

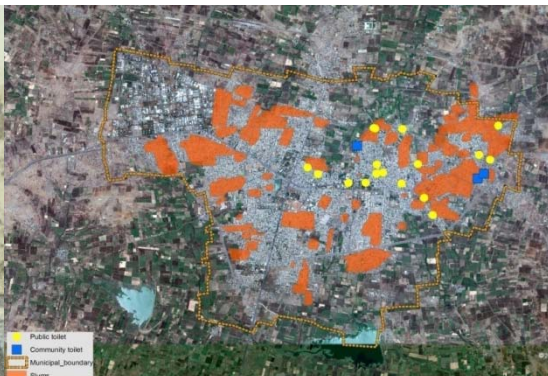
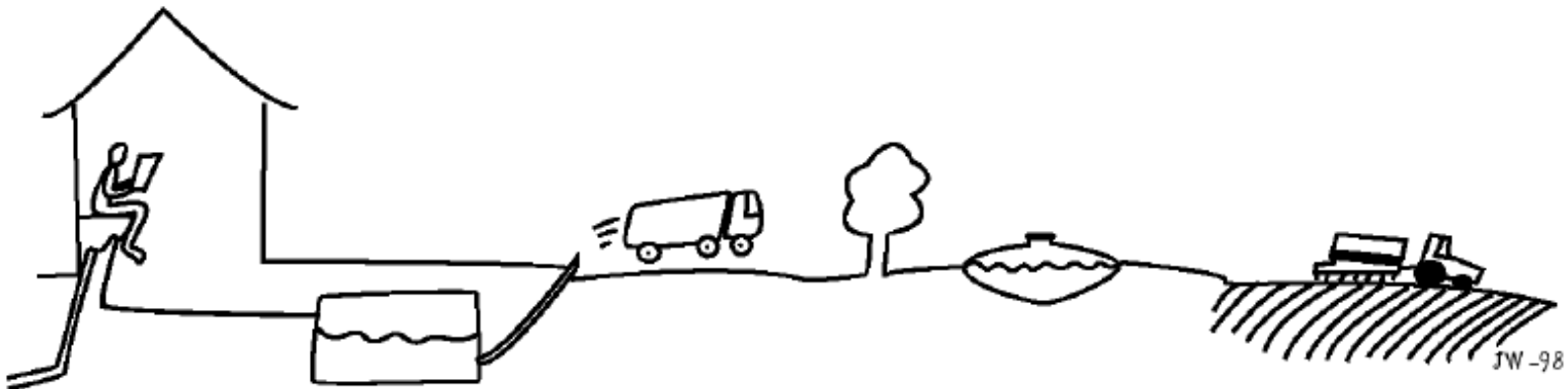
Presentation from the

Workshop on Innovations for Scaling up to Citywide Sanitation

October 16-17, 2012, Ahmedabad



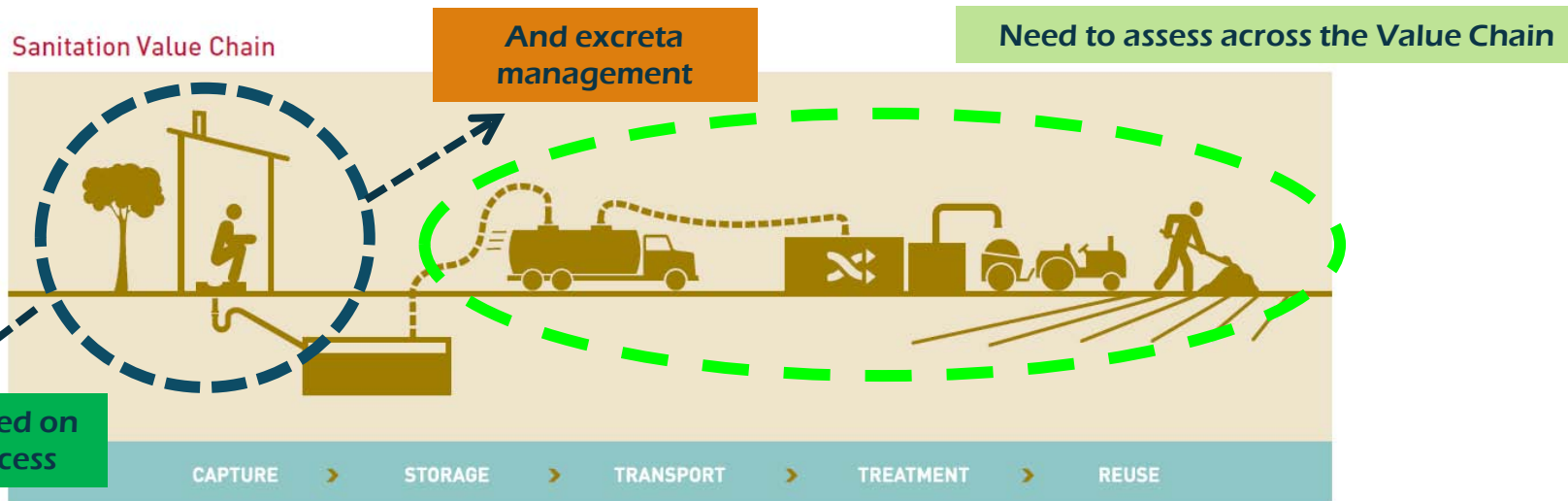
Organised by PAS Project, CEPT University



A framework for Assessing City Wide Sanitation

How is sanitation being assessed?

- ❑ **MDG indicators, focused only on Household Access**
 - Proportion of population using an improved sanitation facility
 - Sanitation ladder tracking Open defecation
- ❑ **For the post-2015 period**, JMP has initiated four working groups to identify potential targets and indicators
 - Sanitation targets focus on “excreta management” – for households, schools and health facilities, ODF, adequate sanitation, ‘safe management’, reducing inequality and progressive improvement



USER INTERFACE

**COLLECTION/
STORAGE**

**CONVEYANCE
(through natural drains)**

TREATMENT/ DISPO



**assessment is required across the full
sanitation system or value chain**

SPANS ACROSS THE VALUE CHAIN

Focus of other international benchmarking systems

Benchmarking systems	Focus of wastewater related areas
IBNET	Sewerage network, waster water treatments
IWA	Waste water network related, contract related, performance of waste water treatment plant, on-site sanitation systems included where it is utility's responsibility
ADB (utility data books)	Sewerage network related (drawn from IBNET)
GoI Service Level Benchmark	9 Key Performance Indicators for Waste Water, and 2 for SWD focus on underground networked sanitation systems

Source: IBNET: www.ib-net.org, IWA: Alegre et. al (2008), ADB: MoUD and ADB(2007)

Are these appropriate for situation in India where **only 300 cities** have partial sewerage system and where most use septic tank or pit latrine?

