A Framework for Assessing City Wide Sanitation

PAS Project, CEPT University, INDIA

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

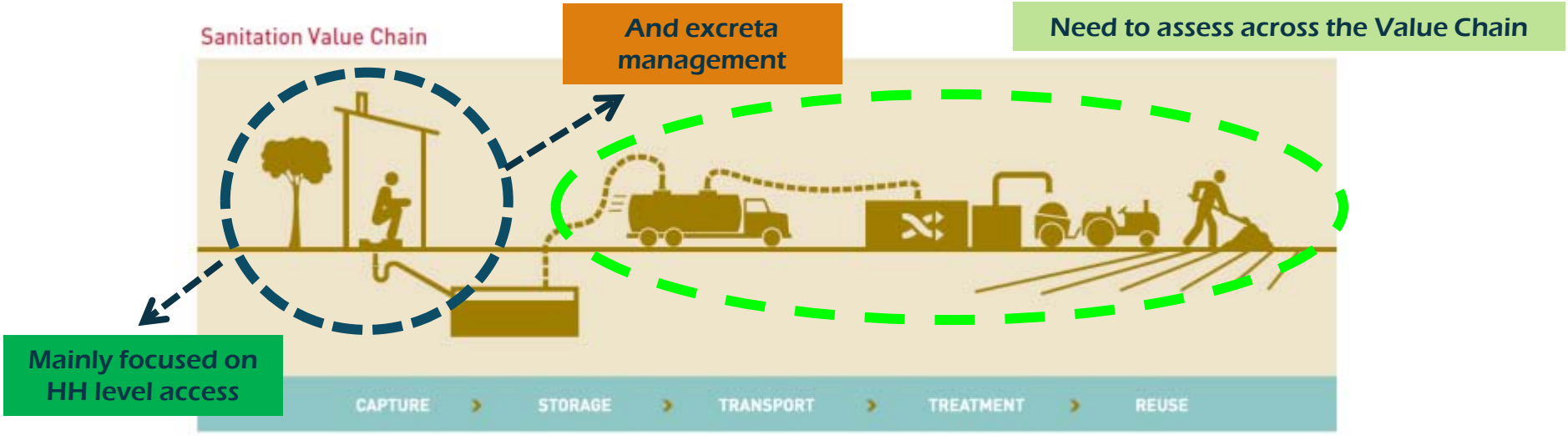


Image Source: http://www.gatesfoundation.org/watersanitationhygiene/Documents/wsh-strategy-overview.pdf

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

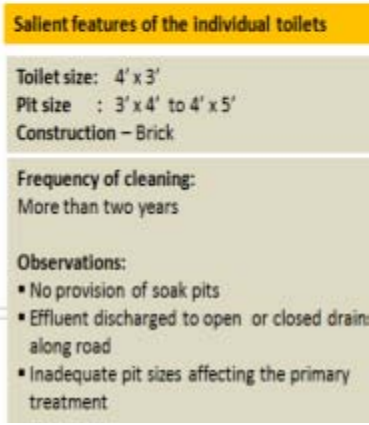
GUJARAT

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



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

Solid waste clogging city drains

Improper management of sub sectors impacts each other and overall city

Newly developed areas without drains or conveyance network

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.

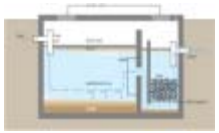
Relatively cleaner Slum settlements in Gondia

