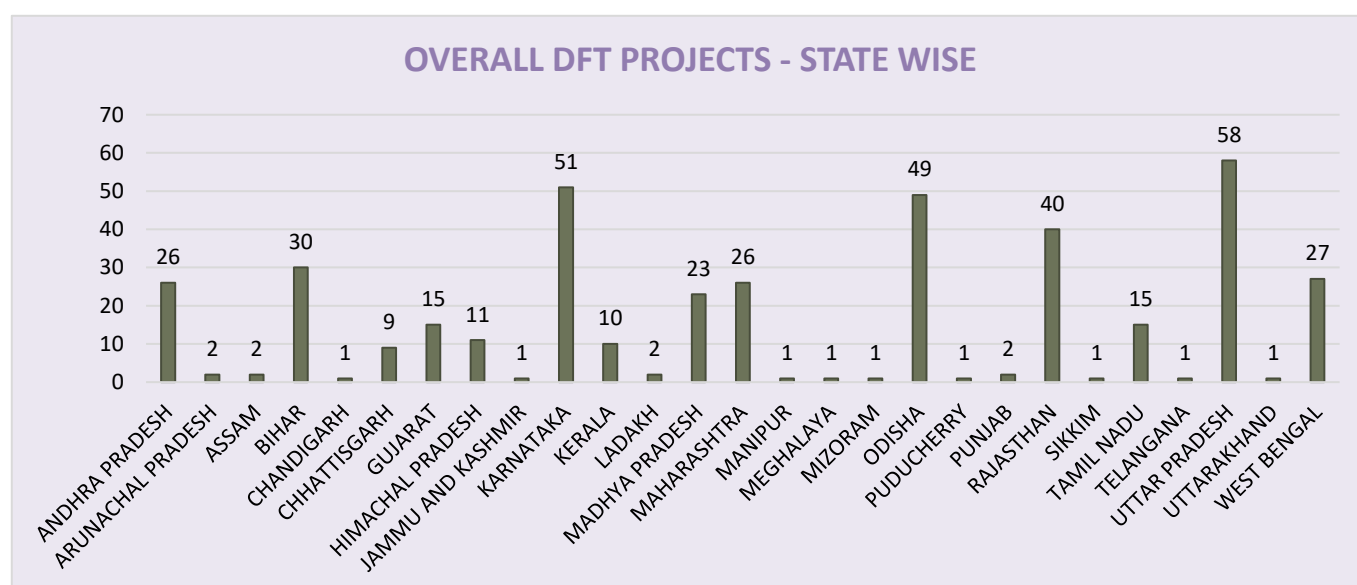


Figure 2-2 Overall project count - India

The State-wise distribution of the 407 sanctioned DfT projects highlights considerable variation in scale across the country. Uttar Pradesh (58 projects) and Karnataka (51 projects) account for the largest sanctioned portfolios, while several States and Union Territories including Chandigarh and Jammu & Kashmir have only a single project sanctioned each.

Completed Projects

In India, of the 407 sanctioned projects, 41 have been completed across five States, as detailed in the accompanying table. Odisha leads with 34 completed projects spread across four districts such as Cuttack, Ganjam, Khurda, and Sundergarh making it the single largest contributor to completions. Uttarakhand records the fewest, with only one completed project, in Dehradun district.

The concentration of completions in Odisha points to comparatively faster execution in that State relative to the rest of the completed cohort.

Table 2-1 Details of Completed projects

Sl.NO	States	Districts	Projects
1	GUJARAT	RAJKOT	2
		AMRELI	
2	MAHARASHTRA	CHANDRAPUR	2
3	ODISHA	CUTTACK	34
		GANJAM	
		KHURDA	
		SUNDERGARH	
4	UTTARAKHAND	DEHRADUN	1
5	WEST BENGAL	SOUTH 24 PARAGNAS	2
		HOWRAH	

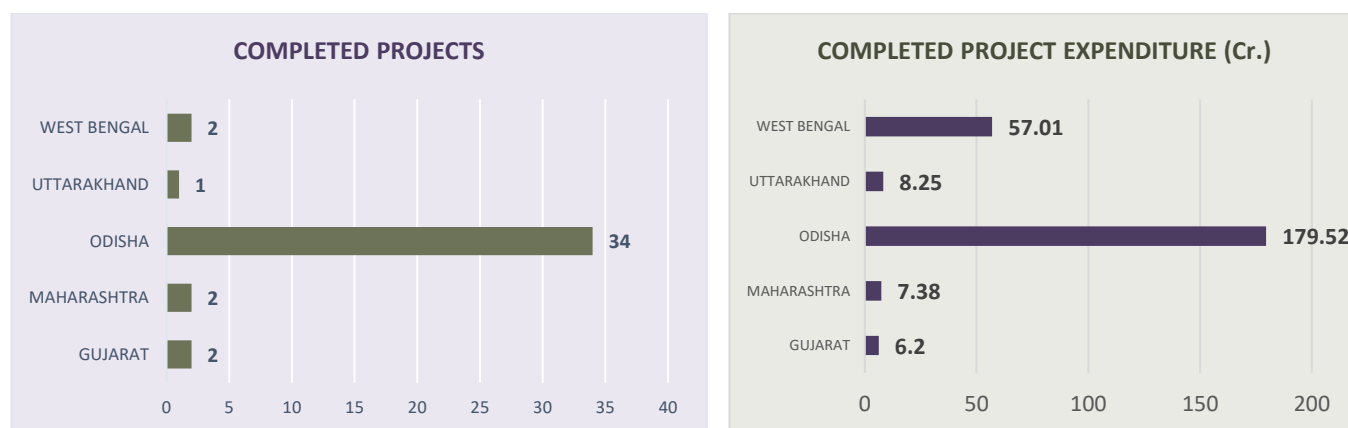


Figure 2-3 Completed projects - Details and expenditure

Expenditure on the 41 completed projects totals Rs. 258.36 crore across the five completing States. Odisha accounts for the highest expenditure, at Rs. 179.52 crore, followed by West Bengal at Rs. 57.01 crore, while Gujarat records the lowest, at Rs. 6.2 crore. Maharashtra and Uttarakhand report expenditure of Rs. 7.38 crore and Rs. 8.25 crore, respectively.

Household coverage from completed projects totals 1,70,345 beneficiaries. Odisha reports the highest number of beneficiary households, at 75,116, including 21,141 households in slum settlements, while Uttarakhand reports the lowest, at 1,250 households because of less projects. West Bengal follows Odisha with 64,406 households, of which 9,798 are slum households, taking the completed-project household coverage to its present level.

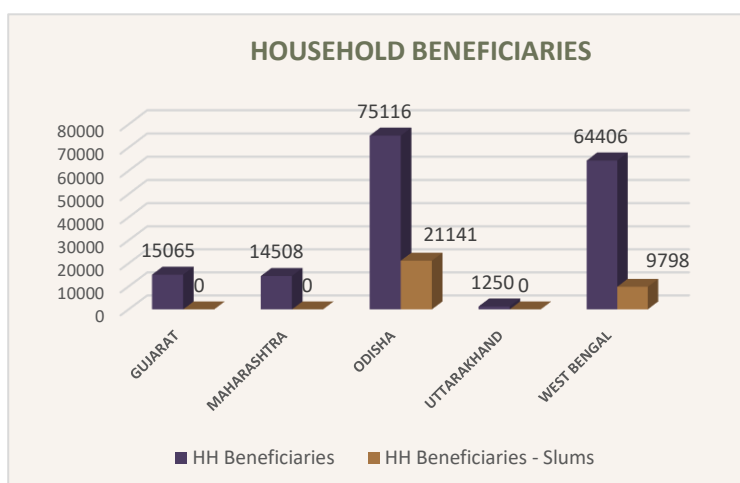


Figure 2-4 Beneficiaries details - Households

Ongoing Projects

The ongoing projects under the DfT Programme move through a defined sequence of implementation stages begins with DPR Preparation, DPR Approval, issuance of the Notice Inviting Tender (NIT), and finally Contract Award, at which point physical execution begins. Each ongoing project's current status reflects where it stands along this pipeline.

Of the 366 ongoing projects, 7 are at the DPR Preparation stage and 10 have their DPR prepared, 12 have progressed to DPR

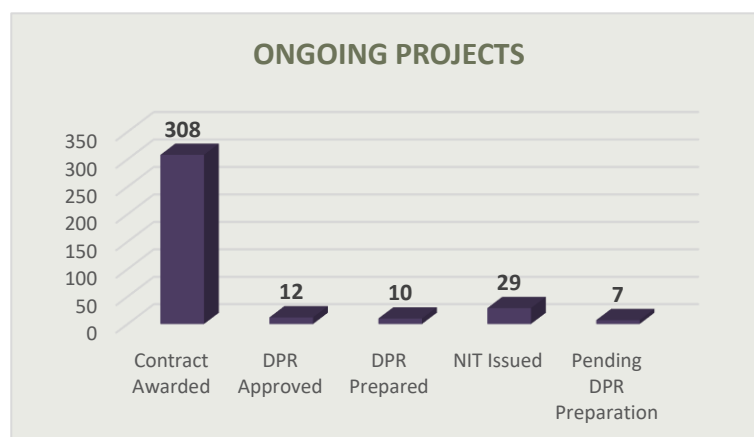


Figure 2-5 Ongoing projects - Stages wise

Approved, 29 have reached the NIT Issued stage, and 308 the largest share has moved to Contract Awarded. This distribution sets out the current procurement-stage profile of the ongoing portfolio.

Physical progress on the 366 ongoing projects shows that 43.4 percent of projects have completed less than 25 percent of construction, while 5.2 percent have crossed 90 percent completion in that the state includes Himachal Pradesh (05 projects), Karnataka (07 projects) Kerala (01), Madhya Pradesh (01), Maharashtra (01), Meghalaya Odisha (02) and Uttar Pradesh (01). The remaining projects are distributed across the 25-90 percent completion range, rounding out the current progress profile.

Table 2-2 Details of physical completion - ongoing projects

Physical progress completion	Projects count
ABOVE 90 %	19
80-90 %	22
60 - 80 %	68
40-60 %	59
25-40 %	39
BELOW 25 %	159
TOTAL	366

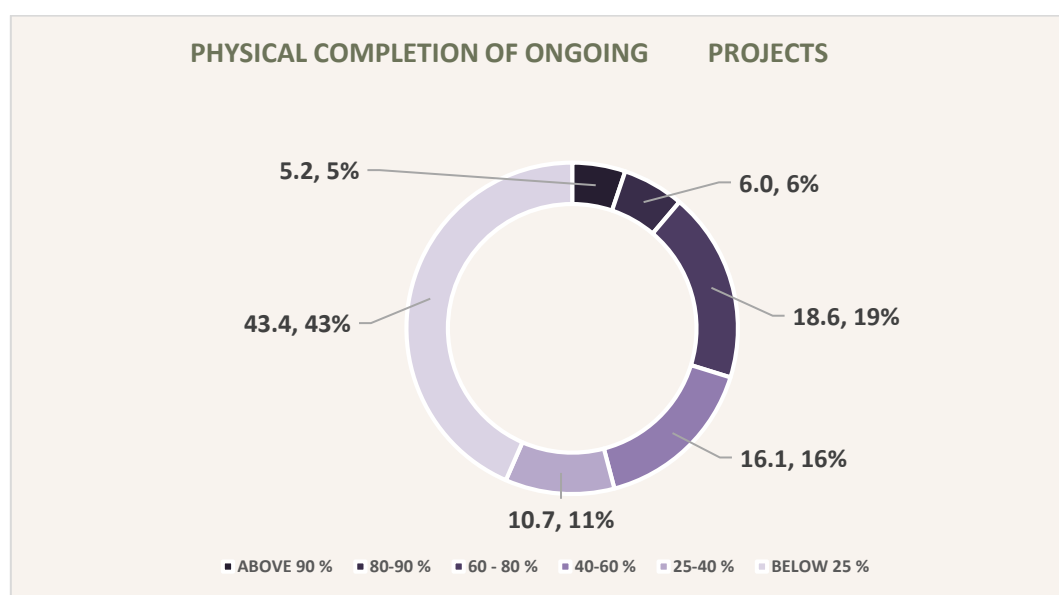


Figure 2-6 Coverage of physical completion of the project

State-wise, ongoing projects are highest in Uttar Pradesh, with 58 projects, followed by Karnataka, with 51. Chandigarh, Jammu & Kashmir, and Manipur, among other States, report one ongoing project each, while Uttarakhand records no ongoing projects, having completed its sole sanctioned project. Together, these figures make up the 366 ongoing projects under implementation.

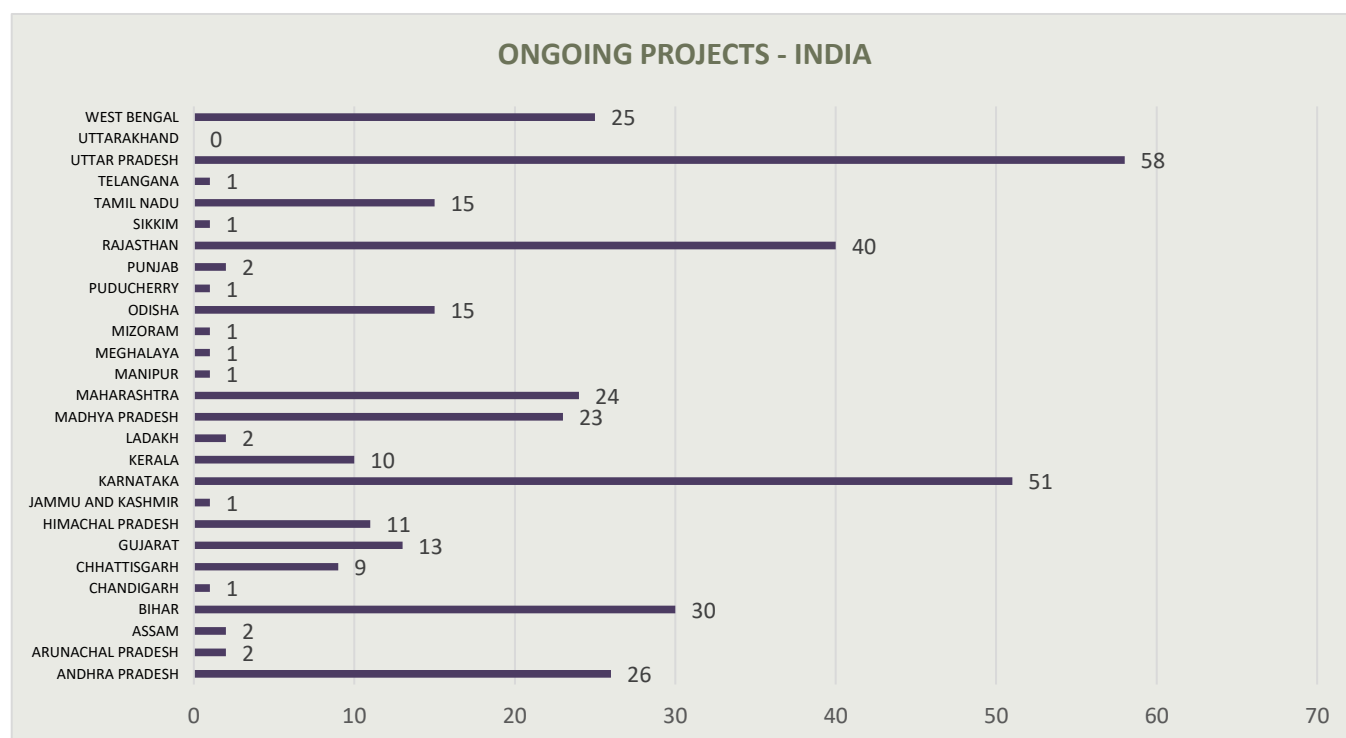


Figure 2-7 Overall ongoing projects - In India

Of the cumulative expenditure of Rs. 6,740.99 crore incurred on the 366 ongoing projects, Maharashtra accounts for the highest, at Rs. 2,927 crore, followed by Karnataka, at Rs. 1,075.80 crore. Kerala reports the lowest recorded expenditure, at Rs. 1.81 crore, followed by Arunachal Pradesh, at Rs. 3 crore, completing the State-wise expenditure profile of the ongoing portfolio.

On completion, the ongoing projects are estimated to benefit 18,67,675 households nationwide. Maharashtra accounts for the highest projected coverage, at 6,33,928 households, followed by Bihar, at 2,43,019, while Sikkim accounts for the lowest, at 546 households, followed by Uttarakhand, at 1,397. These figures represent the anticipated household-level outcomes once the ongoing projects are completed.

Table 2-3 Ongoing projects & Expenditure

States	Ongoing projects count	Expenditure incurred (Cr.)
ANDHRA PRADESH	26	41.29
ARUNACHAL PRADESH	2	3
ASSAM	2	7.55
BIHAR	30	53.33
CHANDIGARH	1	5.86
CHHATTISGARH	9	0
GUJARAT	13	781.04
HIMACHAL PRADESH	11	133.45
JAMMU AND KASHMIR	1	0
KARNATAKA	51	1075.8
KERALA	10	1.81
LADAKH	2	0
MADHYA PRADESH	23	844.08
MAHARASHTRA	24	2927
MANIPUR	1	4.04
MEGHALAYA	1	95.46
MIZORAM	1	8.24
ODISHA	15	61.97
PUDUCHERRY	1	0
PUNJAB	2	0
RAJASTHAN	40	69.24
SIKKIM	1	9.58
TAMIL NADU	15	147.49
TELANGANA	1	35.98
UTTAR PRADESH	58	229.64
UTTARAKHAND	0	0
WEST BENGAL	25	205.14
Grand Total	366	6740.99

The DfT Programme has been rolled out across States and Union Territories nationwide, reflecting its scale as a pan-India initiative under AMRUT. Implementation has progressed at differing paces across the country, with a share of projects already completed and extending assured water access to households, while the remaining projects continue to advance through various stages of execution. Taken together, this indicates a Programme that is steadily moving toward its intended goal of universal tap water access across urban India.

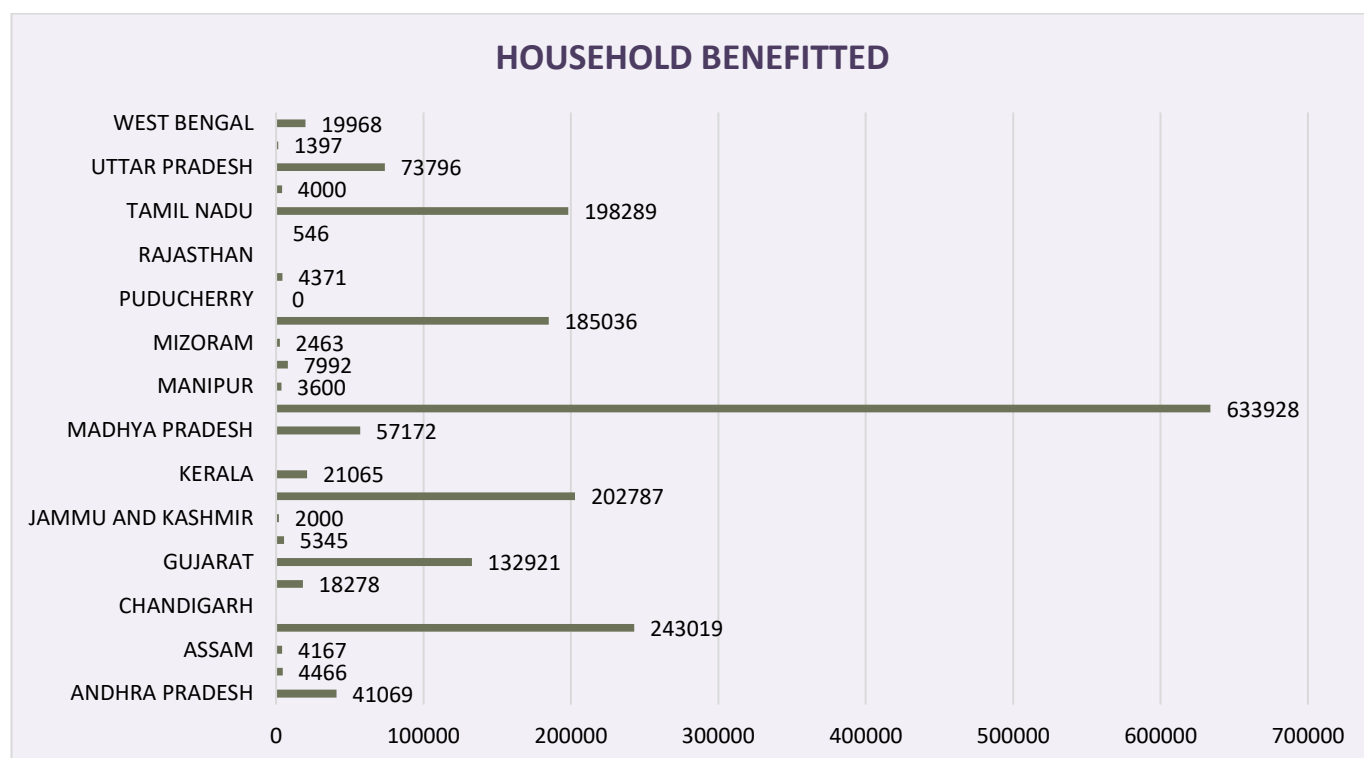


Figure 2-8 Households benefitted - State wise

3. SCOPE OF WORK

The Impact Assessment of the Drink from Tap (DfT) Programme under AMRUT, MoHUA, GoI (Project Code: ADV_26_01) is being undertaken by the AMRUT Centre of Urban Planning for Capacity Building, School of Planning and Architecture Vijayawada (ACUPCB–SPAV) as an advocacy research study. The study assesses the implementation and outcomes of the DfT Programme through a detailed, city-level examination rather than a purely statistical review, with the objective of drawing out lessons and evidence to inform policy going forward.



3.1. Objectives

- To establish the national-level coverage and detailed overview of the DfT Programme.
- To identify representative sample cities based on beneficiaries, physical completion, fund utilisation, and geographic representation.
- To understand the city level urban morphology and water supply characteristics of the selected cities.
- To assess the project performance, outcomes and impacts of DfT interventions against the 9 indicators and 86 parameters.
- To identify implementation gaps, success factors, and good practices across selected cities.
- To recommend measures for improving the scalability, and replicability of DfT interventions.

4. SELECTION OF CITIES

For this purpose, five case study cities have been selected for in-depth analysis, representing the overall implementation of the Programme across the country. The selection of these cities is based on the criteria set out below.

1	Physical Completion Cities selected based on the level of physical progress achieved on their DfT projects, covering projects at an advanced or completed stage of implementation.
2	Maximum Beneficiaries Cities with the highest number of household beneficiaries under the DfT Programme, to capture the projects with the greatest population-level outreach.
3	Maximum Utilisation of Fund Cities with the highest utilisation of sanctioned funds, reflecting projects where financial resources have been most substantially deployed.
4	Geographic Zone Cities selected to represent different geographic zones of the country, ensuring the assessment draws on experience from more than one region of India.

