

➤ Demand and investment opportunity in urban sanitation in Maharashtra

September, 2014



CEPT University



Acknowledgement

The Performance Assessment System (PAS) project aims at developing systems for measurement, monitoring and improvement of urban water supply and sanitation (UWSS) performance in Gujarat and Maharashtra. The PAS Project is funded by the Bill and Melinda Gates Foundation. It is being implemented by the CEPT University.

This report provides findings of the study conducted by Dalberg Global Development advisors, Mumbai to explore opportunities to attract innovative financing (public and private) in urban sanitation models in Maharashtra in order to address the state's sanitation challenge and identify solutions at scale. The study was conducted over the period of August 2013 to July 2014.

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Objectives and Overview

- **There is a significant opportunity to improve sanitation outcomes in urban Maharashtra**
 - ~690,000 households still practice open defecation in urban Maharashtra
 - Maharashtra is the most urbanized state in India and therefore offers a crucial testing ground for the provision of improved sanitation services
 - The work conducted under the BMGF-funded PAS Project provides a very rich base of data for the exploration of innovative approaches in urban Maharashtra for each class of cities (Municipal Corporations, Class A, B C and Nagar Parishad)
- **Seizing the opportunity requires large scale investment and innovative business models** to address key gaps across the sanitation value chain
- **The study was to explore opportunities to attract innovative financing (public and private) in urban sanitation models in Maharashtra in order to address the state's sanitation challenge and identify solutions at scale.** The scope of the project was to answer four key questions:
 - What is the current state of sanitation in urban Maharashtra?
 - Which business opportunities can be established to improve sanitation services?
 - What are the investment requirements for these?
- Information for **249 cities in urban Maharashtra from the PAS Project database was analyzed** to develop the findings and recommendations in this document