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

Sub sectors for Performance Assessment

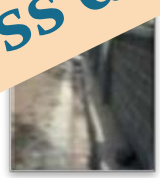
Excreta Disposal

User interface	Collection / storage	Conveyance	Treatment	Reuse / disposal



Grey Water

User interf	yance	Treatment	Reuse / disposal

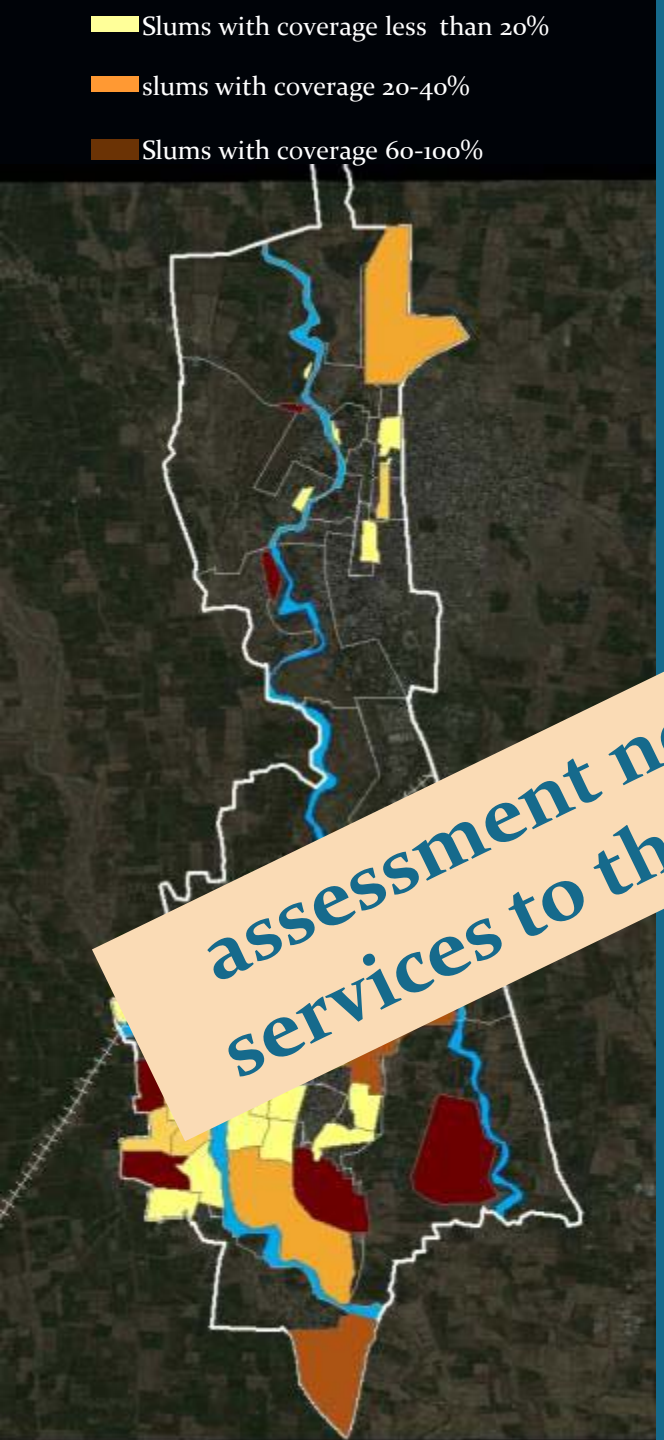


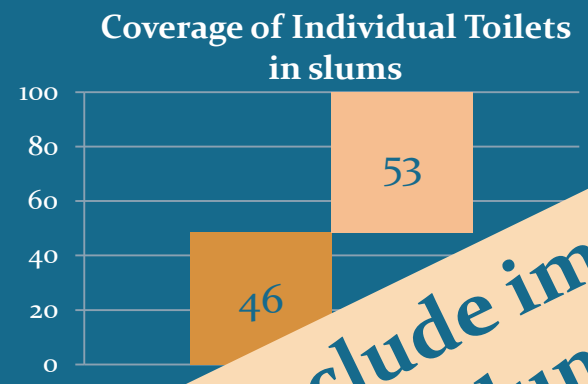
...aste

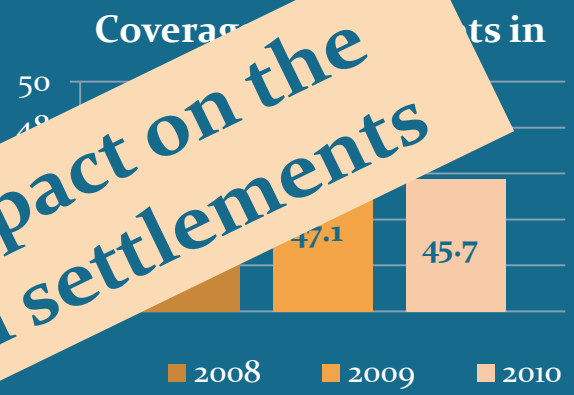
User interface	Collection / storage	Conveyance	Treatment	Reuse / disposal

Performance assessment needs to citywide and integrated across different sub-sectors

Access to toilets in Slums : Achalpur Municipality, Maharashtra

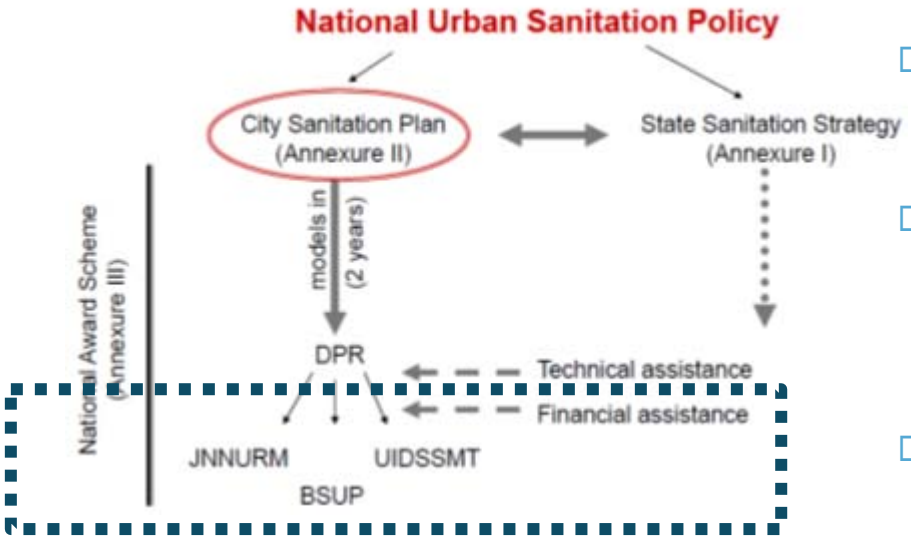






assessment needs to include impact on the services to the poor and in slum settlements

