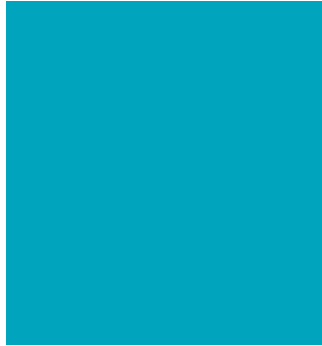




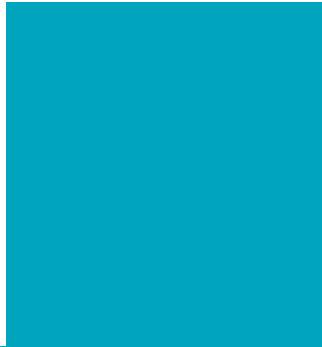
Moving towards water secure and climate resilient cities: Gandhidham



City's water assessment slide deck

Center for Water and Sanitation
(CWAS)

January 2024



Moving towards water secure and climate resilient cities Gandhidham

Water Security Assessment for Gandhidham is prepared by the Center for Water and Sanitation (CWAS), at the Centre for Research and Development Foundation (CRDF), CEPT University in partnership with Empowerment Foundation and Dasra to support Gandhidham Municipal Council To move towards water secure and climate resilient cities.

Acknowledgment

Cities have become more susceptible to water scarcity than ever before. Climate change and resultant uncertain weather patterns are forcing cities to take extreme steps to combat severe water crisis, especially during summer months. Indian cities are no exceptions. Understanding the severity, GoI has launched AMRUT 2.0 (Atal Mission for Rejuvenation and Urban Transformation) which focuses on making cities water-secure and self-sufficient through circular economy of water.

Gandhidham is located in the arid region at the Kachchh district, Gujarat. It receives around 430 mm of annual rainfall in comparison to the national average of 1152 mm. Large part of the Kachchh region including Gandhidham are water stressed with a severe shortage of drinking water in the summer and is characterized as a drought-prone areas. This situation has improved significantly since the long distant Narmada canal water has been made available as drinking water. However, change in rainfall pattern in Narmada catchment may result into water scarcity in Gandhidham, if the local water resources are not managed well.

In this context, CWAS at CEPT University in partnership with Empowerment Foundation and Dasra will support Gandhidham Municipal Council to move towards water security. The key support will include assessment of existing water scenario, developing water security plans for the city and demonstration of pilot projects like rain water harvesting, ground water recharge, revival of defunct wells and reuse of wastewater. A mix of secondary data provided by the city, primary surveys, and stakeholder interactions were done to prepare the assessment slide deck for Gandhidham city.

CWAS team acknowledges excellent support by Gandhidham Municipal council officials. Discussions with other stakeholders such as private water suppliers, water sector experts, community groups and slum households have also helped assess existing water scenario in the city.

We thank the Dasra team for its support and Empowerment Foundation for its grant to CWAS for this activity.

**Meera Mehta and Dinesh Mehta
Center Heads, CWAS**

About the project...

Moving towards water secure and climate resilient cities - Gandhidham:

CWAS-CEPT University in partnership with Dasra and Empowerment Foundation will support Gandhidham Municipal Council to move towards water security.

CWAS in consultation with Gandhidham Municipal Council(s), has carry out citywide assessment and will develop Water Security Action Plan for the city along with some pilot demonstration projects around rainwater harvesting, groundwater recharge / revival of defunct well and potential reuse of used water

The project is being funded by Empowerment Foundation.









What the project will bring in for the cities?

Water security action plan can benefit the cities to become water secure by augmenting water availability through harvesting and/or recharging, overcome water scarcity through demand management, behavioral changes in citizens on judicious use of water through community participation and bring in institutional accord through policy initiatives.

Thus, the study aims at moving Gandhidham towards water secure and climate resilient cities.

The project will develop a water security action plan for both Anjar and Gandhidham...

DEVELOP A WATER SECURITY ACTION PLAN

DEFINE	PLAN				IMPLEMENT			
								
Water Security Plan Objectives	Key Issues and Challenges	Stakeholder Consultation	Set Priorities	Design Initiatives	Implement Pilot Projects	Capacity Building	Engaging with local communities	Developing SoPs/ Guidelines

Desk review of various Water security frameworks across the globe

Assessment and in-depth understanding of current water situation

Stakeholder consultation to bring accountability and ownership towards the initiatives

Implement pilot projects such as RWH, GWR etc. to demonstrate reuse

Capacity building of the ULB officials and other stakeholders involved in the projects

Developing SoP's, guidelines for proper functioning of the pilot project and proposed initiatives

WSAP

Documentation of activities undertaken in these cities and sharing with sector partners in India and globally

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1 Background

2 Study framework and Objectives

3 Gandhidham city overview

4 Assessment of Existing Water Supply

5 Assessment of Existing Sanitation situation

6 Institutional and Regulatory Framework

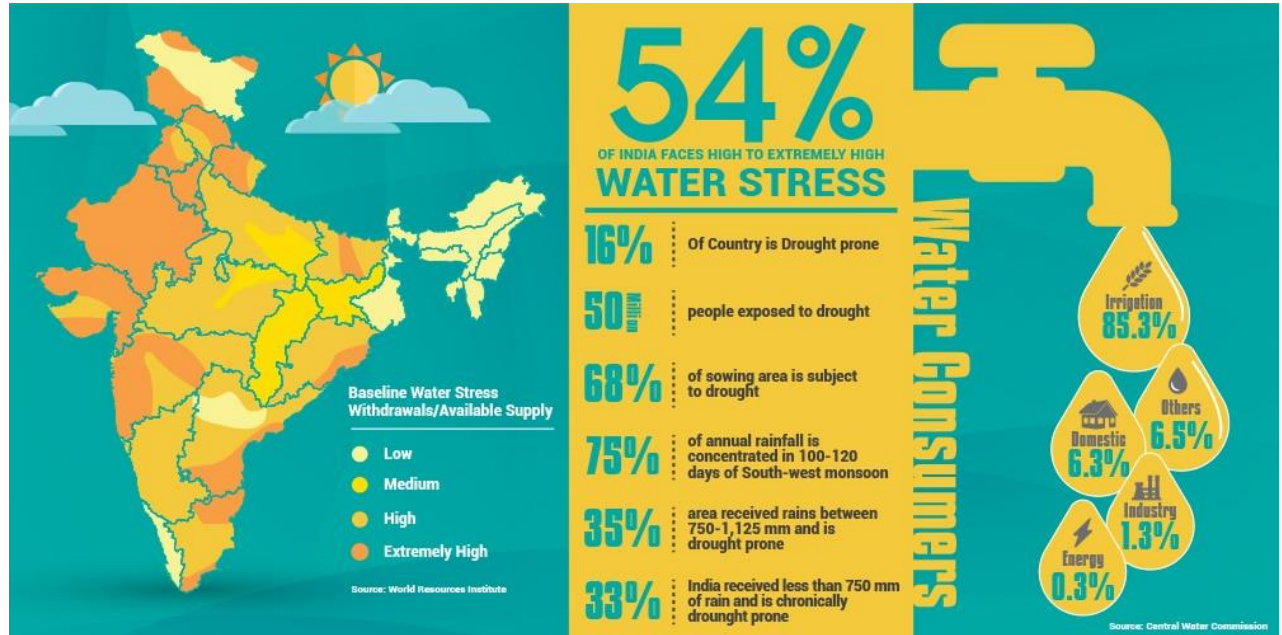
7 Key Findings

8 Way Forward

Overview of water scenario in India

Water availability is becoming less predictable in many places with increased incidences of flooding and droughts.

Equitable access to safe drinking water continues to remain a challenge. Low-income communities, are most vulnerable



The threat of water scarcity or “Day Zero” is looming towards Indian Cities

- High water loss
- High groundwater abstraction
- Rising demand and poor supply management
- Water source pollution

Delhi

- Groundwater depletion with presence of high metals
- Poorly laid out infrastructure leads to high NRW
- Abolition of water tax in 2011

Kolkata

- Inequality between water supply hours
- Pollution of water source and groundwater due to improper industrial effluent discharge
- Poorly laid out infrastructure
- Minimal rainwater harvesting initiative implementation
- Rapid and unregulated urbanization

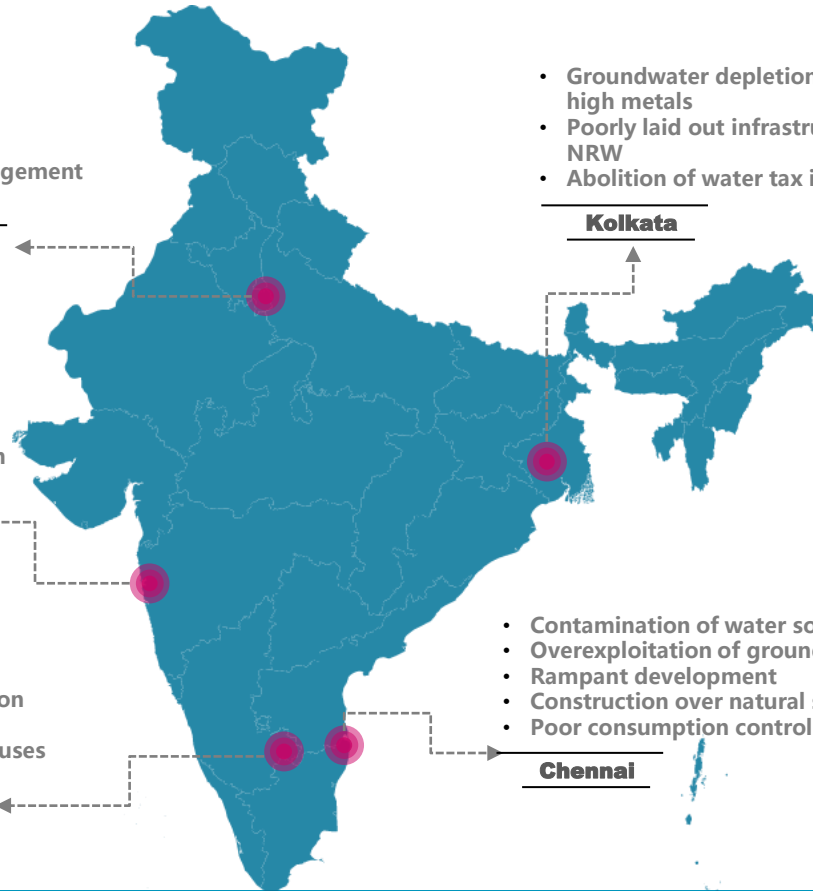
Mumbai

- Poorly laid out infrastructure
- Delaying the groundwater rejuvenation
- High water loss
- Depletion of own sources and dependency on distant sources
- High percentage of concretization which causes flooding

Bengaluru

- Contamination of water sources
- Overexploitation of groundwater
- Rampant development
- Construction over natural streams
- Poor consumption control measures

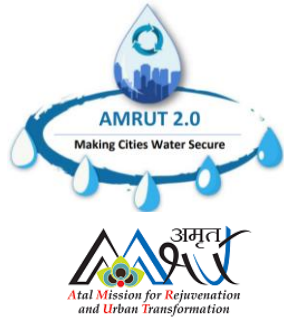
Chennai



Issues faced by urban water resources in India



Water Security is high on National and International agendas, cities too need to align towards these agendas



Government of India has put a strong emphasis on water security – The Atal Mission for Rejuvenation and Urban Transformation 2.0 (AMRUT 2.0) has water security as the central theme

KET OBJECTIVES



Ensuring **universal access** to drinking water connection at household level



Focus on moving towards **water secure** cities



Conservation of waterbodies and **urban aquifer management**



Sustainable Development Goals (SDG 6)

- Target 6.1: Achieve universal and equitable access to **safe and affordable drinking water** for all
- Target 6.6: **Protect and restore water-related ecosystems**, including rivers, aquifers and lakes

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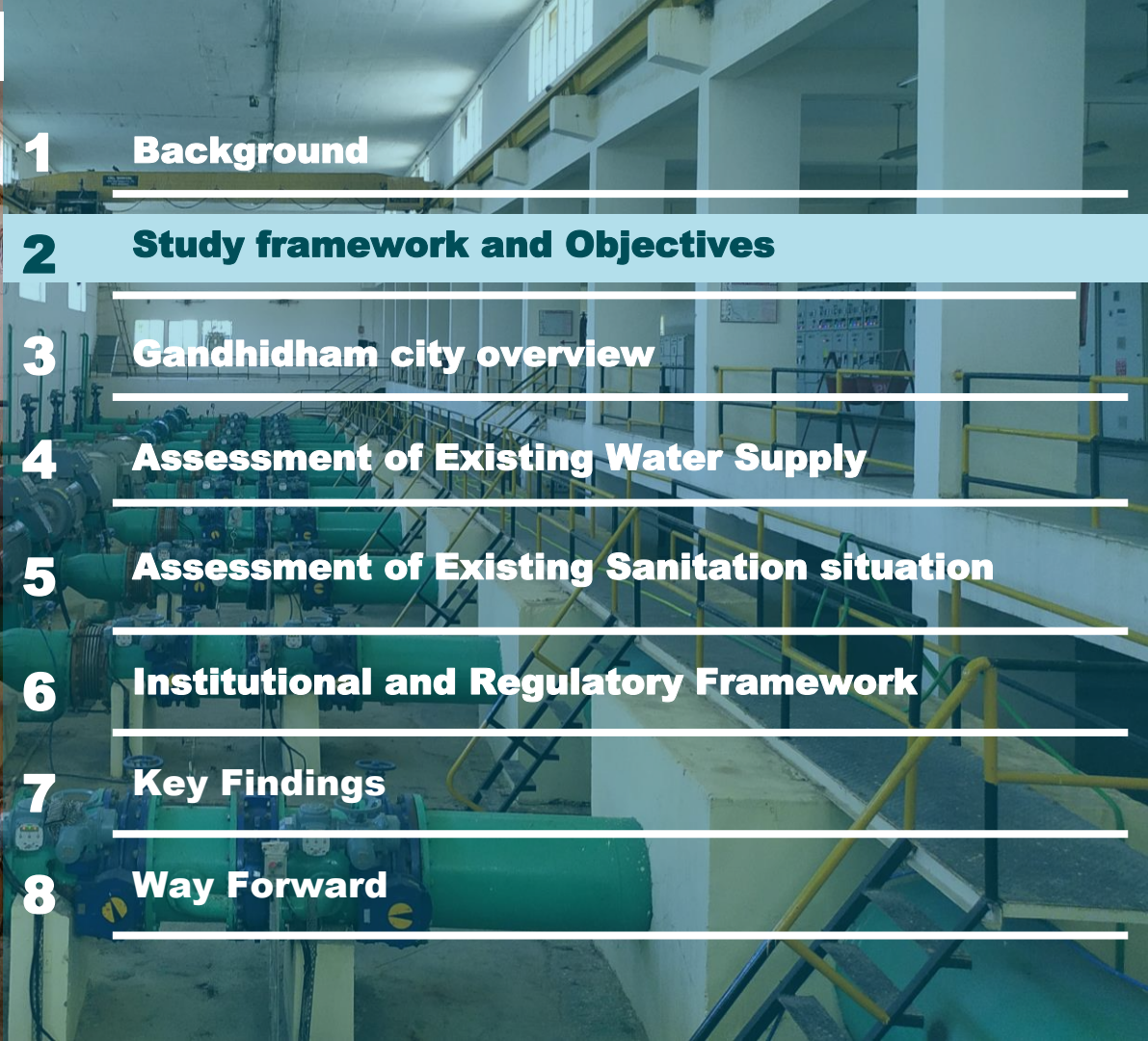
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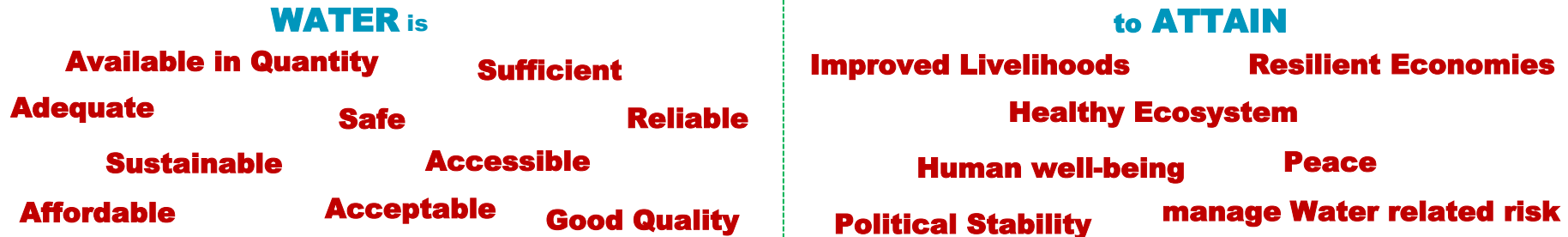
6 Institutional and Regulatory Framework