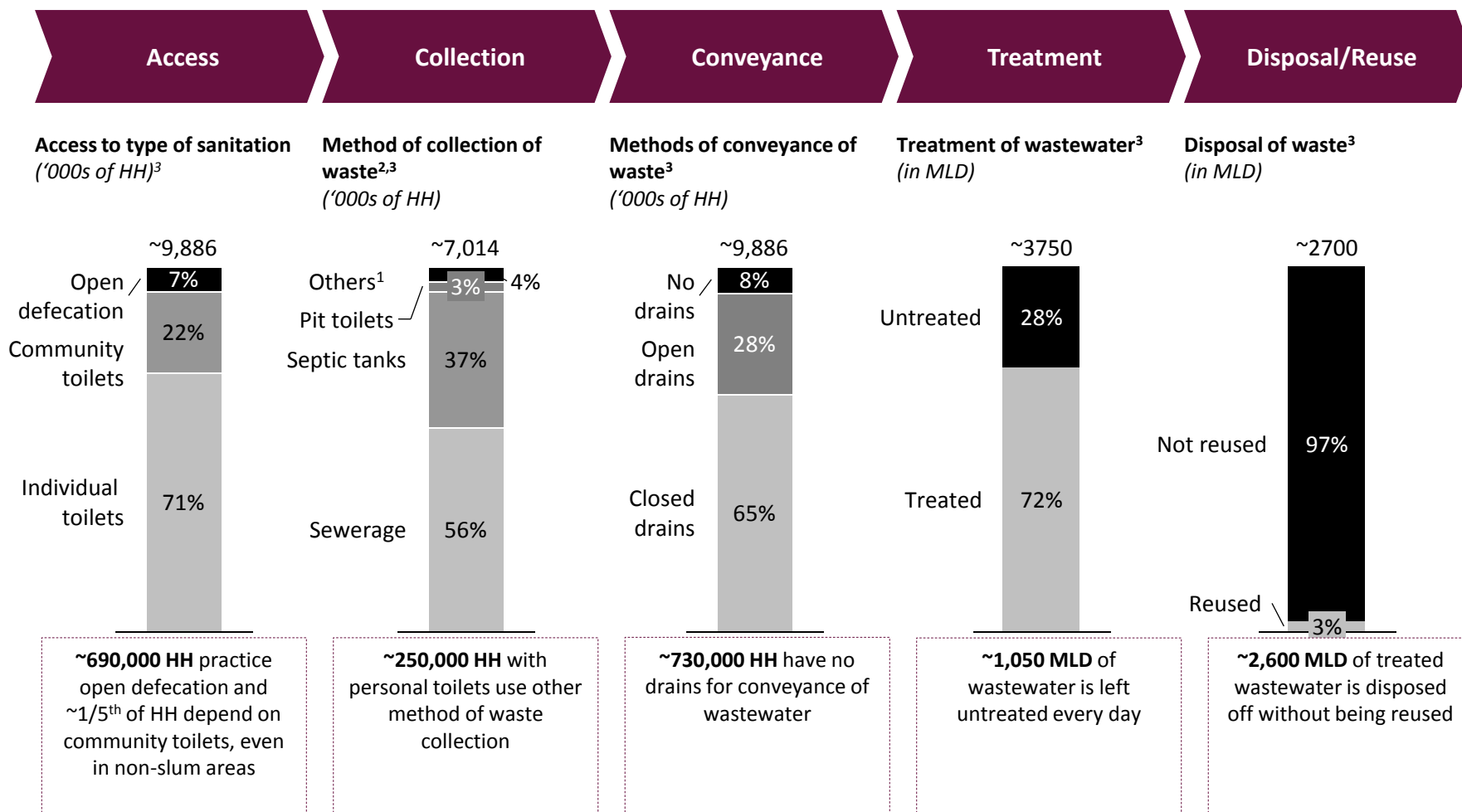
Outline

- **Current state of sanitation in urban Maharashtra**
- Business opportunities
- Investment requirements
- Annexures
 - Model aspects
 - Background data

Executive summary: The current state of sanitation in urban Maharashtra

- **Significant gaps exist across the sanitation value chain in urban Maharashtra**
 - **Access:** ~690,000 households practice open defecation in urban Maharashtra
 - Proportion of households practicing open defecation is significantly higher in smaller towns and in slums
 - **Collection & Conveyance:** ~250,000 households with personal toilets use other methods to dispose waste
 - Proportion of households without access to improved collection & conveyance is consistent across urban Maharashtra
 - **Treatment & reuse:** 28% of all wastewater is currently untreated (~1000 MLD of wastewater)
 - Almost all of wastewater in smaller towns is untreated representing a significant gap in the sanitation value chain
- **There are distinct constraints to address the gaps across the sanitation value chain**
 - **Legal constraints:** Government agencies are reluctant to provide sanitation facilities to non-notified slums and settlements in order to not legalize them
 - **Physical constraint:** Construction of toilets, sewerage networks and centralized treatment plants requires large amounts of space which is not available in high density areas
 - **Lack of intermediaries:** Decentralized models are not widespread and well established solutions and hence there is a lack of funders and service providers along the value chain
 - **Willingness to pay / invest:** Willingness to pay for the construction of personal toilets is low as people prioritize other competing expenses. Willingness to invest in sanitation business opportunities is low and major funders have preferred to invest in water and waste-water management projects
 - **Affordability:** Construction of sewerage network and centralized treatment plants are high cost options and usually unaffordable for the ULBs. Many households are unable to afford to construct personal/shared toilets or install septic tanks

Significant gaps exist across the sanitation value chain in urban Maharashtra



Note: (1) Includes methods of disposal such as basic pour flush latrines, night soil disposed in open pit and latrines serviced by humans/animals

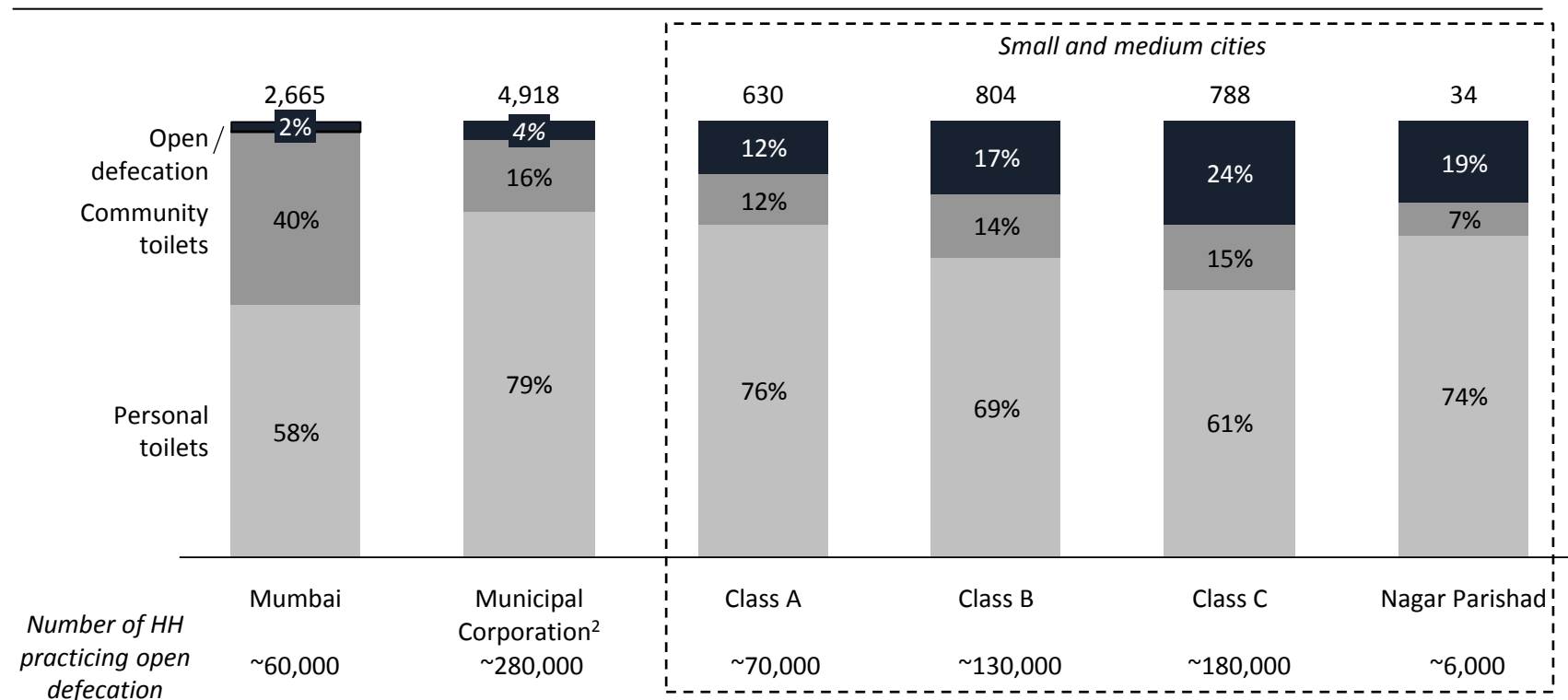
(2) Analysis for personal toilets only (data not available for method of disposal of waste by community toilets) across 247 Urban Local Bodies in Maharashtra