Key SANITATION facts : Implications for Sanitation Solutions

GUJARAT

PARTIAL SEWERAGE
NETWORK IN 62 CITIES OUT
OF 167



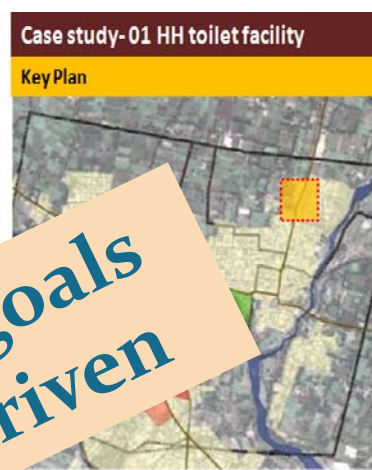
MAHARASHTRA

PARTIAL SEWERAGE
COVERAGE IN 26 CITIES
OUT OF 252

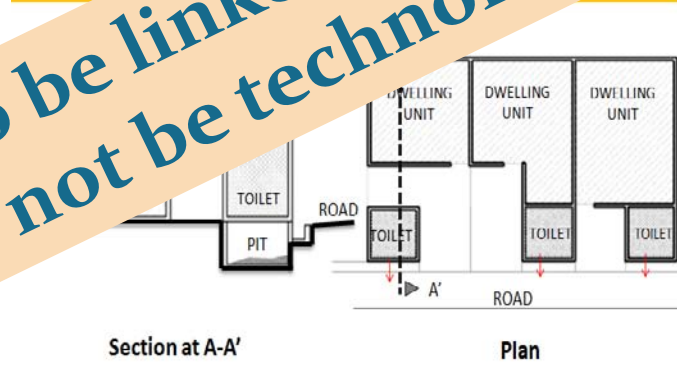


- ❑ The IWA, IB-Net and GOI-SLB frameworks include only assessment of networked sewerage systems

Household Sanitation – On-site treatment and disposal



Schematic



Salient features of the individual toilets

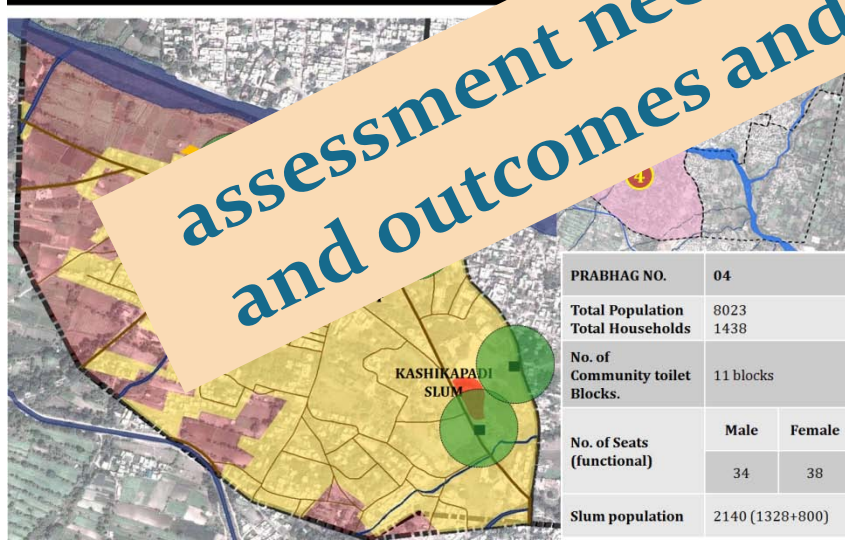
Toilet size: 4' x 3'
Pit size : 3' x 4' to 4' x 5'
Construction – Brick

Frequency of cleaning:
 More than two years

Observations:

- No provision of soak pits
- Effluent discharged to open or closed drain along road
- Inadequate pit sizes affecting the primary treatment

COMMUNITY LEVEL SANITATION FACILITIES



assessment needs to be linked to wider goals and outcomes and not be technology driven

- Availability of septic tanks and soak pits
- Whether onsite facilities confirm to norms
- Frequency of cleaning
- Provisions for septage treatment
- Situational assessment in Slums

CAPTURES NON NETWORKED SOLUTIONS & CONFORMATION TO NORMS

Links between different Sub sectors



Improper management of sub sectors impacts each other and overall city



Improper Solid waste management leads to drain clogging. Black water discharged in natural drains



Newly developed areas without drains or conveyance network

Solid waste clogging city drains



Untreated wastewater polluting built heritage environment

Integrated Contracts for Waste Management in Gondia Municipality

- **Combined contracting of sanitation and solid waste management services**
- 5 out of 40 municipal wards have integrated contract regarding street cleaning, collection and disposal of waste.

Relatively cleaner Slum settlements in Gondia



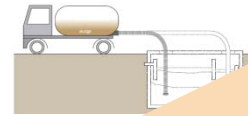
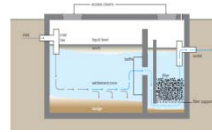
Effective Sanitation Management in a Class A municipality through better contracting of SWM & street sweeping services

Sub sectors for Performance Assessment

Excreta Disposal



User interface	Collection / storage	Conveyance	Treatment	Reuse / disposal
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Grey Water



User interface	Collection / storage	Conveyance	Treatment	Reuse / disposal
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Waste



User interface	Collection / storage	Conveyance	Treatment	Reuse / disposal
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Performance assessment needs to be citywide and integrated across different sub-sectors

Access to toilets in Slums : Achalpur Municipality, Maharashtra

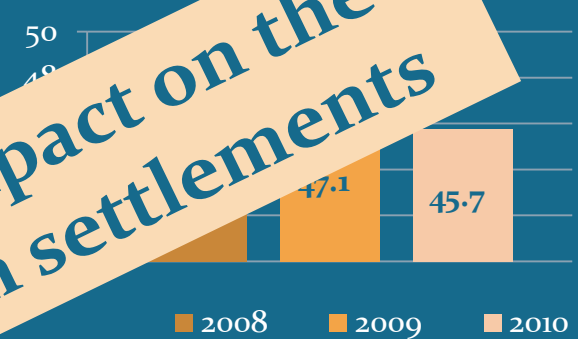
- Slums with coverage less than 20%
- slums with coverage 20-40%
- Slums with coverage 60-100%