7 Key Findings

8 Way Forward



Definitions of water security across the globe focuses on quantity and quality of water



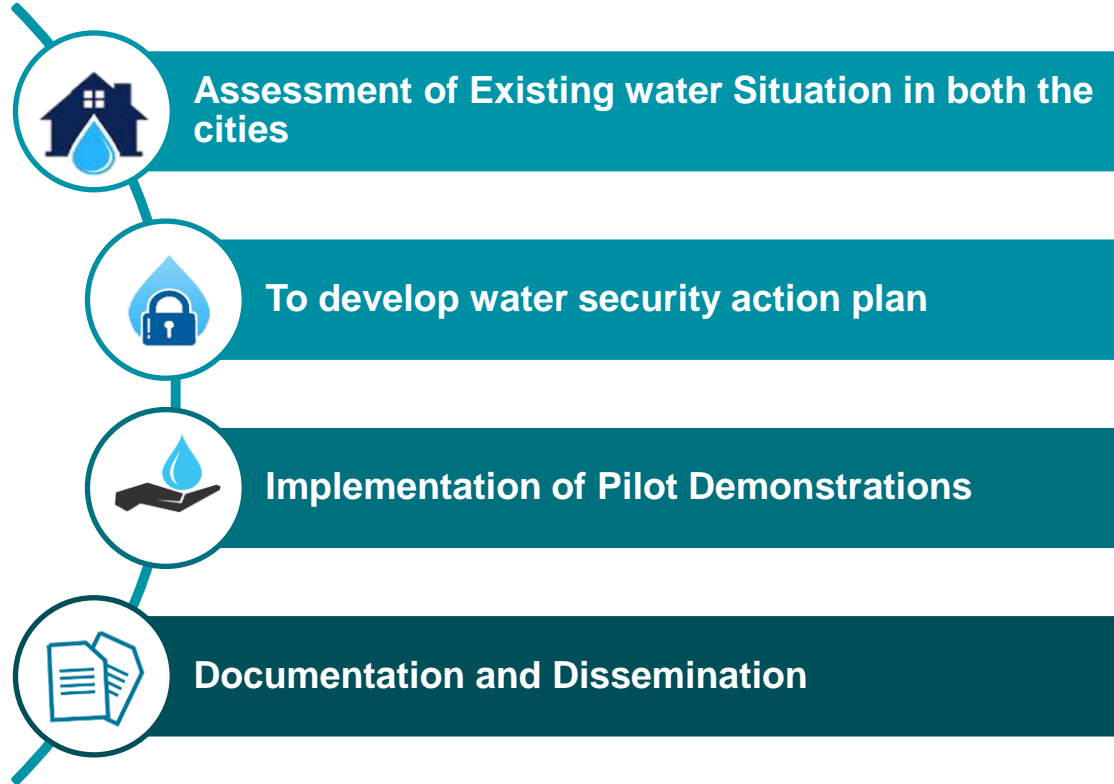
“Water Security is access of water for **basic human needs** in adequate **quantity and quality**, which is **reliable and affordable**.”

The frameworks are **comprehensive**, covering the various aspects associated with **water and water governance**, however water **needs to be looked from regional context** as the situation varies from place to place...

Study Objectives

The study has four main objectives, which are as follows:

- **To Assess the Existing water situation in both the cities:** Existing water situation for both cities will be assessed through the lens of **Accessibility, Quantity, Quality, Reliability and Affordability**.
- **To develop Water Security Action Plan:** Water security action plan will be developed based on the water service chain assessment where **new initiatives** will be explored to make the **two cities water secure**.
- **To implement pilot demonstration projects:** The project also includes implementation of **action oriented pilot demonstration** around rainwater harvesting (RWH), ground water recharge (GWR), recharging urban flood spot etc.
- **To document and disseminate the work:** The complete project along with **scale up plan** will be documented.



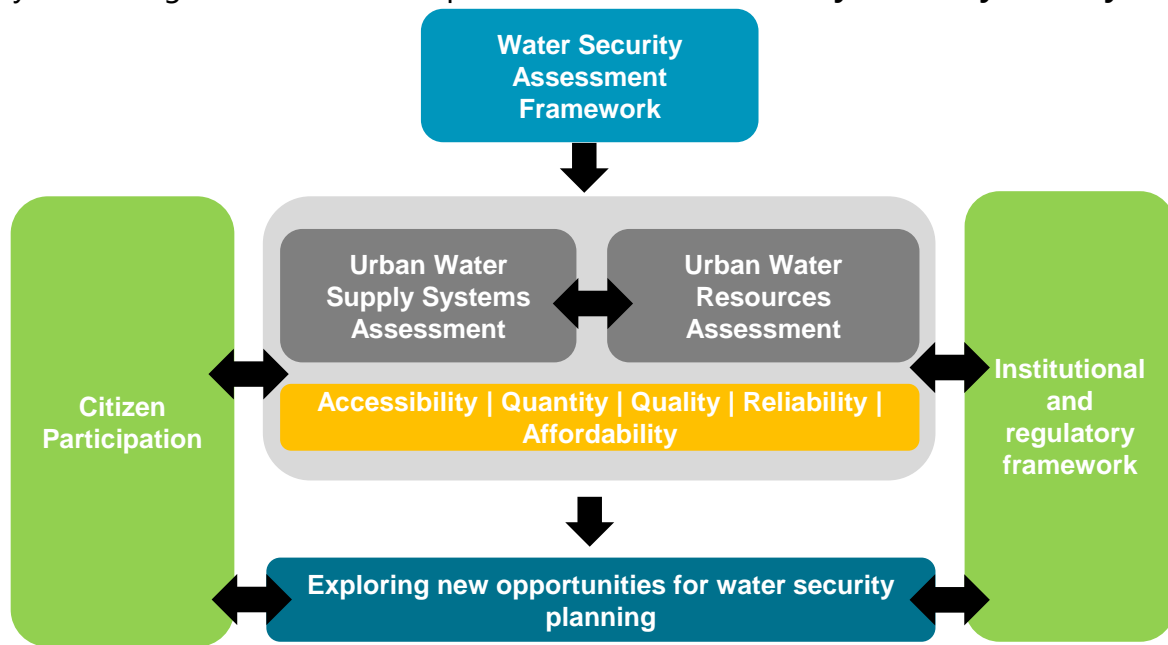
Water Security assessment framework focuses on four key aspects: Water source study, municipal water services, institutional framework and citizen participation

Water Security assessment framework is based on the **Urban Water Security Management Toolkit** developed by **CWAS** and is further **adapted**. The toolkit, assess the city' s existing water situation from **Urban water supply system** and **Urban water resources** perspective. The service chain is analyzed through the lens of five parameters viz., **Accessibility, Quantity, Quality, Reliability and Affordability**.

The **institutional and regulatory framework** adopted in the city plays a vital role in its **water management and service delivery**. Thus the same has been further examined for better understanding of the city' s water system.

Last but not least, **citizens**, the end user, of the water service must be included in the assessment process and hence the framework incorporate **assessing the existing water system from citizen perspective**.

Based on the above assessment framework, the **Water Security Action plan** for the two cities will be developed which will explore the new opportunity to make the cities water secure.



Study Methodology

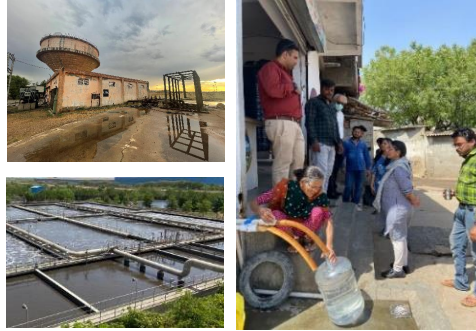
Desk review



Detailed desk review of various Water security frameworks, toolkits etc. adopted across the globe to make cities water secure

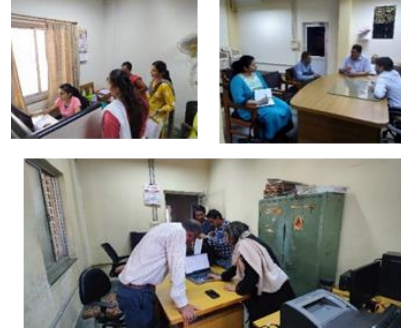
- **Asian Development Bank: Asian Water Development Outlook (AWDO)**
- **United Nation: UN' s Framework for Water Security**
- **WaterAid: Water Security Framework**
- **CWAS: Urban Water Security Planning Toolkit based on Bhuj Experience**

Site Visit



- Site visits to all the **water and sanitation** related **infrastructures** in the entire city
- Survey of all the **slums** to develop **slum profile** and understand equity aspect in city systems
- **City survey** to understand the **urban fabric**

Discussion with ULB officials



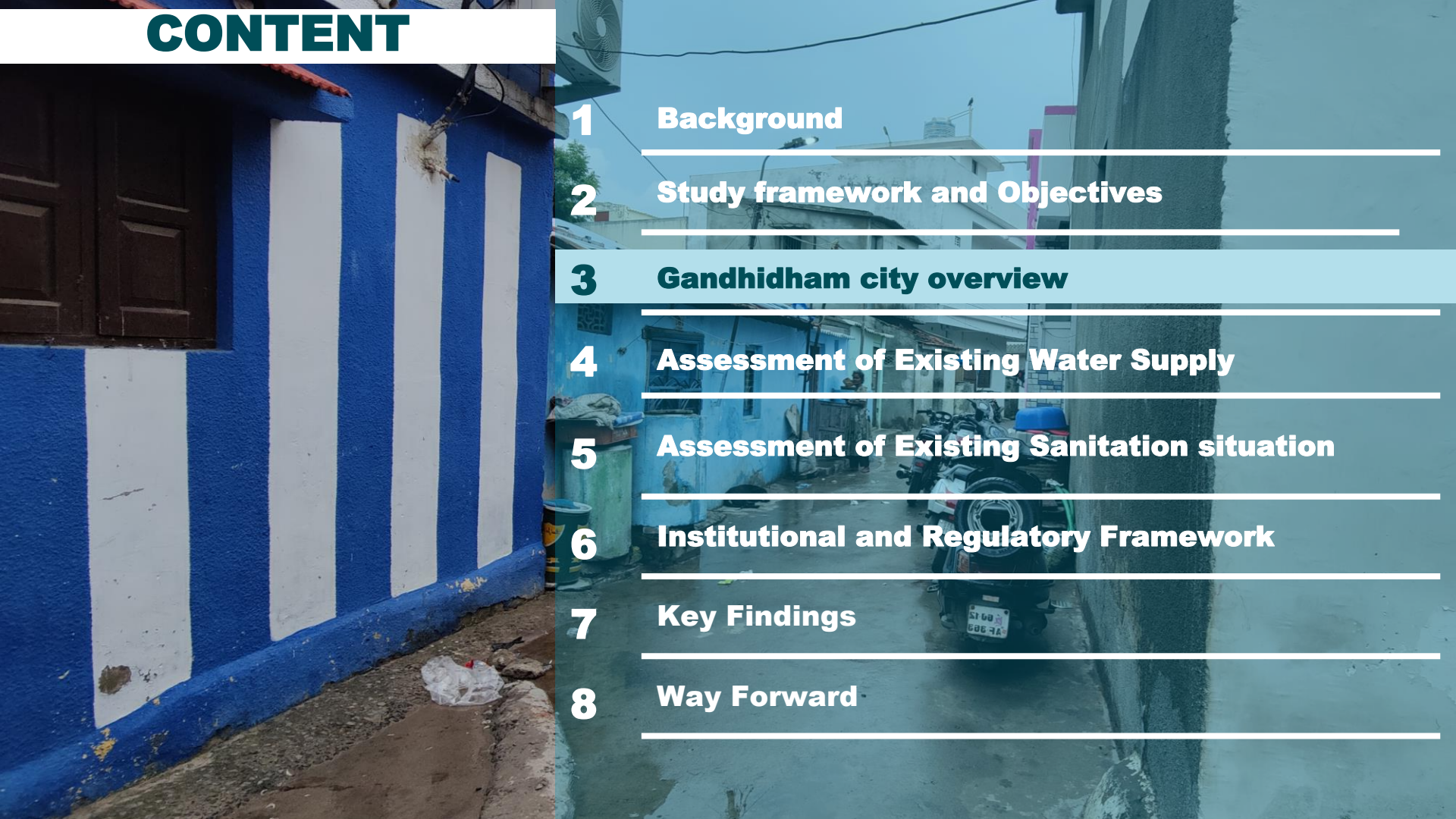
- Discussion with **CO, President, department heads and engineers** to understand the **existing infrastructure and governance practices**
- Visited **various departments** of the ULB like **Water, sanitation, IT, property tax** etc.

Discussion with citizens (including Slum pockets)

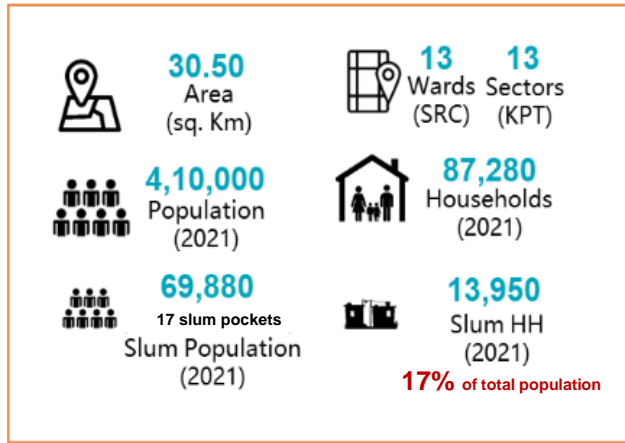
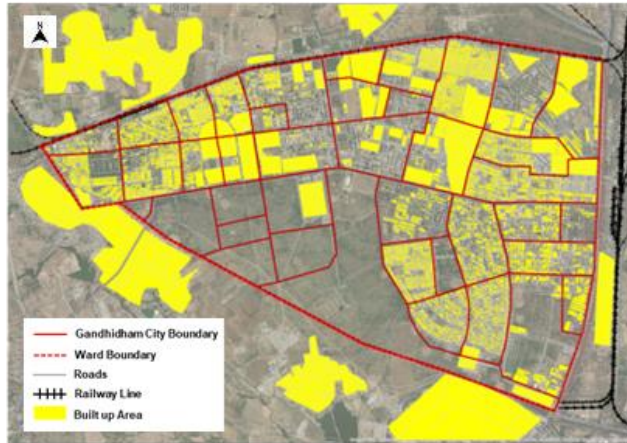


Discussions with **Citizens, slum dwellers, Youth leaders, senior citizens** etc. has been conducted for better **understanding of the existing water and used water systems** in both the cities.