Mobilizing resources for CSPs



Contracting for management of community toilets

Waste collection by informal groups (Scavengers and Rag pickers)

- 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.**

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 or 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 the first three years

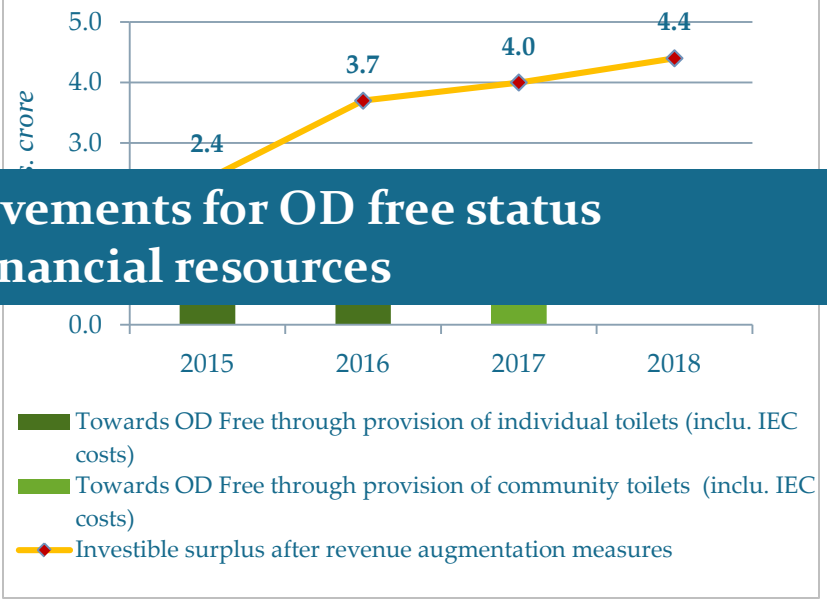
Strategies for ODF	osts crore)
Number of individual toilets	
Number of seats in co	
Cost per indi	15000
Cost	40000
construction cost	0.05
Total cost	5.3

assessment needs to include governance and financing criteria to select options

Phase I: Immediate interventions (

- **Plan** **itions**
  - for
  - of individual and
  - of Septage Management Plan
- **Measures for Increasing Revenues**
  - Improve collection efficiency of sanitation tax
  - Levy rates for drainage tax

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



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

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
Excreta disposal (black water and septage):				
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
Grey water/ storm water				
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
Solid waste management				
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!

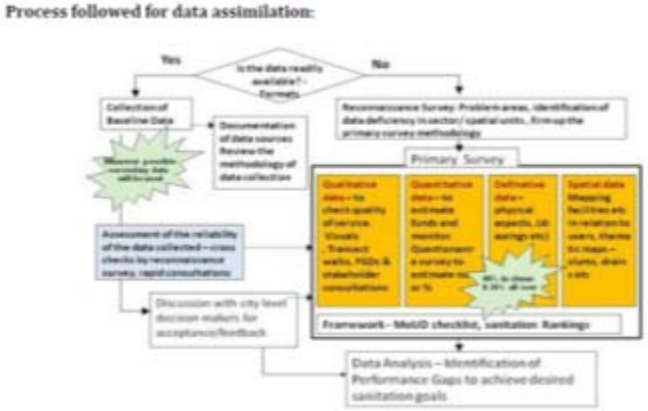
Not about Constructing new sewer network

But

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

Septic tank effluents flowing in open drains in Hingoli Municipality

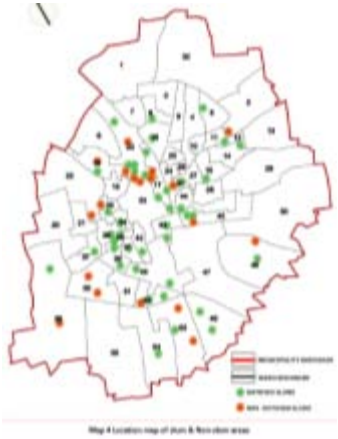
2. There is inadequate information on outcomes



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

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 nee
- It w nd submitted at the earliest.