Coverage of Individual Toilets in slums



Coverage of Individual Toilets in

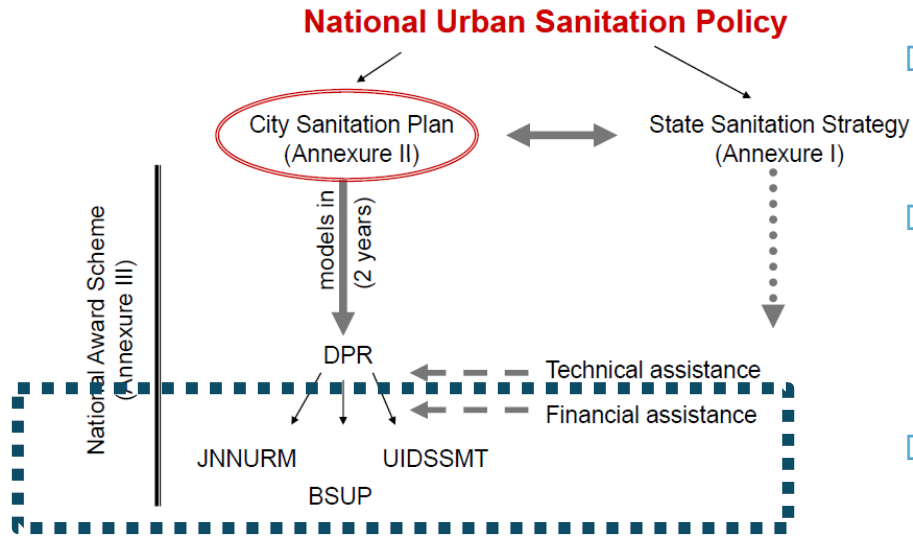


2008 2009 2010

assessment needs to include impact on the services to the poor and in slum settlements



Mobilizing resources for CSPs



- CSPs predominantly focused on capital intensive schemes
- Will need to wait for LARGE schemes or arrange resources on their own !

- **Mobilize /leverage non-public sources – household contributions, micro-finance, private-community contributions**

- **New business models particularly for community/public toilets,**

- **Private sector role in SWM, septic tank emptying, etc.**



Contracting for management of community toilets



Waste collection by informal groups (Scavengers and Rag pickers)



**Better community facilities through
contracting of community toilets in Ambernath**



Septic tank cleaning in Maharashtra

1. **Private parties offer septic tank cleaning services in 56 cities in Maharashtra**
2. In many corporations, due to long waiting period people have shifted to private sector for cleaning works
 - On average it is found each private agency owns 1 -5 vehicles of 3000 litre capacity
 - Case studies from select cities hint there is considerable growth in business ranging from 30% to 40%



Policies influence services in slums



Condition of individual toilets in slums, Maharashtra

- Maharashtra has highest number of HHs in slums across the country, mostly served by public toilets
- **Development in slums guided by Maharashtra Slum areas (Improvement, clearance and redevelopment Act, 1971)**
- **Only protected occupiers (on or before 1st Jan 1995) can be assured of no eviction. Even for them building a toilet is considered extension which requires prior approval as per DC rules and building bye laws**
- Most common options of providing individual sanitation facilities is redevelopment of slums and/or in situ service provision for notified slums under government schemes
- Competent authority can undertake certain in situ improvement works like:
 - Laying of water mains, sewers and storm water drains
 - Provision of urinals, latrines, community baths and water taps

MAHAD: Right leadership with infrastructure and social mobilization

Infrastructural solutions

- Council identified locations for community toilets near settlements; construction from ULBs own funds
- Initially toilets were constructed on govt. lands, and eventually on private lands
- The latter was made possible due to concerted discussions between the private land owner and ULB chief officer
- Regular maintenance of toilets carried out through monitoring surveys

Legislative and social solutions

- In 80's, all new residential properties had to construct individual toilets to obtain BU permission
- Photographs of 'open defecation' incidents published in local media, followed by fines and cases against repeat offenders
- Community involvement: critical link in success of Mahad remaining ODF free

Making city ODF through own revenue sources: Exploring opportunities Chandrapur Municipality

Achieving Open Defecation Free status through provision of individual and community toilets:

- Need to construct about 1600 individual toilets and 65 community toilet blocks having 10 seats per block to make city ODF
- Increasing collection efficiency of sanitation tax, it is forecasted that ULB will generate surplus of **Rs. 2.4 – 4 crore** in first three years

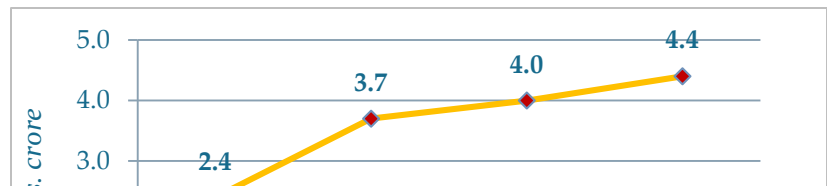
Strategies for ODF	Costs (crore)
Number of individual toilets	
Number of seats in community toilet blocks	
Cost per individual toilet	15000
Cost per community toilet block	40000
Construction cost	0.05
Total cost	5.3

Phase I: Immediate interventions

Plan for provision of individual and community toilets

City can plan phase wise improvements for OD free status through use of own financial resources

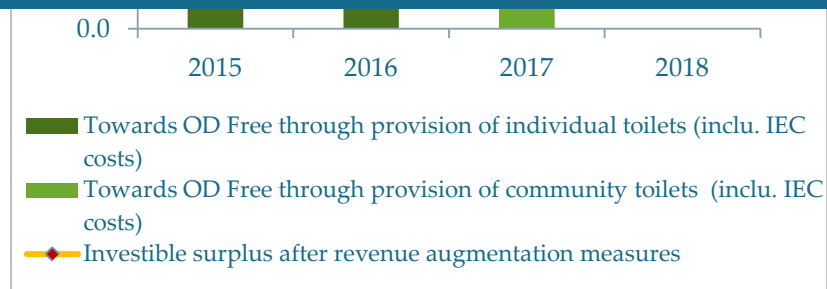
Phase II: Short term interventions (from 2015 - 2018)



of Septage Management Plan

Measures for Increasing Revenues

- Improve collection efficiency of sanitation tax
- Levy rates for drainage tax



A Framework for Citywide Sanitation Assessment

An assessment framework needs to:

- address the **full sanitation systems (or value chains)** from user interface to treatment/disposal and reuse
- be **citywide** and **'integrated' across sanitation sub-sectors** – not only excreta management – but also grey water and solid waste – as all are intricately interlinked in most developing country cities
- be **outcome driven** rather than technology (e.g. not only conventional sewerage systems, and not only individual toilets)
- focus on **equity and access for the poor** and those in **slum settlements**
- use **governance and financing** criteria to guide selection of options

Assessing Sanitation: A Framework

Goals	Functional groups in the value chain				
	User interface	Collection and /or storage	Conveyance	Treatment	Reuse / disposal
Equity and access					
Public health					
Environment					

Setting goals /outcomes for citywide sanitation

User interface	Collection and /or storage	Conveyance	Treatment	Reuse / disposal
<i>Excreta disposal (black water and septage):</i>				
All households/ properties have access to "improved" safe toilet facilities	All households/ properties have appropriate 'storage' or a network connection	All waste water (black water) and septage generated are collected through appropriate systems	All waste water (black) and septage are treated to required standards	As much as possible of the treated waste water (black) and septage is reused and remaining is disposed safely



Setting goals /outcomes for citywide sanitation

User interface	Collection and /or storage	Conveyance	Treatment	Reuse / disposal
<i>Grey water/ storm water</i>				
All households have appropriate rain water harvest / collecting facility and bathrooms	All households have a connection/ outlet for disposal of sullage (greywater)	All greywater generated from septic tanks and sullage is collected either through sewerage or clean and free-flowing drainage network	All waste water (grey) is treated to required standards	As much as possible of the treated waste water (grey) is reused and remaining is disposed safely



Setting goals /outcomes for citywide sanitation

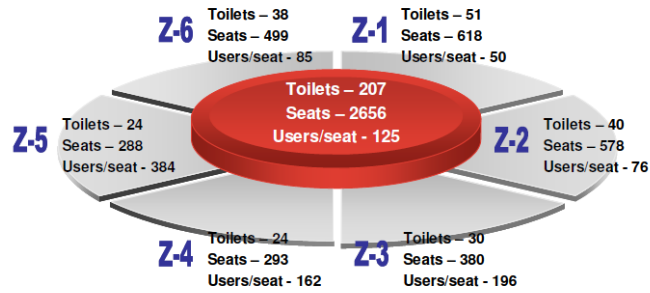
User interface	Collection and /or storage	Conveyance	Treatment	Reuse / disposal
<i>Solid waste management</i>				
All households have access to bins to keep segregated solid waste	All properties have their solid waste collected in a segregated manner through a door-to-door service; All streets are swept daily	All solid waste generated in the city (households, properties, streets) is collected daily and transported	All solid waste is treated at required standards	As much as possible of the treated solid waste is reused and remaining is disposed safely in landfill sites



Lessons from city sanitation plans

Lessons from city sanitation plans

1. Sanitation improvement is not only new sewer network!



Not about Constructing new sewer network

But

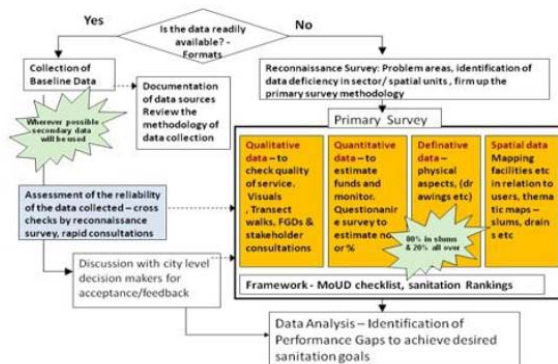
ASSESS OPTIONS
Of on-site treatment and ensure last mile connectivity



Septic tank effluents flowing in open drains in Hingoli Municipality

2. There is inadequate information on outcomes

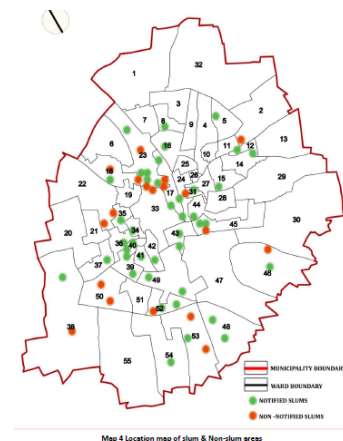
Process followed for data assimilation:



CSPs based on one-off data collection

But

REGULAR OUTCOME MONITORING
should be a part of the plan
(may require technical inputs capacity building, process re engineering to generate more reliable data)



Baseline assessment through GIS mapping for Gulbarga Municipality

Lessons from city sanitation plans

3. Priorities for sanitation through consultations



Mr. B. Jayanna, Commissioner, addressing the participants, March 25, 2011, Shimoga CMC



Participants of the CSP Orientation Workshop on March 25, 2011, Shimoga CMC



The participants involved in group work



The participants presenting group work

Task force meetings for CSP process

Stakeholder consultation process not only for problem identification

But

INFORMED DEBATES
ON OPTIONS
are needed to support consultations

- Awareness and community involvement is very important and adequate emphasis on the same is to be given.

- Since the city is saucer shaped, a proper leveling and contour survey is essential

- The community toilets should be of good specification so as to be attractive to the users.

- The health and safety issues related to sanitation workers needs to be incorporated.

- Community toilets in public places such as markets, bazaars and parks need

Extract of recommendations flowing from sanitation task force meetings for a CSP city
It w and submitted at the earliest.

4. Analysis needed across value chain and sub-sectors!



Usually a 'sectoral' analysis of water, sanitation and solid waste is carried out

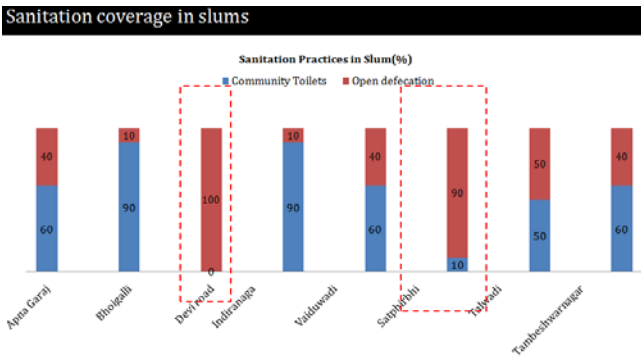
THE LINKAGES AND OPPORTUNITIES
across sub-sectors need to be analysed and explored



Road side drains clogged in Hingoli due to irregular cleaning and solid waste dumping