(3) Analysis for 249 Urban Local Bodies (ULBs) in Maharashtra

Source: CEPT PAS data 2011, Census of India 2011, Dalberg analysis

The situation is worse in small and medium towns, where the incidence of open defecation is particularly high

Access to sanitation by size of city¹
(in '000 HH)



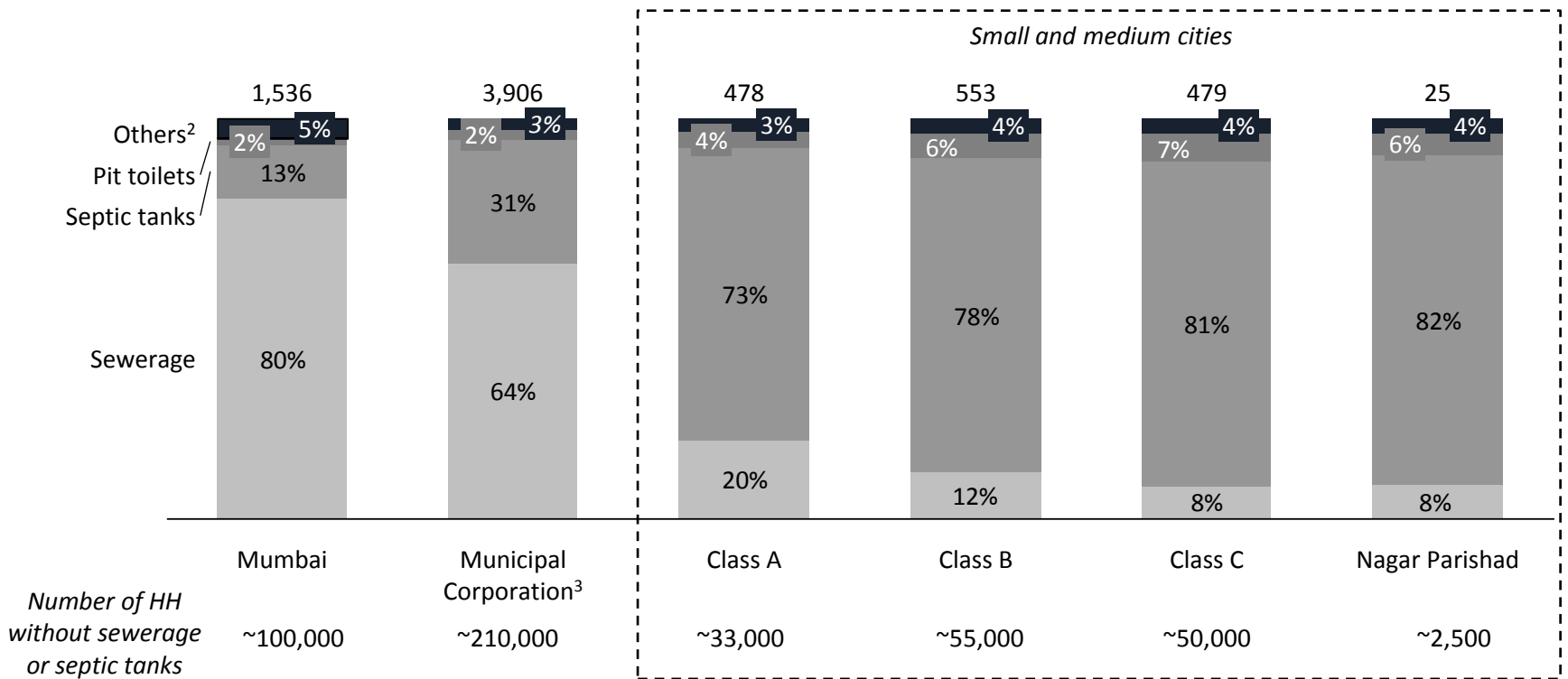
- Maharashtra is characterized by a high reliance on community toilets, even among non slum households, ~13% or ~980 thousand of whom depend on community toilets, compared to ~50% or ~1.1 million slum households