Extract of recommendations flowing from sanitation task force meetings for a CSP city

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

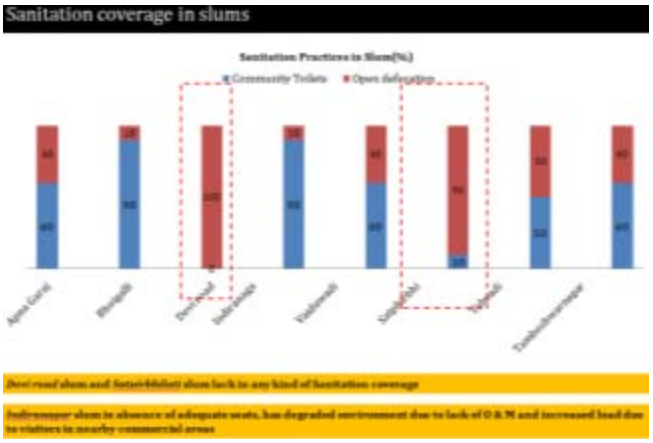
Usually a 'sectoral' analysis of water, sanitation and solid waste is carried out

THE LINKAGES AND OPPORTUNTIES 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



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 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%	[illegible]	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.)

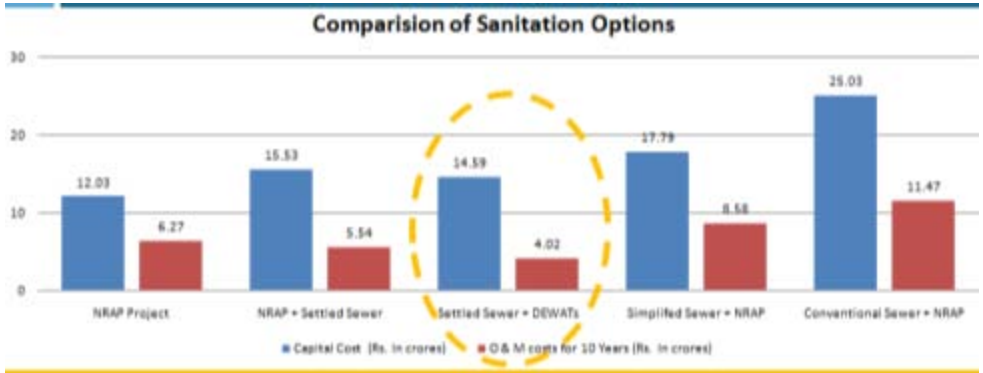
Financing requirements from CSP document

Need to challenge Conventional Solutions and innovate options

Vs

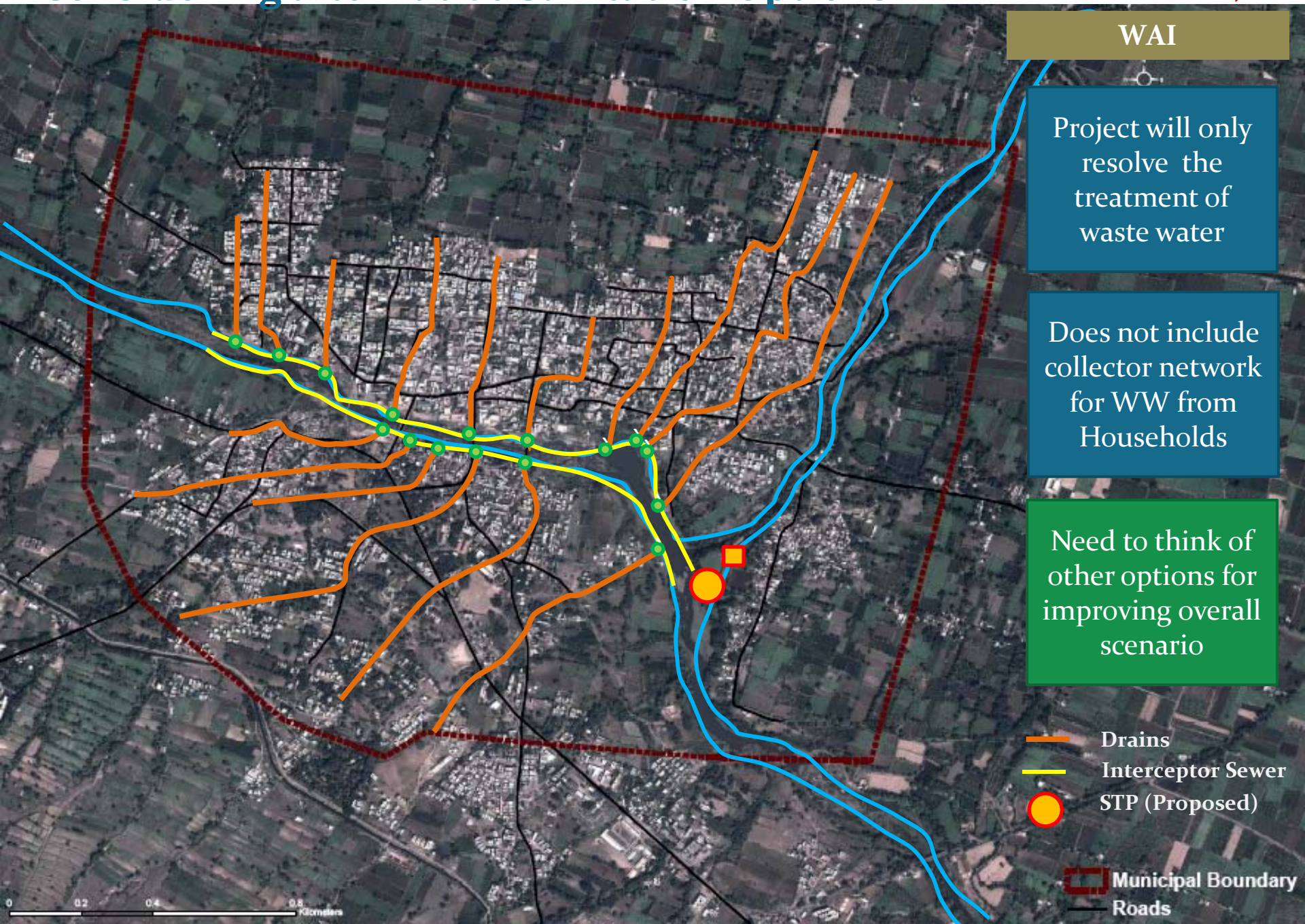
Need to consider long term costing implications !