CONTENT

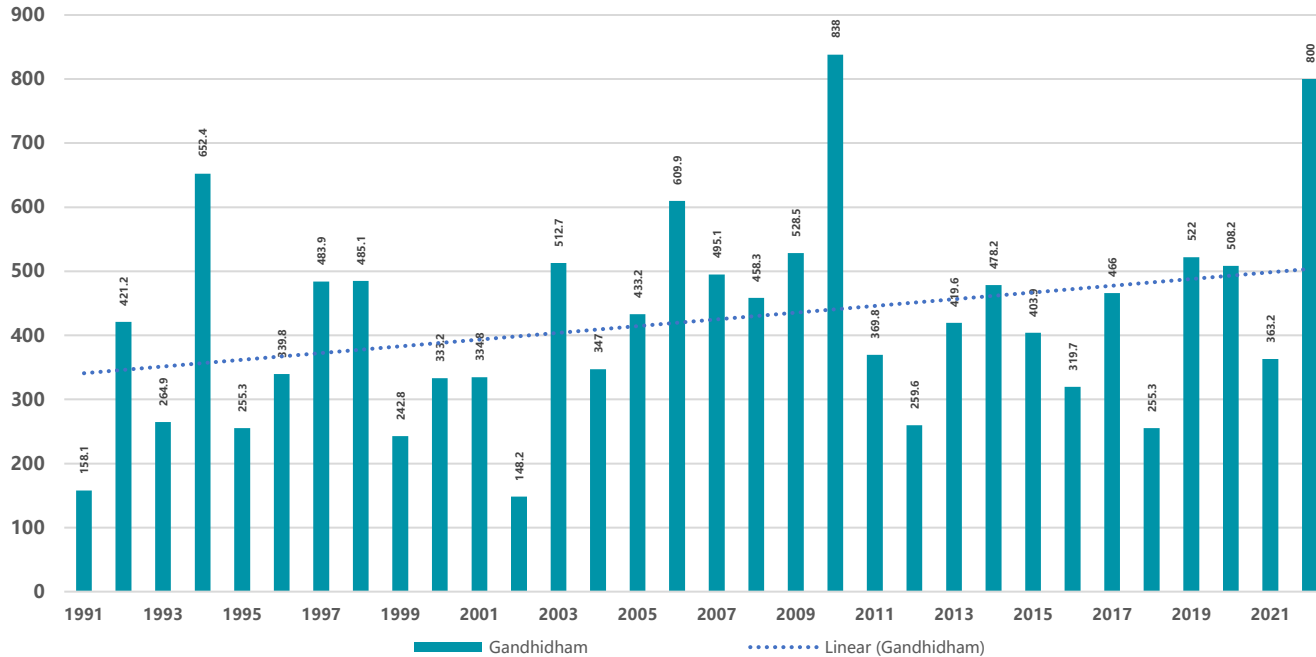
- 
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 - 8 **Way Forward**

Gandhidham is a city located in Kachchh district of Gujarat...



- Kachchh is a largest district of Gujarat State; spread over 45,674 km² with longest coast line of about 406 kms in the state
- Kachchh region falls under arid-semi arid zone (classified by average annual rainfall of 250-500 mm)
- Growing economic and industrial hub in the state. The key industries include Engineering, Power, Steel Pipes, Cement, Handicrafts. Emerging industry sectors include Construction, Chemicals, Ceramics and Textiles

The region is chronically drought prone with a frequency of once every 2.5 years. However the rainfall shows an increasing trend in past three decades



- Kachchh district has faced famine every 2.5 – 3 years
- In the last decade this region faced **severe drought in almost every alternate year (2012,16 & 18)**
- Number of **rainy days** has **increased** (~13 days)

In recent decades the **rainfall pattern shows an increasing trend that can be tapped to augment the own water resource** of the cities in Kachchh Region

Gandhidham is among first planned city for refugees that migrated post independence..



Gandhidham Main Market - 1978

Then..

The city was created in the early 1950s for the resettlement of Sindhi Hindu refugees from Sindh (now in Pakistan) in the aftermath of the partition of India.



Gandhidham Main Market - 1968

Now..



Gandhidham Main market-2023



Gandhidham Timber Depot



Rotary Forest- Urban Forest



Gandhi Samadhi- Adipur



Kandla Special Economic Zone

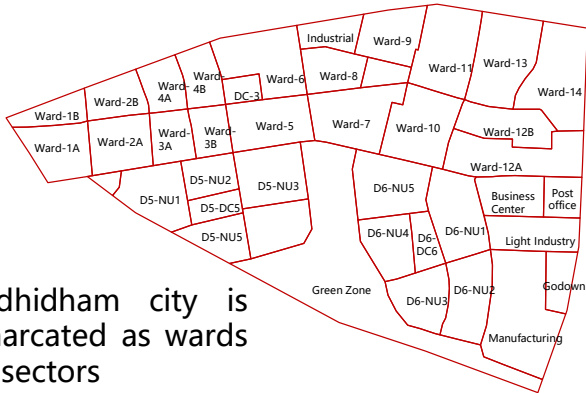


Kandla Port (12-14kms)

Gandhidham is a planned city with various landmarks such as Gandhi Samadhi and Urban forest.

Due to close proximity to Kandla port, Gandhidham houses huge timber market, special economic zone etc. in the peripheral area.

Gandhidham is a planned city developed for resettlement of Hindu Sindhi's post partition



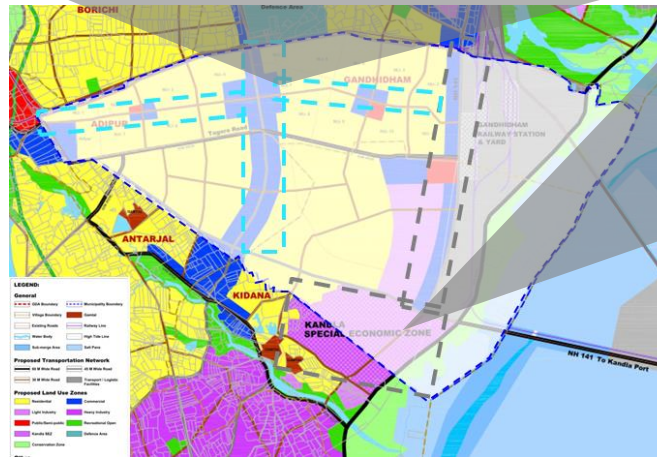
Gandhidham city is demarcated as wards and sectors



Commercial and Industrial Development



The city has commercial development along the main spinal road. Residential setup with G+1 structures can be observed in and around the secondary roads



Major Growth corridors- CBD area, Port, SEZ



The city has dedicated land parcels for commercial setup and industrial functions like - for GIDC, port areas, light industry etc

~17% of Gandhidham Population lives in Slums



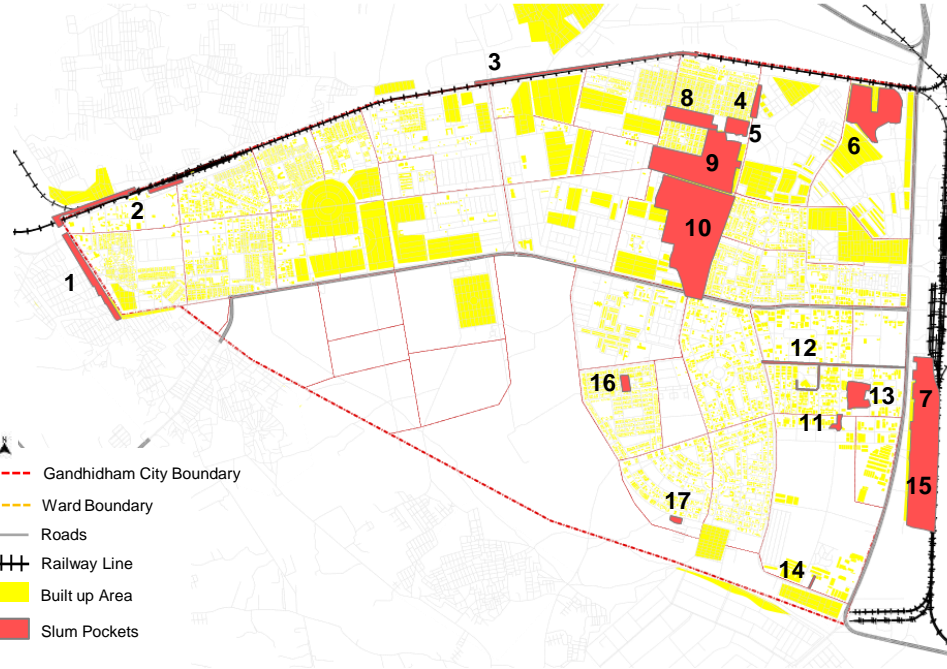
17
Slums



69880
Population



13950
Households



Gandhidham city has **17 notified** slums. The **slum population** ranges from **60 – 13000 +** (as per census 2011). The slums have mix of **partly kacha and pucca** houses with basic **water and sanitation** facilities provided by the **municipality**. These slums have major economic dependency on Kandla port, GIDC, KASEZ and similar industrial setups in and around the city.



Visual assessment of slums- Gandhidham

Roads



Concrete/ bitumen/ paved roads with under ground drainage connection is observed

Housing Typology



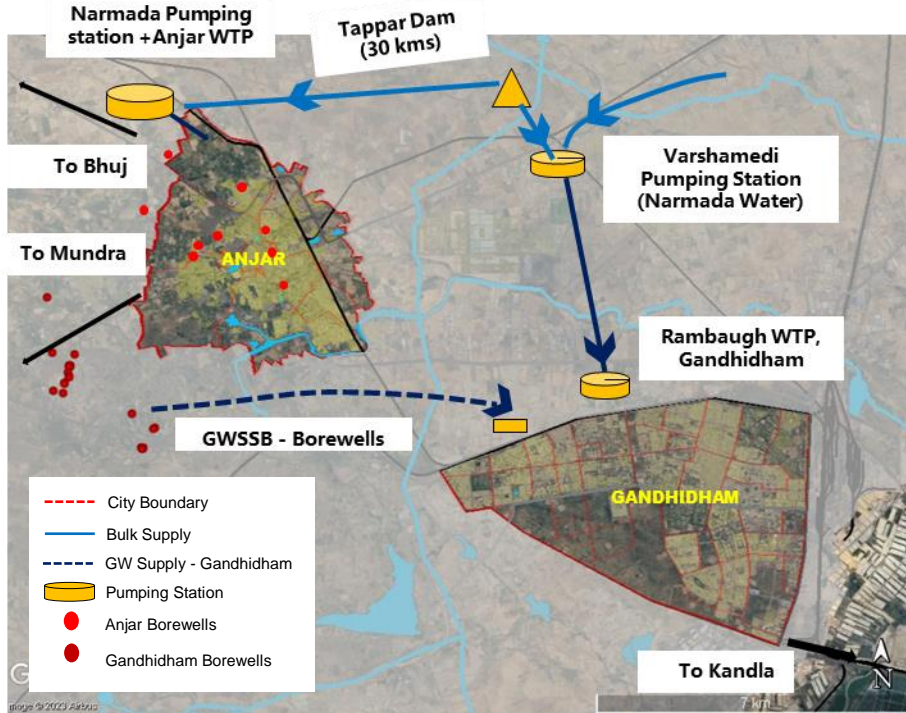
Sundarpuri area have G or G+1 pakka structures rest of the slum have structures with tin shed roofing's

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The water source for the cities has made a radical shift from ground water to distant surface water source, post implementation of Narmada Project



Surface Water



Gandhidham has **75%** dependency Narmada water

GANDHIDHAM – 40 MLD

Ground Water



Gandhidham has **25%** dependency on ground water, which is **Saline** and not fit for drinking purpose

GANDHIDHAM – 12 MLD

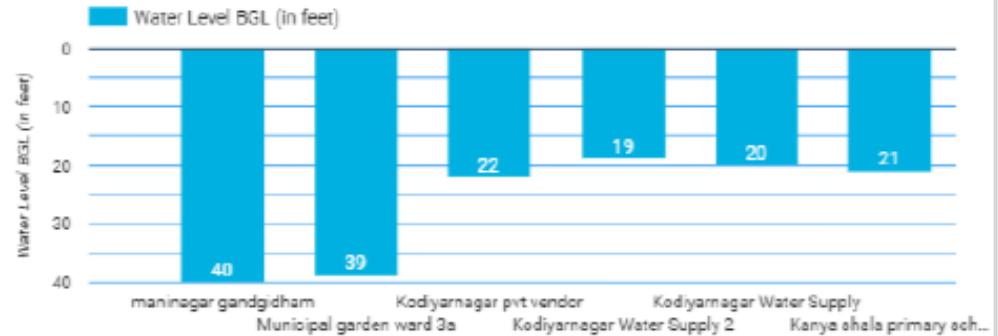
GANDHIDHAM (Total Supply 52 MLD)

- Before Narmada, the city had dependency on **40 tube wells** (situated in Anjar taluka), out of which **12 tube wells** are currently dysfunctional

Also the city is planning to shift to surface water (Narmada water) over a period of 5-8 years

Gandhidham has 25% dependency upon ground water however water is drawn from Anjar's aquifer...

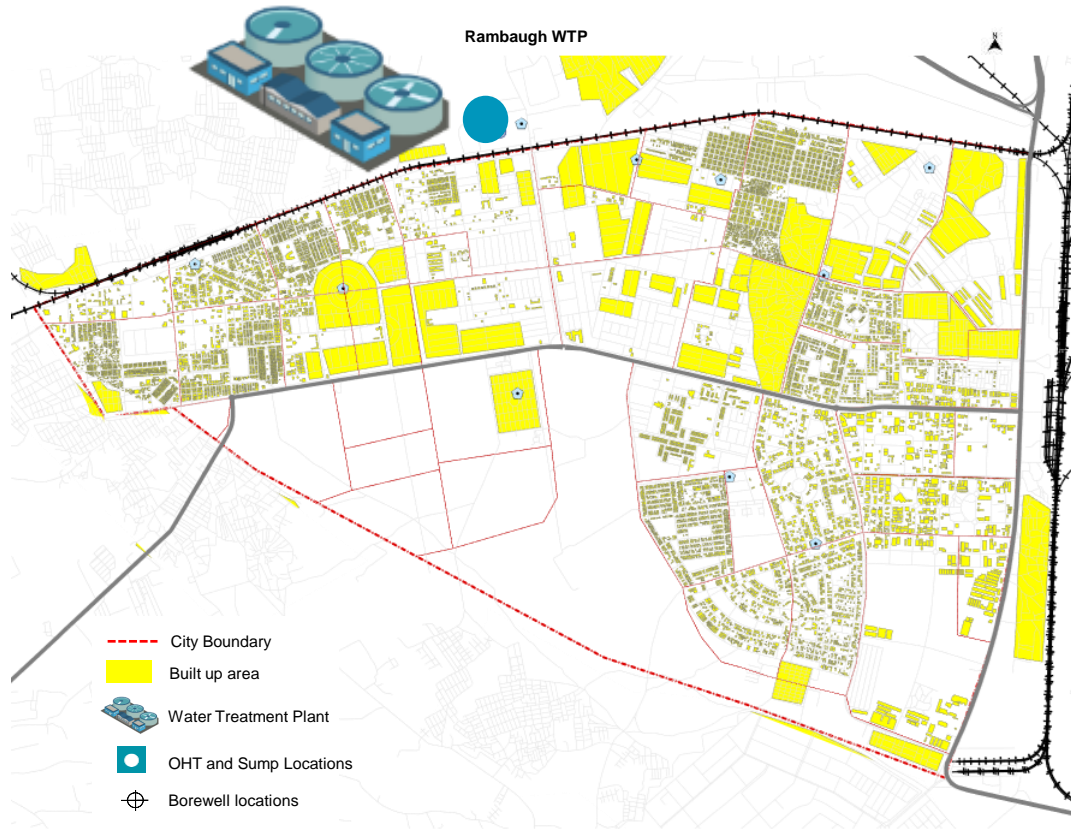
- **Household or community** level bores are present in Gandhidham
- The **30 bores** which supply **12 MLD water** to **Adipur Area** are in **Anjar Taluka**
- **Water levels** observed to be shallow in **Gandhidham at 19 feet to 40 feet.**
- **Saline ground water** is found in parts of Gandhidham.
- **No control, regulation or monitoring** on ground water draft in Gandhidham.