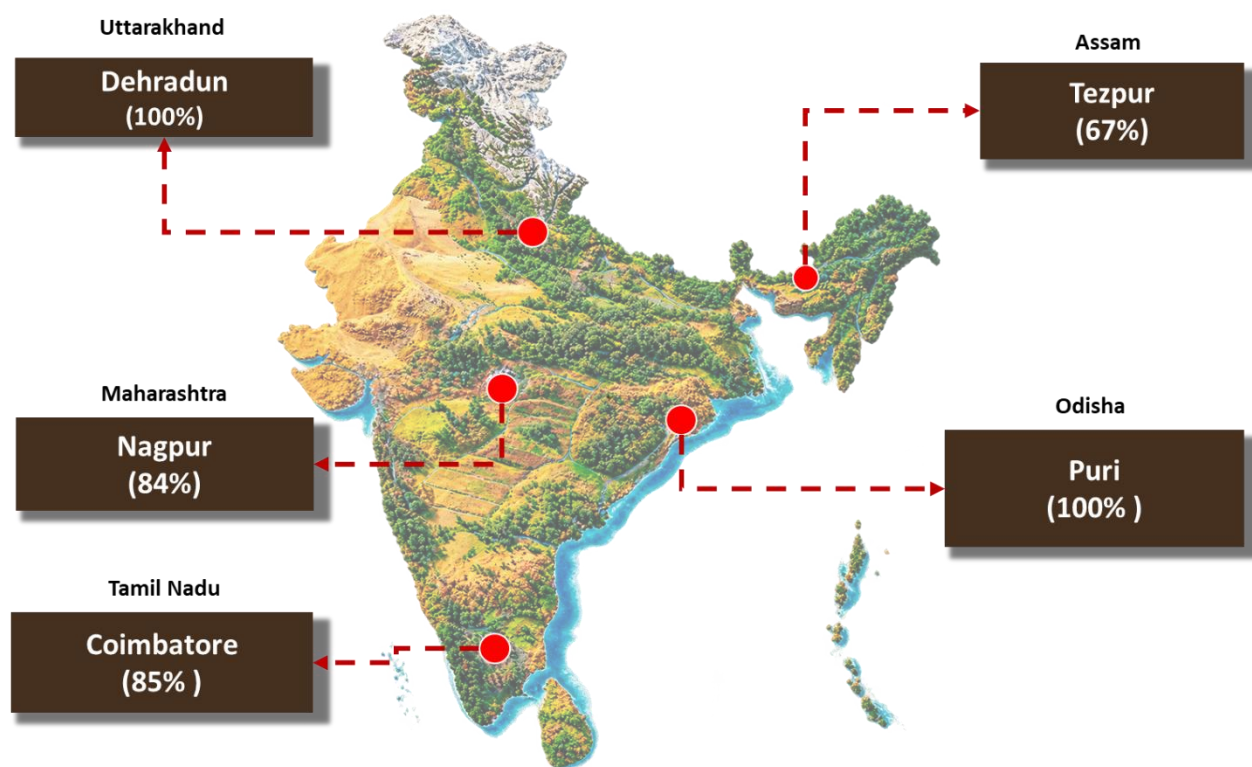


Figure 4-1 Selected Case studies Locations

Based on the above criteria, five case study cities have been identified across India, as listed below:

The information presented in this section has been compiled from data and documents available in the **public domain and will be cross-verified during site visits.**

1. Odisha - Puri

- **Completion:** Puri has achieved full (100%) implementation of the 24x7 Drink from Tap system, serving as the model city that has spurred other cities to take up the project caters to a population of 2.5 lakh in Puri.
- **Water Provision/Pipeline:** To meet the daily requirement of 38 million litres per day (MLD), the water source was shifted from groundwater to surface water, drawn from the Bhargavi river and 33,500 metered connections have been provided across the city.
- Water-borne disease cases have dropped by more than 90%, with no reported deaths.
- Elimination of mineral water bottle usage at public water fountains has reduced plastic waste by 400 metric tonnes annually.
- The initiative also led to a remarkable 97% revenue collection efficiency, highlighting the success of the incentivised approach for Jal Sathis. Timely complaint redressal was maintained at over 90%, ensuring high levels of consumer satisfaction.
- Furthermore, the Non-Revenue Water (NRW) in the DfT cities was reduced to below 15%, showcasing the effectiveness of the program in ensuring the sustainability of the water supply system.

2. Uttarakhand - Dehradun

- **Physical Completion:** In north zone with 100% physical completion achieved on the sanctioned DfT project in Dehradun.
- **Household Beneficiaries:** 1,397 households have benefited from the project.
- **Expenditure:** Total expenditure incurred stands at Rs. 8.25 crore.
- The project is being implemented as a 24x7 water supply system, with storage facility as a component, supported by a SCADA (Supervisory Control and Data Acquisition) system for real-time monitoring and control.

3. Assam - Tezpur

- **Physical Completion:** 67% physical completion achieved on the DfT project in Tezpur, positioning it as a positive-progress case in the North East.
- **Household Beneficiaries:** 4,167 households have benefited from the project so far.
- **Expenditure:** Total expenditure incurred stands at Rs. 7.55 crore.

4. Maharashtra - Nagpur

- **Physical Completion:** In the Centrepoin of India Nagpur is 84% physical completion achieved on the DfT project in Nagpur, positioning it as a positive-progress case in Maharashtra.
- **Household Beneficiaries:** 21,403 households have benefited from the project so far.
- **Expenditure:** Total expenditure incurred stands at Rs. 7.38 crore.

5. Tamil Nadu - Coimbatore

- **Project Cost:** Estimated at Rs. 646 crores, implemented by Coimbatore City Municipal Corporation under a Build-Transfer-Operate (BTO) model, covering the city's 60 wards.
- **Household Connections:** Of the 1.5 lakh household connections planned, over 1.4 lakh have been provided; nearly 96,000 households are receiving 24×7 supply on a pilot basis.
- The project has achieved significant milestones, including the completion of 85% of construction and the commissioning of water supply in 33 District Metering Areas (DMAs), providing 24x7 access to over 51,000 House Service Connections (HSCs).
- An additional 19 DMAs now supply water intermittently to 27,000 HSCs through newly constructed pipelines. With sufficient pressure to supply water directly to overhead tanks (OHTs) without the need for pumping, households are encouraged to adopt the system for direct water access.

5. PROFILING OF THE CASE CITIES

The city profile, administrative structure, water-supply system, and details of the Drink from Tap (DfT) programme for each case city are presented in the following subsections. The information presented in this section has been compiled from data and documents **available in the public domain** and **will be cross-verified** and supplemented through discussions with relevant stakeholders and field visits during the site visit.

5.1. COIMBATORE – Tamil Nadu

Coimbatore, also known as Kovai, is the second-largest city in Tamil Nadu by area and population and the administrative headquarters of Coimbatore district. Located on the banks of the Noyyal River at the foothills of the Western Ghats, the city is a major textile, engineering and information technology (IT) centre, popularly termed the "Manchester of South India."

5.1.1. City Profile

Coimbatore lies at 11°00'03"N, 76°57'48"E at an elevation of 427 m, approximately 495 km south-west of Chennai, and functions as a principal entry and exit point between Tamil Nadu, Kerala and the hill station of Udhagamandalam (Ooty). The city is served by three National Highways NH 47, NH 67 and NH 209 and Coimbatore Junction, which is the second highest revenue-yielding railway station in the Southern Railway zone. Coimbatore International Airport provides domestic and international connectivity.



As per the City Development Plan for Expanded Coimbatore City, the Corporation's population stood at **1,617,711** as per the 2011 Census while the wider Urban Agglomeration recorded a population of 2,136,916. The Corporation's statutory jurisdiction covered **257.04 sq. km.** from 2011 to 2024; a Government Order issued in 2025 has since expanded this to 415.40 sq. km. through the merger of one municipality, four town panchayats and nine village panchayats, though ward delimitation and elections for the enlarged limits remain pending.

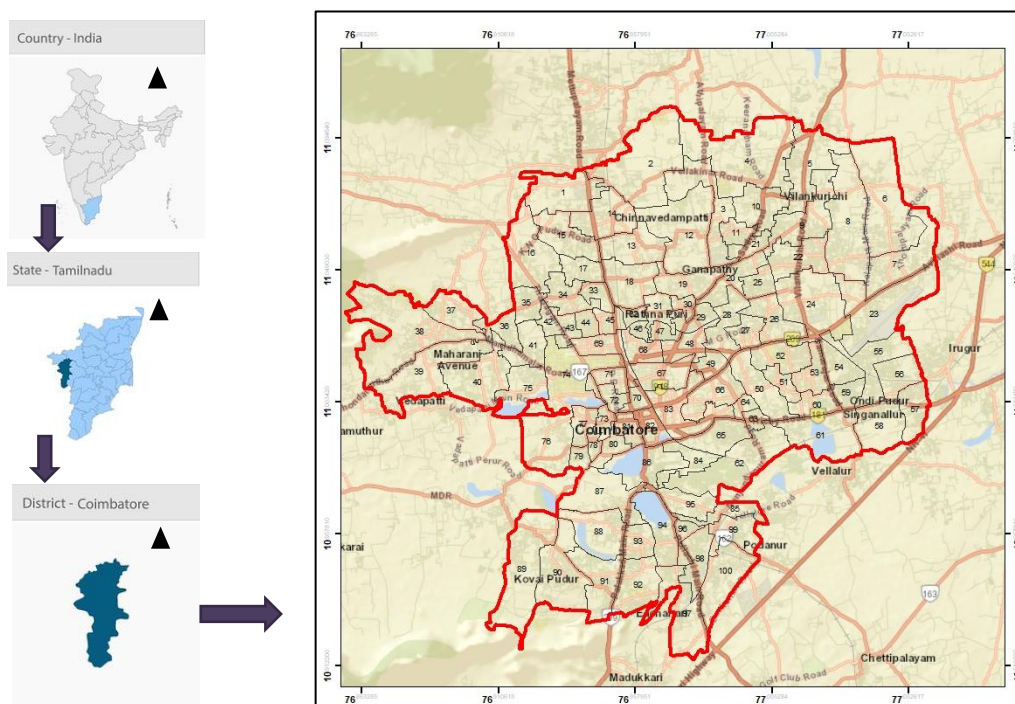


Figure 5-1 Location map of Coimbatore municipal corporation

5.1.2. Administrative Structure

Municipal Corporation Structure

CCMC is headed politically by an elected Mayor and Deputy Mayor and administratively by a Commissioner (an Indian Administrative Service officer). The Corporation Council comprises 100 directly elected councillors (one per ward), organised into five zones for field administration, each with a Zonal Assistant Commissioner.

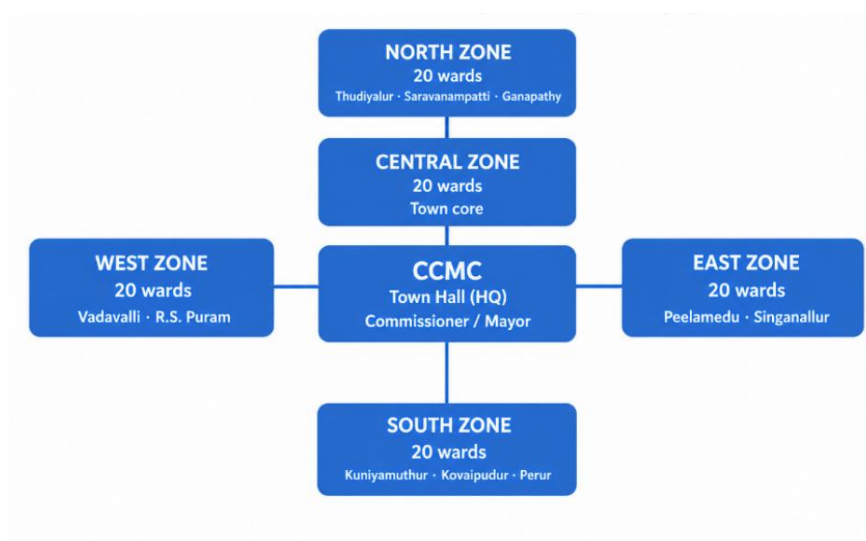


Figure 5-2 Administrative structure

Local Planning Authority & Smart City Mission

Statutory land-use planning for the wider Coimbatore region is exercised by the Coimbatore Local Planning Authority (LPA), constituted in 1974 under the Tamil Nadu Town and Country Planning Act, 1971, and chaired by the District Collector. The Coimbatore Local Planning Area currently comprises the Municipal Corporation together with 21 town panchayats and 41 village panchayats, spanning approximately 438.86 sq. km.

Coimbatore was selected in the first round of the Government of India's Smart Cities Mission (2016) and ranked first among the 11 urban local bodies of Tamil Nadu covered under the Mission in terms of project implementation. Among the 54 projects taken up, the majority were completed by 2023 and the Smart Cities Mission was financially closed nationally on 31st March 2025.

5.1.3. Economic profile of the city

Coimbatore's economic development traces to the establishment of the Coimbatore Cotton and Weaving Mills Association around 1900. Today the economy rests on three pillars - textiles, engineering, and IT/IT-enabled services, pumps and hosiery. The city hosts over 25,000 small, medium and large-scale industrial units, four operational Special Economic Zones, and large manufacturing campuses of firms such as ITC Limited and Larsen & Toubro.



Capital Investment Priorities

The City Development Plan for Expanded Coimbatore City estimated a total capital investment requirement of ₹18,62,275 lakh across municipal service sectors for the period to 2045, phased according to fiscal capacity and sectoral planning horizons (Water Supply and Sewerage to 2045; Storm Water Drainage and Solid Waste Management to 2030).

Table 5-1 Sector wise investment priorities

SL.NO	Sector	Investment (₹ lakh)	% of total
1	Roads, Traffic and Transportation	9,81,291	52.69
2	Water Supply	1,89,562	10.18
3	Sewerage and Sanitation	1,78,850	9.60
4	Storm Water Drains	1,53,898	8.26
5	Development of Existing Drains	1,35,300	7.27
6	Solid Waste Management	95,337	5.12
7	Other sectors (Urban Poor, Governance, Heritage, Environment, Street Lighting, Disaster Management)	1,27,037	6.88
	Total	18,62,275	100.00

5.1.4. Existing Water Supply System

Governing Authority and Administrative Structure

Water supply in Coimbatore is a shared responsibility between the Corporation and the State Water Supply:

- **Coimbatore City Municipal Corporation** - owns and maintains the city distribution network, sanctions connections and bills water charges. Since 2018, it has also engaged SUEZ India Projects Pvt. Ltd. as PPP concessionaire for the old city area.
- **Tamil Nadu Water Supply and Drainage (TWAD) Board** - designs, operates and maintains head-works of Siruvani, Aliyar, Bhavani (K-V) and Pillur I & III, delivering bulk treated water to CCMC's reservoirs.
- **Tamil Nadu MAWS Department** - nodal state department for policy, plan sanction and release of state/central funds.
- **Ministry of Housing and Urban Affairs (GoI)** - central sanctioning authority for AMRUT/AMRUT 2.0 and Smart Cities Mission, funding major augmentation and the 24x7 project.

CCMC Water Supply (Engineering) Department - Organisation

The Water Supply (Engineering) wing of CCMC is headed by the City Engineer, who reports to the Commissioner. The department is organised as follows:

Table 5-2 List of engineers in zones

Level	Designation	Jurisdiction
1	City Engineer	Entire Corporation - overall charge of water supply operations and maintenance
2	Executive Engineer (West)	West and South Zones
2	Executive Engineer (East)	East and North Zones
3	Assistant Executive Engineer	One per zone - East, West, North, South, Central
4	Junior Engineer / Assistant Engineer	One for every two divisions within a zone

Source: (CCMC, Coimbatore City Municipal Corporation, 2026)

Sources & Per Capita Water Supply

Protected water supply is drawn from four major schemes, three of them gravity/pumped bulk schemes owned by TWAD Board and one Pillur Phase II owned and operated directly by CCMC.

Table 5-3 Source of water supply

Scheme	Source / Reservoir	Mode of Conveyance	Operated / Maintained By	Remarks
1. Siruvani Water Supply Scheme	Siruvani Dam, Attappady, Palakkad District, Kerala	Gravity	TWAD Board (head-works); CCMC (city distribution)	Oldest and largest source; inter-state scheme executed by Kerala PWD, funded by the Government of Tamil Nadu under a 1973 agreement; feeds about 36 wards and adjoining villages
2. Pillur Water Supply Scheme (Phases I, II & III)	Pillur Reservoir, Bhavani basin, Nilgiris foothills	Pumping	Pillur-I & III: TWAD Board (Pillur-III being transferred to CCMC, 2026); Pillur-II: CCMC (implemented under JNNURM)	Augmentation scheme commissioned 1982 (Pillur-I) and expanded in 1995 and thereafter under JNNURM (Pillur-II) for about 125 MLD additional supply
3. Aliyar Water Supply Scheme	Aliyar Dam / Reservoir, south of Coimbatore	Pumping	TWAD Board	Supplements supply to added municipal areas and southern parts of the city
4. Bhavani Water Supply Scheme	Bhavani River	Pumping	TWAD Board	Serves the Kavundampalayam, Vadavalli and Veerakeralam added areas

Coimbatore's Citizen's Charter records average per-capita supply at 135 LPCD against a **requirement of roughly 250 MLD** for its 2011 Census population of 15.84 lakh -in line (CCMC, Coimbatore City Municipal Corporation, 2026) with the Government of India's 135 LPCD benchmark for sewered cities. Overall, Tamil Nadu's Corporations and Municipalities averaged about 126 LPCD state-wide, while independent assessments such as a World Bank review peg most Indian cities, Coimbatore included, at 90-120 LPCD (2011) with intermittent, alternate-day supply rather than continuous delivery (Government_of_Tamil_Nadu, 2023).

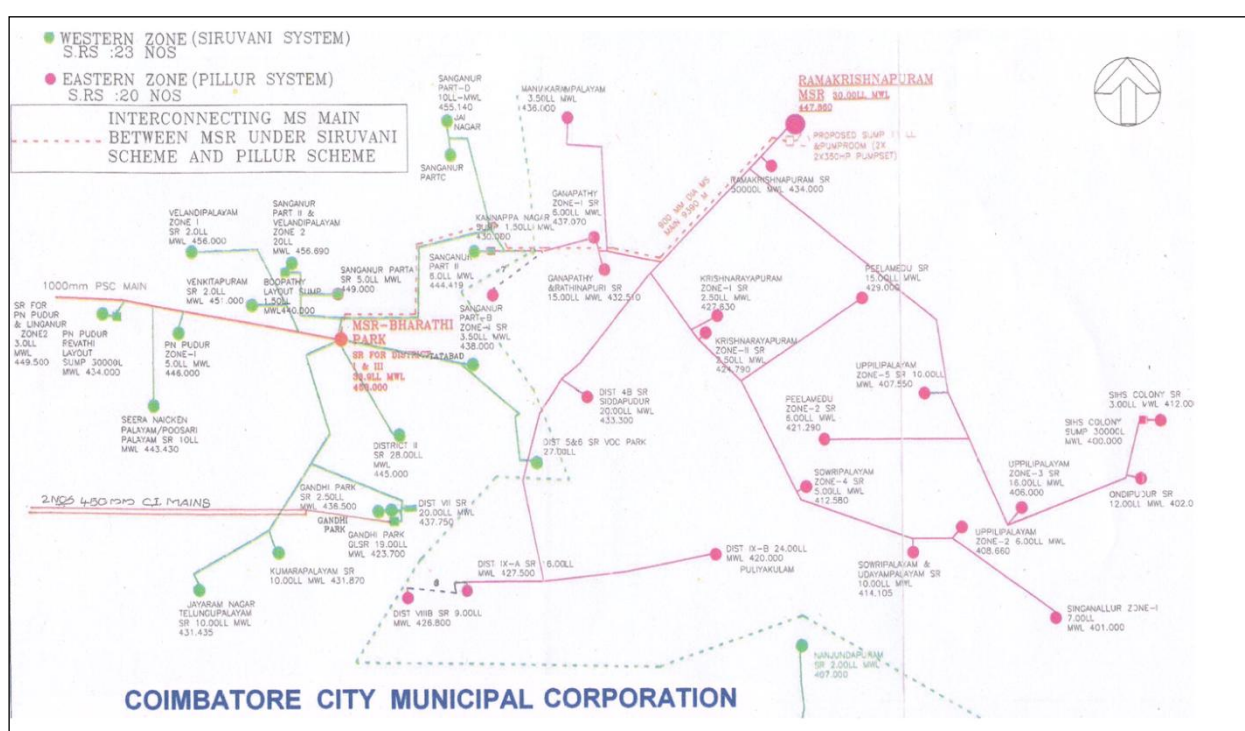


Figure 5-3 Water supply system

Source - City development plan of Coimbatore Municipal Corporation

Table 5-4 Per capita water supply

Indicator	Value
City-wide average per-capita supply (CCMC Citizen's Charter)	135 LPCD
Tamil Nadu, all Corporations/Municipalities except Chennai (state average)	126 LPCD
Total daily requirement (2011 Census population)	250 MLD
Supply frequency, Siruvani-fed areas (before DfT 24x7 project)	Once in two days
Supply frequency, Pillur Phase I & II areas (before DfT 24x7 project)	Once in three to four days

List of Water Supply Schemes in Coimbatore

Table 5-5 List of existing water supply schemes

S. No.	Scheme	Nature of Scheme	Quantum of Water	Implementing / Owning Agency
1	Siruvani Water Supply Scheme	Original bulk source (gravity)	≈ 64-87 MLD drawn (design ≈ 98 MLD)	TWAD Board
2	Pillur Phase I Water Supply Scheme	Bulk source (pumping), commissioned 1982	≈ 65-66 MLD	TWAD Board (transfer to CCMC under review)

3	Dedicated Pillur-II Drinking Water Supply Scheme (JNNURM)	Augmentation scheme, 125 MLD sanctioned	≈ 30 MLD currently distributed	CCMC (implemented under JNNURM)
4	Pillur Phase III Water Supply Scheme	Bulk augmentation	Included within combined Pillur allocation	TWAD Board; management transfer to CCMC approved, 2026
5	Aliyar Water Supply Scheme	Bulk source (pumping)	Supplements southern areas	TWAD Board
6	Bhavani Combined Water Supply Scheme	Bulk source (pumping) for added areas	Serves KVV added areas	TWAD Board

Source: (CCMC, Coimbatore City Municipal Corporation, 2026); (The_Hawk, Civic body in TN's Coimbatore to take charge of Pillur-3 water supply operations, 2026); (TWAD_Board, 2026)

5.1.5. Drink from Tap Programme - Coimbatore

Operations for the 24×7 distribution network have been carried out on a public-private-partnership (PPP) basis, with SUEZ India engaged to manage and operate the piped distribution system for the CCMC area, under a long-term operation and maintenance arrangement following an initial implementation period (Smart_Uilities, 2020).