Note: (1) Classification of cities based on population: municipal corporation (>300,000), Class A (100,000-300,000), Class B (40,000-100,000), Class C (<40,000), NP (as notified) (2) Excludes Mumbai

Source: Census of India 2011, Dalberg analysis

From the collection perspective, small towns and cities rely more on on-site methods of collection

Methods of waste disposal for HH with personal toilets,¹ by size of city
(in '000 HH)



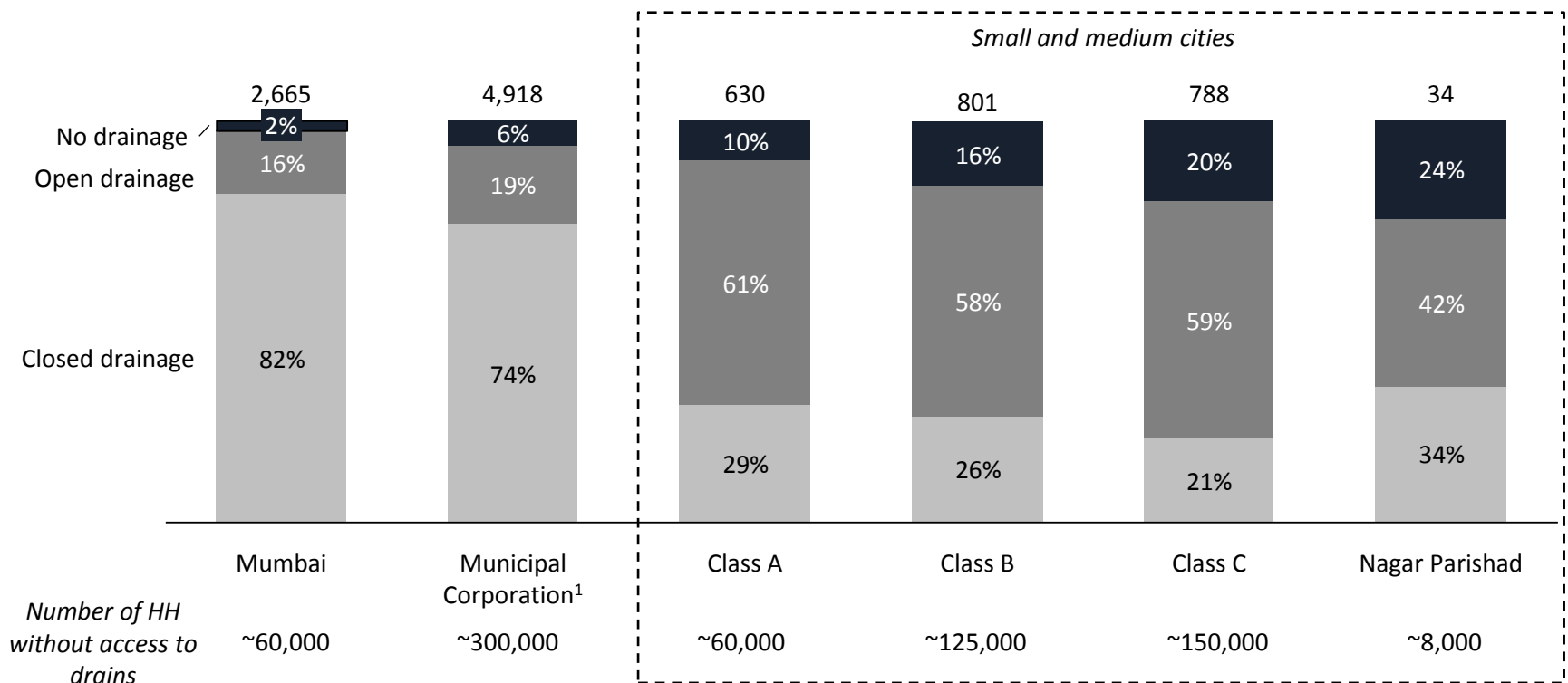
- Sewerage networks are prevalent only in bigger towns of urban Maharashtra
- On site system such as septic tanks are the preferred mode of collection of waste in small and medium towns