Residents have **bores**, which were **drilled during construction of their houses** and they still use the bore water mainly for **daily chores** as and **when required.**

To understand the **geo-hydrological features** of the region, **CWAS** has taken up detailed study of **Geo-hydrological assessment** to characterize aquifers in Gandhidham with **ACT** organization

Gandhidham has installed Water Treatment Plant (WTP) of 40MLD capacity



- Gandhidham has **40 MLD Water Treatment Plant** The city is augmenting its **treatment capacity by 27 MLD** under “Nal se Jal” Project.
- The **WTP at Rambaugh, Gandhidham is non-functional** since more than a year, however Chlorination is done at WTP

Gandhidham's Water Treatment Plant is operated by private contractor

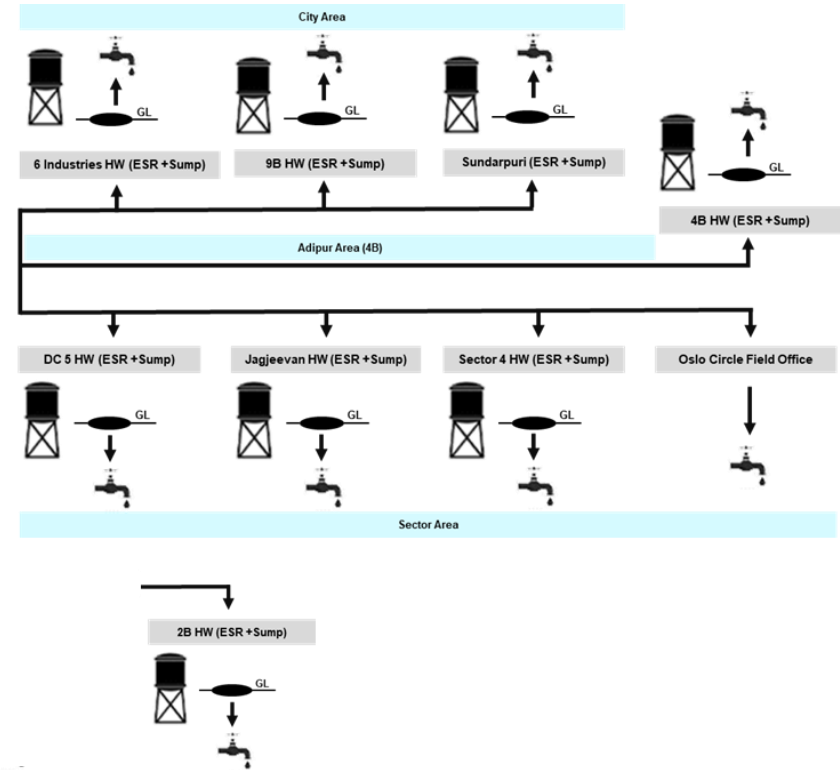
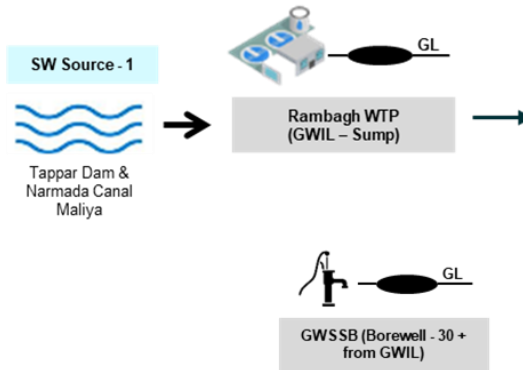
- Private agency named- **R.P. Jaiswal** is managing the WTP for more than an year
- The contract is **revised annually**
- Agency takes care of **mechanical and electrical part**, which includes overseeing the property, monitoring the motors, motor repair, valve repair etc.
- Due to **electricity fluctuations, pump failure** is the major issue which the agency faces
- **Maintenance** of the **metering system** comes under the responsibility of **Gandhidham Municipality**, however the intake meter of the WTP is **not working** since long (application for repair has been submitted to the respective department)

Non functioning meter has bring an **ambiguity on amount of water supplied** by Narmada (Raw bulk supply) and water received by the city

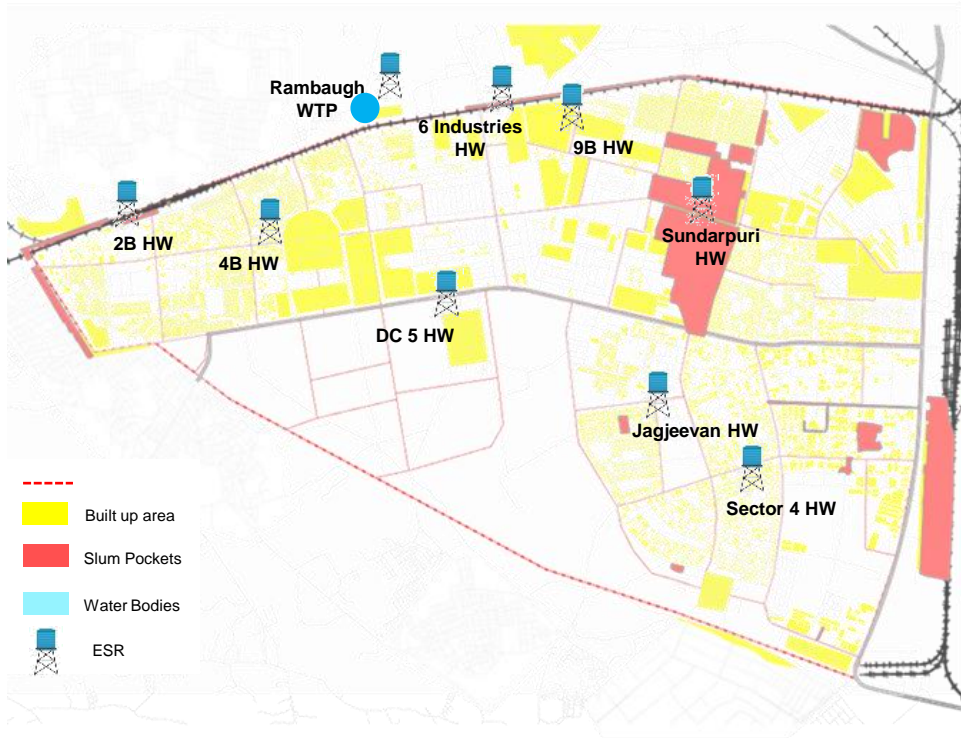


Gandhidham has ~7 ML ESR and ~11 ML Sump storage capacity which distributes water across the city(1/2)

- Gandhidham has **8 ESRs with total 7 ML** capacity
- Gandhidham has **1 UG sumps with total 11.2 ML** storage capacity (sumps are additional storage structures which does not supply water directly to the system)
- The city is **augmenting** its **storage capacity** by constructing **7 ESR/UG** sumps under the “**Nal se Jal**” Project



Gandhidham has ~7 ML ESR and ~11 ML Sump storage capacity which distributes water across the city(2/2)



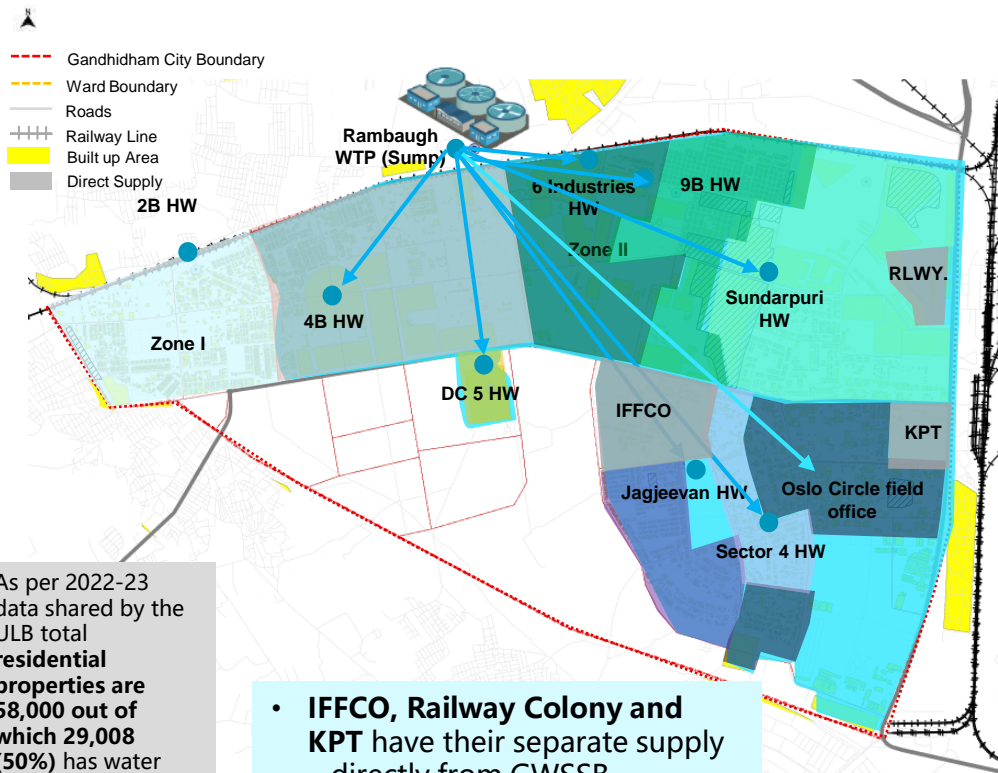
As per MoHUA, the **required storage for daily supply is ~21 ML** which the city suffice

The city needs to emphasize on **management of water supply system and move towards daily water supply systems**

Source: Guidelines for Planning, Design and Implementation of 24x7 Water Supply Systems, MoHUA, <https://mohua.gov.in/pdf/624eb498862a7Guidelines-for-Planning-Design-and-Implementation-of-24x7-Water-Supply-Systems.pdf>

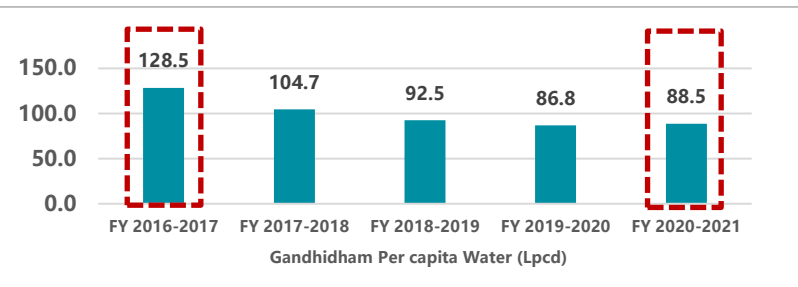
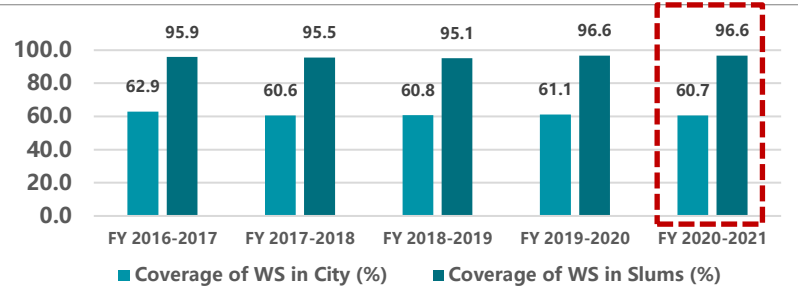
Gandhidham has good water supply coverage with only Khodiyar Nagar slum with partial supply connections

GANDHIDHAM



As per 2022-23 data shared by the ULB total residential properties are 58,000 out of which 29,008 (50%) has water connections

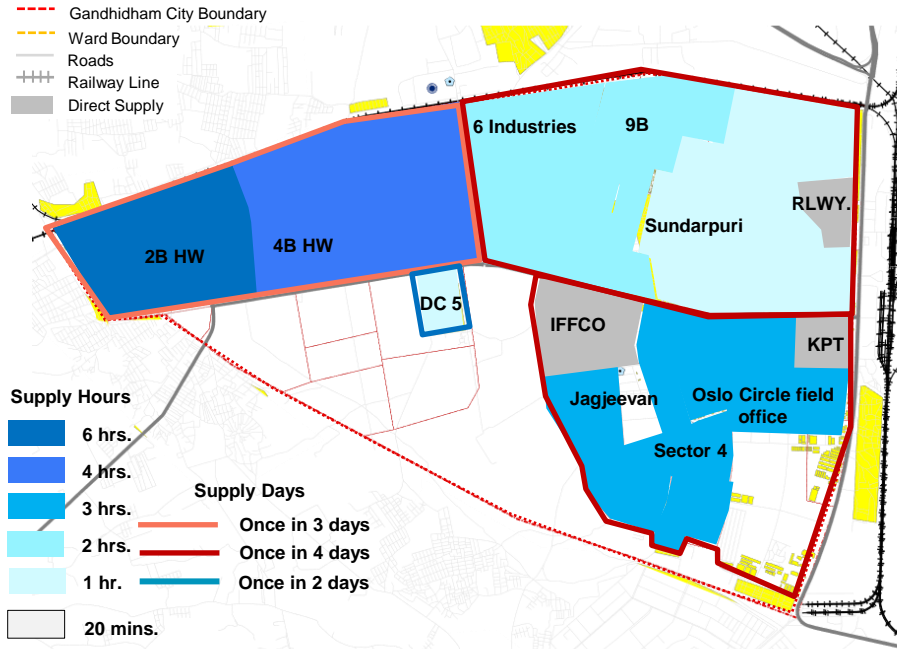
- IFFCO, Railway Colony and KPT have their separate supply – directly from GWSSB



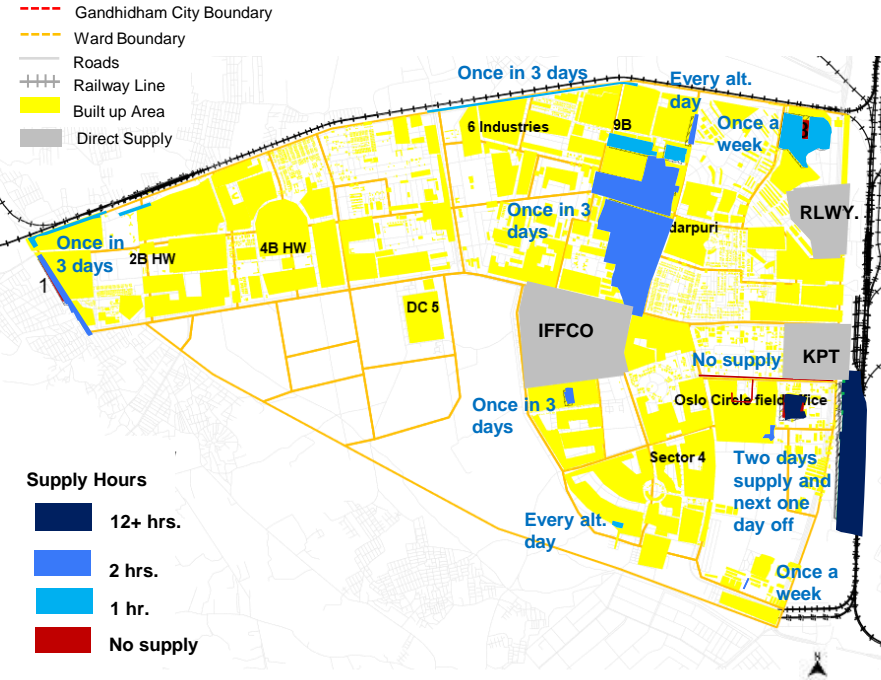
- The coverage of water supply connection is 60%, however on field the city seems to have full coverage
- The per capita supply has decreased from 128 to 89 LPCD over the period of 5 years which is mainly due to increase in population in the city

Gandhidham city has intermittent supply system with once in 3 or 4 days supply and the supply hours vary from 1hr to 6 hours

GANDHIDHAM – City Area Supply Hours



GANDHIDHAM – Slum pockets Supply Hours



Spatial discrepancy in supply hours is observed in city areas. Slum pockets have pressure issues. Some slums have continuous supply for 2 days and then supply is skipped for a day and a few pockets are missed out.