Scheme Objectives

- Convert the existing intermittent water-supply system into a 24× 7 pressurised, metered 'drink-from-tap' quality supply.
- Replace and upgrade the distribution pipeline network, including construction of new/rehabilitated overhead service reservoirs (OHRs).
- Provide household tap/metered connections to all eligible dwellings within the covered wards.
- Reduce Non-Revenue Water (NRW) through leak detection, District Metered Area (DMA) management, and automated metering.
- Improve water quality by minimising storage-related contamination associated with intermittent supply.

Source: (Smart_Uilities, 2020). (MoF_GOI, 2026)

Area and Ward-wise Coverage

Coimbatore's 24×7 'Drink from Tap' water-supply project was initially conceived for the erstwhile Corporation area, i.e., the core urban area that existed prior to the 2011 areal expansion (CCMC, Budget 2023-24, 2023). The project was designed for the core area of approximately 105.6 sq. km, historically comprising 60 wards (Raj A. , 2026); more recent project reporting identifies 58 wards as the project coverage area (Raj A. , The New Indian Express, 2026). The system is being implemented through a network of service reservoirs, distribution zones and District Metered Areas (DMAs), supported by hydraulic modelling, pressure monitoring and metering. Consequently, commissioning of continuous supply has

progressed incrementally across the project area rather than through a single city-wide conversion (Raj A. , Completion of 24x7 water supply project in Coimbatore pushed to Feb 2026, 2025).

Table 5-6 Coverage of water connection

Coverage Parameter	Reported Figure
Wards covered under the 24x7 / drink-from-tap project	60 wards (pre-expansion Corporation limits)
Total CCMC wards (current jurisdiction)	100 wards
Main transmission pipeline laid	60+ km completed
Distribution network laid	~1,700 km (nearly complete; limited stretches pending)
Master service reservoirs	2 principal master service reservoirs maintained by CCMC, plus the dedicated Pillur-II system reservoir
Storage / service reservoirs (city-wide)	126
Distribution network length (city-wide, pre-24x7 project)	2,380 km
Additional feeder mains laid under the 24x7 Project	117 km
Additional / rehabilitated distribution network under the 24x7 Project	1,867 km
New reservoirs / pumping stations built under the 24x7 Project	32

Source: (Indian_Infrastructure, 2020) ; (Smart_Uilities, 2020)

Tap Connections and Beneficiaries

Household connection targets and progress reported for the Coimbatore 24x7 continuous water supply project is summarised below.

Table 5-7 list of beneficiaries under DfT

Scheme	Beneficiary Coverage (as reported)
Entire Corporation area -protected water supply (all four bulk schemes combined)	Population of the Corporation area - 15,84,719 as per the 2011 Census
24x7 Water Supply Project -planned household coverage	≈ 1,50,000 households across 60 old-city wards
24x7 Water Supply Project -house-service connections commissioned (September 2025)	1,13,537 households
24x7 Water Supply Project -households already on continuous supply (September 2025)	90,117 households
Households still on intermittent supply pending full commissioning (Sept. 2025)	23,420 households

Source: (The_Covai_Mail, 2025), (Raj A. , 2026)

Beneficiaries of the scheme are, in the first instance, households within the 60 originally-notified wards that receive metered, round-the-clock piped water in place of the earlier intermittent supply. Indirect beneficiaries include commercial and institutional water users, while the augmentation of the city's bulk water supply by 178.3 MLD through the Pillur-III scheme, drawing water from the River Bhavani, strengthens the reliability and long-term water security of the expanded Coimbatore Corporation area,

particularly the newly incorporated areas. (CPHEEO_MoHUA, 2021; The_Hawk, Civic body in TN's Coimbatore to take charge of Pillur-3 water supply operations, 2026; The_News_Minute, 2023).

Funding and Financial Details

Table 5-8 Financial details of DfT

Component	Reported Cost / Detail
24×7 Continuous Pressurised Water Supply Scheme (60 wards - AMRUT + Smart Cities Mission (Government of India) + State + CCMC (~ 20% capital share))	~ Rs. 646 crore
Total contract value including construction and O&M	~ Rs 2,975.16 crore

Source: (Raj A. , 2026; CCMC, Budget 2023-24, 2023)

Overall, the project is reported to be in an advanced stage of physical completion for core infrastructure, while full household-level, city-wide switch-over to round-the-clock supply remains in progress and is being staged ward-by-ward. Residents in non-pilot wards continue to receive water on the pre-existing scheduled-hours basis pending full commissioning.

5.2. TEZPUR - Assam

Tezpur is a city on the northern bank of the Brahmaputra River in Sonitpur district, Assam, of which it is the administrative headquarters and the seat of the North Assam Division and is governed by the Tezpur Municipal Board (TMB), one of 104 statutory urban local bodies (ULBs) in the state. Known traditionally as the "Cultural Capital of Assam" and popularly styled the "City of Eternal Romance" after its association with the Usha-Aniruddha legend. Tezpur is among the oldest urban centres in the state, with the city's core dating to the colonial-era headquarters of the erstwhile Darrang district. Sonitpur district itself was carved out of Darrang in 1983, with Tezpur retained as its headquarters. (Government_of_Assam, District at a glance, District Official Website, Sonitpur, 2026)



5.2.1. City Profile

Tezpur lies at approximately 26°37'42"N, 92°47'59"E, on the northern bank of the Brahmaputra, roughly 175 km north-east of Guwahati. The town sits at an elevation of about 80 -142 m, and functions as a gateway for onward travel into Arunachal Pradesh (via the Kolia Bhomora Setu bridge across the Brahmaputra) as well as to the Nameri National Park and Eastern Himalayan foothills. Rainfall is high and winters (October–February) are cool and dry; the region also experiences the pre-monsoon squalls locally known as 'Bordoichila'. (World_Weather, 2026)

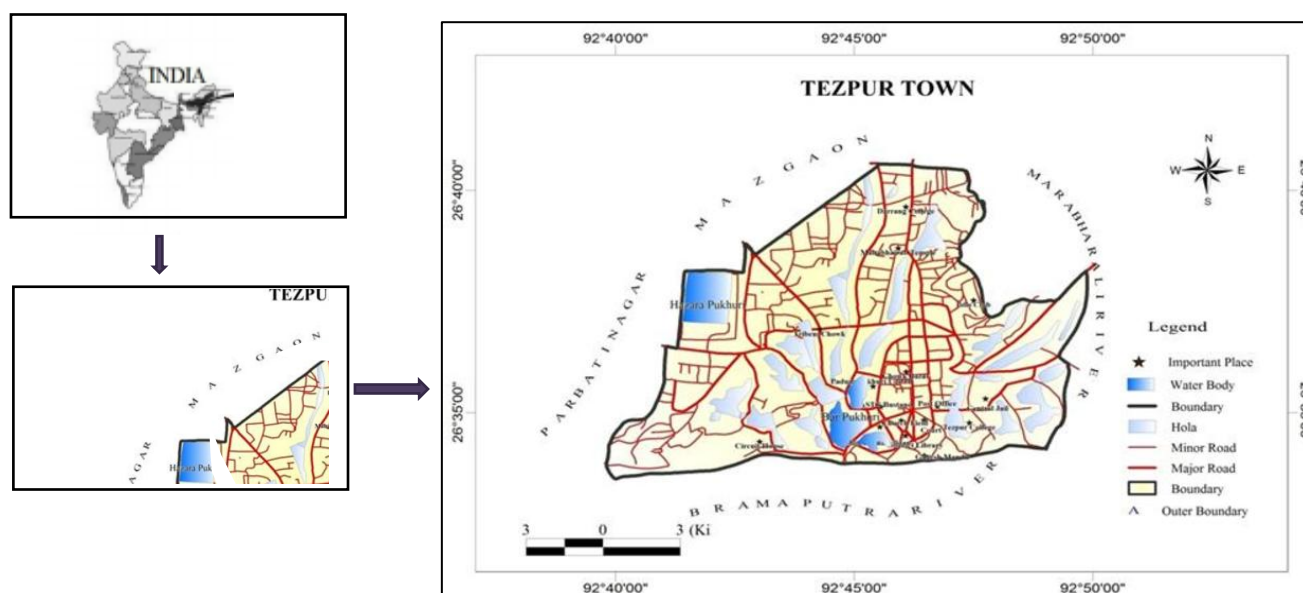


Figure 5-4 Location map - Tezpur, Assam,

Source: www.vecteezy.com; Iosr, J., Dipam, S., & Manash, J.N. (2015).

Table 5-9 Demography details

Administrative Unit	Reported Population (2011 Census)	Area
Tezpur Municipal Board	58,559	7.10 sq. km.
Tezpur Sub-District / Block (town + 123 surrounding villages)	282,032 (urban: 1,02,505; rural: 1,79,527); ~ 3,77,923 as an estimated 2024 figure reported in local media	546.69 sq. km.
Sonitpur District (HQ: Tezpur)	13,11,619 (2011); district portal cites 19,25,975 for undivided figures	2,076.70 sq. km.

Source: <https://tezpur.assamurban.in/about-us>; <https://censusindia.gov.in/>

5.2.2. Administrative Structure

Tezpur is administered by a Municipal Board. The Tezpur Municipal Board was constituted in 1894 and covers a statutory area of about 7.10 sq. km., divided into 19 wards, each represented by an elected ward commissioner. The Board functions under Assam's Urban Development Department (UDD) framework, alongside sister bodies such as the Assam Urban Water Supply & Sewerage Board and the Assam State Housing Board (Tezpur_Municipal_Board, 2026).

At the district level, Sonitpur is headed by a Deputy Commissioner based in Tezpur, who also chairs district-level bodies such as the Local Planning Authority equivalents and disaster-management structures. Sonitpur falls under the North Assam Division, one of Assam's administrative divisions, with the Divisional Commissioner likewise stationed at Tezpur. The district covers four Vidhan Sabha constituencies and is part of the Sonitpur Lok Sabha constituency (Government_of_Assam, Sonitpur District Official Website, Government of Assam, India, 2022).

Key Institutions

- Tezpur Municipal Board - civic administration, water/sanitation billing and local infrastructure within statutory limits (Tezpur_Municipal_Board, 2026)
- Public Health Engineering Department (PHED), Assam - Tezpur PHE Division / Circle - design, execution and O&M of piped water-supply schemes
- Assam Urban Water Supply & Sewerage Board - state-level parastatal supporting urban water/sewerage schemes (AUWSSB, 2026)

5.2.3. Economic profile of the city

Tezpur functions as a trade centre for tea, rice and other crops grown in the surrounding agricultural belt, with some local tea processing. Tourism forms a further pillar of the local economy: Tezpur's own attractions include Agnigarh Hill, Cole Park, the Bhairabi Temple and the Da Parbatia ruins. The town also serves as the principal gateway to Kaziranga National Park, Nameri National Park and Bhalukpong and Tawang in Arunachal Pradesh. The under-construction Guwahati-Tezpur Corridor of NH-15 is expected to reinforce this tea, tourism and trade-linked economy by improving freight and passenger connectivity across North Assam.

5.2.4. Existing Water Supply Condition of Tezpur

Water supply and urban planning functions in Assam are largely handled by state-level line departments rather than the municipal board itself, which creates a multi-agency service delivery structure typical of most Assam towns.

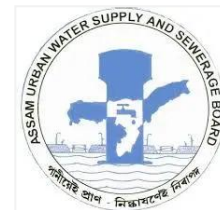


Table 5-10 Departments - Water supply

Level	Agency	Role in Tezpur's Water Supply
State	Assam Urban Water Supply & Sewerage Board (AUWSSB)	Statutory board (est. 1989) responsible for design, execution, and O&M of urban water supply/sewerage schemes, including the ongoing Tezpur town scheme
Urban	Public Health Engineering Department (PHED), Government of Assam	Tezpur PHE Division and Tezpur PHE Circle - designs, constructs and operates piped water-supply schemes for Tezpur town, including new works executed under central missions.
Municipal	Tezpur Municipal Board (TMB)	Local body nominally responsible for water supply function under the Assam Municipal Act, 1956, but in practice water supply is largely executed by AUWSSB/PHED, with TMB levying the local water tax
Municipal oversight	Directorate of Municipal Administration (DMA)	Approves TMB budgets, releases state/central grants, oversees ULB functioning
District administration	Deputy Commissioner, Sonitpur	Historically collected water charges for the town scheme and coordinates disaster/emergency water issues

Source of Water Supply

Tezpur's drinking water supply draws on two main sources:

- **Surface water** - River Brahmaputra: The town's original piped scheme, a 9 MLD water treatment plant near Agnigar hill, was built in the 1980s and draws raw water from the Brahmaputra, treating and distributing it to households within the TMB's ward limits.
- **Groundwater** - deep tube wells / bore wells: A large share of the town's drinking water requirement is met through groundwater extracted via deep tube wells and private/community bore wells.

Table 5-11 Coverage of water supply

Parameter	Status
Original scheme design/commissioning	9 MLD treatment capacity, commissioned in the 1980s
Distribution coverage	limited to sections of the town within TMB's 19 wards; large parts of the town remain outside the piped network
Designed population of water supply system	80575
Household connection level	6,900 through 1,380 household connections

Continuity of supply	Intermittent - typically twice daily for 2 hours in functional AUWSSB-run schemes across Assam towns, well below the national continuous-supply benchmark
No. of wards covered	9

5.2.5. Drink From Tap Programme - Tezpur

Tezpur's 24×7 / "Drink from Tap"-type water supply connection is being delivered as an Urban Local Body (ULB) project under AMRUT 2.0, executed on an Engineering, Procurement and Construction (EPC) basis with a bundled five-year Operation and Maintenance (O&M) period, supplemented by a separate Smart Water Management add-on and a second phase funded through the Urban Infrastructure Development Fund (UIDF). The project is currently at the Contract Awarded milestone and has 1 tender recorded. The project has achieved 67% physical progress and 26.08% financial progress, with an expenditure incurred of ₹7.55 crore (*Database received from Nodal Officer*).

The project incorporates source augmentation, pumping station, water treatment, transmission network, and electrical/mechanical components. Its key features include NRW reduction, 24 × 7 water supply, technology upgradation, and last-mile connectivity, supported by meters, SCADA, GIS, and sensors. The project is not executed in PPP mode (*Database received from Nodal Officer*).

Phase I - Construction of Tezpur Town 24×7 Water Supply Project (EPC Mode)

The consolidated project description states that the Tezpur Town Water Supply Project under AMRUT 2.0, Phase I is formulated to supply potable water to a targeted population of 75,893 by the year 2025, with a projected 18,739 households. Tezpur already has a functional water supply project with functional tap connections in 1,296 households. The project proposes augmentation of some existing infrastructure along with the inclusion of new components, with no duplicity identified. The Drink from Tap technology component is proposed for the existing 24 × 7 Tezpur Water Supply Project under AMRUT 2.0, covering Zone 1 and Zone 3, including the specified partial wards (*Database received from Nodal Officer*).

Table 5-12 Details of Phase I - DfT

Smart Water Management Add-On (Phase I)

Table 5-13 Details of SWM under Phase I

Field	Recorded Detail
Work title	Implementation of Smart Water Management System for Tezpur 24×7 Water Supply Project Phase I under AMRUT 2.0 in Assam, including 5 years Operation and Maintenance on EPC Mode (<i>Database received from Nodal Officer</i>).
Tendering authority	Urban Development Department, Government of Assam (Sonitpur) (Housing & Urban Affairs, Government of Assam, 2026)
Estimated cost	Rs. 19.16 crore (per tender notice); recorded as Rs. 25 crore approved project cost on the MoHUA AMRUT 2.0
Status (as on AMRUT 2.0 portal, 2 March 2026)	NIT (Notice Inviting Tender) Stage

Proposed WTP capacity covered	9.46 MLD (same as Phase I, confirming this is an add-on to the Phase I asset base) (<i>Database received from Nodal Officer</i>)
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This component is intended to overlay Supervisory Control and Data Acquisition (SCADA)/Programmable Logic Controller (PLC)-based monitoring, District Metered Area management and smart metering onto the Phase I network once its physical construction is complete consistent with AMRUT 2.0's Non-Revenue Water (NRW) reduction and demand-management reform requirements.

Phase II - UIDF (NHB)

Table 5-14 Details of Phase II – DfT

Field	Recorded Detail
Project title	Tezpur Town Water Supply Project, Phase II (Baruah, 2026)
Funding instrument	Urban Infrastructure Development Fund (UIDF), a ₹10,000-crore corpus operationalised by the National Housing Bank (NHB) for Tier-2/Tier-3 urban infrastructure in India (Urban Infrastructure Development Fund, 2026)
Reported cost	₹71.34 crore (Baruah, 2026)
Announced by	Jayanta Mallabaruah, Minister for Housing & Urban Affairs, Government of Assam (foundation stone laid) (Baruah, 2026)
Target beneficiaries	Approximately 4167 household water connections (<i>Database received from Nodal Officer</i>).
Stated objective	24×7 access to safe drinking water across all wards of Tezpur (<i>Database received from Nodal Officer</i>).

Water Supply and Treatment Parameters (*Database received from Nodal Officer*).

- Proposed quantity of water to be supplied (in MLD) - **9.5 MLD**
- Proposed water treatment capacity to be added (in MLD) - **9.46 MLD**
- Proposed length of transmission network to be laid (in km)- **0.2 km**

Households and Water Connections

The consolidated data indicates that an estimated **14,451 households** in wards and 945 households in slums are expected to benefit from the project. Of these, 9,124 new connections are proposed in wards and 945 new connections are proposed in slums. In addition, 5,327 existing connections in wards are proposed to be serviced, while the consolidated row records no existing connections to be serviced in slums. (*Database received from Nodal Officer*).

Estimated & Awarded Project Cost

The consolidated funding data indicates ₹41.3676 crore under CAPEX central Assistance and ₹4.5964 crore from CAPEX State Funds. For O&M, ₹ 3.62 crore is recorded under O&M State Funds and ₹3.7437 crore under O&M XV FC. (*Database received from Nodal Officer*).

Table 5-15 Financial Details of DfT programme

Factors	Estimated amount	Awarded amount
Total project cost (in Cr.)	Rs. 82.57	53.3277
CAPEX (in Cr.)	Rs. 74.37	₹ 45.964
O&M (in Cr.)	Rs. 8.20	₹ 7.3637

5.3. DEHRADUN - Uttarakhand

Dehradun Municipal Corporation (DMC) is the civic body governing Dehradun, the interim capital of Uttarakhand and the headquarters of Dehradun district. Situated in the Doon Valley at the foothills of the Himalayas, it is the largest of the state's 11 municipal corporations by population and area. (Dehradun D. A., 2026)

5.3.1. City Profile

As per the 2011 Census, the population of the Dehradun Municipal Corporation area was 569,578, comprising 299,093 males and 270,485 females, giving a sex ratio of 907 females per 1,000 males. The literacy rate stood at 88.42%, higher than the national urban average. The wider Dehradun Urban Agglomeration (which extends beyond the Corporation's own limits) recorded a population of 706,124. The Dehradun Municipal Corporation exercises jurisdiction over 196.48 sq. km., following a boundary extension carried out in 2018 that incorporated adjacent villages and outgrowths into the Corporation's limits. (Office of the Registrar General & Census Commissioner, 2011)

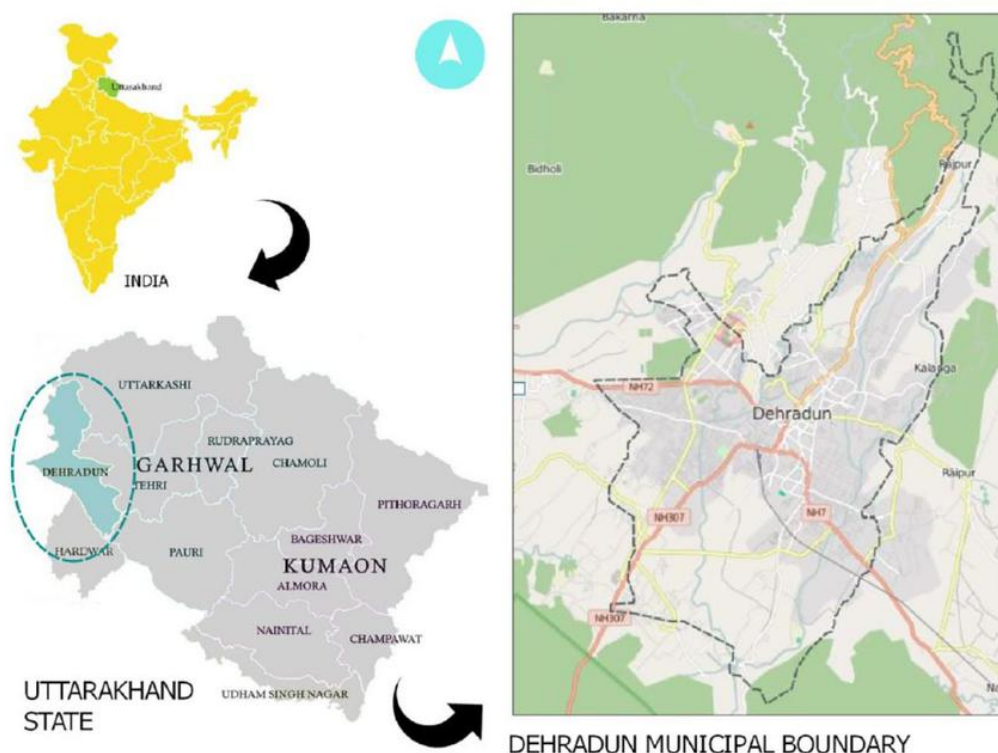
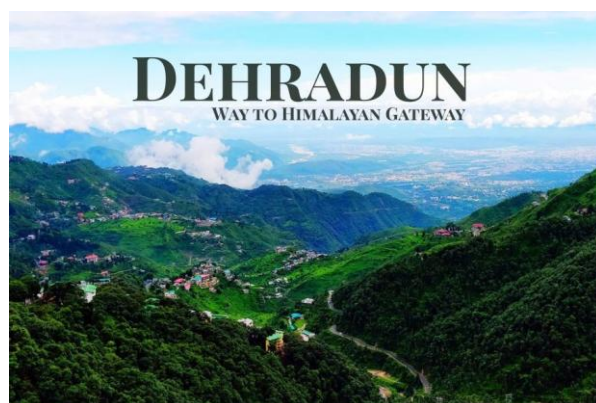


Figure 5-5 Location map of Dehradun City

5.3.2. Administrative Structure

Dehradun Municipal Corporation originated from the upgradation of the Dehradun Municipal Council to full Municipal Corporation status on 9 December 1998 by the Government of Uttar Pradesh, prior to the formation of Uttara hand in 2000. Administratively, the Corporation is headed by a Municipal Commissioner (an IAS officer), assisted by a Deputy Municipal Commissioner and Assistant Municipal Commissioners. (Dehradun N. N., 2026)

Wards

- 100 wards currently each represented by one directly elected corporate (99 corporates and a mayor)
- Ward count has grown over time: 34 wards (1991), 60 wards then 100 wards (2017 - 18), the last jump coming when 72 adjoining villages were incorporated into the Corporation's limits.
- Dehradun Municipal Corporation (DMC) is the local government responsible for civic administration and municipal services within the city in the city. Its functions include urban planning and development, sanitation, waste management, public health, roads and other civic infrastructure.
- Mussoorie Dehradun Development Authority (MDDA) - separate state body for statutory land-use/urban planning across the wider metropolitan area (MDDA, 2026)

5.3.3. Economic profile of the city

Dehradun's economy is significantly shaped by public administration, government services and the associated ancillary sectors. The city is also a long-established centre of education and scientific research, hosting national institutions.