Lessons from city sanitation plans

5. Need a framework for Policy Change



Devi road slum and Saptirbhilati slum lack in any kind of Sanitation coverage

Indiranagar slum in absence of adequate seats, has degraded environment due to lack of O & M and increased load due to visitors in nearby commercial areas

Sanitation improvement is not only about new capital investments

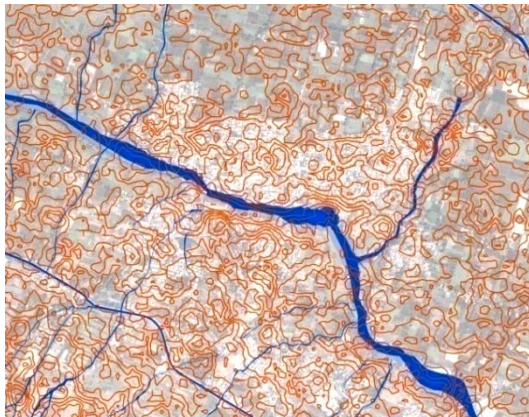
But

NEEDS POLICY CHANGES
to provide equity and affordability in service delivery



Clean pay and use toilets at Sinnar Municipality bus stand premise

6. Quick implementation of LOW COST Measures !



Topography : Wai Municipality

Improvement in not all about high end investments

But

LOW COST MEASURES
can easily start off desired improvements



Clean drains in Wai Municipality that carry storm water and grey water

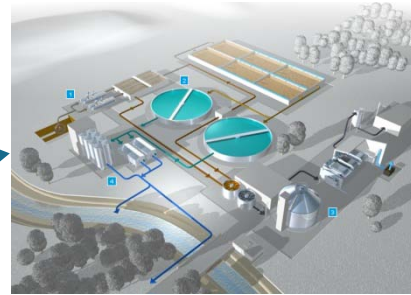
Lessons from city sanitation plans

7. Life cycle costs and financing of sanitation

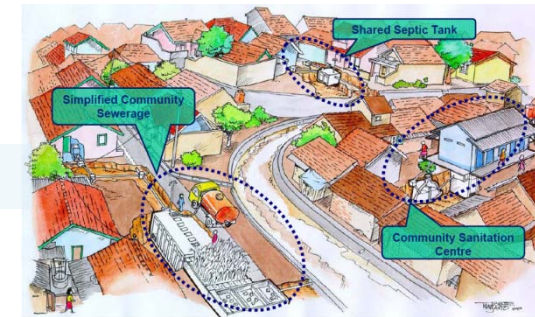
Table 69 Financial Requirements and Mechanisms

S. No.	Existing situation	Proposed action / budget head	Number of units (seats) for CSP implementation on period (2012-2016)	cost per unit	Total cost
*1	No of places of open defecation	Construction of community toilets	229	100000	2,29,00,000
*2		Construction of Individual toilets	2025	20000	4,05,00,000
*3		Construction of Urinals for schools	180	40000	72,00,000
Amount in Crores					
4	No proper disposal of effluent from toilets	*(a) connection to sewer line or drain	22906	15000	34.3 crores
5	disposal of effluent from septic tanks	*(b) connection to sewer line	22329	20000	44.6 crores
6	Recycling and reuse of wastewater	At least 30% wastewater is recycled and reused (37.55MLD)	11.26	1.25 crore	1.25 crores
Solid waste Management in (Quantity)			Total quantity	Quantity that needs to be considered	
1	DTD collection	100%	100%	100%	
2	Composting	At least 20% waste should be composted	223.3TPD	44.6TPD	
3	Generation of fuel or electricity by waste recycling	at least 5% waste is processed and is used as a fuel	223.3TPD	11.16TPD	
4	Recycling and reuse of dry waste	Recycling and reuse of all related waste through rag pickers or through agencies or NGO			
Environment & Awareness					
1	Water resources that are polluted	Study of water pollution levels and suggestive measure to arrest pollution	25 lakh per Zone (approx.)		

Need to challenge Conventional Solutions and innovate options



Vs

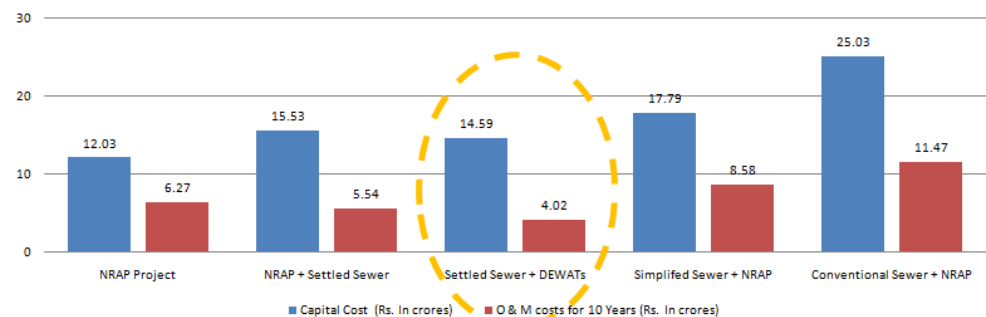


Need to consider long term costing implications !

New ways of bringing smarter management to reduce costs, improve services and revenues