Leakage in the system is the major cause of Non Revenue Water(NRW) in Gandhidham

GANDHIDHAM System Input Volume (52 MLD)	Authorized Consumption (36.9 MLD) 70 %	Billed Authorized Consumption (36.0 MLD) 70 %	Billed Metered Consumption (NA)	Revenue Water (36.0 MLD) 70 %	
			Billed Unmetered Consumption (36.0 MLD) 70 %		
	Water Losses (15.1 MLD) 30 %	Unbilled Authorized Consumption (0.9 MLD) 1.73 %		Unbilled Metered Consumption (NA)	Non-Rvenue Water (15.1MLD) 30 %
				Unbilled Unmetered Consumption (0.9 MLD) 1.73 %	
		Apparent Losses 0 %		Unauthorized-Consumption 0%	
				Metering Inaccuracies (NA)	
Real Losses (15.1 MLD) 30 %		Leakage on Transmission and/or Distribution mains (15.1 MLD) 30 %			

- Need to **switch from ad-hoc to permanent** solutions which can be identified by conducting **water audits**.

Due to intermittent supply, Private Water supply tankers have gained in importance in Gandhidham city, which the citizens find more reliable



Pvt. Water Tankers



Water supply in Gandhidham city is once in 2-4 days, so people have to store water for that duration and in case of delay in water supply or sudden increase of usage, private water suppliers play a crucial role.



It was observed that approx 5 to 10 such suppliers were present within 1 km road length in many areas.



These tankers charge around 300-450rs per Tanker (5000lit water)



These suppliers generally have inhouse/ pvt. Borewells from where they draw water, however there is no control or regulation over ground water extraction



At times there is inspection from municipal authorities and penalties are levied from suppliers. However, they were reluctant to share any information.



In Gandhidham, though the ground water is saline and unfit for use, as per district GW report, we observed that many households have their individual borewells or handpumps which is used for domestic purpose



Bore wells



Ground water in Gandhidham is available at 50-70 ft., with one time cost of installation at Rs. 50,000- 1lakh, thus people find it more economical than private water suppliers



High Dependency on RO water for drinking is observed in Gandhidham



● In **Gandhidham**, citizens are highly dependent on RO water suppliers for drinking purpose. Dependency on these is even higher in slum areas. These water suppliers are spread across the city and specially around slum areas which makes it more convenient option.



RO Water



● Bottled water cost around Rs. 10-25 for normal water and around Rs. 30-40 for cold water (its cheaper if one goes to collect from shop). An average Household spends **Rs. 600-1000/ month on RO water bottles.**



● The main reasons identified for the same are-

- Odd supply hours (3am to 8 am)
- Poor quality of water (bad odour, pale color are observed)
- Low water pressure (quantity of water is not sufficient)
- Dependency on community stand post (lack of individual connection)



● There is **no control or regulation or check** over quality of water supplied

● **People in Non slum Areas also prefer using Ro water bottles** as water supply frequency is once in 3-4 days and there is 30-40% wastage of water in Regular RO.



Water ATM



● Alternate to RO bottles, there are **Water ATMs**, the source of water is ground water (inhouse borewells) but these are open 24x7 and bottles of various sizes can be filled directly. This facility is used by **both Slums and Non-Slum areas.**



● Water tarrif remains **Rs. 1 / liter for normal water and Rs. 2/ liter for cold water** and machine installation cost is around Rs.1 Lakh



Water ATMs have been installed in slums in Gandhidham at private vendors shop which draft ground water through own borewells



Water ATM, Sector 4, Gandhidham

- Water ATM can be used with notes and coins.
- Vendor is making arrangement to make it available 24x7
- Installed by BM Water, just 3 months back (Cost: 1 Lakh)
- **Rs.5/- for 10 L (Normal Water)**
- **Rs.25/- for 10 L (Cold Water)**



Water ATM, Ward 1, Adipur, Gandhidham

- Water ATM can be used with coins and a Water ATM Card
- 24 x7 water is available at the ATM
- Installed by I-Water, just 2 months back
- **Rs.5/- for 10 L**
- **Rs.1/- for 1 L**

The ATM supply approximately **100 bottles of 20 L capacity per day** i.e., 2000 L water from one ATM

People are also dependent upon private water supplier for drinking purpose, this is more prominent in Gandhidham

Water Quality Testing Report of Gandhidham and Anjar								
Report Generation Date:		16-09-2022						
Sample Received Date:		02-09-2022						
Sr.No.	Sample Location	pH	Turbidity, NTU	Total Dissolved Solids (TDS), mg/l	Chloride, mg/l	Alkalinity, mg/l	Hardness, mg/l	E. Coli
	Drinking Water Standards (IS 10500 : 2012)	6.5 - 8.5	1	500	250	200	200	Shall not be Detectable in 100 ml sample
1	Khodiyar Nagar Borewell, G.DM - GMC	7.5	0.1	1650	660	30	1030	Not Detectable
2	A. V. Joshi Slum (Municipal Supply), Sector 10, GIDC	7.8	0.6	378	175	15	545	Detectable
3	Sector 10, Gandhidham Municipal Corporation (GMC)	7.8	0.4	335	157	15	330	Detectable
4	Municipal Supply, Sector - 10, GIDC, Gandhidham	7.7	0.2	401	167	10	625	Not Detectable
5	Municipal Water Supply of Gandhidham School, GIDC, Sector 10	8.0	0.1	378	170	10	195	Not Detectable
6	Ward No.5 Borewell, Gandhidham	6.9	0.1	2941	1859	55	995	Not Detectable
7	GM, Sector - 10	7.7	0.4	351	172	25	530	Detectable
8	Municipal Water Supply, A. V. Joshi, GIDC, Sector - 10	8.0	0.7	396	182	10	290	Not Detectable
9	Anjar Ward No. 9, Vijaynagar	8.0	0.5	510	207	15	470	Not Detectable
10	Anjar Ward No. 2, APMC	7.6	0	571	222	25	1095	Not Detectable
11	Anjar Ward No. 6, Mahadevnagar	7.4	1.3	531	217	20	330	Not Detectable

Poor water quality supplied by Municipality

Major contamination issue during rainy season

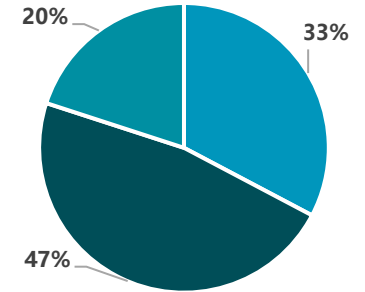
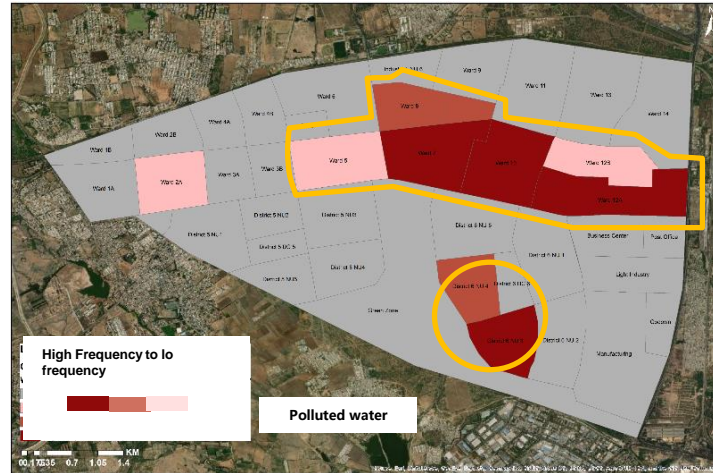
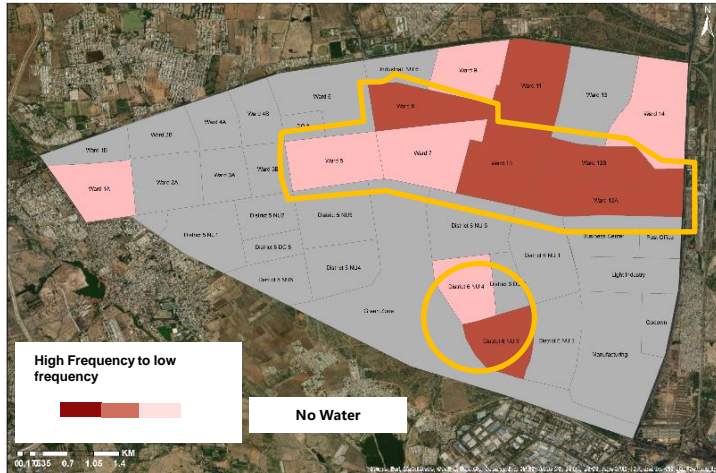
Parallel water and sewage line causing contamination



Based on pilot water testing we found some locations in Gandhidham indicates traces of E.coli, making the water unfit for use.

- Considering the perception and pilot results over drinking the Municipality supplied water, it is important to assess the water quality across the water service chain, thus CWAS is undertaking Water quality testing study in the city

In Gandhidham, 1-2 selected areas are facing issues related to water supply



- Polluted Water
- No Water
- Water connection leakages

- **No supply of water** is the **major issue** which the city incur.
- From the **spatial mapping** it can be observed that **mostly same wards/sectors/areas** are registering complaints
- Though the cities are **addressing the complaints**, however the focus needs to **shift from ad-hoc to permanent** solutions

Human stories for understanding water situation from stakeholder perspective

Citizen perspective



Bindu Suman –
Resident Khodiyar Nagar;
Gandhidham

...We do not have individual water connection.... So we depend upon private tankers...



- **No individual municipal water connection**
- Depends upon **community stand posts**
- Water is available for **once in 3 days** for **1 hour** at **low pressure at the stand posts.**
- **Long waiting queue for fetching water**
- **Timings** are very **odd** – 2:00 to 3:00 am (post mid night)
- Prefer **private water tankers** than municipal water



Geeta Ben –
Resident Lilashanagar;
Gandhidham

...we have good water supply system provided by the Municipality...



- **Individual municipal water connection** since more than 15 Years
- Water is available **once in 3 days** day for **1 hour** at **good pressure**
- The system has **improved post Narmada**
- Geeta ben is **happy** with the **Municipal service**

Service provider perspective



Anil Joshi–
Department; Gandhidham
Municipality

...Municipal services have improved post Narmada ...we now supply sufficient quantity of water...



- **Do not face water scarcity**, post Narmada
- Now Municipality is **supplying sufficient** water in the city
- Supply is for **once in 3 days**, which we plan to make **daily post implementation of Nal se Jal project**
- The **"Nal se Jal"** project will **strengthen** the water system

Mixed perception and responses from stakeholders . . .

CONTENT

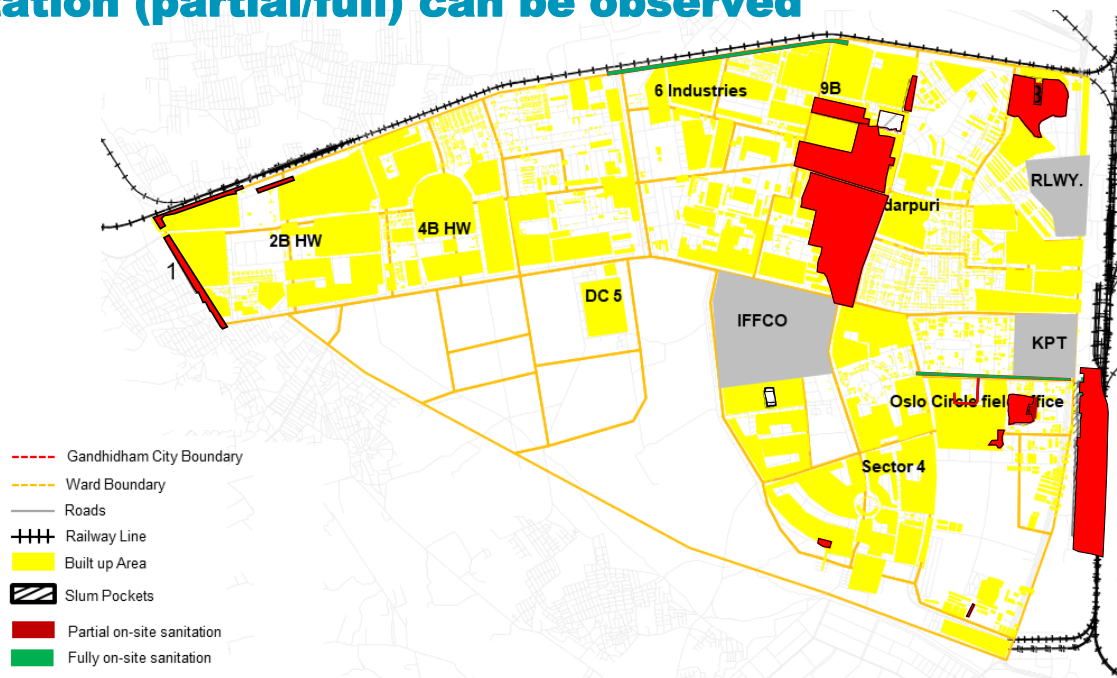


- 1 Background**
- 2 Study framework and Objectives**
- 3 Gandhidham city overview**
- 4 Assessment of Existing Water Supply**
- 5 Assessment of Existing Sanitation situation**
- 6 Institutional and Regulatory Framework**
- 7 Key Findings**
- 8 Way Forward**

The city areas in Gandhidham city has 100% sewered network, however in slum pockets onsite sanitation (partial/full) can be observed

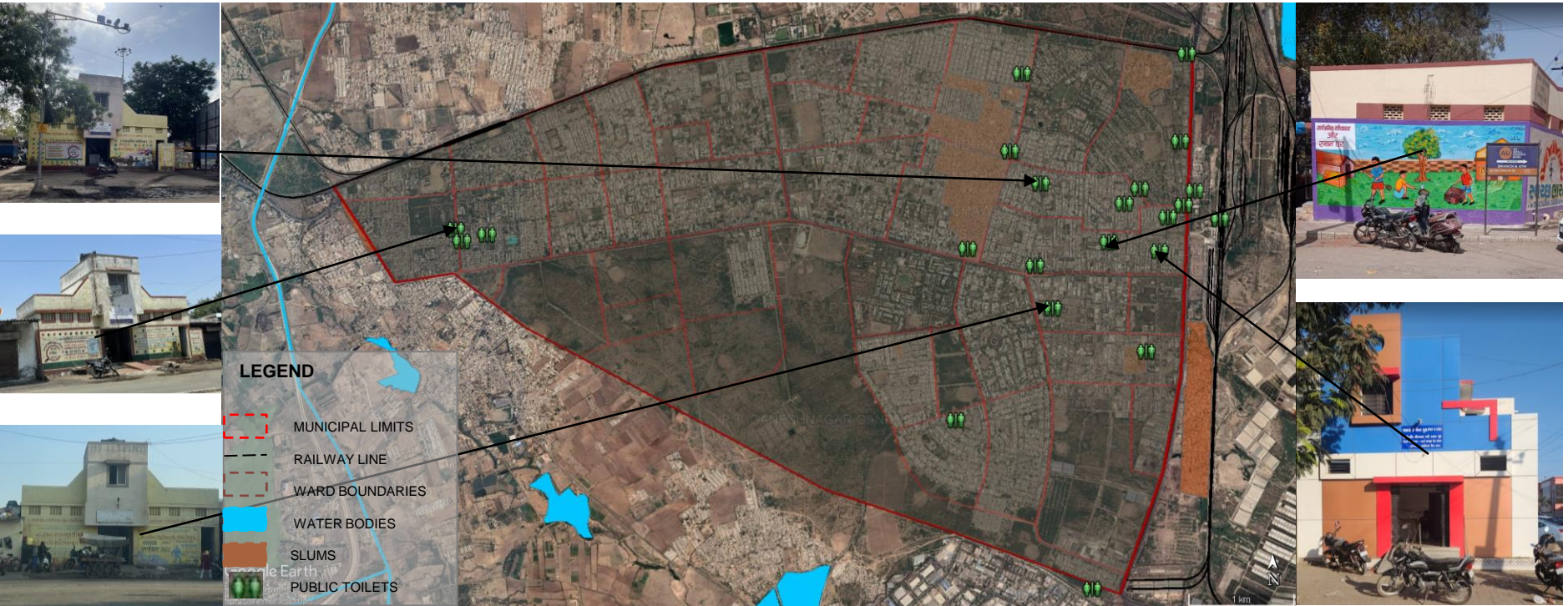
GANDHIDHAM SLUMS			
SR. NO.	SLUM AREA	POP.	HHs.
1	MANINAGAR	1998	415
2	SLUMS ALONG RAILWAY TRACK (WARD-2)	1300	273
3	BHARATNAGAR WARD NO- 11/A	1644	334
4	SONAL NAGAR SLUMS	848	181
5	CHAMUNDA NAGAR	1236	263
6	KHODIYAR NAGAR	4981	1026
7	CARGO SLUMS	9857	2215
8	MAHESHWARI NAGAR- SUNDARPURI AREA	9918	2146
9	OLD SUNDARPURI	8923	1818
10	NEW SUNDARPURI	13525	2776
11	SLUMS NEAR GIDC SHED	220	45
12	SLUMS AROUND STROM WATER DRAIN- FROM OSLO CINEMA TO NH 8	796	160
13	AV JOSHI SLUMS	1189	245
14	G.H.B. SLUMS	66	13
15	SLUMS BEHIND PSL COMPANY (CARGO)	5573	1404
16	JAGJEEVAN NAGAR	824	137
17	VAVAJODA SLUMS	684	167
TOTAL		63582	13618

PLEASE NOTE- DATA AS PER CENSUS 2011



- **29.5 MLD Sewage** Generated in Gandhidham City
- **Around 88% of slum population** in has either partial or full onsite sanitation system

Gandhidham city has achieved ODF++ status since 2016..