The Indian Military Academy (IMA), located in Dehradun, gives the city continuing strategic and cantonment-linked economic significance, alongside a regional office of the Oil and Natural Gas Corporation (ONGC). Tourism forms a further pillar of the local economy: Dehradun functions as the principal gateway to Mussoorie, Rishikesh, Haridwar and the wider Garhwal Himalayas, generating demand for hospitality, transport and retail services. As the state capital, the city also anchors Uttarakhand's trading, wholesale and retail activity for the Doon Valley region, with commercial growth concentrated along corridors such as Rajpur Road, Chakrata Road and the Dehradun - Haridwar and Dehradun - Rishikesh highways. (Dehradun D. A., 2026)

5.3.4. Existing Water Supply Condition of Dehradun

Dehradun's water supply is managed through a shared institutional arrangement between state-level agencies responsible for planning, execution and day-to-day operation. The system draws on a mix of surface-water and groundwater sources, distributed across the city's zonal divisions through an ageing network of pipelines, tube wells and storage reservoirs. The following authorities are responsible for the city's water supply.

Table 5-16 Authorities - Water supply

SL.NO	Authority	Role
1.	Department of Drinking Water (DoDW), Government of Uttarakhand	State nodal department for water supply policy; both UPJN and UJS function under it
2.	Uttarakhand Peyjal Sansadhan Vikas Evam Nirman Nigam (Uttarakhand Peyjal Nigam, UPJN)	Responsible for large capital works, new scheme construction and overall planning of water supply augmentation in Dehradun
3.	Uttarakhand Jal Sansthan (UJS)	Constituted 26 August 2002 by amalgamation of the erstwhile Garhwal Jal Sansthan and Kumaun Jal Sansthan; responsible for day-to-day operation and maintenance (O&M), billing, and small works across Uttarakhand (excluding cantonment areas); Dehradun's urban supply is organised into zonal divisions (North, South and Pithuwala), each headed by an Executive Engineer (Uttarakhand Jal Sansthan, 2018)
4.	Uttarakhand Urban Sector Development Authority (UUSDA)	Project implementation unit for Asian Development Bank (ADB)-supported urban infrastructure projects in Dehradun, including tube well, Overhead Tank (OHT) and distribution-network works in newly added wards (ADB, Asian Development Bank, 2021)
5.	Dehradun Municipal Corporation (Dehradun Nagar Nigam, DNN)	Urban Local Body; grants No-Objection Certificates for land used for water infrastructure, and coordinates with UPJN/UUSDA on ward-level works, though bulk execution and O&M rest with the state agencies above (ADB, Asian Development Bank, 2021)
6.	Dehradun Cantonment Board	Separate authority responsible for water supply within Dehradun Cantonment (Garhi/Dakra and Prem Nagar areas), which fall outside UJS's jurisdiction

- The city is divided into 51 zones for water-supply management demarcated by topography, not by the Corporation's municipal ward boundaries (Deltares, 2024).
- Historically organized into 3 broad sub-systems: North zone (mainly surface water), South zone, and Pithuwala zone (both mainly groundwater/tube wells). (ADB, Asian Development Bank, 2011)
- Only 5 zones currently receive a sufficient supply (at the 135 lpcd benchmark). (Deltares, 2024)
- The remaining 46 zones are supply-deficient, with per-capita supply ranging as low as 65 lpcd against highs of ~170 lpcd in better-served zones like Nehru Colony and Rajendranagar. (ADB, Asian Development Bank, 2011)
- These 46 deficient zones are being upgraded through two parallel programmes, split evenly (Deltares, 2024).

Source of Water Supply

A piped water supply system has existed in Dehradun for more than a century, dating to 1885 under British administration, when pipelines were laid from a natural spring at Kolukhet, about 25 km from the

city; the system was remodelled and underwent major augmentation between 1936 and 1939 (Deltares, 2024).

Table 5-17 Source of Existing water supply

SL.NO	Source Category	Named Sources	Reported Quantum
1.	Surface water	Bijapur Canal; Bandal river; Kolhukhet spring (historic); Mausifali	≈ 25.86 MLD currently extracted for supply (Water Watch Numerical, 2026)
2.	Groundwater (tube wells)	Tube wells distributed across the city, concentrated in the South and Pithuwala zones	≈ 124.8 MLD currently extracted; groundwater constitutes approximately 90% of the city's total water supply
3.	Combined installed capacity (all sources)	-	≈ 257.68 MLD (i.e., substantially more than what is currently extracted and distributed) supply

The North zone of the city is supplied predominantly from surface-water sources, while the South and Pithuwala zones rely predominantly on groundwater drawn through tube wells. Dehradun's water supply network relies on approximately 232 tube wells citywide, with a combined installed capacity of about 226.88 MLD, though only around 96 tube wells are actively operational, producing roughly 142.81 MLD (Jaiswal, Thakur, Kumar, & Kannaujiya, 2021). This is supplemented by two major water works Dilaram Bazar and Shahanshahi Ashram and 2 operating Water Treatment Plants. Storage is provided through 64 Overhead Tanks and 15 Clear Water Reservoirs (grown from a single CWR at Kolukhet historically), together holding approximately 117 million litres, distributed via a pipeline network that has expanded from about 25 km in 1885 to over 550 km today. Despite total production of around 178 MLD, distribution losses mean only about 71.2-92.13 MLD (depending on the estimate used) actually reaches consumers.

Tap - House Connections

A single, dated, city-wide total for Uttarakhand Jal Sansthan-managed household tap connections in Dehradun's main urban area was not identified in the public sources reviewed for this note. The following connection figures are available at the sub-area or scheme-package level:

Table 5-18 Details of Tap connections

Area / Package	Reported Connections	Authority
Dehradun Cantonment - Garhi/Dakra area	2,741 water connections	Dehradun Cantonment Board (separate from UJS)
ADB-funded DMA 7, Package 1 (Nai Basti area, added wards)	950 new consumer connections (planned)	UUSDA / UPJN (ADB, Asian Development Bank, 2021)
ADB-funded Banjarawala scheme (South Dehradun added wards)	5,400 water connections (planned, across 136 km of new network)	UUSDA / UPJN UPJN (ADB, Asian Development Bank, 2021)

Other Water-Related Schemes and Programmes

Table 5-19 Other water supply related schemes and programmes

SL.NO	Scheme / Programme	Funding Source	Use / Scope
1.	Jawaharlal Nehru National Urban Renewal Mission (JNNURM) Water Supply Augmentation Scheme	JNNURM (Central + State), Rs. 77.78 crore	Construction of 30 tube wells (The Tribune, 2009)
2.	Uttarakhand Urban Sector Development Investment Program (UUSDIP) - Tranche 2	Asian Development Bank (ADB) loan + State share,	Water Treatment Plant works in Dehradun; cleaning of water tanks and reservoirs; water supply works in Roorkee and Haldwani (ADB, Asian Development Bank, 2011)
3.	Uttarakhand Urban Sector Development Investment Program (UUSDIP)- Tranche 4	ADB loan + State share	Dehradun water distribution network; gravity water main from Bindal to Dilaram; modernisation of pump houses; mobile/in-situ generators; a 68-MLD sewage treatment plant (ADB, Asian Development Bank, 2021)
4.	Uttarakhand Water Supply Program for Peri-Urban Areas	World Bank loan, ≈ USD 150 million (medium-term, 2018-2024)	Universal metered household connections with pressurised, 24×7 supply at 135 lpcd in rapidly urbanising peri-urban growth clusters, including the Dehradun–Rishikesh cluster (World Bank, 2017)
5.	Uttarakhand Integrated and Resilient Urban Development Project (UIRUDP)	ADB loan, implemented through UUSDA	District Metered Area (DMA)-wise construction of tube wells, Overhead Tanks, chlorination/disinfection systems, Ductile Iron pipe networks and new house-service connections, with SCADA and GIS systems, in newly added South Dehradun wards (e.g., Banjarawala, Nai Basti) (ADB, Asian Development Bank, 2021)

5.3.5. Drink from Tap Programme – Dehradun

For water-supply management, Dehradun is divided into 51 zones; only 5 zones receive a sufficient supply at the 135 lpcd benchmark, and the remaining 46 deficient zones are split between two parallel programmes 23 zones upgraded under AMRUT and 23 zones upgraded with support from the Asian Development Bank (ADB).

Prime Minister Narendra Modi inaugurated the Dehradun water supply coverage for the 23 AMRUT zones on 9 November 2025, during a programme marking the Silver Jubilee (25th anniversary) of Uttarakhand's formation. This formed part of a wider package of projects worth over ₹8,260 crore launched that day,

including over ₹930 crore of projects inaugurated and over ₹7,200 crore of projects for which foundation stones were laid among them the Song Dam Drinking Water Project, designed to supply 150 MLD of drinking water to Dehradun as a new bulk source. (Akashvani News, 2025)

AMRUT funding for Uttarakhand's seven Mission cities (Dehradun, Haridwar, Haldwani, Rudrapur, Kashipur, Roorkee and Nainital) has been reported at a combined ₹650 crore (₹585 crore Central share plus ₹65 crore State share), targeting 100% household water coverage at 135 lpcd. Within this 23-zone AMRUT umbrella, individual ward/DMA-level projects have been sanctioned, executed and in at least one documented case completed (CPHEEO_MoHUA, 2021). The most granular, project-level record available for this note is the Shastri Nagar 24×7 Water Supply Scheme, detailed in full below.

24×7 Water Supply Scheme Project

Table 5-20 Project details of DfT

Field	Value
Urban Local Body (ULB)	Dehradun
Project Type	Water Supply
Project Title	Shastri Nagar 24×7 Water Supply Scheme
Project Milestone	Project Completed
Number of Tenders	1
Physical Progress	100%
Financial Progress	95.93%
Expenditure Incurred	₹8.25 crore
Actual Completion Date	31 May 2025
Executed in PPP Mode?	No

The scheme's core objective is 24×7 water supply with last-mile connectivity. Proposed and delivered components include a 4.35 km distribution system, 1,250 ultrasonic smart water meters, 5 communication gateways, 6 electronic bulk flow meters, and 1 command centre. These components are intended to support continuous water supply, improved monitoring, and better management of the distribution system. Monitoring of water quantity and quality is carried out through Supervisory Control and Data Acquisition (SCADA) and smart sensors.

Storage Capacity

Table 5-21 Storage details of DfT

Parameter	Value
Proposed storage capacity to be newly built	0.31
Achieved storage capacity newly built	0.31

Households and Water Connections

An estimated 1,250 households across the covered wards are expected to benefit from the project. Of these, 115 were new connections proposed, and 1,135 were existing connections to be serviced/upgraded under the scheme.

Project Cost - Estimated and Awarded

Table 5-22 Fund estimated and awarded details

Cost Component	Estimated	Awarded
Total Project Cost (TPC)	₹9.8903 crore	₹9.8903 crore
CAPEX	₹8.6003 crore	₹8.6003 crore
O&M	₹1.29 crore	₹1.29 crore

CAPEX funding of ₹8.6003 crore is made up of ₹7.7403 crore under CAPEX Central Assistance (CA) and ₹0.86 crore from CAPEX State Funds, the O&M cost of ₹1.29 crore is entirely funded under O&M State Funds.

5.4. PURI - Odisha

Puri is a well-known port city and a Municipality in the Eastern Indian State of Odisha which borders the Bay of Bengal. The city acts as the Head Quarters of Puri District and is about 60 kilometers South of Bhubaneswar. Internationally recognized for its religious and cultural significance particularly with regards to the Jagannath Temple, Puri is considered as one among the four main pilgrimage centers in Hinduism that form the Char Dham. (Government_of_Odisha, 2026)

The significant factors contributing to the development and urbanization of Puri include its coastal location, religiosity, heritage characteristics, and tourist-based economy. Furthermore, the city has been identified by the Government of India under the Heritage City Development and Augmentation Yojana (HRIDAY) program for the purpose of developing the city through urban planning sensitive to preservation of heritage. (Government_of_Odisha, 2026)

5.4.1. City Profile

Geography

Located on the Eastern Coast of Odisha around the latitudes 19° and longitudes 84°29'E, bordering the Bay of Bengal, Puri is located at nearly sea level. As such, the oceanic setting has a strong influence upon both the physical environment and climate conditions within Puri.

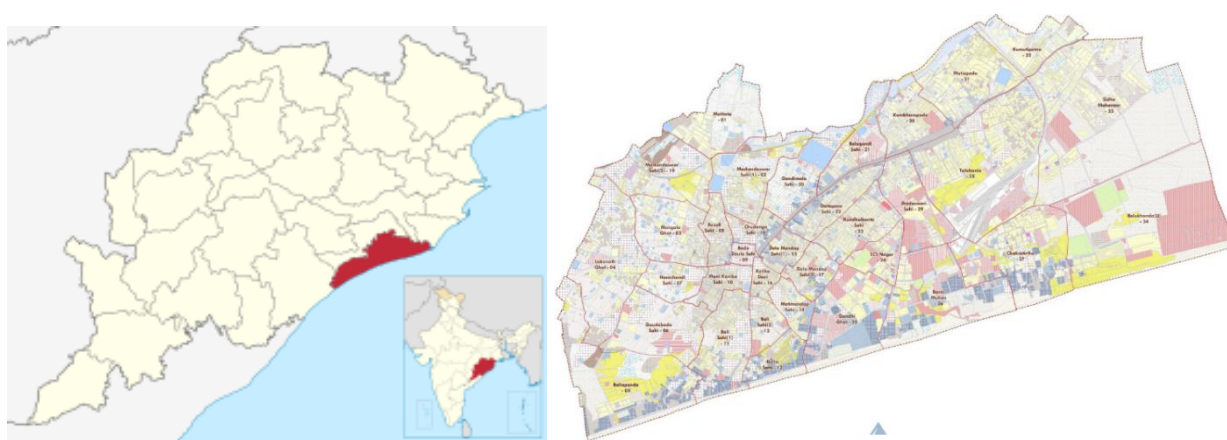


Figure 5-6 Location map of Puri

The geography of Puri District has been broadly classified as two main divisions:

Littoral Tract: Coastal area which lies in between inland alluvium and Bay of Bengal. Sandy ridges stretch across the coast line and represents the prominent coastal landscape of the district.

Level Alluvial Tract: Inland region is made almost completely from flat alluvial ground. The majority of the agricultural area for the district lies within this area. Most specifically rice (paddy) grows on these soils. This region is drained through many of its numerous channels and distributaries which are part of the Mahanadi River system. The combination of the coastal and alluvial landscapes gives Puri a unique physical character, with beaches, sandy coastal stretches, agricultural lands and watercourses forming important elements of the regional landscape.

Climate

The tropical coastal climate that Puri has is largely based on it being near the Bay of Bengal. In general, the year can be split into three different seasons; summer, monsoon and winter.

- **Summer:** March to June
- **Monsoon:** June to September
- **Winter:** October to February

Temperature varies between about 17° C (62.6 ° F) and 34° C (93.2°F). The coastal area experiences seasonal weather patterns similar to those experienced along the coastline of the Bay of Bengal.

5.4.2. Administrative Structure and Demographic Profile

Puri functions as the Administrative Head Quarters (HQ) for Puri District. According to 2011 Census, the district has a population of 1,698,730 which comprises 865,380 male populations and 833,350 female populations. (Odisha, ULBs List, 2026). The average Population Density is 488 persons/sq.km.



Figure 5-7 Area and Demographic profile

At City Level: In 2011, Puri had an approximate population of about 2.01 lakhs. The Odisha Housing & Urban Development Department recorded that there were an estimated 200,564 people within Puri's Urban Local Body in 2011.

Administrative Divisions:

Table 5-23 Administrative data

Descriptions	Area / Numbers
Area	3479.00 sq.km.
No. of Blocks	11
No. of Tahasils	11
No. of Municipality	01
No. of Grampanchayat	268
No. of Villages	1722

Source: (Odisha, ULBs List, 2026)

5.4.3. Existing Water Supply Condition of Puri

The urban water supply system of Puri is managed within the institutional framework of the Government of Odisha, with the Water Corporation of Odisha (WATCO) playing a major role in the operation, management and development of the urban water supply system.

The Urban Water Supply System in Puri has become stronger due to the expansion of its water source, the construction of treatment plants, new water pipe systems for transportation and distribution, new tanks for water storage and better management of the entire water supply network. WATCO, as part of the Odisha government's institutional framework, manages operations and development of the urban water supply system. In addition to this work, the state's programs for urban water supply also seek to move away from reliance upon groundwater to more stable and long-term supplies using surface waters.

Institutional Framework for Water Supply

Water Corporation of Odisha (WATCO)

The Water Corporation of Odisha (WATCO) is a key agency responsible for urban water supply services in Odisha. The major responsibilities of WATCO include the provision of safe and treated drinking water, development of new water supply projects and operation and maintenance of existing water supply infrastructure.

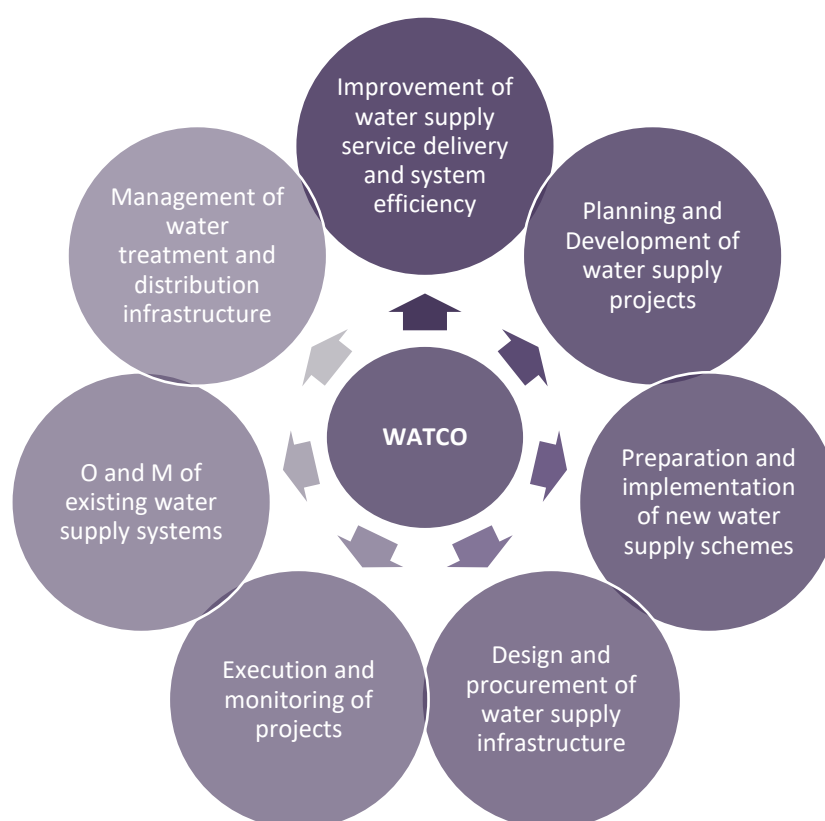


Figure 5-8 WATCO

Public Health Engineering Organization (PHEO)

The Public Health Engineering Organization (PHEO), is another key agency involved with the provision of the urban water supply infrastructure in Odisha. It plays a critical role in enhancing the urban water supply infrastructure throughout the State. This includes the development of new or improved water supplies; treatment processes for drinking water production; the design and construction of water supply distribution networks and the associated transmission systems.

Major Government Programmes Supporting Urban Water Supply

The Government of Odisha implements urban water supply projects through multiple programmes and funding mechanisms. At present, the major programmes identified for urban water supply are **BASUDHA, and DfT (AMRUT 2.0)**. In FY 2024–25, 112 projects were completed under these flagship programmes across the State. (Odisha, Report of the Sixth State Finance Commission, Odisha 2026–2031, Volume I, 2026)

BASUDHA

The **BASUDHA programme** is an important State-level initiative for improving water supply infrastructure. It supports the development and augmentation of water supply systems, including source development, treatment, and transmission and distribution infrastructure.

AMRUT and AMRUT 2.0

The **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)** identifies water supply as one of its principal components. The programme supports the development and improvement of urban water supply infrastructure, including water sources, treatment plants, distribution networks and related infrastructure. (Odisha, Report of the Sixth State Finance Commission, Odisha 2026–2031, Volume I, 2026)

5.4.4. Drink from Tap Programme - Puri

Odisha's Government initiated Drink from Tap (DfT) Mission to ensure all households have 24x7, pressurized and potable water supplied through their tap. The initiative was taken in August 2019. The main goal of the initiative was to have access to clean and reliable drinking water so that there will be no need for boiling, filtering, or storing water within the house. Puri has been chosen as one of the pilot cities for the implementation of this initiative. In 2021, Puri became the first Indian city where all households received citywide Drink from Tap water supply (100% coverage) (Rath, 2025). To implement the initiative, many areas were given facilities of water treatment, storage, distribution, metering, water quality monitoring, institutional frameworks, community participation and smart water management. Involvement of WATCO, the Water Corporation of Odisha along with the Odisha Urban Academy and other governmental bodies helped to implement the DfT-Mission in Puri. This initiative transformed the traditional intermittent water supply system into a 24/7 consumer-orientated water supply service.

Background and Need for DfT in Puri

Prior to the implementation of the DfT Mission in Puri, the city's existing water supply systems presented many services delivery and operation problems. Due to its intermittent nature and vulnerability to contamination, the water supply system had a high degree of variability throughout the distribution network regarding both equal access to supply and consistent pressure.

Major concerns related to the water supply in Puri before DfT were:

- Intermittent and unpredictable water supply availability.
- Inconsistent water pressure in the entire distribution network.
- High levels of physical loss through leakage from the distribution network.
- Risk of contamination in the distribution networks.

- Limited level of piped water coverage for households.
- Dependence by the majority of residents on public standpipes and/or alternative water sources.
- Public perception of dissatisfaction with the quality and reliability of provided water.

Implementation of DfT

The implementation involved improvements across the entire water-supply system, from source to tap, with regard to treatment, storage, distribution and consumer level services. Pipeline upgrades have added strength to existing assets as well as the addition of new storage tanks, pump station upgrades and improved pressure management throughout the system. In addition, the implementation of Smart Distribution Zones and District Metered Areas improved monitoring of the distribution network and control water losses.