Note: (1) Analysis for individual toilets only, since data for community toilets is not available, (2) Includes primitive methods of disposal such as basic pour flush latrines, night soil disposed in open pit, and latrines serviced by humans/animals, (3) Excludes Mumbai

Source: PAS data 2011, Census of India 2011, Dalberg analysis

Wastewater in small towns is usually conveyed through open drains, and septic tanks are cleaned infrequently across the board

Methods of conveyance of waste for HH by size of city
(in '000 HH)



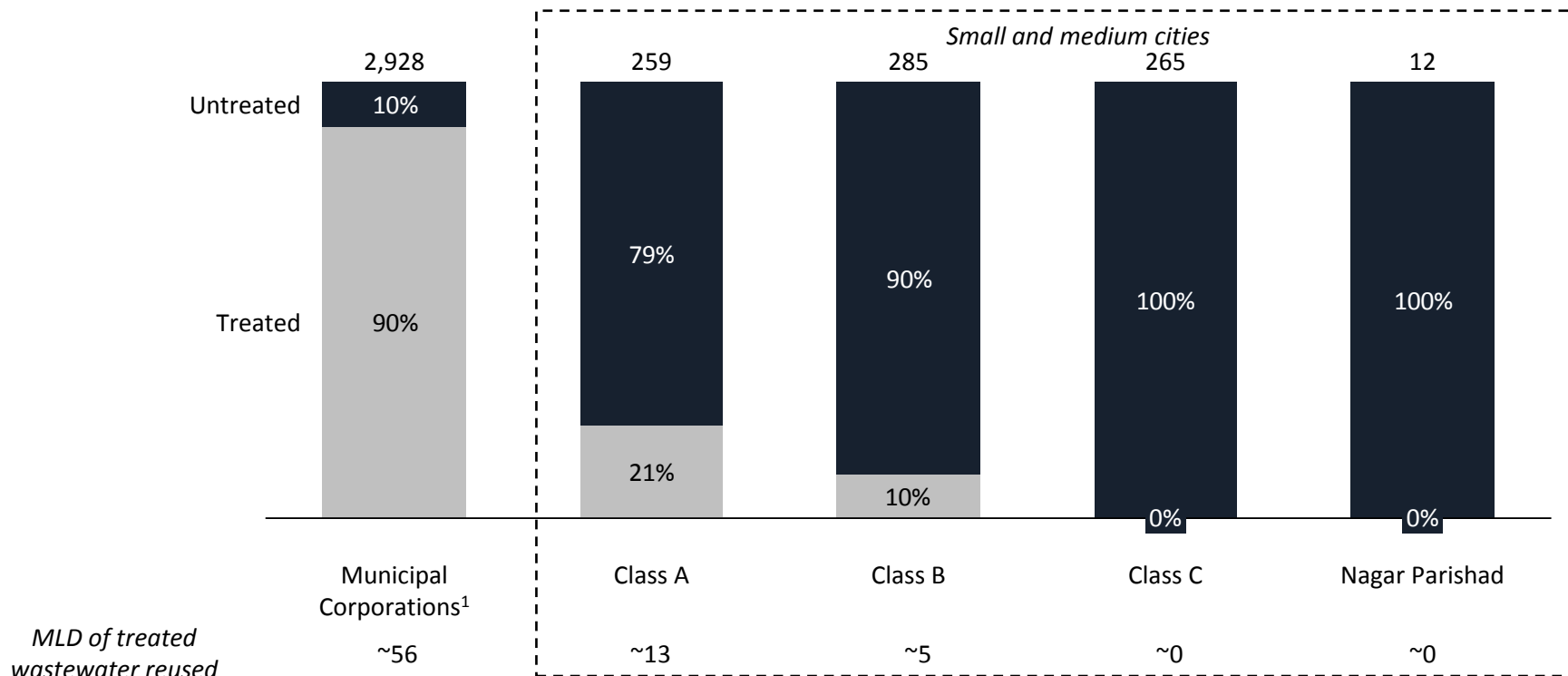
- Small and medium towns depend on open drains & ~20% of HH do not have access to drains at all
- Only ~6% of septic tanks are emptied annually in small and medium towns, as compared to the optimal level of ~33%². The corresponding figure for municipal corporations is 14%

Note: (1) Excludes Mumbai (2) As per MoUD guidelines, a household septic tank must be emptied every 3 years hence 33% should be emptied annually

Source: PAS data 2011, Census of India 2011, Dalberg analysis

While treatment is limited across the state, it is virtually non-existent in smaller towns and cities

Treatment of wastewater generated, treated and reused by size of city
(In MLD)



- Lack of decentralized waste treatment solutions in small & medium towns results in most wastewater being disposed off without treatment
- Only 6 out of 252 ULBs in urban Maharashtra have reported an ability to treat septage, only one of which is a medium Class A town of Ichalkaranji. In other cities, most of the septage is dumped in open drains and water bodies