Comparison of Sanitation Options



Financing requirements from CSP document

Considering alternative Sanitation Options

WAI

Project will only resolve the treatment of waste water

Does not include collector network for WW from Households

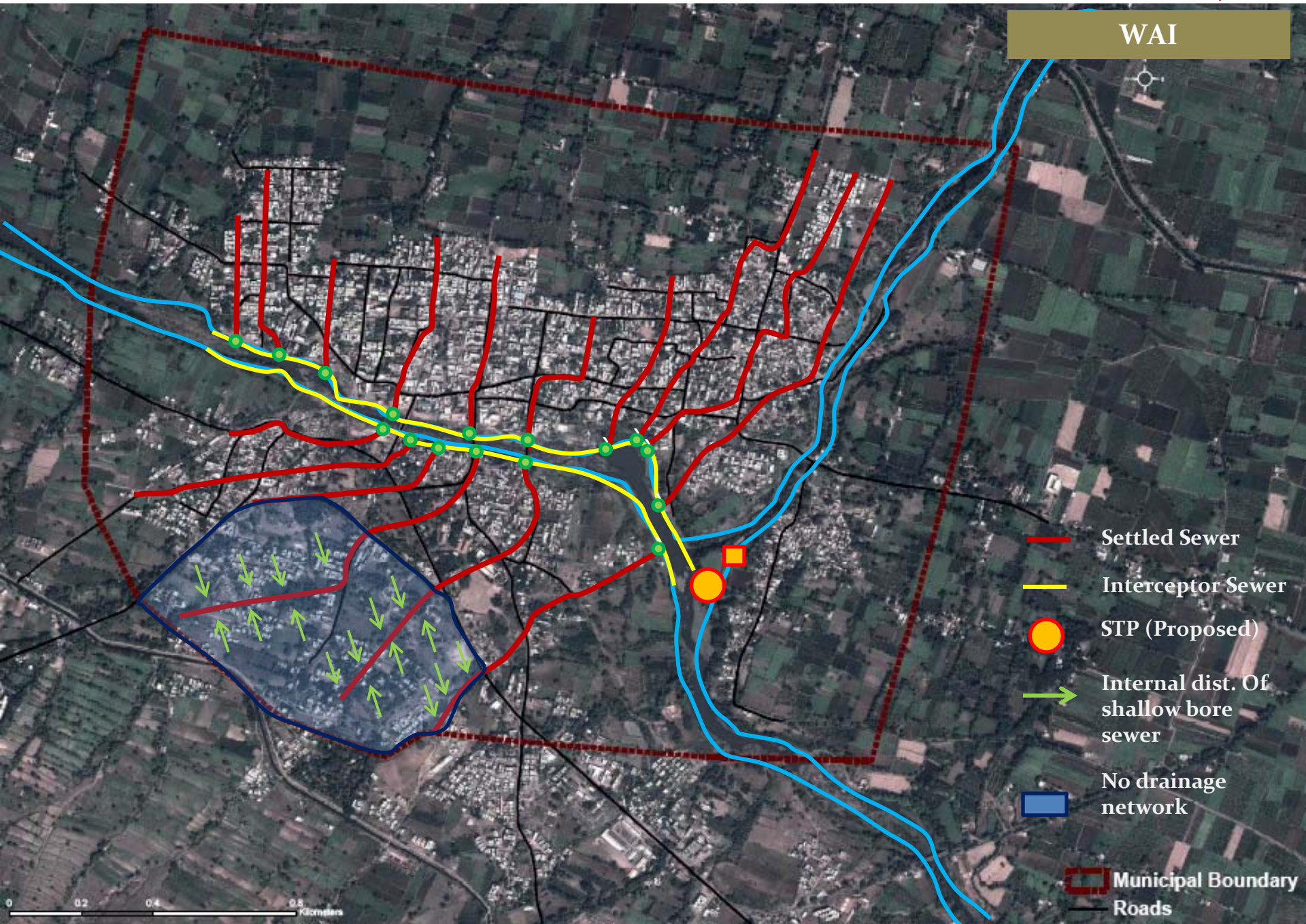
Need to think of other options for improving overall scenario