Another key area of focus for the program is the implementation of Internet of Things (IoT) based Smart Water Management System. These smart sensors are placed at various points on the system allowing for the ability to monitor the flow rate of water, pressure and quality of the water in real time. The system allows for remote monitoring of the system, enables faster identification and mitigation of operational problems, and provides for increased resiliency of the water supply system when it encounters natural disasters like cyclones.

Community Participation through Jalasathi

Community involvement is incorporated into the Jalasathi program where women of Self-Help Group are involved as a liaison between the WATCO (the water supplying agency) and its customers. As part of their role, the Jalasathis provide support to customers by performing functions such as reading meters, distributing bills and collecting payments, assisting in connecting new users to the system, conducting on-site assessments of customer-side water quality, and addressing grievances. The Jalasathi program has created an additional level of communication and engagement between the customer and the supplier of drinking water. Additionally, it provides another avenue for women's participation in delivering services within government.

Outcomes of DfT Implementation

Following the DfT implementation in Puri, there were positive changes to the water-supply services for the city. Every resident of Puri has access to drinkable tap-water (Drink from Tap) on a continuous basis. All of the households in the town have both full house-connections and full metered connections. Additionally, non-revenue water loss is less than 15% and revenue collection is greater than 97%.

In addition, the system allows for continuous real-time tracking of the status of water supply and quality. It includes GIS based data about consumers and assets. Complaints can be registered automatically and resolved quickly as well. According to the documentation for the project, around 2 lakhs people who live in Puri benefit directly from their 24/7 water supply.

Scalability of the DfT Model

Puri's experience, is being developed into a template to scale up the DfT Mission to other urban locations in Odisha. Similarly, Jalasathi is now being scaled up to additional city locations, demonstrating the

possibility of combining technological support for managing water supply systems with community involvement.

Costs and duration of the DfT Project

According to reports, the DfT pilot project in Puri costed approximately Rs. 46 crores and took about nine months to complete. (Drink from TAP Mission, Housing & Urban Development Department, Government of Odisha, n.d.) This pilot project established a consistent twenty-four hours per day, and seven days per week (24×7) potable water distribution system.

5.5. NAGPUR - Maharashtra

Nagpur, also known as the "Orange City," is the third-largest city in Maharashtra after Mumbai and Pune, and the largest city in central India. Located at the geographical centre of the country marked by the Zero Mile Stone, Nagpur is the administrative headquarters of Nagpur district and serves as the winter capital of Maharashtra, hosting the state legislature's winter session.

5.5.1. City Profile

Nagpur's civic administration traces back to 1864, when a Municipal Council was constituted to govern an area of about 15.5 sq. km. with a population of roughly 82,000. The Nagpur Municipal Corporation (NMC) was constituted in March 1951 under the C.P. and Berar Municipal Corporation Act, and its jurisdiction has since expanded through successive annexations of surrounding villages and townships to its present statutory area of approximately 227 sq. km. As per the 2011 Census, the Corporation's population stood at 2,405,665, while the wider Nagpur Urban Agglomeration recorded 2,497,870; current estimates place the city's population at well over 3.5 million.

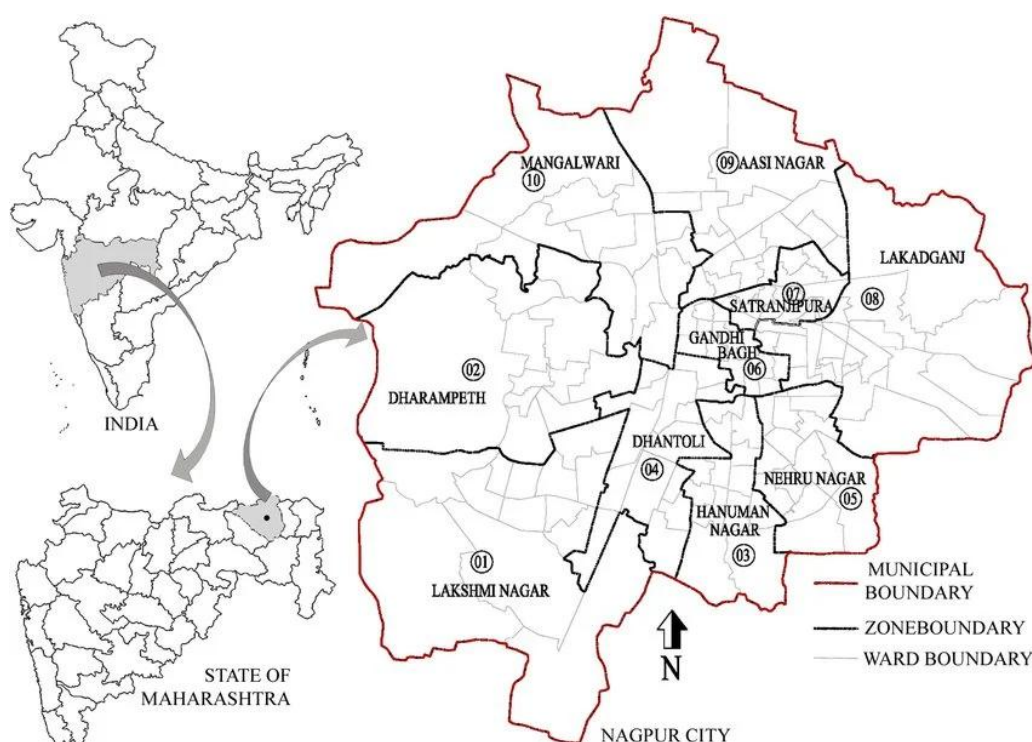
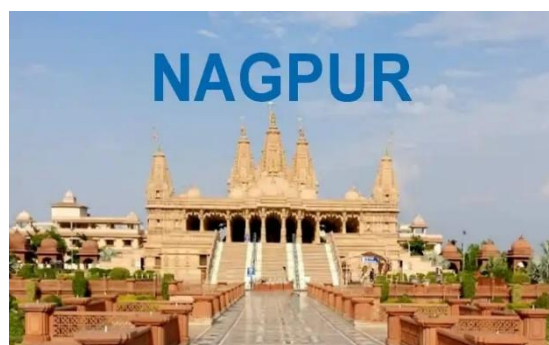


Figure 5-9 Location map -Nagpur
Source: Kotharkar, 2019

5.5.2. Administrative Structure

NMC is headed politically by an elected Mayor and Deputy Mayor and administratively by a Municipal Commissioner, an Indian Administrative Service officer. As of the most recent civic elections, the Corporation Council comprises 151 directly elected councillors, one per ward, with the ruling and opposition benches drawn from the state's major political parties. For field administration, the city is organised into ten administrative zones, each headed by a Zonal Officer/Assistant Commissioner responsible for local service delivery, including water supply, sanitation, roads and public health within that zone.

Table 5-24 Administrative structure

Category	Details
Governing Body	Nagpur Municipal Corporation (NMC)
Established	March 1951
Corporation Council	151 elected Corporators (one per ward)
Total Wards	151
Total Zones	10
Zone Names	Laxmi Nagar, Dharampeth, Hanuman Nagar (VRTM), Dhantoli, Nehru Nagar, Gandhi Baugh, Sataranjipura, Lakadganj, Ashi Nagar, Mangalwari
Zonal Head	Zonal Officer / Assistant Commissioner (one per zone)

5.5.3. Economic profile of the city

Nagpur's economy rests on trade, logistics, manufacturing and increasingly IT-enabled services. Historically known for its orange trade, which gave the city its popular name, Nagpur today hosts MIHAN-SEZ, a large cluster of IT, aviation-MRO and logistics enterprises benefiting from the city's central location and cargo-hub airport. The city is also a centre for mining-equipment manufacturing, power-generation, defence and ordnance production, and a growing services sector, supported by several engineering and medical education institutions that make Nagpur an educational hub for the wider Vidarbha region.

5.5.4. Existing Water Supply Condition of Nagpur

Water supply in Nagpur is delivered through a layered institutional arrangement combining the municipal corporation, a corporation-owned special purpose vehicle, a private operating partner, and state and central government departments responsible for policy and funding.

Table 5-25 Department related to water supply

Authority	Role
Nagpur Municipal Corporation (NMC)	Statutory authority for water supply; owns all water supply assets (sources, treatment plants, network, reservoirs); exercises this function through its Water Works (Engineering) Department (World bank , 2026)
Nagpur Environmental Services Limited (NESL)	Special purpose vehicle wholly owned by NMC; holds the underlying concession for the 24x7 water supply project on NMC's behalf (World bank , 2026)
Orange City Water Private Limited (OCW)	Private operating partner under a long-term PPP concession; a 50:50 joint venture of Veolia Water (India) Pvt. Ltd. and Vishvaraj Environment Pvt. Ltd.; responsible for treatment plant operation, network management, metering, billing and customer service
Government of Maharashtra – Urban Development Department	State-level policy oversight, plan approvals, and release of state matching funds for water-sector schemes
Ministry of Housing and Urban Affairs (MoHUA), Government of India	Central sanctioning authority for JNNURM (earlier) and AMRUT/AMRUT 2.0 (currently), funding major augmentation and network works
Asian Development Bank (ADB)	Non-sovereign external lender that has partially funded capital expenditure for water supply augmentation works, including the Pench-IV project (ADB, Asian Development Bank, 2013)

Existing Water Sources

Nagpur's water supply depends on two principal surface-water sources, supplemented marginally by a local lake and limited groundwater use.

Table 5-26 Existing source of water supply

Source	Description	Approx. Contribution
Pench Dam (Navegaon Khairi Reservoir)	On the Pench River; commissioned 1976–77 using tail-race releases from the upstream Totladoh hydropower dam; augmented in stages through Pench I–IV schemes	Over 70% of city supply; Pench Right Bank Canal allocation of about 255.71 MCuM/year
Gorewada Lake	Local reservoir; minor, supplementary source for the city	Small supplementary share
Groundwater	Limited use through wells/borewells	Marginal, roughly 10 MLD

Distribution Network and Connections

The city's water distribution network extends to approximately 3,000 km of pipeline, reaching households and non-domestic consumers across NMC's jurisdiction. Bulk distribution infrastructure has also been expanded under source-augmentation works, including an additional 278.3 km of bulk distribution network laid across five zones as part of the Pench-IV scheme (ADB, Asian Development Bank, 2013)

Bulk water is pumped through key installations at Kanhan, Mahadula and Gorewada, and balanced at the Master Balancing Reservoir at Governor House, fed from the Godhani treatment plant. The Pench-IV augmentation scheme also added two new Ground Service Reservoirs and further Elevated Service Reservoirs to the city's storage network, supporting more even distribution as the network has expanded. An assessment of the system found Non-Revenue Water, covering physical leakage, commercial losses and metering error, at approximately 54% of water supplied, with an overall system efficiency of only about 32%.

Financial and Operating Parameters

NMC's reported annual expenditure on water supply operation and maintenance stands at approximately Rs. 95 crores, with an annual energy bill for pumping and treatment reported in the range of Rs. 22 to 28 crores. On the revenue side, annual water-charge demand has been reported at approximately Rs. 71.5 crore against recovery of around Rs. 50 crores, leaving arrears of roughly Rs. 21.5 crore; the cost of treating water has been estimated at approximately Rs. 3.30 to 5.30 per 1,000 litres across different assessment periods.

Water Supply Schemes and Programmes

Alongside the city-wide 24x7 PPP concession, NMC has implemented a series of distinct, funded schemes over the years to strengthen the underlying water supply system covering leak reduction, energy efficiency, network expansion, source augmentation, wastewater reuse, and pro-poor and financial reforms.

Table 5-27 Existing schemes & programmes - Water supply

Scheme / Programme	Fund (Approx.)	Use / Purpose
Leak Detection Programme (JNNURM Phase-1)	Rs. 3.30 crore	Installed flow meters from source to ESR; reduced billed-water losses (UFW) from 23% to about 2% in the pilot area (Nagpur Municipal Corporation, 2014)
Water Audit Programme	Rs. 25.00 crore	Piloted 24x7 supply for 15,000 connections; replaced 20,000 consumer meters; brought unaccounted-for water below 25% (Nagpur Municipal Corporation, 2014)
Energy Audit Programme	Rs. 28.00 crore	Replaced pumps installed before 2000 with units of at least 70% efficiency; reduced pumping head by about 12 m on the Pench-1 system; introduced centralised monitoring
Expansion of Distribution Network	Rs. 43.21 crore	Extended piped connectivity to 572 layouts, bringing over 2 lakh additional population under piped water supply
Pench-IV Augmentation Scheme	Rs. 422 crore sanctioned (revised to ≈ Rs. 550 crore); JNNURM + ADB loan	Augmented raw and treated water availability by 115 MLD via a new WTP at Godhani; reduced conveyance losses in the Pench canal (ADB, Asian Development Bank, 2013)
Upgradation of Kanhan Water Supply System	Rs. 83 crore (JNNURM)	Improved optimum utilisation of the Kanhan River as an additional raw-water source for the city

Water Reuse Project (WENEXA-II)	Rs. 131 crore (JNNURM)	Treated wastewater reuse project aimed at making the region water-surplus and reducing dependence on freshwater sources
New Water Supply Policy for Slums	Policy reform (no separate capital outlay)	Extended metered, formal connections and improved service to urban-poor and slum households, reducing unauthorised/unmetered use
Rationalisation of Water Tariff and Telescopic Billing	Revenue reform (no separate capital outlay)	Aimed at full recovery of operation and maintenance costs while using slab-based (telescopic) tariffs to encourage water conservation
Kanhan-Kolar Barrage Project (revived, under consideration)	Central funding being sought; cost not yet finalised	Proposed new barrage at the Kanhan-Kolar confluence to reduce dependence on the Pench reservoir and improve raw-water availability, particularly in East and North Nagpur during summer

5.5.5. Drink from Tap Programme - Nagpur

Complementing the OCW concession, NMC has sanctioned a dedicated project under AMRUT 2.0 titled "Work of Water Distribution Infrastructure in Unauthorized and Authorized Layouts/Localities/Slums in Nagpur City, including Construction of Sump with Feeder Main and Providing/Installing Booster Pumps." Unlike the OCW concession, this project is executed departmentally rather than in PPP mode, and is specifically targeted at extending 24x7, metered water supply and reducing non-revenue water in authorised and unauthorised layouts and slum localities that required dedicated network augmentation beyond the original concession area (Database received from Nodal officer).

Table 5-28 Details of DfT – Nagpur

Factors	Details
Project Milestone (current stage)	Contract Awarded
Number of Tenders	14
Physical Progress	84.93%
Financial Progress	79.96%
Expenditure Incurred	₹284.41 crore
Excess Expenditure Incurred	₹9.79 crore

The project's stated components span storage, distribution network, pumping stations and transmission network infrastructure, with meters and sensors identified as the monitoring elements. Its key declared features are non-revenue water (NRW) reduction, 24x7 water supply, and last-mile connectivity - placing it squarely within the wider DfT objective of converting intermittent supply into safe, continuous, drink-from-tap quality water at the household level (*Database received from Nodal officer*).

Table 5-29 Infrastructure details – DfT

Infrastructure Component	Proposed Scale
New storage capacity	1 ML
Transmission network (new)	62 km
Distribution network (new)	178 km
Distribution network (existing, to be replaced)	82 km
New pumping stations	1
Pumping mains	0.5 km

Households and Water Connections

The project is estimated to benefit 3,19,171 households across regular city wards and a further 1,49,110 households in slum settlements. It proposes 67,352 new connections in wards and 17,416 new connections in slums, in addition to servicing 2,51,819 existing ward connections and 1,31,694 existing slum connections that already have a municipal link but require upgraded, continuous supply (*Database received from Nodal officer*).

Project Cost and Funding

The estimated Total Project Cost (TPC) is ₹421.85 crore, comprising an estimated capital expenditure (CAPEX) of ₹381.85 crore and an estimated operation and maintenance (O&M) cost of ₹40 crore. Following award, the contracted CAPEX and Total Project Cost were both fixed at ₹355.71 crore is financed through a combination of Central Assistance, State funding and Fifteenth Finance Commission grants (*Database received from Nodal officer*).

6. ANALYTIC FRAMEWORK FOR DfT IMPACT ASSESSMENT

The impact assessment of the Drink from Tap (DfT) Programme adopts a dual-perspective approach, evaluating the scheme from both the citizen's side (demand) and the Authority's side (supply). On the citizen's side, the assessment examines behavioural change, satisfaction levels, the impact of continuous water supply, and the equity of service delivery across the operational zones. On the Authorities side, it evaluates water quality, service impact, physical coverage, and institutional capacity of the scheme. Together, these two dimensions are assessed through a set of indicators and parameters designed to understand the reliability, scope, and scalability of the programme across the selected cities.

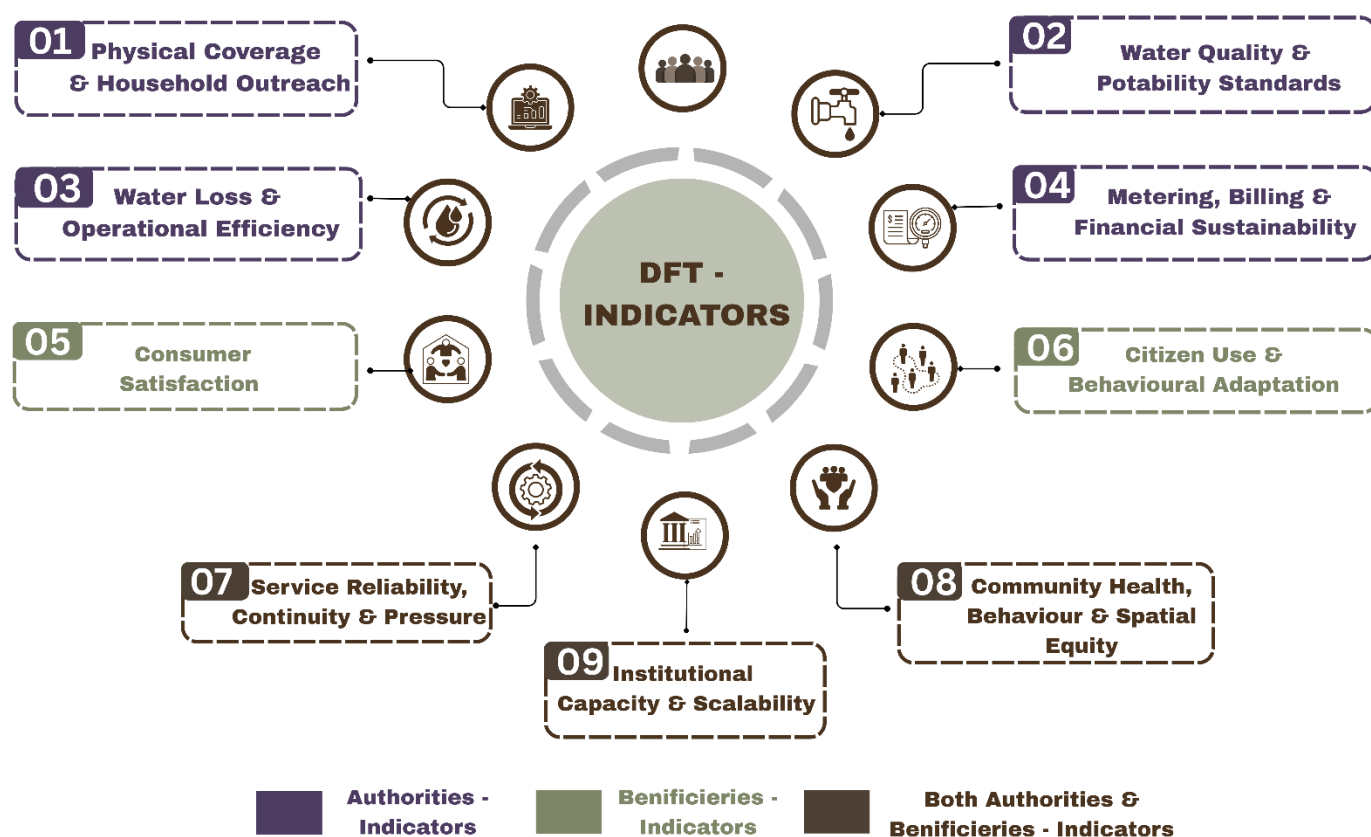


Figure 6-1 DfT Indicators

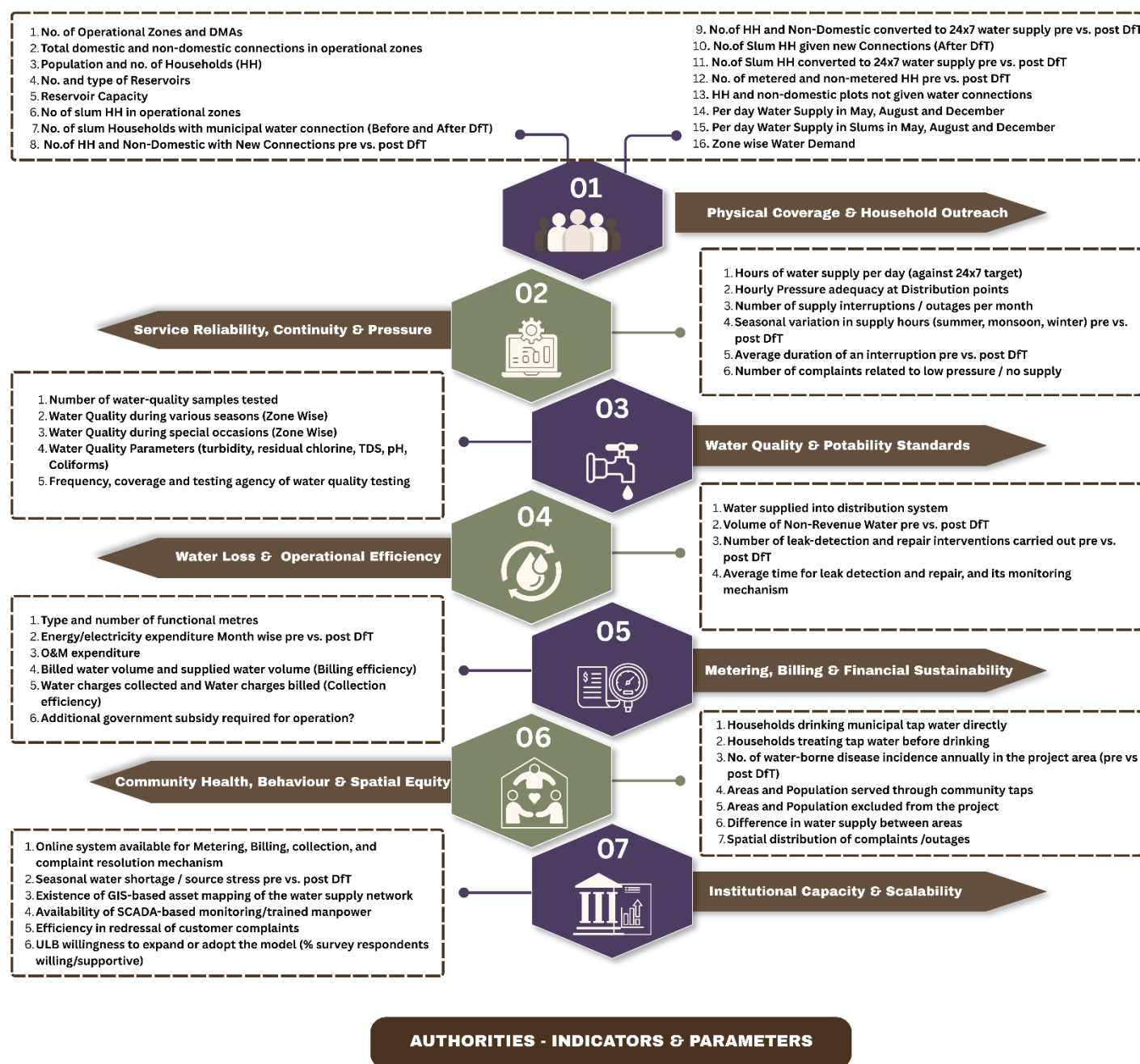


Figure 6-2 DfT Indicators and Parameters to authorities

This evaluation framework is structured across two complementary sets of indicators. The first set, comprising seven indicators and fifty parameters, is built on authority-based data and is designed to evaluate and assess DfT implementation from the perspective of the technical, financial and institutional performance recorded by the ULB. Each parameter under these seven indicators is framed to serve its parent indicator's specific evaluation objective. The second set, comprising five indicators and thirty-six parameters, is built on beneficiary-based data and is designed to capture and understand the actual impact of the DfT programme as experienced by citizens. Together, these two sets of indicators and parameters form the complete basis for assessing both the delivery performance of the programme and its realised impact on the people it serves.