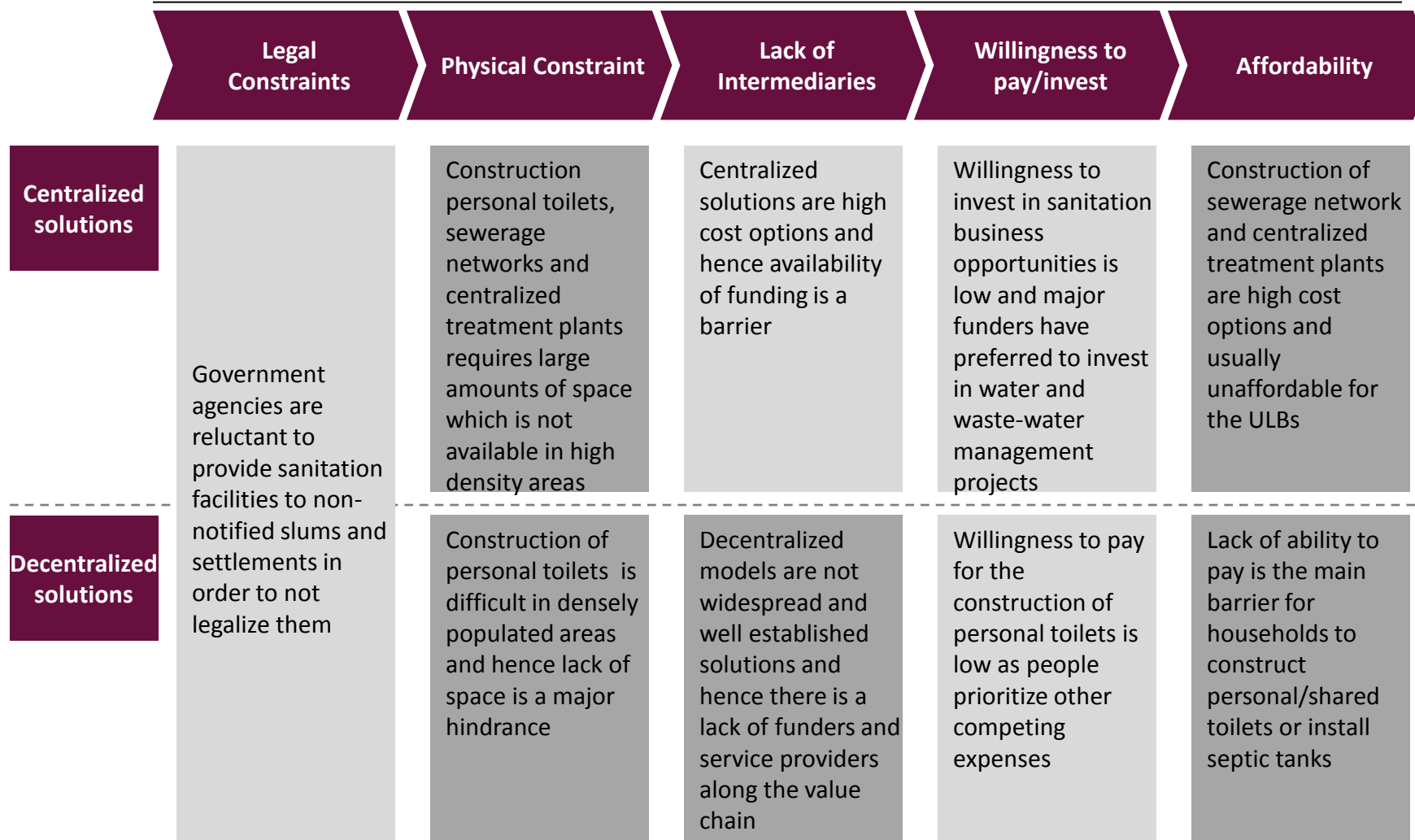
Note: (1) Excludes Mumbai, since data is not available for the city

Source: Septage management report – PAS, PAS data 2011, Census of India 2011, Dalberg analysis

There are distinct constraints to address the gaps across the sanitation value chain