- **22 active Public Toilets** and **No community toilets** were found in Gandhidham Municipal limits.
- **20 toilets are Pay and Use** out of 22 and maintained by Sulabh International and Aadarsh Samajik Seva Sansthan.
- Gandhidham achieved **ODF++ status in year 2016.**
- **6667 Individual toilets** were last sanctioned in year 2015-16.

Some of the Slum pockets have partial or full on-site sanitation system in Gandhidham, which are dependent upon on demand desludging system

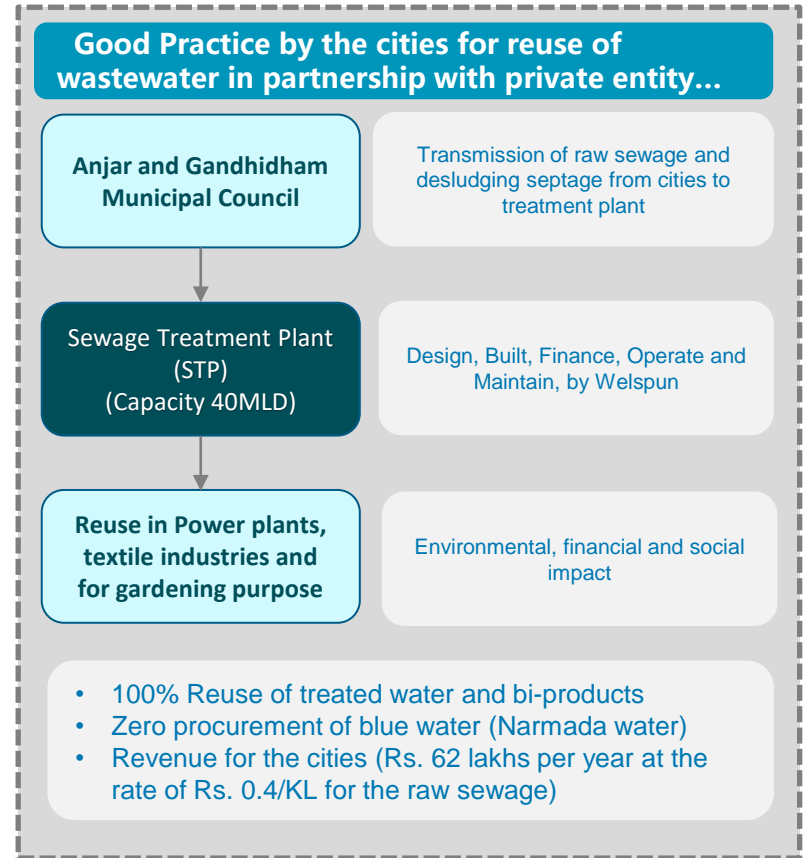
Desludging by ULBs	Free of cost
Desludging by Pvt. operators	Rs. 350-500/-

- Even though the city has 100% sewer connection as per PAS data, **desludging has been observed in Maninagar and Sundarpuri areas**
- **Emptying** is done at a **collection point near Rambagh WTP**, where Welspun has laid out a pipeline
- Pumping Station – approx. **30 km from the city**

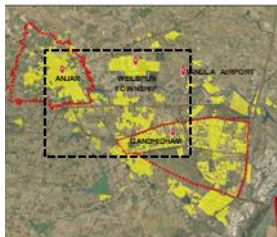
Desludging **on demand basis** is observed in the city, hence scheduling of the same can be considered for systematic operation of on-site sanitation management

The cities showcase 100% reuse in Circular economy of wastewater management...

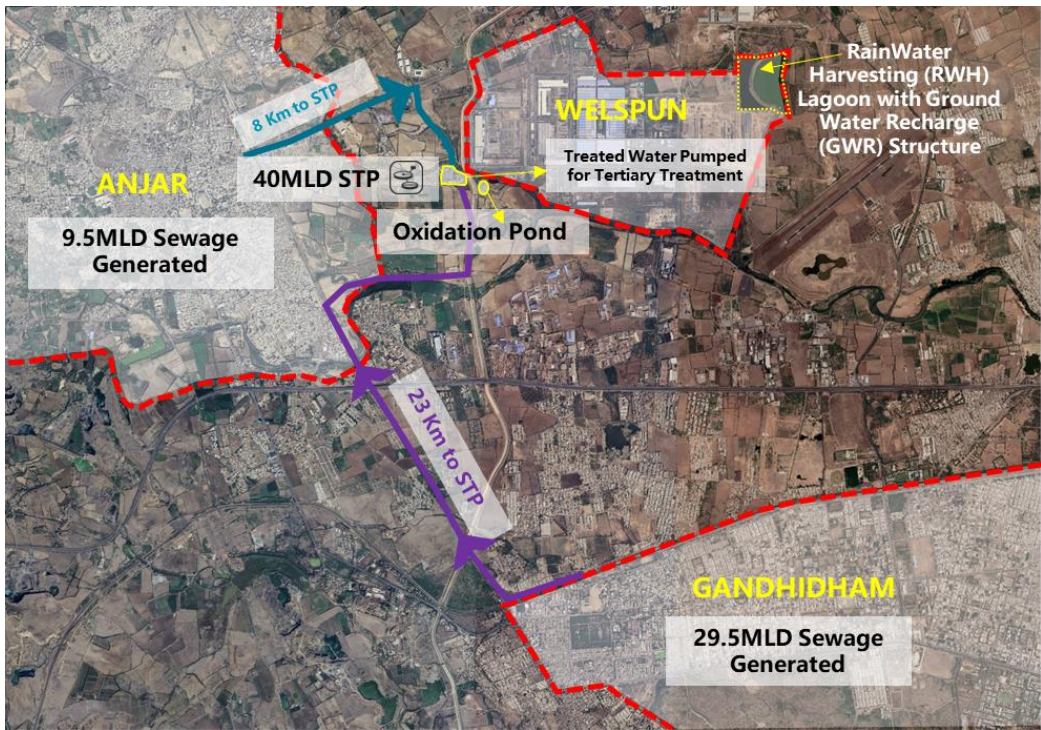
- **Anjar and Gandhidham Municipalities** have entered in a **concession agreement** with **WIL** (Welspun India Limited) for a period of **35 years**
- Welspun has used a **Design, Build, Finance and Operate (DBFO)** model for this Sewage Treatment Plant
- Welspun is paying **40 Paisa/KLD** to the municipalities through which Cities receive a **revenue of Rs. 62 lakhs per year**
- Sewage from both the cities is **treated in the STP**, further the treated water is **used by the textile industry** (Welspun)
- Benefits of the project:
 - ✓ Elimination of dumping of untreated sewage into the Nakti Creek
 - ✓ Revenue to municipalities through royalty from Welspun
 - ✓ Entire waste water is being recycled for production activities at Welspun
 - ✓ Zero water pollution and sludge generation
 - ✓ Excess bio-sludge is used as manure for plantation



Anjar and Gandhidham have common STP, owned and operated by Welspun, which has reduced burden on blue water use by the industry from Narmada



Map showing STP location near Anjar and Gandhidham

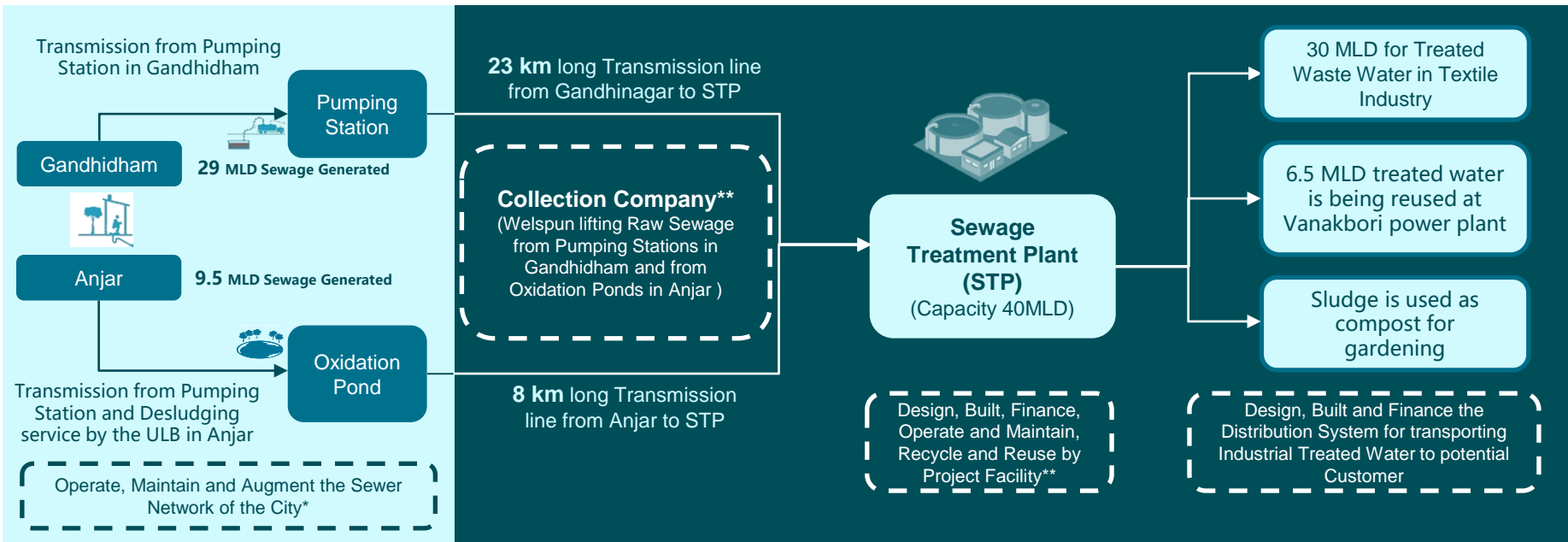


Sewage Treatment Plant - Welspun

Anjar and Gandhidham have a common STP, Built, Owned and Operated by Welspun, which has reduced burden on blue water use by the industry from Narmada

Responsibility of ULBs*

Responsibility of Concessionaire**



Revenue: 61.9 Lakh per Annum at the rate of Rs. 0.4/KL Sewage Collection + 50% of Revenue Generated from Sale of Carbon Credit

Capital: 20Lakh for Technical and Legal Support for Implementation of Project

*The respective ULBs ensure that Sewer generated by citizens is free from Industrial waste, hazardous material, prohibited and restricted material
 **Welspun Infrastructure Ltd and Technology Providing Partner Ion Exchange Ltd (Concessionaire).
 *** Sewage Pumping Station other than GNP Facility, network of bulk transmission of sewage from Designated location to STP proposed by Concessionaire.

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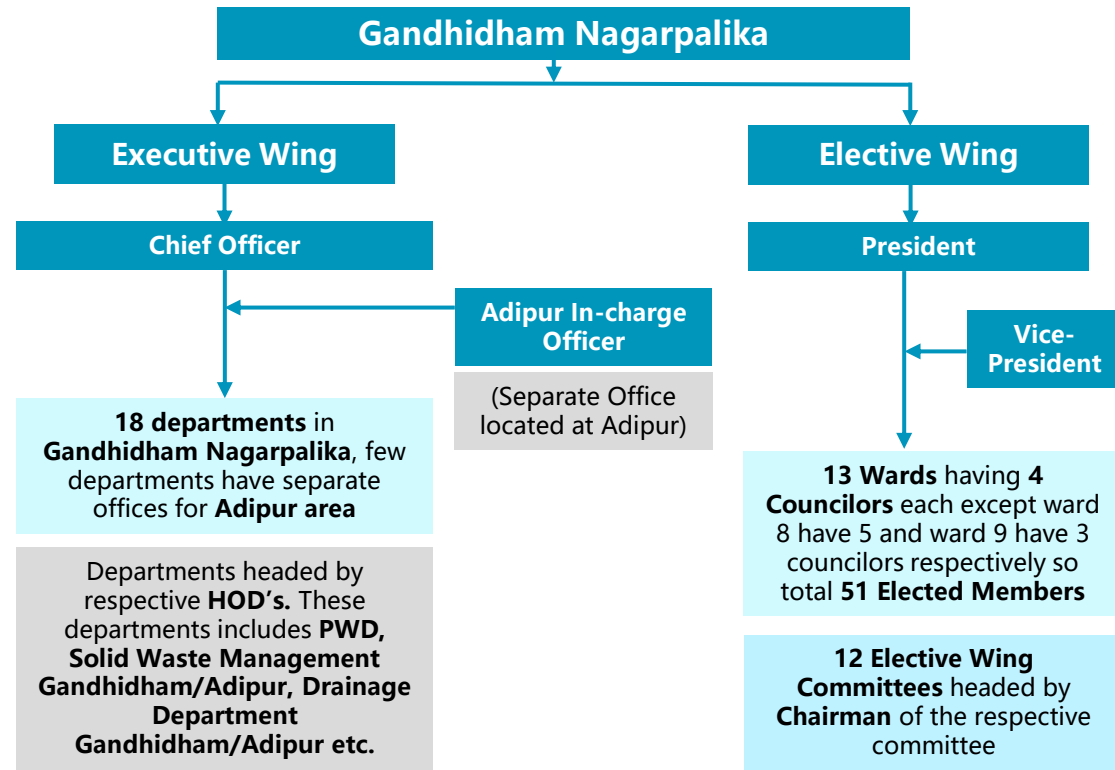
Water Sector institutional set up in Gandhidham city

Agency/ Authority	Jurisdiction	Roles and Responsibilities
Sardar Sarovar Narmada Nigam Limited (SSNNL)	State Level	<ul style="list-style-type: none"> • Bulk supply of Narmada water
Gujarat Water Infrastructure Limited (GWIL)	State Level	<ul style="list-style-type: none"> • Establish bulk water Infrastructure projects across the state for drinking water • To prepare, promote, execute, finance, implement and operate and maintain water supply projects in the state
Gujarat Water Supply and Sewerage Board (GWSSB)	State Level	<ul style="list-style-type: none"> • Development and proper regulation of water and sewerage services in the state; Implementation of state government schemes on water and sanitation
<ul style="list-style-type: none"> • Gandhidham Municipal Council • Industrial estates (GIDC) 	City Level	<ul style="list-style-type: none"> • Water service provider • Operation and maintenance • Levying and collecting taxes and user charges

Gandhidham Municipality established in 1959, was separated from Anjar taluka in 1997

Gandhidham Nagarpalika was established in the year 1959 and was separated from Anjar taluka in 1997. There are two wings in -Executive wing and Elective wing.