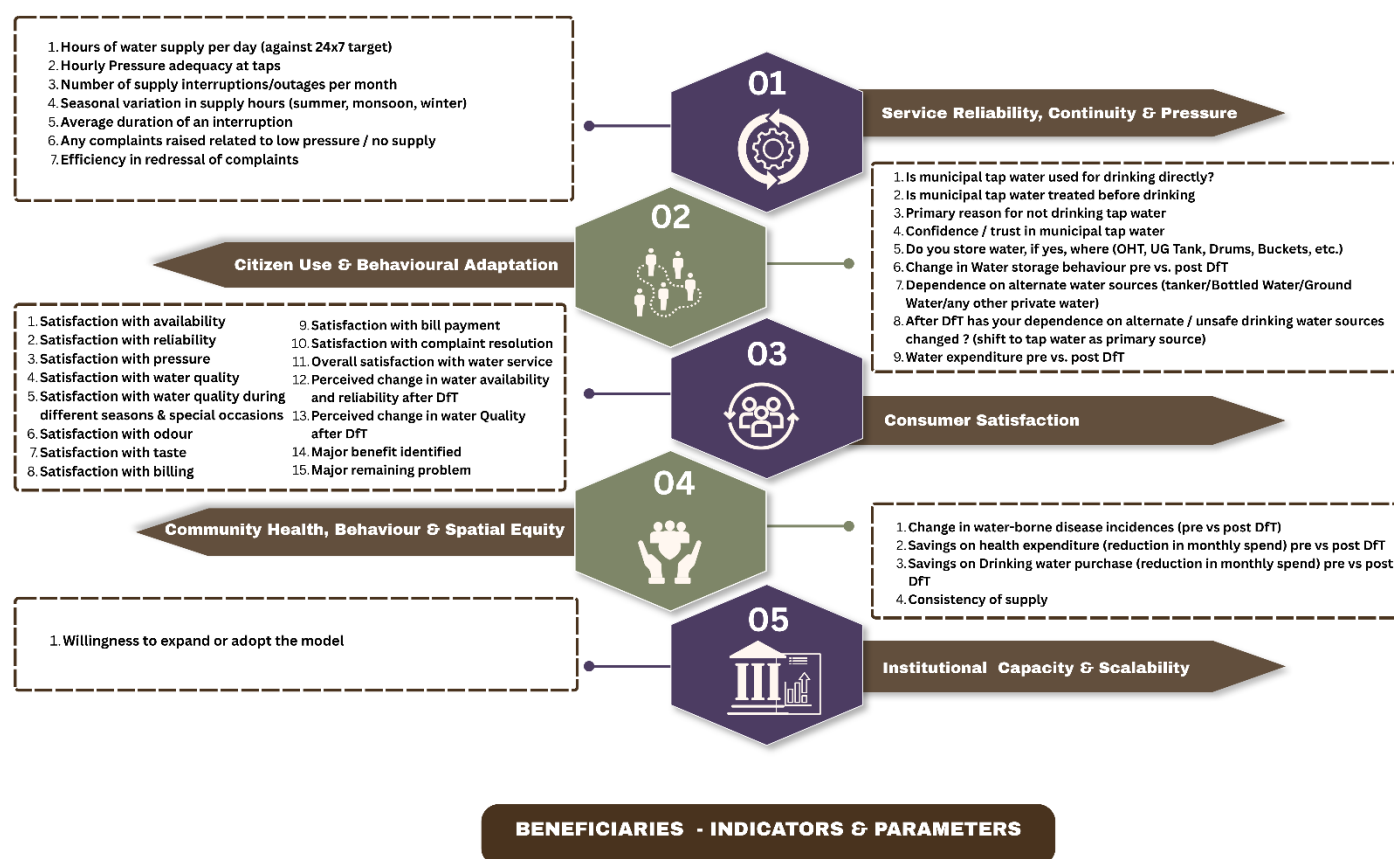


Figure 6-3 DfT Indicators to beneficiaries

6.1. Selected indicators & parameters

This impact assessment comprises a total of 9 indicators targeted to authorities and beneficiaries, with each indicator supported by a set of parameters that enable its detailed analysis.

6.1.1. Indicators & Parameters to Authorities

Indicator A: Physical Coverage & Household Outreach

This indicator establishes the baseline physical and demographic footprint of the water supply across the city. It captures the operational boundaries, connection universe, storage infrastructure, and the extent to which piped water access including for slum households has expanded before and after DfT implementation.

Parameter 1: No. of Operational Zones and DMAs

This parameter records the total number of District Metering Areas (DMAs) and operational/pressure zones into which the ULB has divided its water distribution network for management under the DfT programme. Each DMA is a hydraulically isolated sub-network with defined inlet and outlet metering points, allowing

zone-wise monitoring of supply, pressure and losses. Since the data is captured at the city level, it gives the total management units and understanding the number and boundaries of DMAs is foundational, helps assess whether the network has been adequately segmented for 24x7 monitoring, and reveals the administrative granularity at which the ULB manages continuous water supply.

Parameter 2: Total domestic and non-domestic connections in operational zones

This parameter captures the total number of active water supply connections both domestic and non-domestic recorded separately for each DMA / operational zone / ward. Collected from respected authorities and nodal officer records, it establishes the size of the connected customer base that the DfT programme serves at a granular spatial level. Comparing domestic against non-domestic connection counts helps the evaluation in composition of water supply quantity and identify zones with disproportionately high commercial load that may need different pressure or supply management. Because the data is disaggregated to ward level, this parameter lets the assessment map connection density against population and infrastructure investment, forming a key input for calculating per-capita coverage and projecting future demand across the city.

Parameter 3: Population and no. of Households (HH)

This records the resident population and the corresponding number of households in each DMA / operational zone / ward, sourced from ULB or census-linked secondary records. It provides the demographic denominator against which every coverage, connection and consumption figure in the survey is benchmarked. For example, knowing the number of households at ward level allows to calculate what proportion of the population actually has a functional DfT connection, rather than relying on citywide averages that can mask localised gaps. This parameter is especially critical for equity analysis, since comparing population figures across wards reveals whether investment and coverage have been distributed proportionately, or whether certain wards remain under-served relative to their population share.

Parameter 4: No. and type of Reservoirs

This parameter documents the number and type of water storage structures Elevated Service Reservoirs (ESR) and Ground Level Service Reservoirs (GLSR) available in each operational zone, as reported by the ULB. Storage infrastructure is a key determinant of whether a zone can sustain continuous, pressurised supply, since reservoirs balance fluctuations between production and consumption and provide a buffer during source or pumping interruptions. By recording the count and type at zone level, the evaluation can identify zones that are storage-deficient relative to their population and connection load, which is often a root cause of low pressure or intermittent supply.

Parameter 5: Reservoir Capacity

It's helps to captures the total storage capacity, in cubic metres, of all reservoirs (ESR/GLSR) in each operational zone. While the previous parameter counts the number and type of structures, this one quantifies their actual holding capacity, which determines how many hours of buffer supply a zone can sustain if production or pumping is interrupted. Comparing reservoir capacity against zonal water demand allows to assess storage adequacy and identify zones at risk of supply breakdown during peak demand or source disruption. This is a critical engineering input for judging whether the infrastructure investments

are sufficient to support the continuous 24x7 water supply, and it directly informs recommendations on where additional storage capacity may be required.

Parameter 6. No. of slum HH in operational zones

This parameter records the number of households located in notified and non-notified slum settlements within each DMA / operational zone / ward based on ULB or nodal agency records. Slum households are a priority focus of the DfT impact evaluation because they represent the population segment most likely to have historically lacked formal, reliable piped water access. Establishing the slum household count at a granular spatial level creates the denominator needed to calculate what share of slum households have since been connected, converted to 24x7 supply, or remain excluded. This is one of the important baseline figures to assess whether the programme has genuinely improved equity of access, making this parameter a prerequisite for every subsequent slum-related coverage and inclusion indicator in the survey.

Parameter 7: No. of slum Households with municipal water connection (Before and after DfT)

This parameter compares the number of slum households holding a formal municipal water connection before DfT against the number holding one after implementation, at DMA / ward level. It measures the programme's core inclusion objective directly, rather than relying on aggregate citywide connection growth that can mask whether the most vulnerable households actually benefited. The analysis reads this before-after gap zone by zone to understand where slum outreach has been effective and where connection growth still needs to reach informal settlements more fully in the next phase of implementation.

Parameter 8: Number of HH and Non-Domestic with New Connections pre vs. post DfT

This parameter counts the new domestic and non-domestic water connections issued before and after the DfT intervention, recorded separately for each DMA / operational zone / ward. It measures the pace and spatial spread of network expansion attributable to the programme, distinguishing organic growth that may have occurred anyway from the acceleration in connections that DfT specifically enabled. Tracking domestic and non-domestic connections separately also helps whether growth has been balanced or skewed toward commercial consumers, which has implications for both equity and revenue. Where connection growth is heavily concentrated in a few wards which shows where the remaining implementation effort is required to extend new connections more uniformly across the city.

New connections / total HH × 100

Parameter 9: Number of HH and Non-Domestic converted to 24x7 water supply pre vs. post DfT

This parameter tracks how many domestic and non-domestic connections have moved from intermittent to continuous (24x7) water supply, comparing the position before and after DfT at DMA / operational zone / ward level. Since 24x7 supply is the headline promise of the Drink from Tap programme, this parameter is one of the most direct measures of whether the programme is delivering on its core objective, as opposed to peripheral improvements such as new connections or better-quality testing. The analysis compares conversion rates across zones to understand whether continuous supply has been rolled out evenly, which informs the sequencing and prioritisation needed for the remaining zones still on intermittent supply.

Formula: 24x7 Conversion Rate (%) = (No. of Connections Converted to 24x7 / Total Connections in Zone) x 100

Parameter 10: Number of Slum HH given new Connections (After DfT)

This parameter records the absolute number of slum households that received a new municipal water connection specifically after the DfT programme commenced, captured at DMA, zone and ward level. Unlike parameter 7, which compares before-and-after totals, this figure isolates the fresh connections issued during the DfT period, giving a clean measure of incremental outreach to slum communities that can be directly attributed to the programme's implementation window.

Parameter 11: Number of Slum HH converted to 24x7 water supply pre vs. post DfT

This parameter measures how many slum households have moved from intermittent to continuous supply, comparing pre- and post-DfT figures at DMA / operational zone / ward level. In some cities, already had 24x7 supply before DfT was implemented, so the pre-DfT figure must be recorded accurately rather than assumed to be zero, to avoid overstating the programme's actual contribution. The analysis narrows the citywide 24x7 conversion figure down to slum households specifically, to assess whether continuous supply has genuinely reached this segment and where follow-up action is still needed.

Parameter 12: No. of metered and non-metered HH pre vs. post DfT

This parameter records how many household connections are fitted with a functional water meter versus how many remain unmetered, compared before and after DfT implementation at DMA / operational zone / ward level. Metering is a prerequisite for volumetric billing, leak accountability and demand management, so this parameter indicates how much of the technical foundation for financially sustainable, 24x7 supply has actually been put in place. A rising metered share after DfT suggests the programme is building the systems needed for long-term sustainability, while a persistently high non-metered share signals a gap that will undermine billing efficiency and non-revenue water control even if physical supply has improved.

Formula: Metering Coverage (%) = (No. of Metered Households / Total Households Connected) x 100

Parameter 13: HH and non-domestic plots not given water connections

This parameter counts households and non-domestic plots that, despite lying within a serviced at DMA / operational zone / ward, have not been given a water connection, recorded at ward level. It captures a residual coverage gap that connection and population figures alone do not reveal, since a zone can look well-served in aggregate while specific pockets remain excluded. The analysis reads this alongside population and slum data to size the remaining coverage gap precisely, so that the next phase of connection work can target these specific plots.

Parameter 14: Per day Water Supply in May, August and December

In these records the volume of water supplied per day, in MLD, during three representative months May, August and December at DMA / operational zone / ward level. Capturing supply across three seasons allows the analysis to assess whether supply has been genuinely consistent through the year rather than only during favourable conditions to households. Large month-to-month fluctuations at a given zone are read as an indication of source dependency or infrastructure limitation, and this understanding is used to identify zones that need supply-side strengthening.

Parameter 15: Per day Water Supply in Slums in May, August and December

It mirrors the previous one but isolates water supply volumes to slum settlements specifically, across the same three months, at DMA / operational zone / ward level. Comparing this against the citywide seasonal supply figure lets the analysis test whether slum areas receive proportionate supply relative to the rest of the city, or are disproportionately affected during periods of scarcity such as summer. This understanding verifies whether equity gains reported elsewhere in the survey are matched by actual, measurable supply volumes reaching slum households across all seasons.

Parameter 16: Zone wise Water Demand

This parameter estimates total water demand, in MLD, for each operational zone based on population, connections and per-capita consumption norms, as reported by the ULB. It is the benchmark against which actual supply figures are compared to determine whether each zone is adequately served or running a deficit. The analysis compares demand against supply, zone by zone, to identify areas that will need augmented production, storage or distribution capacity to sustain 24x7 supply as population and connections continue to grow.

Formula: Demand-Supply Gap (MLD) = Zone Water Demand (MLD) - Zone Water Supply (MLD)

Indicator B: Service Reliability, Continuity & Pressure

This indicator assesses whether water supply is actually continuous, adequately pressurised and free from frequent breakdowns, which together define the lived experience of a 24x7 service. It moves beyond physical coverage to measure operational performance.

Parameter 01: Hours of water supply per day (against 24x7 target)

This parameter records the actual number of hours per day that piped water is supplied in each operational zone and ward, measured against the 24x7 target. It is the most direct measure of whether continuous supply has actually been achieved, since coverage and connection numbers alone do not reflect the lived experience of a household still receiving water for only a few hours a day. The analysis maps supply hours zone by zone to identify precisely which parts of the city have reached true continuous supply and which still operate intermittently.

Parameter 02: Hourly Pressure adequacy at Distribution points

This parameter measures water pressure, in PSI, at distribution points on an hourly basis at DMA / operational zone / ward level. Continuous supply alone does not guarantee usability, since water must also reach households at sufficient pressure to serve upper floors and avoid contamination through back-siphoning in low-pressure pipes. The analysis cross-checks hourly pressure readings against supply-hour data to identify zones where supply looks adequate on paper but pressure drops below standard during peak demand, which points to where distribution-side strengthening is required.

Parameter 03: Number of supply interruptions / outages per month

Counts of unplanned supply interruptions recorded each month in each DMA / operational zone / ward level, drawn from ULB operational logs. Frequent interruptions, even if individually short, erode confidence

in supply continuity and push households back toward storage tanks or alternative sources. The analysis uses this monthly, zone-wise count to identify network segments that are structurally weak or prone to repeated failure, which is used alongside the average-duration parameter to prioritise sections of the network for maintenance and reinforcement.

Formula: Interruption Frequency Rate = (Total Interruptions in Zone / No. of Connections in Zone) x 1,000

Parameter 04: Seasonal variation in supply hours (summer, monsoon, winter) pre vs. post DfT

This parameter compares average daily supply hours across summer, monsoon and winter, before and after DfT at DMA / operational zone / ward level. Many intermittent systems show sharp seasonal drops in supply, particularly in summer, so this parameter tests whether DfT has genuinely smoothed out that volatility rather than only improving average annual figures. The analysis tracks the gap between seasonal extremes over time to assess system resilience and to identify zones where source augmentation or storage strengthening is still needed for year-round continuity.

Parameter 05: Average duration of an interruption pre vs. post DfT

Calculates the average length of each supply interruption, in hours per month, comparing the position before and after DfT at DMA / operational zone / ward level. While parameter 19 counts how often outages occur, this one measures how long each last, reflecting the responsiveness of operation and maintenance activity. The analysis reads frequency and duration together to build a complete picture of network reliability, which is used to assess whether maintenance response has genuinely improved alongside physical infrastructure.

Parameter 06: Number of complaints related to low pressure / no supply

This parameter records the number of citizen complaints specifically related to low pressure or no supply, logged through the ULB complaint system at DMA / operational zone / ward level. Complaint volumes serve as a citizen-reported cross-check against the technical supply and pressure readings collected elsewhere, since a zone with high complaints despite adequate technical data suggests a gap between recorded and experienced service. The analysis tracks whether complaint volumes have declined since DfT was introduced, as a citizen-facing measure of improved reliability.

Indicator C: Water Quality & Potability Standards

This indicator evaluates whether the water delivered through the DfT network is actually safe to drink directly from the tap, which is the defining promise of the programme. It covers the extent, frequency and seasonal spread of quality testing, and the specific chemical and bacteriological parameters monitored against potability standards.

Parameter 01: Number of water-quality samples tested

This parameter records the total number of water samples collected and tested for quality parameters in each DMA / operational zone / ward level based on ULB testing logs. Testing volume is a proxy for how rigorously potability is being monitored, since the promise of drinking-quality water directly from the tap needs to be backed by an adequate and representative sampling regime. The analysis checks testing

coverage against prescribed norms to establish how reliable the quality claims for each zone actually are before those results are used elsewhere in the survey.

Parameter 02: Water Quality during various seasons (Zone Wise)

It presents a composite water quality index for each zone, calculated separately across different seasons, drawn from ULB monitoring data. Water sources and networks are often more vulnerable to contamination during monsoon, so tracking quality seasonally tests whether the system maintains potability year-round or only during favourable dry-season conditions. The analysis compares seasonal index values across zones to identify where resilience gaps exist, which is used to prioritise monsoon-specific safeguards such as improved disinfection or storage protection.

Parameter 03: Water Quality during special occasions (Zone Wise)

This parameter captures a water quality index recorded during special occasions, such as festivals or large public gatherings, when demand surges or network stress can temporarily compromise supply quality, reported at zone level. These periods place unusual strain on pumping schedules and disinfection contact time. The analysis compares quality performance during such events against normal-day readings to assess whether the ULB's quality assurance systems hold up under peak-demand conditions, and not only during routine operation.

Parameter 04: Water Quality Parameters (turbidity, residual chlorine, TDS, pH, Coliforms)

This parameter records the measured values for the core physio-chemical and bacteriological indicators of potability, turbidity, residual chlorine, TDS, pH and coliforms at DMA and zone level. These are the specific thresholds under IS 10500 and CPHEEO guidelines that determine whether water is safe to drink without further treatment. The analysis compares results against prescribed limits, parameter by parameter, to identify precisely where and why water may fail potability standards, rather than producing a single pass/fail verdict for each zone.

Parameter 05: Frequency, coverage and testing agency of water quality testing

This documents how often water quality testing is conducted, how much of the network it covers, and which agency performs the testing ULB laboratory, state PHED, or accredited third party at DMA, zone and ward level. The credibility of any quality result depends on these institutional details, since infrequent testing or reliance on the operating authority itself can weaken confidence in reported compliance. The analysis reviews testing frequency, coverage and independence together to assess the overall rigour behind the water-quality data used in the survey.

Indicator D: Water Loss & Operational Efficiency

This indicator examines how efficiently water is moved from production to consumption, focusing on losses in the distribution network and the system's ability to detect and repair leaks quickly. Non-revenue water and repair responsiveness are core determinants of both the technical and financial sustainability of a 24x7 network. These parameters reveal whether operational efficiency has kept pace with expanded coverage.

Parameter 01: Water supplied into distribution system

This parameter records the total volume of water, in MLD, pumped into the distribution network at DMA / operational zone level, measured at bulk metering points. This is the starting figure for calculating non-

revenue water and overall system efficiency, since every downstream loss or unbilled consumption is measured as a deduction from this baseline volume. The analysis relies on accurate, zone-wise bulk metering to establish this figure, which is the precondition for every efficiency and loss-related calculation in this section.

Parameter 02: Volume of Non-Revenue Water pre vs. post DfT

This quantifies Non-Revenue Water (NRW) produced and supplied but not billed, due to leakage, illegal connections or metering inaccuracies comparing volumes before and after DfT at DMA / operational zone level. NRW is a widely used utility performance benchmark, so the analysis compares pre- and post-DfT figures to assess whether the programme has improved technical and commercial efficiency, and not only supply continuity. This understanding is used to identify zones where loss-reduction measures still need to be strengthened.

Formula: $NRW (\%) = [(Water\ Supplied\ into\ System - Water\ Billed\ to\ Consumers) / Water\ Supplied\ into\ System] \times 100$

Parameter 03: Number of leak-detection and repair interventions carried out pre vs. post DfT

This parameter counts leak-detection surveys and repair interventions carried out each month, comparing activity levels before and after DfT at DMA / operational zone level. An increase in intervention frequency after DfT indicates strengthened leak management, which matters more under continuous pressure, since undetected leaks cause greater loss under 24x7 supply than under intermittent supply. The analysis reads this alongside the NRW figure to understand whether efficiency gains are being driven by active leak management or by other factors such as new pipe-laying.

Parameter 04: Average time for leak detection and repair, and its monitoring mechanism

This parameter measures how long it takes, on average, to detect and repair a leak, together with a description of the monitoring mechanism used SCADA alerts, citizen reporting, or routine patrol at DMA and zone level. Response time affects how much treated water is wasted and how long a network is exposed to contamination risk at the point of failure. The analysis compares repair time against the monitoring mechanism in use to assess whether faster response reflects genuine procedural improvement or continued reliance on citizen complaints.