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

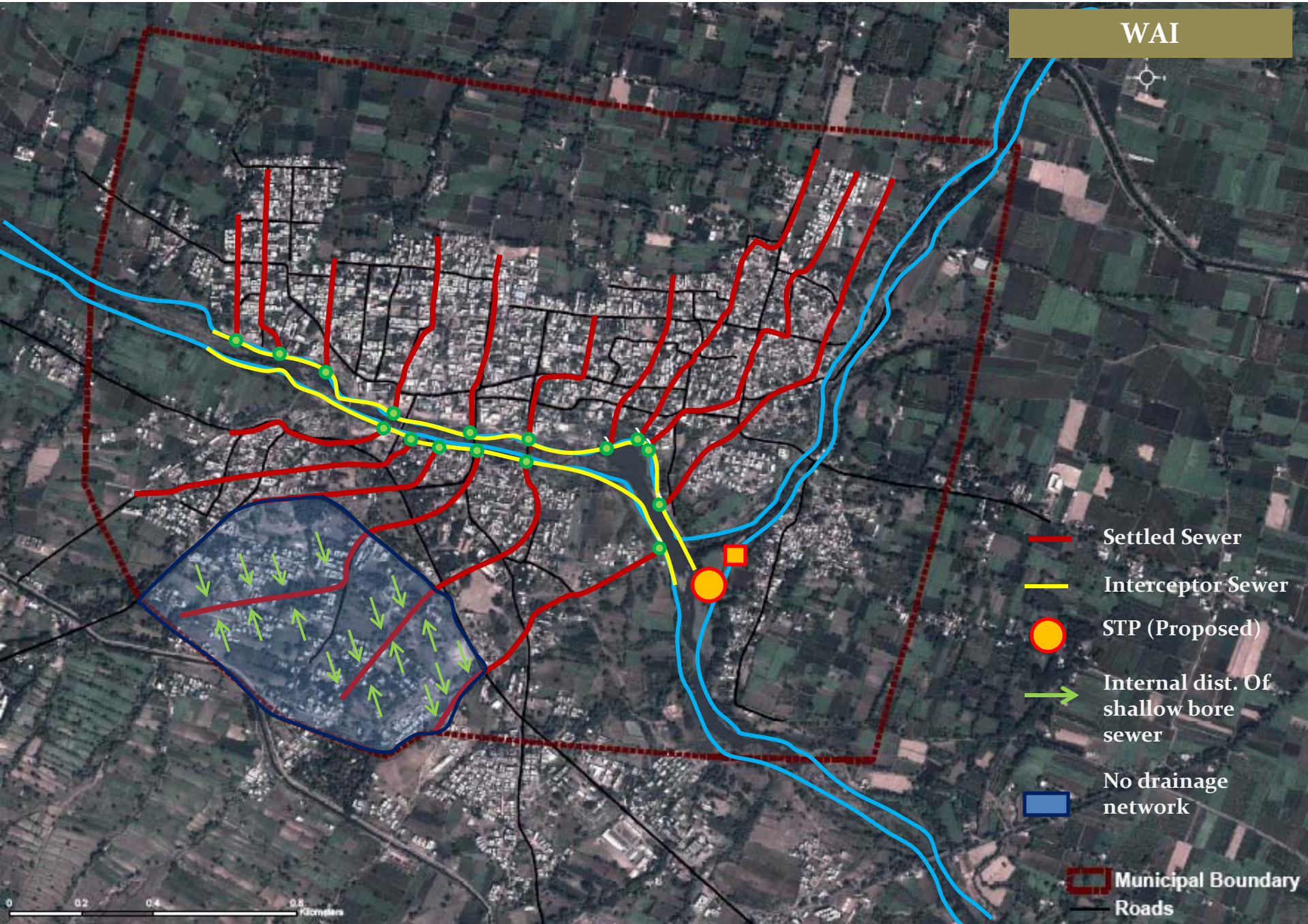


Considering alternative Sanitation Options

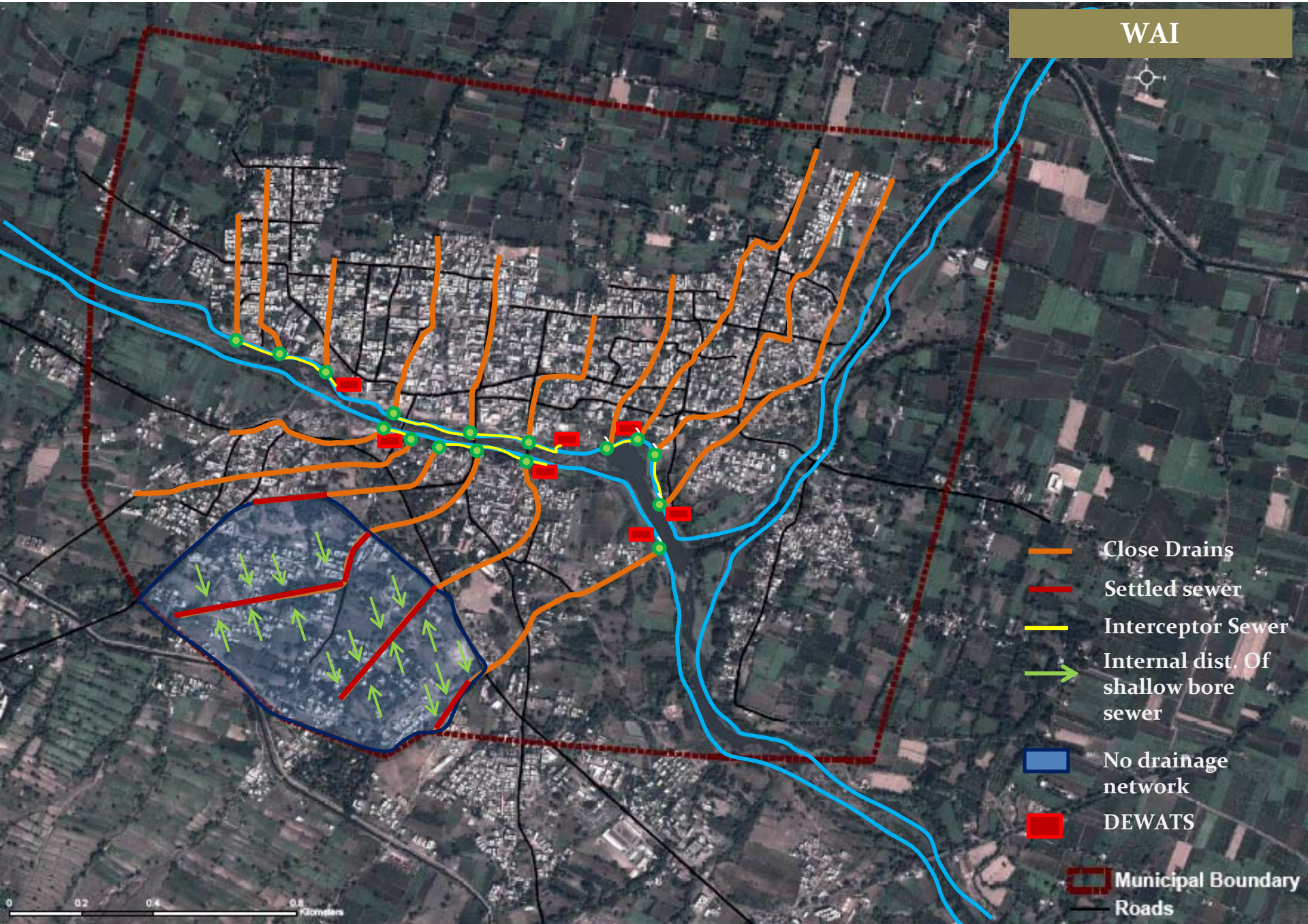
NRAP Project



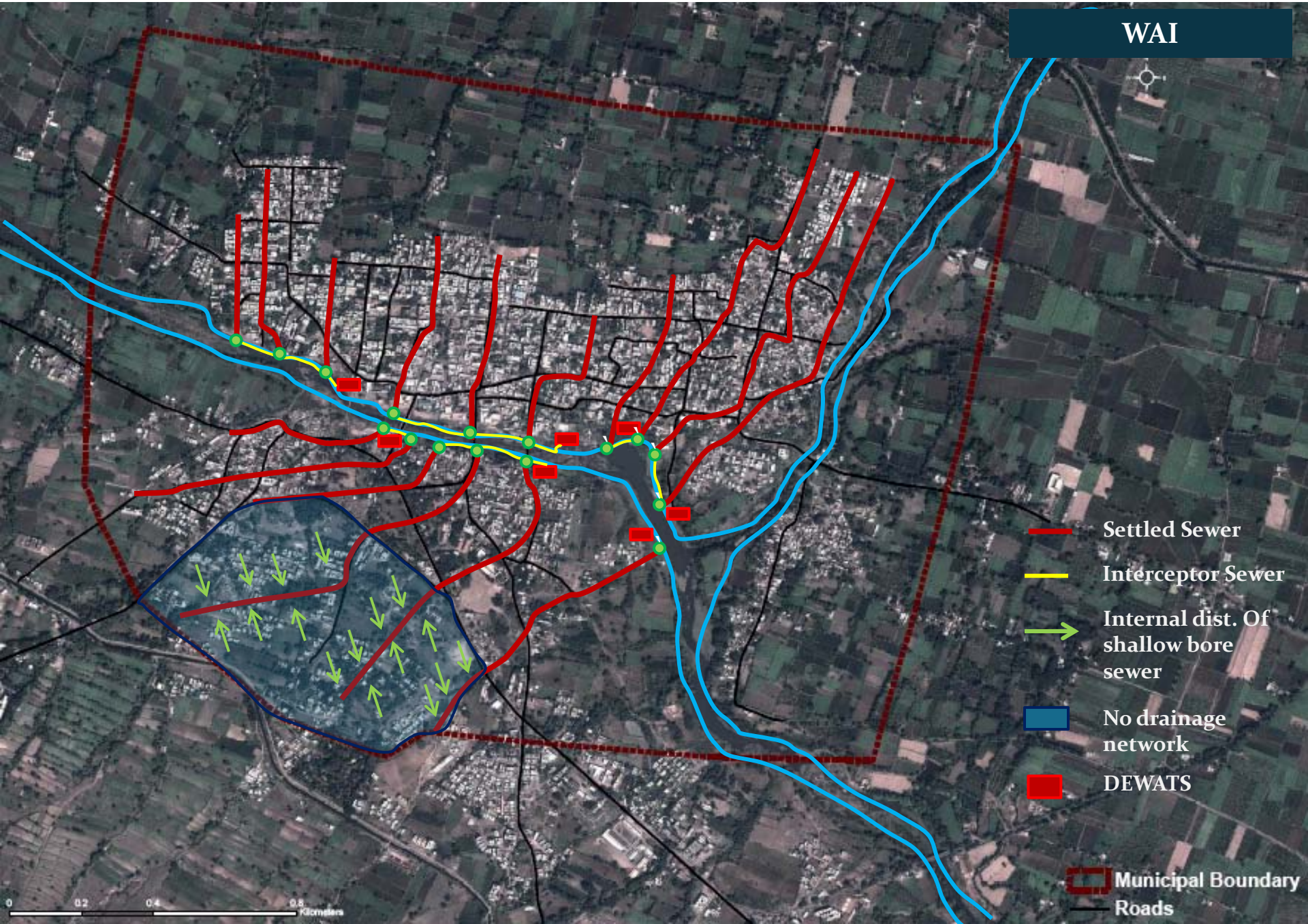
Settled Sewer + NRAP Project



Settled Sewer/Closed Drains Connected to DEWATS



Settled Sewer + DEWATS



Assessment Matrix : Sanitation options

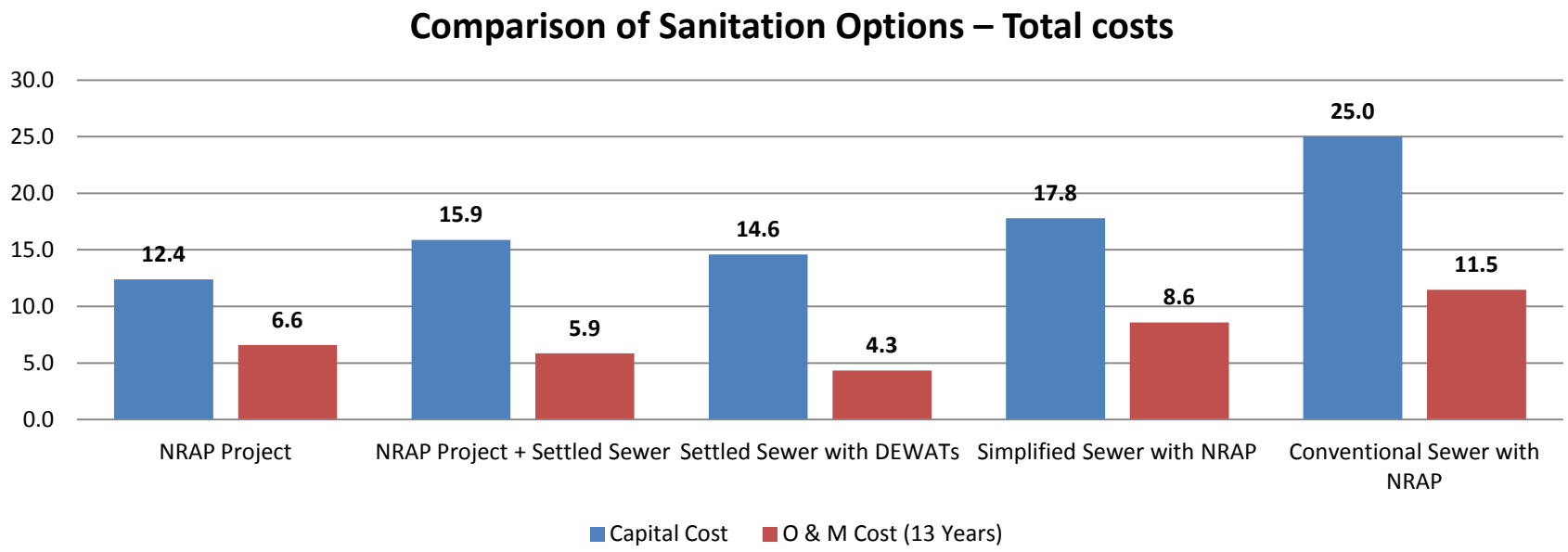
Parameters / Options	NRAP Project	NRAP + Settled Sewer	Settled Sewer + DEWATs	Simplified Sewer + NRAP	Conventional Sewer + NRAP
Brief Description of Option	Drains connected to interceptor sewer which leads to a centralized treatment system	Settled sewers will be connected to interceptor sewer which leads 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)
Operati	to othe			compared t other options like DEWATs	
Approp Existing	ards th			ty without requirement of pumping of waste water	
Operations of treatment facility	Centralized treatment		Decentralized treatment	Centralized treatment	
	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	
	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	
	-		Ope		
Use of treated Wastewater	Ease of disposal of treated				
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