■ Primary barriers ■ Secondary barriers

Constraints



Outline

- Current state of sanitation in urban Maharashtra

- **Business opportunities**

- Investment requirements

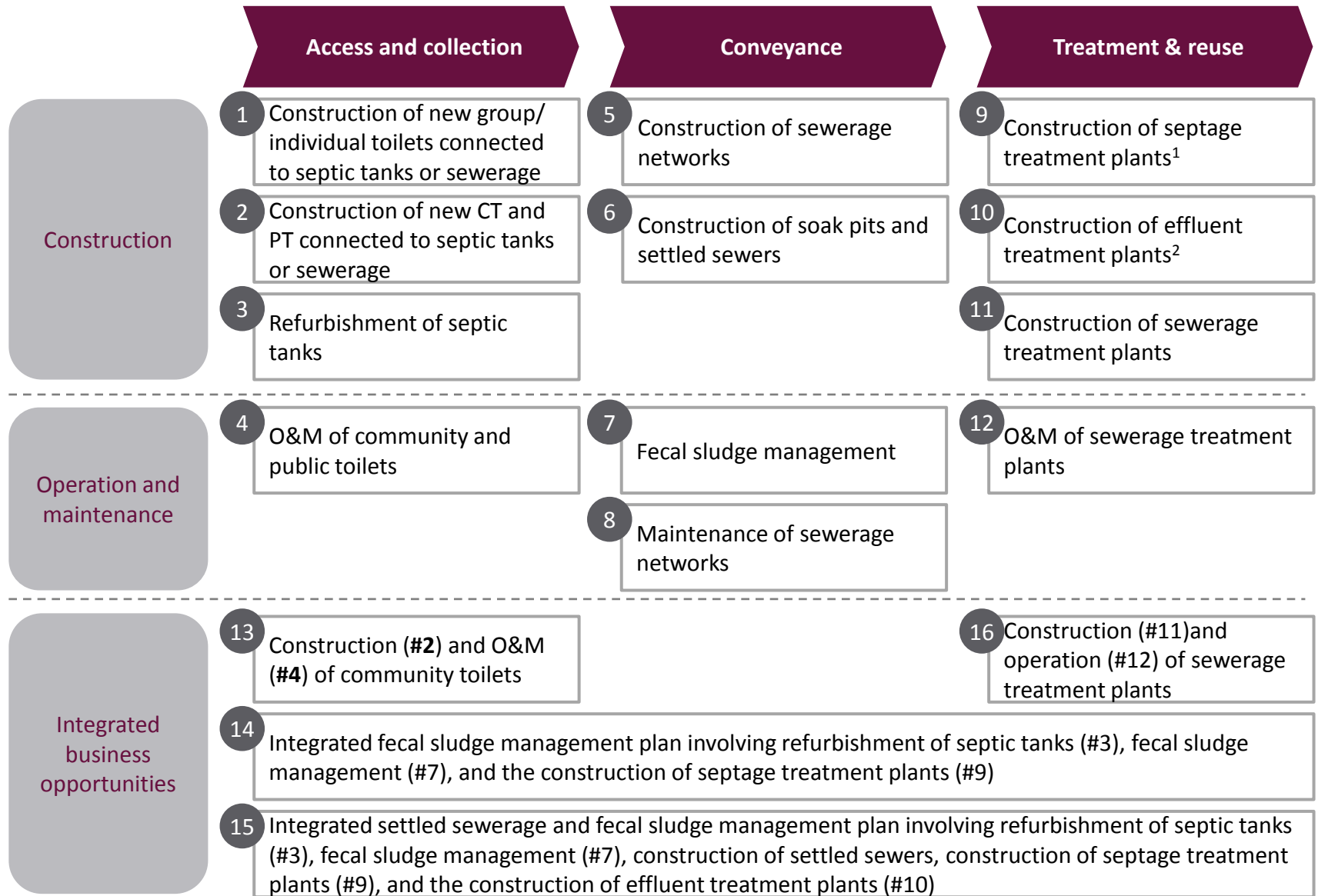
- Annexures

- Model aspects
- Background data

Executive summary: Demand side analysis

- **We have identified 16 existing and emerging business opportunities with the potential to improve sanitation outcomes across the value chain**
 - These business opportunities are evidenced by a large variety of existing public and private players
 - There are four ‘integrated opportunities’ we have identified which appear to be emerging approaches to addressing sanitation across the value chain (opportunities 13 to 16)
- **We developed six scenarios which we believe to be representative of addressing the sanitation challenge in urban Maharashtra**
 - Scenario 1: Community toilets only, decentralized collection and conveyance
 - Scenario 2: 50/50 split of community and personal/shared toilets, decentralized collection and conveyance
 - Scenario 3: Same as 1, but with all toilets in Municipal corporations and in other class cities with sewerage projects under JnNURM and UIDSSMT, connected to sewerage network
 - Scenario 4: Same as 2, but with all toilets in Municipal corporations and in other class cities with sewerage projects under JnNURM and UIDSSMT, connected to sewerage network
 - Scenario 5: Same as 3, but with all toilets in cities with greater than 100 LPCD of water availability connected to sewerage
 - Scenario 6: Same as 4, but with all toilets in cities with greater than 100 LPCD of water availability connected to sewerage
- **We have developed a flexible model to calculate the size of investment required for each business opportunity under each scenario**
 - Investment required in sanitation business opportunities given our example scenarios ranges from USD ~550 million to ~1.3 billion