- **Executive wing** is mainly the part of government which enforces law and has overall responsibility. The key person here is **Chief Officer (CO)**. There are **18 departments** mainly water supply, sanitation, Public Health, PWD, Taxation etc. each of these departments are headed by respective HOD's. A few departments have separate offices for Adipur area.
- **Elective wing** comprises of elected members from each ward of the city. The key person is **President along with Vice President**. There are **13 wards with 4 councilors** in each ward so a total of **51 elected members**. There are **12 committees** mainly water works, social welfare etc. that are headed by chairman of respective committee.



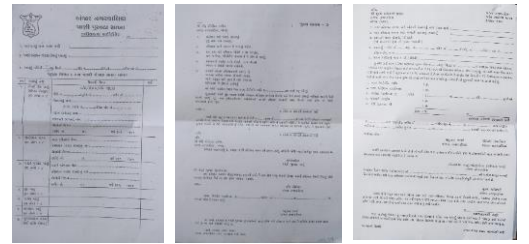
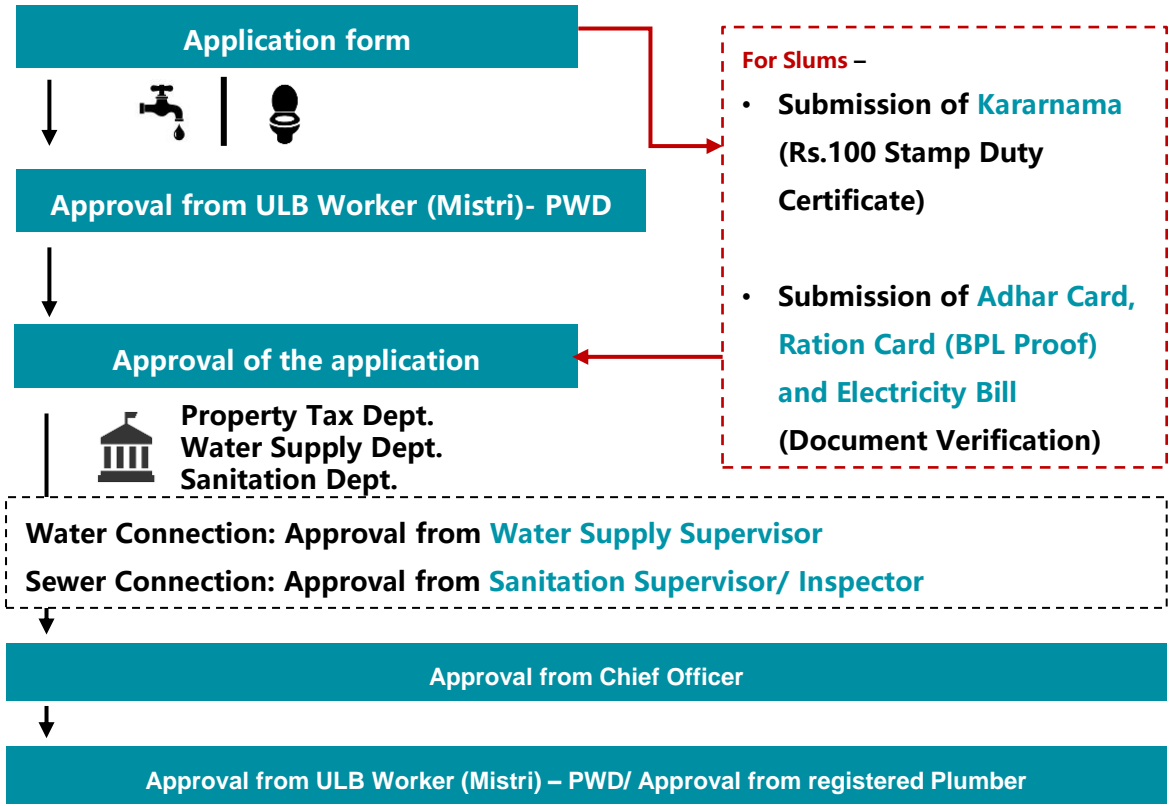
Gandhidham Water department falls under the purview of PWD, however it would be good if the city has separate and dedicated water department

Institutional Set-up of Gandhidham Municipal Council

Agency/ Authority	Jurisdiction	Category	Roles and Responsibilities
Gandhidham Municipality	City Level	Urban Local Body	<ul style="list-style-type: none"> • Infrastructure and Services within the area of jurisdiction • Property tax collection within the area of jurisdiction • All functions and services as per Gujarat Municipalities Act
Gandhidham Development Authority (GDA)	Regional Level (Master plan Area)	Development Authority	<ul style="list-style-type: none"> • Regional plan preparation • Development control and planning • Building Approval and development permission • Road network layout and development
	City Level (Neighborhood Units- NU area)		
The Sindhu Resettlement Corporation Ltd (SRC)	City Level (Wards Area)	Joint stock company for new town development	<ul style="list-style-type: none"> • Land management in Wards area • ESW, LIG Housing/ other community projects
Deendayal Port Authority (Kandla Port Trust-KPT)	Regional Level (Port Area)	Port Authority	<ul style="list-style-type: none"> • Land management in Sectors area of Gandhidham • Kandla Port management and services • Industrial projects related to port and shipping • CSR projects, activities under Swacchta Abhiyan of KPT
	City Level (Sector Area)		

Gandhidham Municipality takes around 3-4 weeks time for new water and sewerage connections with the similar processes.

Approximate time taken for complete procedure – 3 – 4 weeks



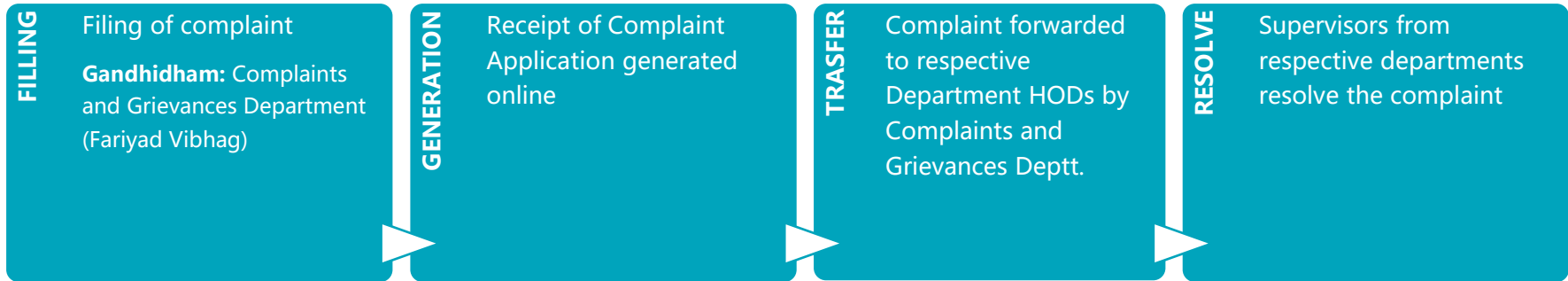
Water and wastewater Application



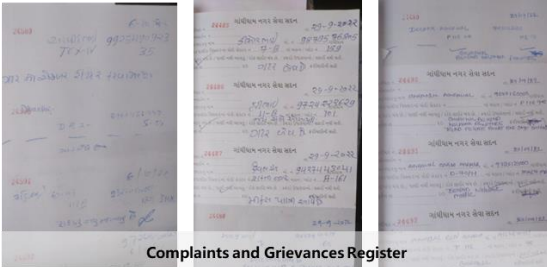
Additional Documents submitted by Slum Dwellers

Few slum dwellers, with **no individual water connections** stated that submission of multiple documents makes it difficult to apply for the same, thus **city can simplify the process** in terms of number of documents

Gandhidham Municipality has online as well as offline complaint redressal systems, however online system is not functional.



Gandhidham: Timeframe for redressal – approximately 2 weeks



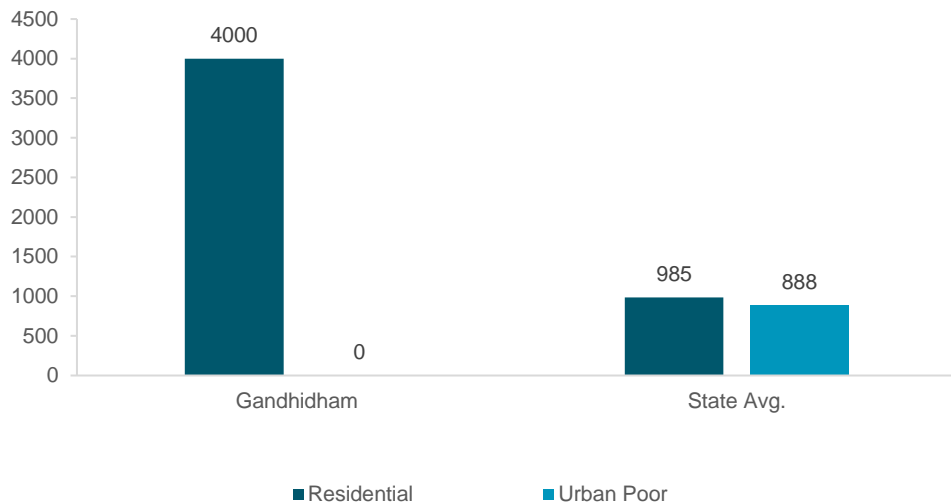
- The complaint can be **tracked online**
- Three **types of water related complaints** that can be registered:
 - **Water Leakages**
 - **Mix Water**
 - **Not getting water**

- Gandhidham city's **online complaint redressal** is facing **issues** due to which **complaints are registered offline**
- The city **appointed a consultant** for establishing online system, however the project was **void in-between**
- The **city can adopt to state portal E-nagar** for the same, which Anjar has also adopted

Gandhidham has high water connection charges compare to state average..

Water Connection Charges – One time charge in INR

Water Connection Charge



Gandhidham connection cost–

1000 : Deposit

1000 : T.O Fees

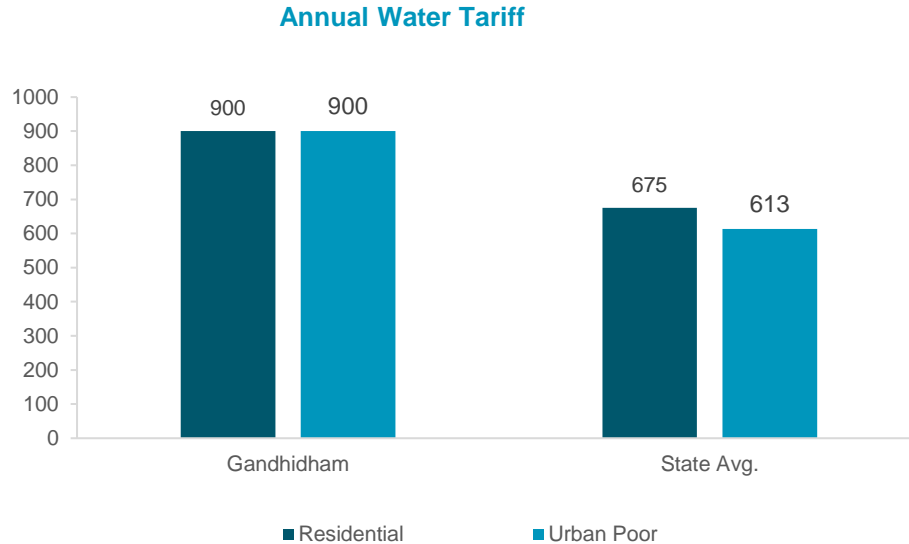
1000 : NC

1000 : Road Cutting charges

- The **state average** for water connection charges is **Rs. 985/-** and **Rs. 888/-** for residential and urban poor respectively
- **Gandhidham have high connection charges**, however **no charges are levied from Urban Poor** for same

Gandhidham has flat annual water tariffs

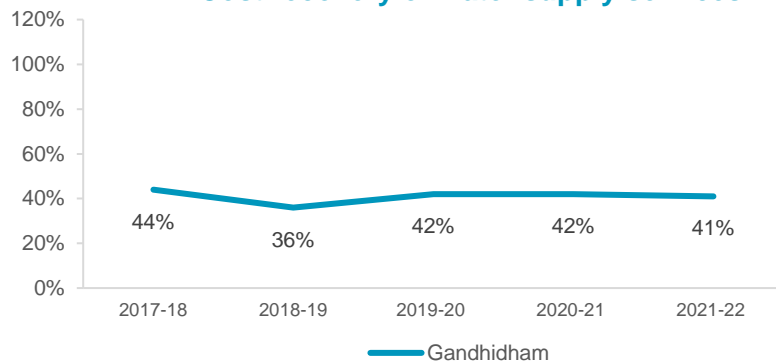
Water Tarrif – Annual Charge in INR



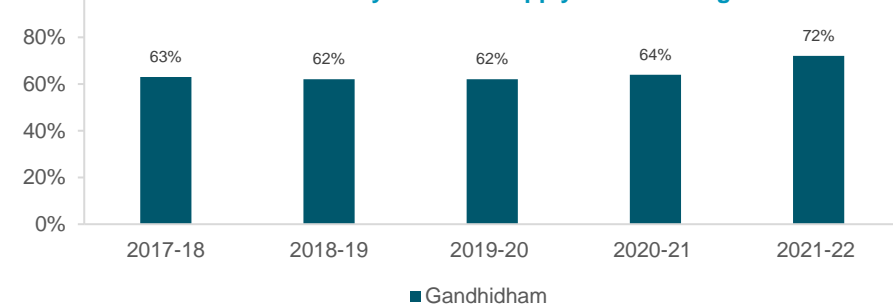
- The **city charge Rs. 900/- annually**, which is **higher than the state average**
- The city also **levy same tariff from the urban poor**, which otherwise varies in their respective peer cities
- City can pass special circular or GR to reduce water tariff for urban poor or link it with property tax to have **progressive tax system**. This will allow the tax to be more equitable as those with larger and better properties pay a higher property tax and water tax.