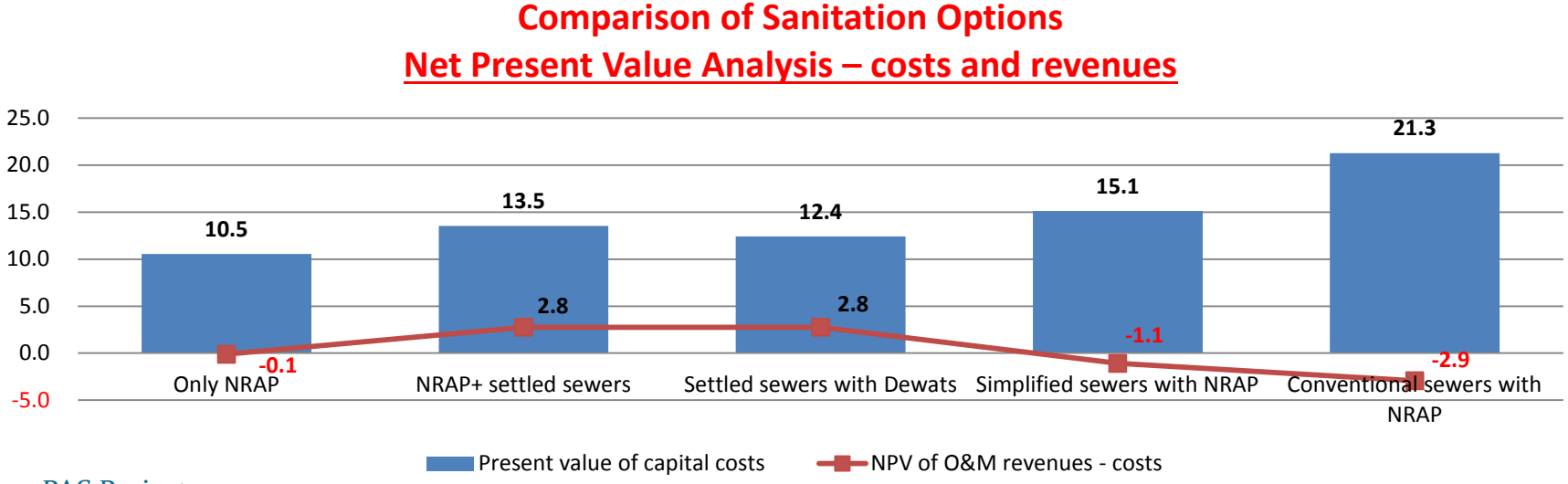
Only NRAP will not solve all WW problems

Lower in operational costs, Provides options for decentralized treatment

Highest capital investment and O&M implications

Choosing from the alternatives





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
Greywater (sullage) and storm water disposal				
All households have access to collecting facility and bathrooms	All properties have disposal of sullage (greywater)	All waste water generated is collected in network or clean and free-flowing drainage	All waste water treated to standards	As much as possible of the treated waste water (grey) is reused and remaining is disposed safely
Solid waste:				
All households have access to bins to ke	All properties have their solid waste collected in a and solid waste collected	All solid waste generated in the city transported to treatment sites	All solid waste is treated at required	As much as possible of the treated solid waste

Integrated

Full sanitation system value chain

Goals and outcome driven

Equity and focus on slums

Governance and finance to select options

Thank You