- Drains
- Interceptor Sewer
- STP (Proposed)
- Municipal Boundary
- Roads

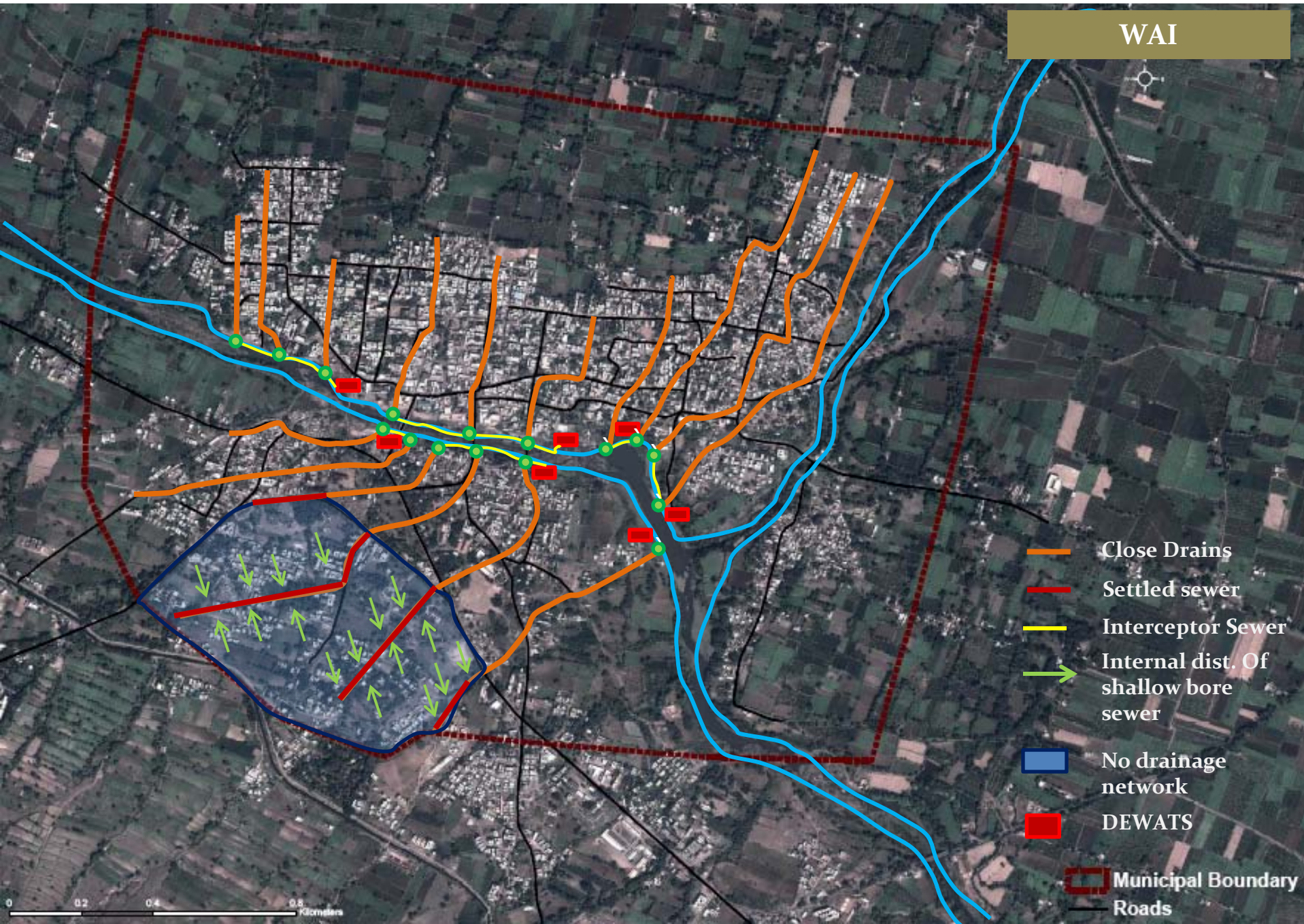
0 0.2 0.4 0.6 Kilometers

Settled Sewer + NRAP Project

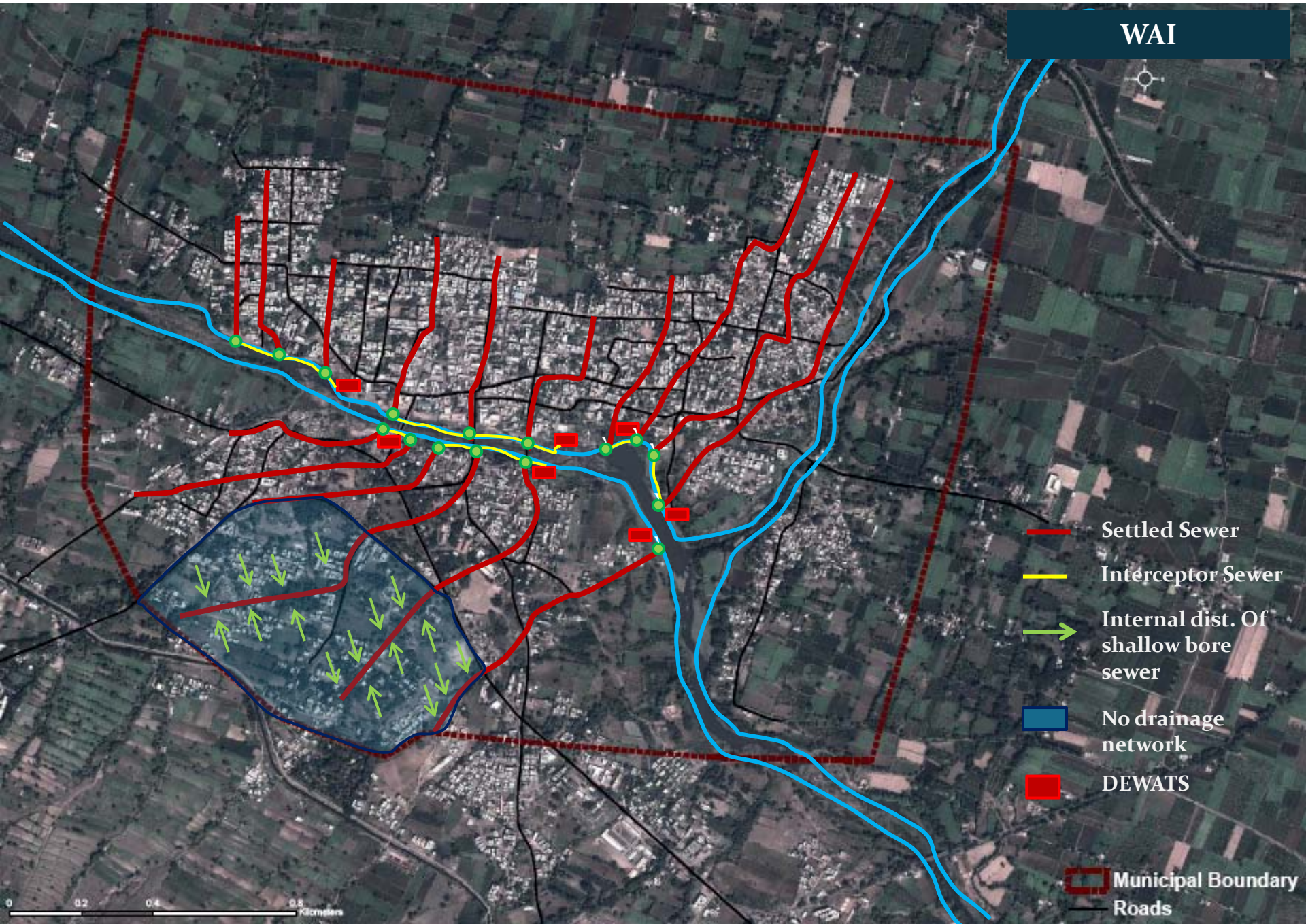
WAI



Settled Sewer/Closed Drains Connected to DEWATS



Settled Sewer + DEWATS



Assessment Matrix : Sanitation options

Parameters / Options	NRAP Project	NRAP + Settled Sewer	Settled Sewer + DEWATs	Simplified Sewer + NRAP	Conventional Sewer + NRAP
Brief Description of Option	Drains connected to interceptor sewer which leads to a centralized treatment system	Settled sewers will be connected to interceptor sewer which leads to centralized treatment system	Settled sewers will be connected to DEWATs which will be provided at the outfall location of waste near the river.	Simplified sewers will be connected to interceptor sewer which leads to centralized treatment system	Conventional sewers will be connected to interceptor sewer which leads to centralized treatment system
Capital Cost	Rs 12.03 crores (Rs. 6.08 is for interceptor sewers / pumping stations, 4.87 crores is for STP)	Rs. 12.03 crores (NRAP Project) & Rs. 3.5 crores (Settled Sewer)	Rs. 3.6 crores (Settled Sewer) & Rs. 10.99 crores (DEWATs)	Rs. 12.03 crores (NRAP Project) & Rs. 5.76 crores (Simplified Sewer)	Rs. 12.03 crores (NRAP Project) & Rs. 13 crores (Conventional Sewer)
Operational Costs	Lower in operational costs, Provides options for decentralized treatment	Lower in operational costs, Provides options for decentralized treatment	Higher in operational costs, Provides options for centralized treatment	Higher in operational costs, Provides options for centralized treatment	Higher in operational costs, Provides options for centralized treatment
Appropriateness for Existing Conditions	Not suitable for decentralized treatment	Not suitable for decentralized treatment	Not suitable for decentralized treatment	Not suitable for decentralized treatment	Not suitable for decentralized treatment
Operations of treatment facility	Operations is easy as the ULB has only to operate one treatment plant	Operations is easy as the ULB has only to operate one treatment plant	Maintenance of so many DEWATs may be difficult.	Operations is easy as the ULB has only to operate one treatment plant	Operations is easy as the ULB has only to operate one treatment plant
	Requires energy and would have high O & M implications on ULB finance	Requires energy and would have high O & M implications on ULB finance	Requires less energy	Requires energy and would have high O & M implications on ULB finance	Requires energy and would have high O & M implications on ULB finance
Use of treated Wastewater	Ease of disposal of treated wastewater	Ease of disposal of treated wastewater	Ease of disposal of treated wastewater	Ease of disposal of treated wastewater	Ease of disposal of treated wastewater
Management of waste water within the city	Does not improve the condition of waste water management within the city	This option improves the condition of waste water management within the city as the waste water will flow in closed conduit and would not smell and pollute within the city			
Flexibility of Expansion	Expansion of interceptor sewer and treatment facility would be difficult	Expansion of network can take place, but expansion of treatment facility would be little difficult	Expansion of network and DEWATs can take place	Expansion of network can take place, but expansion of treatment facility would be little difficult	
Requirement of FSM	3 Vacuum emptier trucks are required to clean septic tanks,			Not required	
Previous Experience of ULB in managing such options	No Experience	No Experience	No Experience	No Experience	
IEC Requirement	Not Required	Will be required			Not Required