Indicator E: Metering, Billing & Financial Sustainability

This indicator assesses the commercial and financial part of the DfT system whether consumption is accurately metered, water is billed and collected efficiently, and the utility's operating expenditure is being met sustainably. Financial health is what allows continuous supply infrastructure to be maintained over time rather than degrading after the initial investment. These parameters test the long-term viability of the programme beyond its physical rollout.

Parameter 01: Type and number of functional metres

This parameter records the type of water meters installed mechanical, electromagnetic, ultrasonic or smart/AMR -and how many are currently functional at DMA / operational zone / ward level. A meter that is installed but non-functional is effectively no meter for billing purposes, so this distinction gives a true picture of metering capacity rather than the nominal asset-register figure. The analysis reviews meter type

and functional status together to assess how much of the metering infrastructure actually supports accurate, timely billing.

Parameter 02: Energy/electricity expenditure Month wise pre vs. post DfT

It helps to track the ULB's monthly electricity expenditure for water supply operations primarily pumping, comparing costs before and after DfT at ward level. Continuous pumping typically consumes more energy than intermittent supply, so this figure helps establish the true operating cost of the DfT model. The analysis compares electricity cost trends against supply-hour data to understand whether rising costs reflect the genuine cost of continuous operation or scope for pump-scheduling efficiency, which informs financial planning for sustained 24x7 supply.

Parameter 03: O&M expenditure

This parameter captures the ULB's total monthly Operation and Maintenance (O&M) expenditure for the water supply system with a description of major cost heads at city level. O&M expenditure covers staffing, chemicals, energy, repairs and routine maintenance, and is central to judging whether the city can sustain DfT-level service without continued external subsidy. The analysis compares this figure against revenue collected from water charges to calculate a cost-recovery position, which indicates the programme's financial sustainability once capital investment tapers off.

Parameter 04: Billed water volume and supplied water volume (Billing efficiency)

This parameter compares billed water volume against supplied water volume, in MLD at DMA / operational zone / ward level. Billing efficiency is the commercial counterpart to the technical NRW figure, showing how much of the water leaving the system is actually converted into revenue. The analysis reads billing efficiency alongside NRW to distinguish losses caused by ageing meters or billing gaps from losses caused by physical leakage, since the corrective action required differs between the two.

Formula: Billing Efficiency (%) = (Billed Water Volume / Water Supplied Volume) x 100

Parameter 05: Water charges collected and Water charges billed (Collection efficiency)

This parameter compares water charges collected in rupees, against water charges billed at DMA / operational zone / ward level. Collection efficiency is distinct from billing efficiency, since accurate billing can still go uncollected due to weak enforcement or non-paying segments, directly affecting the ULB's ability to fund ongoing O&M. The analysis tracks collection efficiency zone by zone to identify areas, often lower-income wards, where affordability or enforcement issues need targeted attention rather than only technical correction.

Formula: Collection Efficiency (%) = (Water Charges Collected / Water Charges Billed) x 100

Parameter 06: Additional government subsidy required for operation?

Records at DMA / operational zone / ward level, whether the ULB requires additional government subsidy beyond collected water revenue to sustain day-to-day operation, along with a description of the extent of that dependency. This is the ultimate financial sustainability test for the programme, since continuous reliance on external subsidy has a different long-term outlook than approaching full cost recovery from own revenue. The analysis reviews subsidy dependence across zones to understand how uniform or concentrated this financial gap is across the city.

Indicator F: Community Health, Behaviour & Spatial Equity

This indicator connects the technical performance of the DfT system to real household behaviour, health outcomes and spatial fairness in how benefits are distributed. It examines whether households actually trust and consume tap water directly, whether waterborne illness has fallen, and whether service quality is equitable across different parts of the city. These parameters translate infrastructure performance into lived community impact.

Parameter 01: Households drinking municipal tap water directly

This parameter records, the number of households consuming municipal tap water directly without treatment, at DMA / operational zone / ward level. This is important behavioural outcome measures for the programme, since the goal is not only to supply potable water but to build enough trust that households drink it straight from the tap. The analysis compares direct-consumption levels against objective water-quality results to understand whether gaps reflect actual water quality issues or a trust and awareness gap.

Parameter 02: Households treating tap water before drinking

This parameter records, the number of households that still boil, filter or otherwise treat tap water before drinking, at DMA / operational zone / ward level. This is the direct complement to the previous parameter and helps identify why households have not yet moved to direct consumption. The analysis compares this figure against objective water-quality data to understand whether continued treatment reflects genuine quality concerns or persistent habit despite favourable test results, which shapes what kind of follow-up action is needed.

Parameter 03: No. of water-borne disease incidence annually in the project area (pre vs post DfT)

This parameter compares the annual number of reported waterborne disease cases such as diarrhoea, typhoid or jaundice in the project area before and after DfT at DMA / operational zone / ward level. A decline in disease incidence provides health-outcome evidence of impact, going beyond process and output measures. The analysis reads this alongside water-quality and supply-continuity data.

Formula: Disease Incidence Reduction (%) = $\frac{[(\text{Pre-DfT Annual Cases} - \text{Post-DfT Annual Cases}) / \text{Pre-DfT Annual Cases}] \times 100$

Parameter 04: Areas and Population served through community taps

This parameter maps the areas and counts the population relying on shared community stand-posts rather than individual household connections at DMA / operational zone / ward level. Community taps are often a transitional service model for informal settlements awaiting formal connection, so this figure shows how much of the population still depends on this lower tier of service. The analysis uses the spatial mapping to identify clusters of community-tap dependency that should be prioritised for individual household connection in the next phase.

Parameter 05: Areas and Population excluded from the project

This parameter maps the areas and counts the population that remain entirely outside the DfT project boundary, receiving no service under the programme at DMA / operational zone / ward level. This is a key equity check, since strong coverage and quality statistics for the serviced area can mask a substantial excluded population. The analysis uses the spatial mapping to see whether excluded areas are randomly distributed or concentrated in particular settlement types, which shapes how future phases of the programme should be planned.

Parameter 06: Difference in water supply between areas

Calculates the gap in water supply volume in MLD, between the best-served and worst-served at DMA / operational zone / ward level in the city. While earlier parameters report supply for each area individually, this one explicitly quantifies the spread between them, turning individual data points into a direct equity measure. The analysis reads this gap alongside population figures for the affected areas to understand the scale of population impacted by supply disparity, informing where equalisation measures are most needed.

Parameter 07: Spatial distribution of complaints /outages

This parameter maps the geographic distribution of citizen complaints and supply outages across the city, showing location-wise counts at DMA / operational zone / ward level. Visualising this spatially, rather than only as aggregate totals, helps identify recurring hotspots often linked to ageing infrastructure, low-lying pressure zones, or a history of illegal tapping. The analysis uses this spatial pattern to understand whether service problems cluster in particular neighbourhood types, which is used to target maintenance and engineering interventions to those specific locations.

Indicator G: Institutional Capacity & Scalability

This indicator assesses whether the ULB has the institutional systems, digital tools and organisational readiness needed to sustain and scale the DfT model beyond the initial project area. It covers digital monitoring platforms, GIS asset mapping, SCADA systems, complaint redressal efficiency and the ULB's own willingness to expand the model. These parameters determine whether the programme's gains are institutionally durable and replicable.

Parameter 01: Online system available for Metering, Billing, collection, and complaint resolution mechanism

This parameter documents whether the ULB has deployed online or digital systems for metering, billing, payment collection and complaint resolution, described separately for each function at DMA / operational zone / ward level. Digitisation of these functions is closely linked to billing accuracy, faster collection and quicker complaint turnaround, which underpin the financial and service-quality gains examined elsewhere in the survey. The analysis reviews each function separately to identify which back-office processes remain manual, showing where institutional strengthening is still required.

Parameter 02: Seasonal water shortage / source stress pre vs. post DfT

Measures the extent of seasonal water shortage or source stress, shortfall against demand, comparing the position before and after DfT at DMA / operational zone / ward level. Source stress from groundwater depletion, reservoir drawdown or reduced river flow is an upstream constraint that can undermine even a

well-managed distribution network, so this tests the resilience of source planning rather than only distribution infrastructure. The analysis tracks this shortfall over time to understand whether source-side risk to continuous supply has reduced.

Parameter 03: Existence of GIS-based asset mapping of the water supply network

Records whether the ULB maintains a Geographic Information System (GIS) based digital map of its water assets pipelines, valves, reservoirs, connections at DMA / operational zone / ward level, along with the map itself where available. GIS-based asset mapping enables faster leak localisation and more informed network planning than paper records or institutional memory. The analysis furtherly helps to understanding the spatial distribution of the network and also ULBs work this spatial map with more efficiently.

Parameter 04: Availability of SCADA-based monitoring/trained manpower

This parameter records whether SCADA-based remote monitoring systems are in place, and whether trained manpower is available to operate them, at DMA / operational zone / ward level. SCADA systems allow real-time, centralised monitoring of pressure, flow and reservoir levels, which is important for managing a continuous supply system efficiently at scale. The analysis reviews both the technology and the staffing dimension together, since SCADA infrastructure without adequately trained operators delivers limited practical benefit in day-to-day operation.

Parameter 05: Efficiency in redressal of customer complaints

This parameter measures the percentage of customer complaints resolved within the ULB's defined service-level timeline, at ward level. Complaint redressal efficiency is a citizen-facing measure of institutional responsiveness, complementing the more technical supply and pressure indicators collected elsewhere. The analysis compares complaint volume against redressal efficiency ward by ward to identify service-quality and governance gaps that could undermine public trust even where underlying infrastructure performance looks adequate, informing where complaint-handling processes need strengthening.

Parameter 06: ULB willingness to expand or adopt the model (% survey respondents willing/supportive)

Captures, through structured interviews with ULB officials at ward level, the degree of institutional willingness to expand or replicate the DfT model beyond the current project area. Institutional buy-in influences whether budgetary, staffing and procedural changes needed to sustain and expand the programme are actually taken forward. The analysis reviews both the percentage of supportive respondents and the qualitative reasoning behind their views to understand the institutional readiness for scaling the model further.

6.1.2. Indicators & Parameters to Beneficiaries

Indicator A: Physical Coverage & Household Outreach

This indicator captures how households themselves experience the continuity, pressure and reliability of water supply, gathered directly from beneficiaries through the primary survey. It complements authority-

reported technical data with the lived reality of daily supply hours, interruptions and responsiveness of complaint redressal.

Parameter 01: Hours of water supply per day (against 24x7 target)

This parameter records the number of hours of daily water supply as reported by beneficiary households, measured against the 24x7 target. It reflects the duration of supply a household actually experiences, shaped by local timing, storage habits and network conditions in that area. The analysis aggregates these responses by ward and zone to build a supply-hours profile across the city. This profile shows which areas are closest to genuine continuous supply and which still fall well short of the target, guiding where further improvement is needed. The findings help track whether continuity gains observed here are holding up across the city.

Parameter 02: Hourly Pressure adequacy at taps

This parameter measures water pressure, through the time a household reports it takes to fill a standard 10-litre bucket at the tap. Since most households do not have pressure-measuring equipment, this simple proxy captures flow adequacy as it is actually experienced at the point of use. The analysis aggregates fill-time responses by zone to build a pressure-adequacy profile across the operational zone. This profile identifies areas where households experience weak flow, helping prioritise distribution-side improvements in those specific locations. The findings remain simple to collect and compare consistently across all five cities.

Parameter 03: Number of supply interruptions/outages per month

Records the number of supply interruptions a household experiences each month, reported by beneficiaries. It reflects how often water stops flowing from the household's own point of view, capturing disruptions that may not always appear in centralised records. The analysis compiles these monthly counts by zone to identify areas with the highest frequency of reported outages. This helps prioritise which parts of the network need closer attention for reliability, and sets a baseline for tracking change over future rounds. The findings help decide which segments of the network need reinforced maintenance first.

Parameter 04: Seasonal variation in supply hours (summer, monsoon, winter)

It helps to records the daily supply hours a household experiences across summer, monsoon and winter by beneficiaries. It reflects how consistent supply feels through the year, since intermittent systems often show sharp seasonal drops that a single annual figure would conceal. The analysis compares seasonal responses within and across the operational zones to identify where the sharpest seasonal drop in supply hours occurs. This is used to decide where seasonal supply augmentation or storage support is most urgently required going forward. The findings help direct storage or source-augmentation investment to the areas that need it most.

Parameter 05: Average duration of an interruption

This parameter records the average length of a supply interruption, in hours, as experienced by the household. It reflects how long a household typically goes without water once supply stops, which shapes reliance on storage and alternate sources during that period. The analysis aggregates household-reported interruption duration by zone to identify areas where outages tend to last longest. This helps prioritise faster restoration in these areas, and provides a baseline to track whether household-experienced

downtime shortens over time. The findings help understand whether restoration response is genuinely getting faster in practice.

Parameter 06: Any complaints raised related to low pressure / no supply

Records whether, and how many times, a household has raised a complaint about low pressure or no supply. It reflects actual complaint-raising behaviour among beneficiaries, including instances that may not always turn into a formally logged complaint. The analysis gets this count by ward to identify areas where households report frequent problems, and reviews how many of these issues actually lead to a complaint being raised. This helps understand where households experience problems but may not voice them formally. The findings help distinguish genuine service gaps from gaps in complaint reporting itself.

Parameter 07: Efficiency in redressal of complaints

This parameter captures, how households rate the speed and effectiveness of complaint resolution based on their own experience. It reflects whether the outcome of a complaint felt timely and adequate to the household that raised it. The analysis aggregates these ratings by zone to build a redressal-satisfaction profile across the city. This profile identifies areas where complaint handling is perceived as slow or inadequate, helping prioritise where the redressal process itself needs to be strengthened. The findings point to the specific zones where the redressal process itself needs strengthening.

Indicator B: Citizen Use & Behavioural Adaptation

This indicator examines how households actually use and respond to the water supplied under DfT, including whether they drink it directly, how they store water, and their continued dependence on alternate sources. It is based on responses from beneficiary households and measures the behavioural shift the programme is expected to bring about at the household level.

Parameter 01: Is municipal tap water used for drinking directly?

This parameter records whether a household drinks municipal tap water directly without any additional treatment. It is one of the clearest behavioural indicators of public acceptance in the programme, since supply and quality improvements only translate into impact once households actually rely on the water as delivered. The analysis calculates the share of households answering across zones to build a direct-consumption profile for the operational zone. This profile shows where acceptance in tap water has grown and where households still hesitate to drink it directly. The findings show where public trust in tap water is strongest and where it still lags.

Parameter 02: Is municipal tap water treated before drinking?

Records whether a household treats municipal tap water, by boiling or filtering, before drinking it. It quantifies the extent of continued caution or habit-driven treatment among beneficiaries. The analysis reviews the share of households still treating water across zones and reads this alongside the reasons households give for not drinking directly. This shows where continued treatment reflects a specific, addressable concern and where it is simply a long-standing habit that awareness efforts could help shift

over time. The findings help decide whether the response needed is technical correction or awareness building.

Parameter 03: Primary reason for not drinking tap water

This parameter records, in the household's own words, the main reason they do not drink tap water directly. It captures the specific barrier taste, odour, visible impurity, past illness, or habit behind a household's hesitation. The analysis groups these open-ended responses into common categories by zone to identify which barriers are most frequently cited in each area. This shows whether the dominant concern in a given zone calls for a technical fix or for a targeted awareness and communication effort. The findings support designing area-specific messaging that addresses the actual barrier cited.

Parameter 04: Confidence / trust in municipal tap water

Captures, how confident a household is regarding the safety of municipal tap water. It is a distinct measure from actual consumption, since a household may drink tap water out of necessity while still rating its confidence low. The analysis compiles confidence scores by zone to build a public-confidence profile across the operational zone. This profile identifies areas where confidence remains low, helping prioritise where communication and awareness efforts are most needed to strengthen public confidence in the supply. The findings identify where confidence-building communication is likely to have the most impact.

Parameter 05: Do you store water, if yes, where (OHT, UG Tank, Drums, Buckets, etc.)

This parameter records whether a household stores water and, if so, in what type of container example overhead tank, underground tank, drums or buckets. Storage practice reflects how much a household still hedges against supply uncertainty, and container type has a bearing on both water quality and volume retained. The analysis tabulates storage prevalence and container type by zone to build a household storage-behaviour profile. This shows where dependence on storage remains high despite improved supply, and where practice has genuinely shifted. The findings show how far household storage practice has adjusted to steadier supply.

Parameter 06: Change in Water storage behaviour pre vs. post DfT

Records whether a household's water storage practice has changed since DfT was introduced, with a short description of what changed. It reflects whether continuous supply has reduced reliance on stored water, a practical sign of confidence in supply continuity. The analysis compares reported storage behaviour before and after DfT by zone to identify where households have scaled down storage. This shows the extent of genuine behavioural adaptation, and where old storage habits still persist despite improved service. The findings mark how much household behaviour has genuinely shifted since the programme began.

Parameter 07: Dependence on alternate water sources (tanker / Bottled Water / Ground Water / any other private water)

This parameter records whether a household still depends on alternate sources like tanker supply, bottled water, groundwater or other private sources alongside the municipal connection. Continued dependence on these sources despite a functioning DfT connection point to unresolved gaps in confidence, quantity or quality. The analysis tabulates the type and prevalence of alternate-source dependence by zone to build a dependence profile across the operational zone. This shows where DfT has not yet fully displaced pre-

existing coping mechanisms among households. The findings show which areas still lean on alternate sources despite a working connection.

Parameter 08: After DfT has your dependence on alternate / unsafe drinking water sources changed (shift to tap water as primary source)

Records whether a household's dependence on alternate or unsafe sources has changed since DfT, with a description of the shift, if any. It measures whether municipal tap water has become the household's primary drinking-water source, rather than simply an additional option used alongside others. The analysis reviews this reported shift by zone to build a picture of how completely households have transitioned to tap water. This shows where the shift to tap water as the main source is complete or still partial. The findings show how completely tap water has replaced other sources in each area.

Parameter 09: Water expenditure pre vs. post DfT

This parameter records a household's monthly expenditure on water including purchased water, tanker charges or filtration costs before and after DfT. A reduction in this expenditure reflects a direct financial benefit of improved municipal supply reaching the household. The analysis compares pre- and post-DfT spending by zone to calculate the average household saving attributable to the programme. This shows which areas have seen the largest financial benefit, and where spending has not fallen despite improved supply, pointing to continued reliance on alternate sources. The findings quantify the direct financial benefit reaching households under the programme.

Indicator C: Consumer Satisfaction

This indicator captures household satisfaction across every dimension of the water service, from availability and pressure to quality, billing and complaint handling. It is based on responses from beneficiaries and identifies which specific service aspects are driving overall satisfaction or dissatisfaction across the city.

Parameter 01: Satisfaction with availability

Captures household satisfaction with the general availability of water by beneficiaries. It is a summary perception measure reflecting how households feel about supply access overall, distinct from the specific hours-of-supply figure recorded separately. The analysis compiles availability satisfaction scores by zone to build a perception profile across the operational zone. This profile shows which areas feel well served in terms of access, and which need improvement even where technical figures appear adequate. The findings flag areas where perceived access still lags behind actual performance.

Parameter 02: Satisfaction with reliability

This parameter captures household satisfaction with the reliability or predictability of water supply. It reflects whether households can depend on water arriving when expected, which matters as much to daily planning as total supply hours. The analysis reviews reliability satisfaction by zone to build a predictability-perception profile across the operational zone. This profile highlights areas where unpredictable timing is lowering household confidence, guiding where scheduling consistency needs the most attention going

forward. The findings point to where scheduling consistency, rather than total hours, needs the most work.

Parameter 03: Satisfaction with pressure

Captures household satisfaction with water pressure by beneficiaries which reflects how adequate the flow at the tap feels for daily use, regardless of total supply hours. The analysis reads pressure satisfaction scores by zone alongside the bucket-fill-time responses collected separately, building a fuller picture of perceived flow adequacy. This shows which zones need distribution-side attention, even in areas where households report otherwise adequate supply duration. The findings help determine whether the underlying issue lies in network pressure or household plumbing.

Parameter 04: Satisfaction with water quality

This parameter captures household satisfaction with the overall quality of water received, rated on a Likert scale. It reflects citizen perception of safety and cleanliness clarity and past experience. The analysis compiles quality satisfaction scores by zone to build a perception profile across the operational zone. This profile identifies areas where quality perception is weak, showing where communication about water safety, or further quality improvement itself, is most needed to build household confidence. The findings flag areas where confidence in water safety still needs to be built up.

Parameter 05: Satisfaction with water quality during different seasons and special occasions

Captures household satisfaction with water quality specifically during different seasons and special occasions such as festivals. It reflects whether confidence in quality holds steady during periods of known network stress rather than only under normal conditions. The analysis compares seasonal and event-specific satisfaction scores by zone to identify where quality perception dips during monsoon or peak-demand periods. This shows where resilience measures are most needed from a household perspective. The findings flag where seasonal or event-specific safeguards deserve closer attention.

Parameter 06: Satisfaction with odour

This parameter captures household satisfaction with the odour of water received. Odour is one of the most immediate sensory cues shaping a household's willingness to drink water directly, independent of its actual safety. The analysis reviews odour satisfaction by zone alongside direct-consumption rates to understand how strongly odour concerns influence continued treatment or alternate-source use. This shows where a specific, identifiable quality issue may be undermining household confidence in the tap water. The findings help separate a genuine quality problem from a purely sensory one.

Parameter 07: Satisfaction with taste

Captures household satisfaction with the taste of water received, rated. Like odour, taste is a sensory factor that strongly shapes whether a household chooses to drink tap water directly. The analysis reads taste satisfaction by zone alongside the primary reasons households give for not drinking tap water directly. This shows whether taste is a recurring, specific barrier in particular areas, or whether the underlying concern lies elsewhere in perception rather than in water quality. The findings show whether taste is best addressed as a technical or a perception issue.

Parameter 08: Satisfaction with billing

This parameter captures household satisfaction with the accuracy and clarity of water bills. It reflects the commercial, day-to-day interface between the household and the utility, separate from supply performance itself. The analysis compiles billing satisfaction by zone to build a billing-perception profile across the operational zone. This profile identifies areas where bills are seen as unclear or inaccurate, guiding where the billing process itself may need to be simplified or better communicated. The findings point to where billing communication itself needs to be made clearer.

Parameter 09: Satisfaction with bill payment

Records household satisfaction with the ease of paying water bills, It reflects how convenient and affordable and also accessible the payment process is, including whether digital or in-person payment channels work smoothly for households. The analysis reviews payment satisfaction by operational zone to build a payment-experience profile and affordability across the operational zone. This profile identifies where payment friction may be discouraging timely payment, guiding where the process needs to be made simpler or more accessible for households. The findings flag where the payment process itself may need to be simplified.

Parameter 10: Satisfaction with complaint resolution

This parameter captures household satisfaction specifically with how their complaints were resolved. It focuses on the outcome of the resolution itself, distinct from how quickly the complaint was addressed. The analysis compiles resolution satisfaction by operational zone to build a picture of how households experienced the outcome of complaints they raised. This shows where complaints closed on record may still leave the household dissatisfied, pointing to where resolution quality needs closer attention going forward. The findings flag where a formally closed complaint may still need a second look.