Gandhidham has low cost recovery of water services and high collection efficiency of water charges

Cost recovery of water supply services



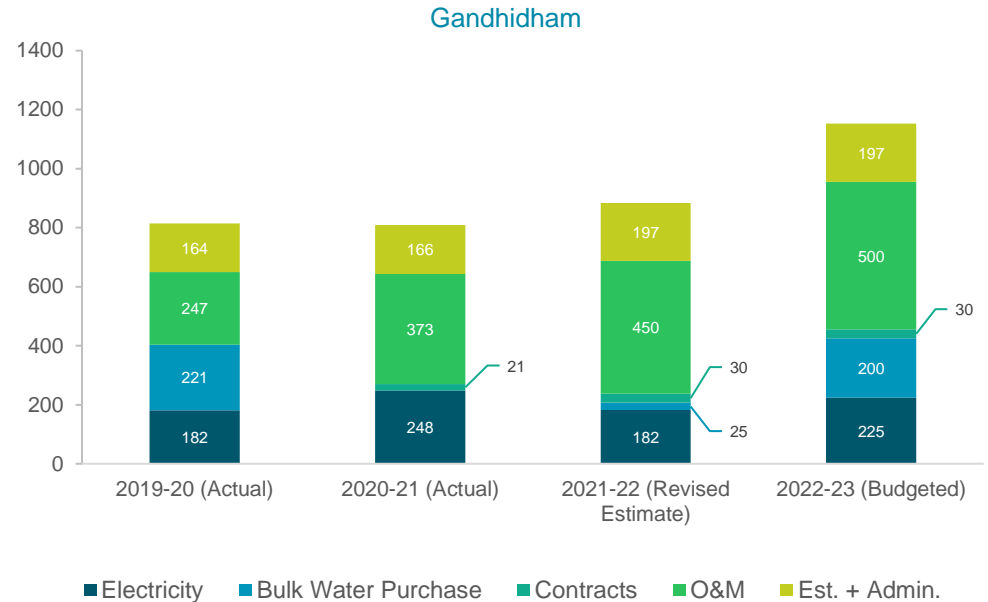
Collection Efficiency of Water Supply related charges



- Gandhidham's cost recovery has **remained low at around 40%** against the State average of 92%.
- In Gandhidham, Water tax collection efficiency is steady at 62% till year 2020-21 and increased to 72% in year 2021-22.
- Gandhidham city should revise water tax to **recover operation and maintenance cost** and move from flat rate charge to % property tax to make it equitable and inclusive.
- City can introduce One Time Settlement Schemes to collect its property tax and water tax arrears.
- City can also organise arrear collection drives and can offer rebates or relax the penalties.

Revenue Expenditure for Water Supply- Gandhidham

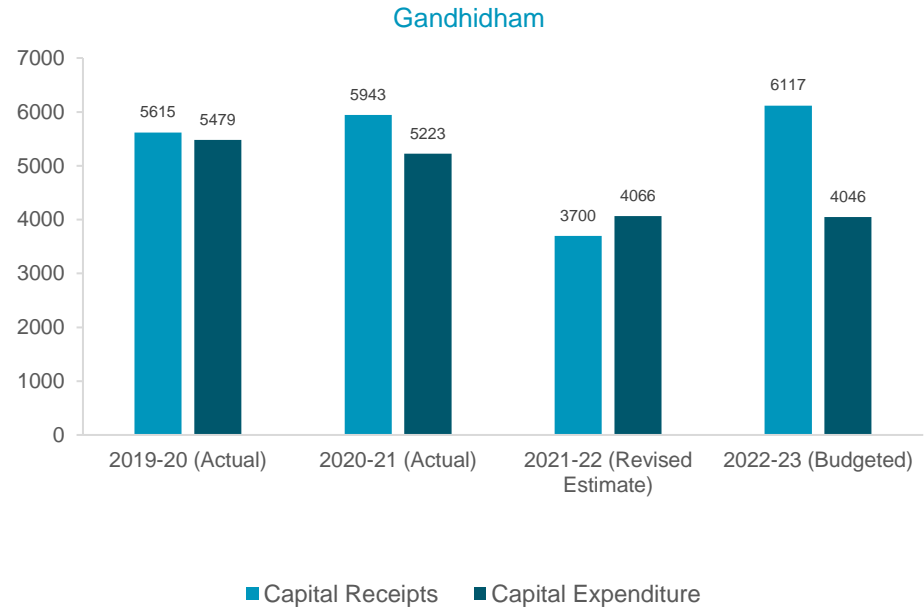
- Operation and maintenance makes the largest contribution to Anjar's revenue expenditure on water supply.
- Bulk water purchase and contract expenses negligible in 2020-21 and 2021-22 revised estimate.
- In 2020-21, O&M expenses increased significantly by 51% from previous year.



All figures in INR lakhs

Capital Receipts and Expenditure- Gandhidham

- Capital receipts have been higher than expenditure in all years except 2021-22 revised estimate.
- In 2021-22 revised estimate, capital receipts fell by 60% as there were significant reduction in capital receipts from AMRUT and SJMMSVY.
- In 2022-23 budget capital receipts are consistent with previous years.

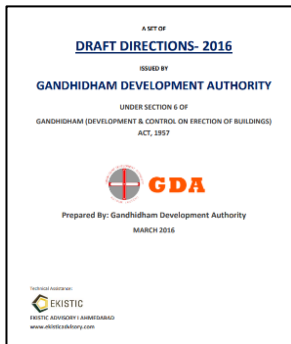


All figures in INR lakhs

Policy level initiatives have been taken by authorities to augment own water resources however ground implementation is very limited

Inclusion of Rainwater Harvesting in Building Permission...

- Gandhidham Development Authority (GDA) (Est.1957)
- Inclusion of Rainwater harvesting as part of **Environment Responsiveness**



- **Manual** building approval system
- Records of only **total building approved available**
- **No** ground implementation **monitoring** practiced

Rain water harvesting is mandatory for all buildings with ground coverage of 80 sq.mts and above

Building Plot Area (Sq.km)	Harvest Infrastructure Type
Between 80 to 500	Percolation Pit or Bore Recharge
Between 500 to 1500	Percolating Well with Rain Water Harvesting System
Between 1500 to 4000	Percolating Well with Rain Water Harvesting System (up to ground second river)
4000 and above	Percolating Well with Rain Water Harvesting System (up to ground second river) for every 4000 sq.mt area

Policy initiatives needs to be supported by ground level monitoring system and incentives for property owners to invest in RWH . . .

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Key findings across water supply service chain

Key Findings Across the Water Supply Service Chain

Quantity

Water Source (MLD)



Gandhidham has **75%** dependency Narmada (distant) water

Gandhidham has **25%** dependency on ground water



Gandhidham has **Saline GW** depend up on Anjar's aquifer

City is further planning to shift to **100%** Narmada (distant) water under “Nal se Jal” project in next 5 years

City authorities has **no plans to augment own water sources**

Accessibility

Coverage

Gandhidham has **64%** individual water supply connections

The city will achieve **100%** individual **WS connections** post implementation of “Nal se Jal” Project under **AMRUT 2.0**

The per capita supply has decreased in Gandhidham from

28 to 89 LPCD over the period of 5 years

City authorities has **plans to provide 140 LPCD** on daily basis

Quality

Water Treatment Plant



Gandhidham has **40 MLD** treatment capacity

The city is augmenting their treatment capacities by **27 MLD** (Gandhidham)



Gandhidham WTP is **non-functional** from more than an year

GWSSB conducts regular water **quality testing** in Gandhidham

Reliability

Intermittent supply



Gandhidham Supply days – **Once in 3-4 Days**
Supply Hours – **1 to 6 hours**

Distribution is **not uniform** in terms of supply **across the city**

Presence of **private water suppliers** can be observed in **Gandhidham**

Affordability

Cost Recovery 2021-22



GANDHIDHAM – 41 %

Collection Efficiency 2021-22



GANDHIDHAM – 71 %

Water Connection Charges



GANDHIDHAM – Rs. 4000/-

Water Tariff



GANDHIDHAM – Rs. 900/-

Connection charges and tariff are same for city area and slum pockets

In **Gandhidham** people incur monthly **additional expenditure** on procuring water from private supplier

Key Findings across supply chain for Gandhidham City



Water Source

Quantity

- The city has **75%** dependency upon **Narmada water supply system (NWSS)**, which is a distant source, thus **seasonal variation in quantity** of supply persists, as per discussions with city officials
- The city, **before NWSS was dependent upon 40 borewells, out of which 28 are active**, however the **12 dysfunctional bore wells can be revived** to strengthen city's own water source
- In Gandhidham there is a huge **market of Pvt. Water suppliers, which source their water from Ground water, with no regulation** on the same.
- The city is planning to **shift 100% on Narmada**(distant source) water supply under **"Nal se Jal"** project in next 5 years.
- **City authorities** has **no plans** to **augment own water** sources



Coverage

Accessibility

- Gandhidham has **64% Individual water supply connections**, however the cities will achieve **100%** individual water supply connections **post implementation of "Nal se Jal"** project under AMRUT 2.0.
- The **per capita water supply** has **decreased** over the period **from 129 LPCD (2016-17) to 90 LPCD (2020-21)**, indicating the **acute need to augment** the current **water supply system/ management**
- City authorities have plans to provide **140 LPCD on daily basis**

Key Findings across supply chain for Gandhidham City



Water Treatment

Quality

- Gandhidham has **40 MLD treatment capacity**, however in case of **Gandhidham the WTP is non- functional** for more than an year; thus city needs to refurbish existing water treatment plant to ensure safe water supply to its citizens
- In discussion with **citizens (slum as well as non-slum areas)** we found that almost every **house hold has borewell** and uses ground water, however as per **CGWB, the water is saline and unfit** for use, the issue needs to be addressed by better water management by the city administration



Intermittent Supply

Reliability

- In Gandhidham, water is supplied for **once in 3 to 4 days**, with supply hours ranging from **1 hour to 6 hours**, in most of the areas, **increasing the dependency on pvt. Water suppliers** or on borewells
- **Distribution is not uniform** in terms of supply hours across the city



Cost Recovery

Affordability

- In Gandhidham, **water tariff is Rs. 900/- annually** for household connection with connection charges of Rs. 4000/- and no charges are applicable in slums.
- **Cost recovery is 41%** in Gandhidham.

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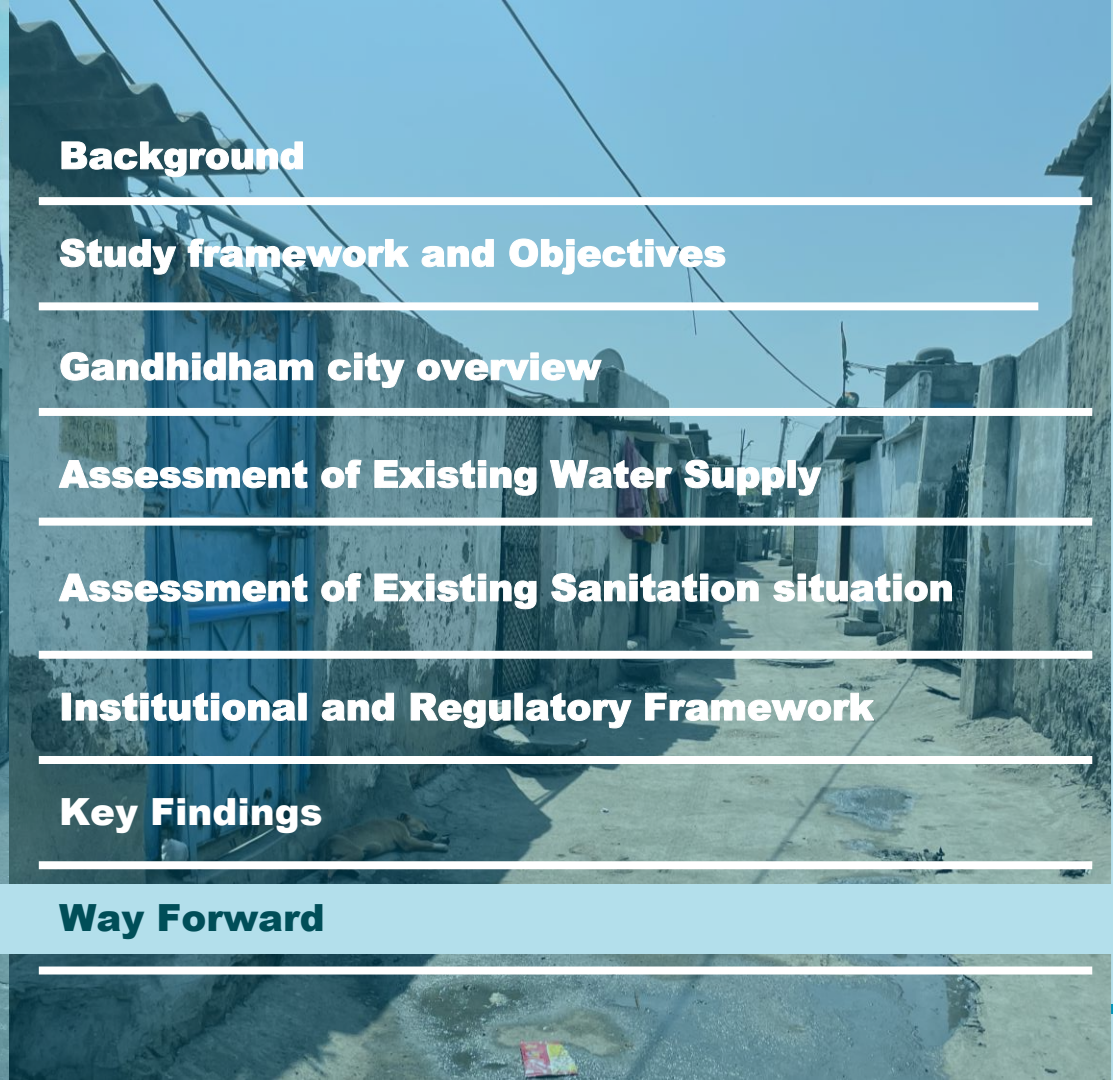
Institutional and Regulatory Framework

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Key recommendations to explore in the Water Security Action Plan...(1/3)

Findings



High dependency of distant water



Possible recommendations to be explored

AUGMENTATION OF OWN WATER RESOURCES

- Implementation of RWH/ GWR structures
- Initiating the implementation from **educational buildings, public buildings, parks and gardens** and further scaleup to **community and individual HH Levels**
- **Strengthening existing policy** frameworks for successful implementation and monitoring
- **Building awareness** for Government officials, experts and citizens



Intermittent water supply



MOVING FROM INTERMITTENT TO DAILY SUPPLY

- **Technical evaluation** of existing water infrastructure to move towards daily supply
- **Awareness generation** towards **benefits of daily water supply** over intermittent water supply – Reduced NRW, less wastage of water due to excess storage, contamination reduction etc. – to **change perception** issues and **behavioural pattern**
- Explore **automation of valve operations** (pilot water supply zone) to address resource crunch

Key recommendations to explore in the Water Security Action Plan...(2/3)

Findings



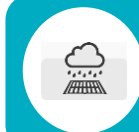
Prevalent presence of
Private water market



Possible recommendations to be explored

REDUCING DEPENDENCY ON PVT. WATER MARKET

- As per field observation and FGDs dependency is due to - **intermittent supply; odd supply timings, pressure issues at tail end HHs and quality of water supplied**
- **Quality of water** supplied needs to be **assessed**, this will drive the next step; if **quality is poor** –ULB need to follow **quality testing regime**; if **quality is good** - **awareness** among citizen needs to be generated



Urban Flood due to
changing climate pattern



MITIGATION MEASURE TO ADDRESS CLIMATE CHANGE

- Identification of **urban flooding spots** in the entire city
- **Strategic approach to mitigate urban flooding: Institutional measures**– pre monsoon cleaning of stormwater drains; **Awareness** – pre monsoon cleaning drive; citizen engagement; **GWR structures** (low-cost structures in slums identified with water logging situation, society level GWR structures)
- **Community participation** for O&M of structures to develop a sustainable system

Key recommendations to explore in the Water Security Action Plan...(3/3)

Findings



Issues related to Water supply in Slum pockets



Possible recommendations to be explored

COMMUNITY WATER SUPPLY SYSTEM FOR 24X7 - SLUMS

- Though the coverage of water supply connections in slums is 100%, issues related to water supply such as **intermittent water supply, pressure issues at tail end HH, odd supply timings** etc. were identified, **community ESRs/ reservoirs** can be developed for pilot slum
- The system will **provide water to the slum dwellers for 24X7**, thus resolving the issues faced on day to day basis
- **Good practices** from across the globe supports such community systems

THANK YOU

CWAS CENTER
FOR WATER
AND SANITATION

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About us

The Center for Water and Sanitation (CWAS) is a part of CEPT Research and Development Foundation (CRDF) at CEPT University. CWAS undertakes action-research, implementation support, capacity building and advocacy in the field of urban water and sanitation. Acting as a thought catalyst and facilitator, CWAS works closely with all levels of governments - national, state and local to support them in delivering water and sanitation services in an efficient, effective and equitable manner.



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