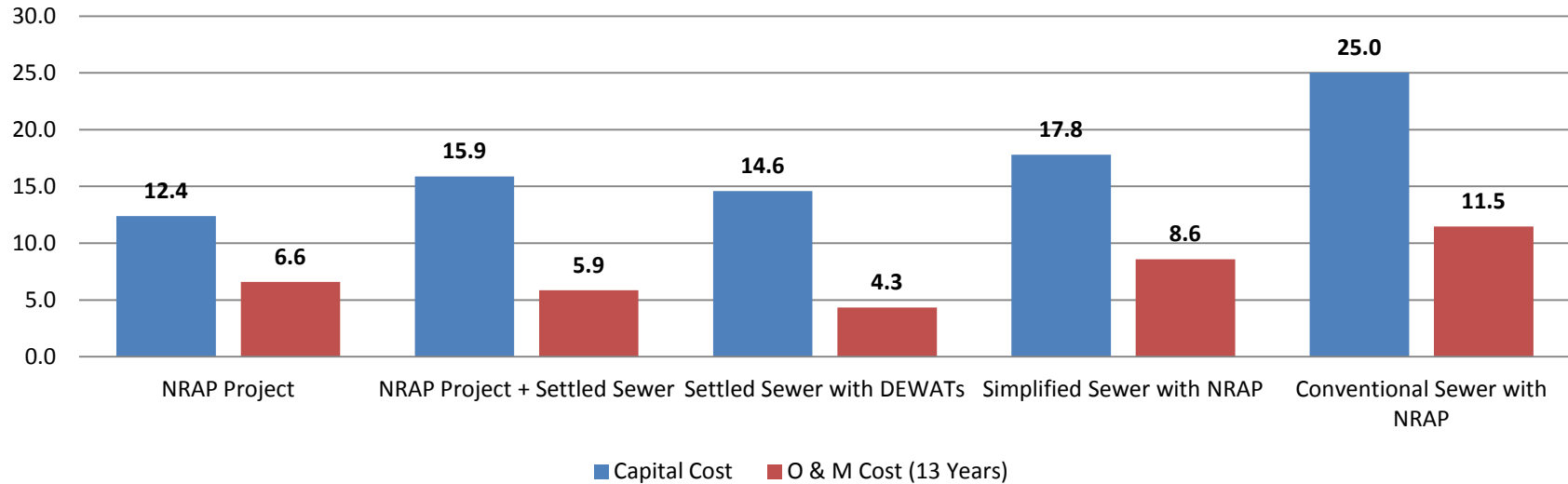
Only NRAP will not solve all WW problems

Lower in operational costs, Provides options for decentralized treatment

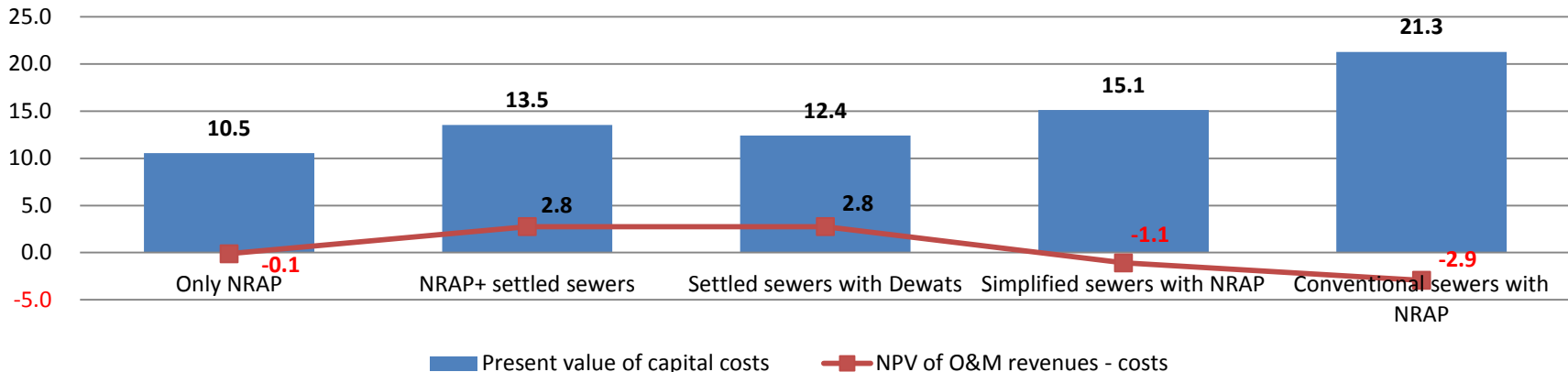
Highest capital investment and O&M implications

Choosing from the alternatives

Comparison of Sanitation Options – Total costs



Comparison of Sanitation Options Net Present Value Analysis – costs and revenues



A New Sanitation Framework

User interface	Collection / storage	Conveyance	Treatment	Reuse / disposal
Excreta disposal (black water and septage):				
All properties have access to "improved" safe toilet facilities	All properties have modes for storage/collection of sewage	All waste water (black water) and septage generated are collected through underground sewerage and/or	All collected waste water (black) and septage are treated to required standards	As much as possible of treated waste water (black) and septage are reused /remaining disposed safely
Integrated				
Full sanitation system value chain				
Greywater (sullage) and storm water disposal				
All households have access to collecting facility and bathrooms	disposal of sullage (greywater)	network or clean and free-flowing drainage	greywater treated to standards	As much as possible of the treated waste water (grey) is reused and remaining is disposed safely
Goals and outcome driven				
Equity and focus on slums				
Solid waste management				
All households have access to bins to keep	All properties have their solid waste collected in a	All solid waste generated in the city	All solid waste is treated at required	As much as possible of the treated solid waste
Governance and finance to select options				
	and solid waste collected	transported to treatment sites		

Thank You