Parameter 11: Overall satisfaction with water service

Captures a single overall satisfaction rating for the water service as a whole, given directly by the household. It serves as a summary measure that draws together individual satisfaction across availability, reliability, pressure, quality and billing into one composite judgement. The analysis compares this overall score by operational zone alongside the individual component scores to identify which specific service aspects are driving overall satisfaction up or down. This provides a single, comparable benchmark of citizen sentiment across all five cities. The findings offer a quick headline figure for comparing citizen sentiment across cities.

Parameter 12: Perceived change in water availability and reliability after DfT

This parameter captures, how much a household perceives water availability and reliability to have improved since DfT was introduced. Unlike the standalone satisfaction scores, this parameter is framed explicitly as a before-after comparison from the household's own perspective. The analysis compiles this perceived-change score by zone to build a picture of felt improvement across the operational zone. This shows where households feel the strongest improvement, and where perceived change remains minimal despite the programme being implemented there. The findings show how far citizens credit the programme with a felt improvement.

Parameter 13: Perceived change in water Quality after DfT

Captures how much a household perceives water quality to have changed since DfT was introduced. It is the quality-specific counterpart to the previous parameter, isolating perceived improvement in safety and

cleanliness separate from availability or reliability. The analysis reviews this perceived-change response by zone to build a quality-perception trend across the operational zone. This shows where households recognise a genuine improvement in water quality, and where perception has not shifted much despite the programme being implemented in that area. The findings show whether recognition of better quality is keeping pace with the data.

Parameter 14: Major benefit identified

This parameter records, in the household's own words, the single major benefit they associate with the DfT programme. It captures what households themselves consider most valuable about the intervention, ranging from time saved to reduced expenditure or improved health. The analysis groups these open-ended responses into common benefit categories by operational zone to identify which type of impact is most frequently cited. This shows which aspects of the programme are resonating most strongly with households across the different areas surveyed. The findings point to which programme features are worth reinforcing and promoting further.

Parameter 15: Major remaining problem

Records, in the household's own words, the single most significant problem they still face with the water service. It captures unresolved concerns that structured rating questions may not fully surface on their own. The analysis groups these open-ended responses into common problem categories by zone to identify the most frequently cited remaining issue in each area. This shows where corrective action is still expected by households, complementing the other satisfaction and behavioural parameters collected in this framework. The findings point to where citizen-facing corrective action is still expected.

Indicator D: Community Health, Behaviour & Spatial Equity

This indicator links the water service directly to household health and financial outcomes, capturing perceived changes in illness, health spending and water-purchase costs since DfT was introduced. It also records how consistently households experience their supply. These parameters translate infrastructure performance into tangible household-level benefit that citizens can describe directly.

Parameter 01: Change in water-borne disease incidences (pre vs post DfT)

Captures, a household's perception of change in waterborne illness within the household since DfT was introduced. It reflects lived health experience as reported by the household itself, rather than a formally recorded case count. The analysis compiles this significant health change by zone to build a health-perception profile across the operational zone. This shows whether households themselves associate the programme with a tangible reduction in illness within their own home. The findings show whether households themselves link the programme to better health.

Parameter 02: Savings on health expenditure (reduction in monthly spend) pre vs post DfT

This parameter captures, a household's reply of reduced monthly health-related expenditure since DfT was introduced. It reflects the financial dimension of any health benefit, since fewer waterborne illnesses typically translate into lower medical spending for the household. The analysis reviews this perceived

saving by zone to build a financial-benefit analysis linked to health outcomes. This shows the extent of household-level financial relief that citizens associate with improved water quality under the programme. The findings show how much financial relief citizens associate with fewer illnesses.

Parameter 03: Savings on Drinking water purchase (reduction in monthly spend) pre vs post DfT

Captures, a household's perception of reduced monthly spending on purchased drinking water, such as bottled or tanker water, since DfT was introduced. It reflects a financial benefit distinct from health savings, tied specifically to reduced reliance on alternate purchased sources. The analysis compares these answers by zone alongside reported water expenditure figures. This shows how much of the reported saving households specifically attribute to no longer needing to buy water. The findings show how much of any saving is specifically tied to no longer buying water.

Parameter 04: Consistency of supply

This parameter records a household's assessment of how consistent their daily supply hours have been, distinct from the total number of hours received. It reflects predictability of timing, which affects a household's ability to plan daily use without relying on storage. The analysis reads consistency ratings by zone alongside the seasonal variation responses collected separately. This shows where supply is technically adequate in total hours but still felt as unpredictable, pointing to where scheduling regularity needs improvement. The findings show where supply needs to become more predictable, not just longer.

Indicator E: Institutional Capacity & Scalability

This indicator captures the beneficiary's own view on whether the DfT model should be expanded or adopted more widely, based on their direct experience of the service. It complements the institutional-capacity assessment collected separately with a citizen perspective on whether the model is worth replicating, closing the framework with ground-level endorsement or hesitation toward scale-up.

Parameter 01: Willingness to expand or adopt the model

Records whether a household is willing to see the DfT model expanded or adopted more widely, with a short description of their reasoning. It captures citizen-level endorsement of the programme, based on the household's own direct experience of the service. The analysis reviews the share of supportive households by zone and examines the accompanying reasons to understand what drives support or hesitation. This shows the extent of ground-level public backing for scaling the DfT model further across the city. The findings show how far public backing extends for taking the model further.

7. TIMELINE OF THE PROJECT

The study is proposed to be carried out over a **four-month period**, commencing on **25th August** with the formal start of the project and culminating in the submission of the Final Report on **24th December**. The work has been structured into **nine sequential milestones** so as to allow adequate time for scoping, fieldwork, analysis and iterative reporting. Following the Project Start, the immediate next step, targeted for 27th August, is the finalization of the **Scope of Work** and the confirmation of the choice of cities, building on the tentative selections outlined above. This is to be followed by the **Selection of Impact Indicators** by 11th September, refining the seven broad indicator heads into a detailed, field-ready evaluation framework. An **Inception Report** is scheduled for 19th September, at which point the study's methodology, sampling approach and instruments will be presented for review before fieldwork begins in earnest.

The core fieldwork window, comprising **Site Visits** to the selected cities, is planned to run from 28th September through 28th October, a five-week period during which primary data will be collected from Municipal Officers, Service Providers, Residents and other Urban Stakeholders across all sampled locations. This will be followed by the **Analysis of Indicators** by 10th November, during which the field data will be consolidated and assessed against the seven indicator heads.

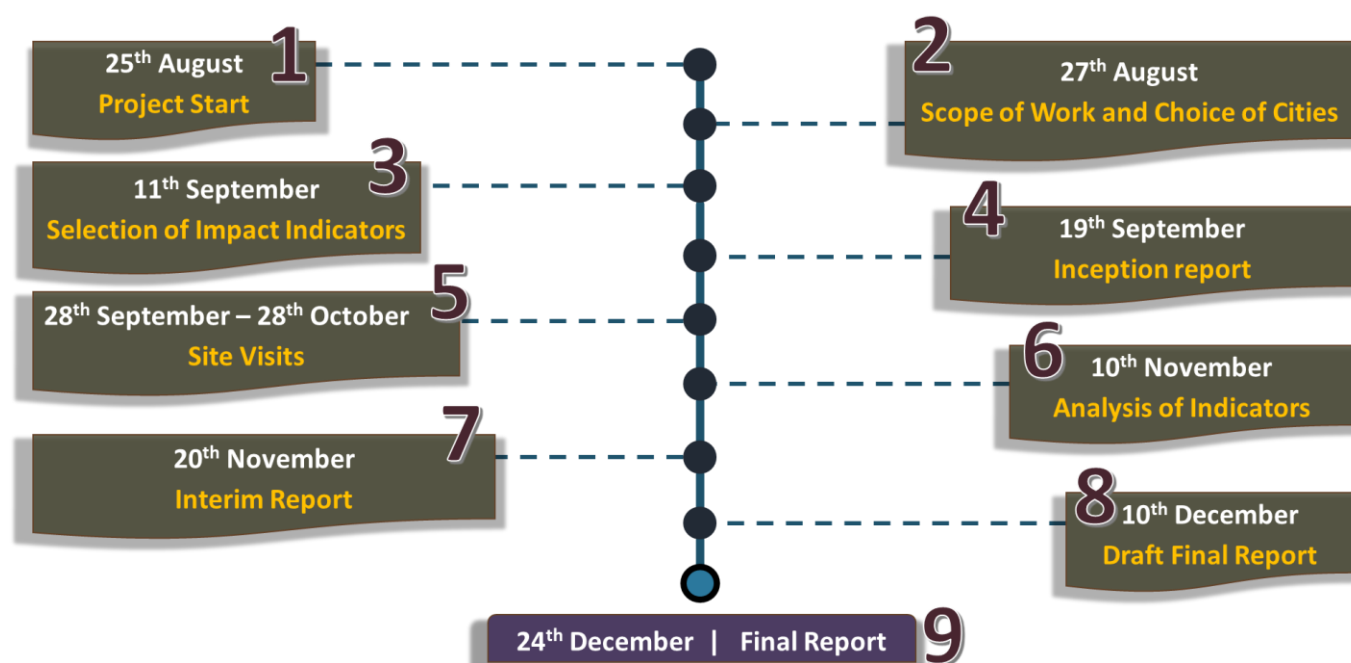


Figure 7-1 Timeline of the project

The findings of this analysis will first be presented in an **Interim Report** by 20th November, offering an early view of emerging success stories and gaps. This will be refined into a **Draft Final Report** by 10th December, incorporating feedback received on the interim findings, before the study concludes with submission of the **Final Report** on 24th December.

8. ABOUT THE PROJECT TEAM

Table 8-1 Project Team

NAME	ROLE	EXPERTISE / EXPERIENCE
Prof. Dr. Ayon K. Tarafdar	Principal Investigator	Professor and Head, ACUPCB-SPAV. 23+ years of experience. Environmental Planner. Expertise in climate-sensitive spatial planning, environmental planning, resilience & vulnerability assessment, environmental impact studies. Ph.D (NTNU Norway), MS-UEP (Norway), B.Plan (SPA Delhi)
Prof. Dr. Ramesh Srikonda	Co-Principal Investigator	Professor and Director, SPAV. 40+ years of experience. Architect and Transport Planner. Research Focus in Sustainable Architecture & Energy Efficiency, climate-responsive design, urban planning. Ph.D., PGDEE, MTP, B.Arch.
Prof. Dr. Adinarayanane R.	Team Member	Professor & Head - Department of Planning. 30+ years of experience. Engineer and Urban Planner. Expertise in urban & regional dynamics, sustainable urban development, infrastructure planning, urban land management, climate-responsive planning, energy-efficient planning, advanced urban systems and public policy. Ph.D., M.Tech (Urban and Rural Planning) IIT-Roorkee, B.E. (Civil Engineering)
Dr. Prasanth Vardhan	Team Member	Associate professor, SPAV. 14+ years of experience. Urban Planner. Expertise in infrastructure Planning & Financing, Urban Land Management, Land Value Capture, Transportation Planning, GIS & Spatial Analysis, Regional Planning, Sustainable Urban Development, Master Plan Preparation, Environmental Planning, Urban Governance, Smart Cities & Infrastructure. Ph.D., M.Plan(IP), B.Plan.
Dr. Nitesh Shukla	Team Member	Assistant Professor, SPAV. Engineer and Urban Planner. Expertise in GIS applications & Regional planning. Ph.D (Urban Resilience), M.tech (Urban , Community & Region Planning), B.Tech (Civil Engineering).

Ms. Swathikka S	Research Officer	1+ years of experience. Architect and Environmental Planner. Expertise in GIS and spatial analysis, Climate resilience, Blue Green Infrastructure, Environmental Planning, Disaster Management. B.Arch, M.Plan (EPM)
Ms. Debasmita Bhowmik	Junior Research Officer	Architect and Environmental Planner. B.Arch, M.Plan (EPM)
Ms. Poomail V	Research Assistant	Urban Planner. B.Plan.

ANNEXURE A

Project Title: Impact Assessment of DfT Programme under AMRUT-MoHUA-GoI

INDICATORS AND PARAMETERS – TO AUTHORITIES

SL/NO	INDICATORS	S.NO	PARAMETERS	DATA SOURCE	UNIT	EXTENT
A	Physical Coverage & Household Outreach	1	No. of Operational Zones and DMAs	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	City
		2	Total domestic and non-domestic connections in operational zones	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		3	Population and no. of Households (HH)	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		4	No. and type of Reservoirs	Secondary (ULB / Govt. Agency / Nodal Officer)	Count, ESR/GLSR	Operational Zone wise
		5	Reservoir Capacity	Secondary (ULB / Govt. Agency / Nodal Officer)	cu.m	Operational Zone wise
		6	No. of slum HH in operational zones	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		7	No. of slum Households with municipal water connection (Before and After DfT)	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		8	Number of HH and Non-Domestic with New Connections pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		9	Number of HH and Non-Domestic converted to 24x7 water supply pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise

		10	Number of Slum HH given new Connections (After DfT)	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		11	Number of Slum HH converted to 24×7 water supply pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ ward wise
		12	No. of metered and non-metered HH pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ ward wise
		13	HH and non-domestic plots not given water connections	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ ward wise
		14	Per day Water Supply in May, August and December	Secondary (ULB / Govt. Agency / Nodal Officer)	MLD	DMA / Operational Zone wise/ ward wise
		15	Per day Water Supply in Slums in May, August and December	Secondary (ULB / Govt. Agency / Nodal Officer)	MLD	DMA / Operational Zone wise/ ward wise
		16	Zone wise Water Demand	Secondary (ULB / Govt. Agency / Nodal Officer)	MLD	Operational Zone wise
B	Service Reliability, Continuity & Pressure	17	Hours of water supply per day (against 24×7 target)	Secondary (ULB / Govt. Agency / Nodal Officer)	Hours/Day	Operational Zone wise/ Ward wise
		18	Hourly Pressure adequacy at Distribution points	Secondary (ULB / Govt. Agency / Nodal Officer)	PSI (pounds per square inch) / hour	DMA / Operational Zone wise
		19	Number of supply interruptions/outages per month	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		20	Seasonal variation in supply hours (summer, monsoon, winter) pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Hours/Day	DMA / Operational Zone wise/ Ward wise

		21	Average duration of an interruption pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Hours/Month	DMA / Operational Zone wise/ Ward wise
		22	Number of complaints related to low pressure/no supply	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
C	Water Quality & Potability Standards	23	Number of water-quality samples tested	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		24	Water Quality during various seasons (Zone Wise)	Secondary (ULB / Govt. Agency / Nodal Officer)	Index	DMA / Operational Zone wise
		25	Water Quality during special occasions (Zone Wise)	Secondary (ULB / Govt. Agency / Nodal Officer)	Index	DMA / Operational Zone wise
		26	Water Quality Parameters (turbidity, residual chlorine, TDS, pH, Coliforms)	Secondary (ULB / Govt. Agency / Nodal Officer)	Description, Count	DMA / Operational Zone wise
		27	Frequency, coverage and testing agency of water quality testing	Secondary (ULB / Govt. Agency / Nodal Officer)	count per month/year, map, description	DMA / Operational Zone wise/ Ward wise
D	Water Loss & Operational Efficiency	28	Water supplied into distribution system	Secondary (ULB / Govt. Agency / Nodal Officer)	MLD	DMA / Operational Zone wise
		29	Volume of Non-Revenue Water pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Quantity	DMA / Operational Zone wise
		30	Number of leak-detection and repair interventions carried out pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Count/month	DMA / Operational Zone wise
		31	Average time for leak detection and repair, and its monitoring mechanism	Secondary (ULB / Govt. Agency / Nodal Officer)	HOURS OR DAYS, description	DMA / Operational Zone wise

E	Metering, Billing & Financial Sustainability	32	Type and number of functional metres	Secondary (ULB / Govt. Agency / Nodal Officer)	Description, Count	DMA / Operational Zone wise/ Ward wise
		33	Energy/electricity expenditure Month wise pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	Rupees / Month	Ward wise
		34	O&M expenditure	Secondary (ULB / Govt. Agency / Nodal Officer)	Rupees / Month, Description	City
		35	Billed water volume and supplied water volume (Billing efficiency)	Secondary (ULB / Govt. Agency / Nodal Officer)	MLD, %	DMA / Operational Zone wise/ Ward wise
		36	Water charges collected and Water charges billed (Collection efficiency)	Secondary (ULB / Govt. Agency / Nodal Officer)	Rupees, %	DMA / Operational Zone wise/ Ward wise
		37	Additional government subsidy required for operation?	Secondary (ULB / Govt. Agency / Nodal Officer)	Description, Yes/No	DMA / Operational Zone wise/ Ward wise
F	Community Health, Behaviour & Spatial Equity	38	Households drinking municipal tap water directly	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		39	Households treating tap water before drinking	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		40	No. of water-borne disease incidence annually in the project area (pre vs post DfT)	Secondary (ULB / Govt. Agency / Nodal Officer)	Count	DMA / Operational Zone wise/ Ward wise
		41	Areas and Population served through community taps	Secondary (ULB / Govt. Agency / Nodal Officer)	Map, Count	DMA / Operational Zone wise/ Ward wise
		42	Areas and Population excluded from the project	Secondary (ULB / Govt. Agency / Nodal Officer)	Map, Count	DMA / Operational Zone wise/ Ward wise

		43	Difference in water supply between areas	Secondary (ULB / Govt. Agency / Nodal Officer)	MLD	DMA / Operational Zone wise/ Ward wise
		44	Spatial distribution of complaints/outages	Secondary (ULB / Govt. Agency / Nodal Officer)	Location wise count, map	DMA / Operational Zone wise/ Ward wise
G	Institutional Capacity & Scalability	45	Online system available for Metering, Billing, collection, and complaint resolution mechanism (please mention separately)	Secondary (ULB / Govt. Agency / Nodal Officer)	Description	DMA / Operational Zone wise/ Ward wise
		46	Seasonal water shortage/source stress pre vs. post DfT	Secondary (ULB / Govt. Agency / Nodal Officer)	%	DMA / Operational Zone wise/ Ward wise
		47	Existence of GIS-based asset mapping of the water supply network	Secondary (ULB / Govt. Agency / Nodal Officer)	Yes / No (Map)	DMA / Operational Zone wise/ Ward wise
		48	Availability of SCADA-based monitoring/trained manpower	Secondary (ULB / Govt. Agency / Nodal Officer)	Yes / No	DMA / Operational Zone wise/ Ward wise
		49	Efficiency in redressal of customer complaints	Secondary (ULB / Govt. Agency / Nodal Officer)	%	Ward wise
		50	ULB willingness to expand or adopt the model (% survey respondents willing/supportive)	Secondary (ULB / Govt. Agency / Nodal Officer)	Description in 100 words	Ward wise

ANNEXURE B

Project Title: Impact Assessment of DfT Programme under AMRUT-MoHUA-GoI

INDICATORS AND PARAMETERS – TO BENEFICIARIES

SL/NO	INDICATORS	S.NO	PARAMETERS	DATA SOURCE	UNIT
A	Service Reliability, Continuity & Pressure	1	Hours of water supply per day (against 24x7 target)	Primary (Beneficiaries)	Hours/Day
		2	Hourly Pressure adequacy at taps	Primary (Beneficiaries)	Time taken to fill a 10-litre bucket
		3	Number of supply interruptions/outages per month	Primary (Beneficiaries)	Count / Month
		4	Seasonal variation in supply hours (summer, monsoon, winter)	Primary (Beneficiaries)	Hours/Day
		5	Average duration of an interruption	Primary (Beneficiaries)	Hours
		6	Any complaints raised related to low pressure / no supply	Primary (Beneficiaries)	Count
		7	Efficiency in redressal of complaints	Primary (Beneficiaries)	Likert scale
C	Citizen Use & Behavioural Adaptation	8	Is municipal tap water used for drinking directly?	Primary (Beneficiaries)	Yes / No
		9	Is municipal tap water treated before drinking?	Primary (Beneficiaries)	Yes / No
		10	Primary reason for not drinking tap water	Primary (Beneficiaries)	Description - 50 words
		11	Confidence / trust in municipal tap water	Primary (Beneficiaries)	Likert Scale
		12	Do you store water, if yes, where (OHT, UG Tank, Drums, Buckets, etc.)	Primary (Beneficiaries)	Yes/No, Tick option
		13	Change in Water storage behaviour pre vs. post DfT	Primary (Beneficiaries)	Yes/No, Description
		14	Dependence on alternate water sources (tanker / Bottled Water / Ground Water / any other private water	Primary (Beneficiaries)	Yes / No, Tick option
		15	After DfT has your dependence on alternate / unsafe drinking water sources changed? (Shift to tap water as primary source)	Primary (Beneficiaries)	Yes / No, Description
		16	Water expenditure pre vs. post DfT	Primary (Beneficiaries)	Rupees
D	Consumer Satisfaction	17	Satisfaction with availability	Primary (Beneficiaries)	Likert Scale
		18	Satisfaction with reliability	Primary (Beneficiaries)	Likert Scale
		19	Satisfaction with pressure	Primary (Beneficiaries)	Likert Scale

		20	Satisfaction with water quality	Primary (Beneficiaries)	Likert Scale
		21	Satisfaction with water quality during different seasons and special occasions	Primary (Beneficiaries)	Likert Scale, Description
		22	Satisfaction with odour	Primary (Beneficiaries)	Likert Scale
		23	Satisfaction with taste	Primary (Beneficiaries)	Likert Scale
		24	Satisfaction with billing	Primary (Beneficiaries)	Likert Scale
		25	Satisfaction with bill payment	Primary (Beneficiaries)	Likert Scale
		26	Satisfaction with complaint resolution	Primary (Beneficiaries)	Likert Scale
		27	Overall satisfaction with water service	Primary (Beneficiaries)	Likert Scale
		28	Perceived change in water availability and reliability after DfT	Primary (Beneficiaries)	Likert Scale
		29	Perceived change in water Quality after DfT	Primary (Beneficiaries)	Description
		30	Major benefit identified	Primary (Beneficiaries)	Description - 100 words
		31	Major remaining problem	Primary (Beneficiaries)	Description - 100 words
E	Community Health, Behaviour & Spatial Equity	32	Change in water-borne disease incidences (pre vs post DfT)	Primary (Beneficiaries)	Likert Scale
		33	Savings on health expenditure (reduction in monthly spend) pre vs post DfT	Primary (Beneficiaries)	Likert Scale
		34	Savings on Drinking water purchase (reduction in monthly spend) pre vs post DfT	Primary (Beneficiaries)	Likert Scale
		35	Consistency of supply	Primary (Beneficiaries)	(Consistent hrs of supply)
F	Institutional Capacity & Scalability	36	Willingness to expand or adopt the model	Primary (Beneficiaries)	Yes / No, Description - 100 words

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