We have identified 16 business opportunities with the potential to improve sanitation outcomes across the value chain



Note: (1) Technology used: Sludge drying beds (2) Technology used: Facultative aerated lagoon

Source: Dalberg analysis

These business opportunities are evidenced by a large variety of existing public and private players (1/2)

Business Opportunities	Description	Examples of existing players
1 Construction of new group/ individual toilets connected to septic tanks or sewerage	<ul style="list-style-type: none"> Business opportunity catering to demand for personal and shared toilets by HH practicing open defecation 	<i>Uniloo (Ghana), EZ Toilets- IDE (Cambodia), LooWatt (Madagascar), 3S Shramik (India), Sanishop (Cambodia)</i>
2 Construction of new CT and PT connected to septic tanks or sewerage	<ul style="list-style-type: none"> Business opportunity catering to demand for improved sanitation by HH practicing open defecation unable to get personal toilets 	<i>Dignified Mobile Toilets (Nigeria), 3S Shramik (India)</i>
3 Refurbishment of septic tanks	<ul style="list-style-type: none"> Business opportunity for refurbishment of septic tanks to allow easy access for cleaning 	<i>Local contractors</i>
4 O&M of community and public toilets	<ul style="list-style-type: none"> Business opportunity to execute contracts for maintenance of community toilets in cities across slum and non slum areas 	<i>Gramalaya (India), Hype Integrated Communications (India), 3S Shramik (India)</i>
5 Construction of sewerage networks	<ul style="list-style-type: none"> Business opportunity for constructing sewerage network for new and existing toilets without access to sewerage 	<i>Vishwa infrastructure (India) Ramky Infrastrucutre (India)</i>
6 Construction of soak pits and settled sewer	<ul style="list-style-type: none"> Business opportunity for constructing soak pits and settled sewer for toilets with septic tanks for safe conveyance of wastewater 	<i>Clearford industries (Canada), SANIMAS (Indonesia), AREM (Mali)</i>
7 Fecal sludge management	<ul style="list-style-type: none"> Business opportunity for maintenance of septic tanks through periodic cleaning, sludge conveyance and disposal 	<i>Blue star enviro services, Global Enviro Engineers (India), Bear Valley Ventures - Tiger toilets (Tanzania), 3S Shramik (India)</i>
8 Maintenance of sewerage network	<ul style="list-style-type: none"> Business opportunity for maintenance of sewerage networks to ensure safe conveyance of waste to treatment plants 	<i>FCC services (Spain), MACE (U.A.E.)</i>

These business opportunities are evidenced by a large variety of existing public and private players (2/2)

Business Opportunities	Description	Examples of existing players
9 Construction of septage treatment plants	<ul style="list-style-type: none"> Business opportunity for augmenting decentralized treatment capacity for treatment of fecal matter from septic tanks 	<p><i>Sandec (Ghana, Senegal, Uganda), SANIMAS (Indonesia)</i></p>
10 Construction of effluent treatment plants	<ul style="list-style-type: none"> Business opportunity for treatment of solid-free effluents 	<p><i>BORDA (Germany), CDD (India), Waste Enterprisers (Ghana, Senegal, Uganda), SANIMAS (Indonesia)</i></p>
11 Construction of sewerage treatment plants	<ul style="list-style-type: none"> Business opportunity for augmenting waste treatment capacity for sewerage 	<p><i>Thermax (India), Ramky Infrastrucutre (India)</i></p>
12 O&M of sewerage treatment plants	<ul style="list-style-type: none"> Business opportunity for operation and maintenance of centralized treatment plants 	<p><i>General Electric (U.S.A.), Veolia (France)</i></p>
13 Construction and O&M of community toilets	<ul style="list-style-type: none"> Business opportunity to construct and operate community toilets 	<p><i>Sulabh (India), Ecotact (Kenya), 3S Shramik (India)</i></p>
14 Integrated fecal sludge management plan (IFSM)	<ul style="list-style-type: none"> Business opportunity to construct, operate community toilets and engage in treatment of waste 	<p><i>Sanergy (Kenya), Peepoo (Kenya), 3S Shramik (India)</i></p>
15 Integrated settled sewerage and FSM	<ul style="list-style-type: none"> Business opportunity for the conveyance and treatment of septage and effluents from septic tanks 	<p><i>CDD (settled sewer and treatment plants), 3S Shramik (FSM and treatment plants)</i></p>
16 Construction and operation of sewerage treatment plants	<ul style="list-style-type: none"> Business opportunity to construct and operate centralized waste treatment plants 	<p><i>Veolia (France), Degremont (France)</i></p>

Outline

- Current state of sanitation in urban Maharashtra
- Business opportunities
- **Investment requirements**
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We have developed a flexible model to calculate the size of investment required for each business opportunity across the value chain

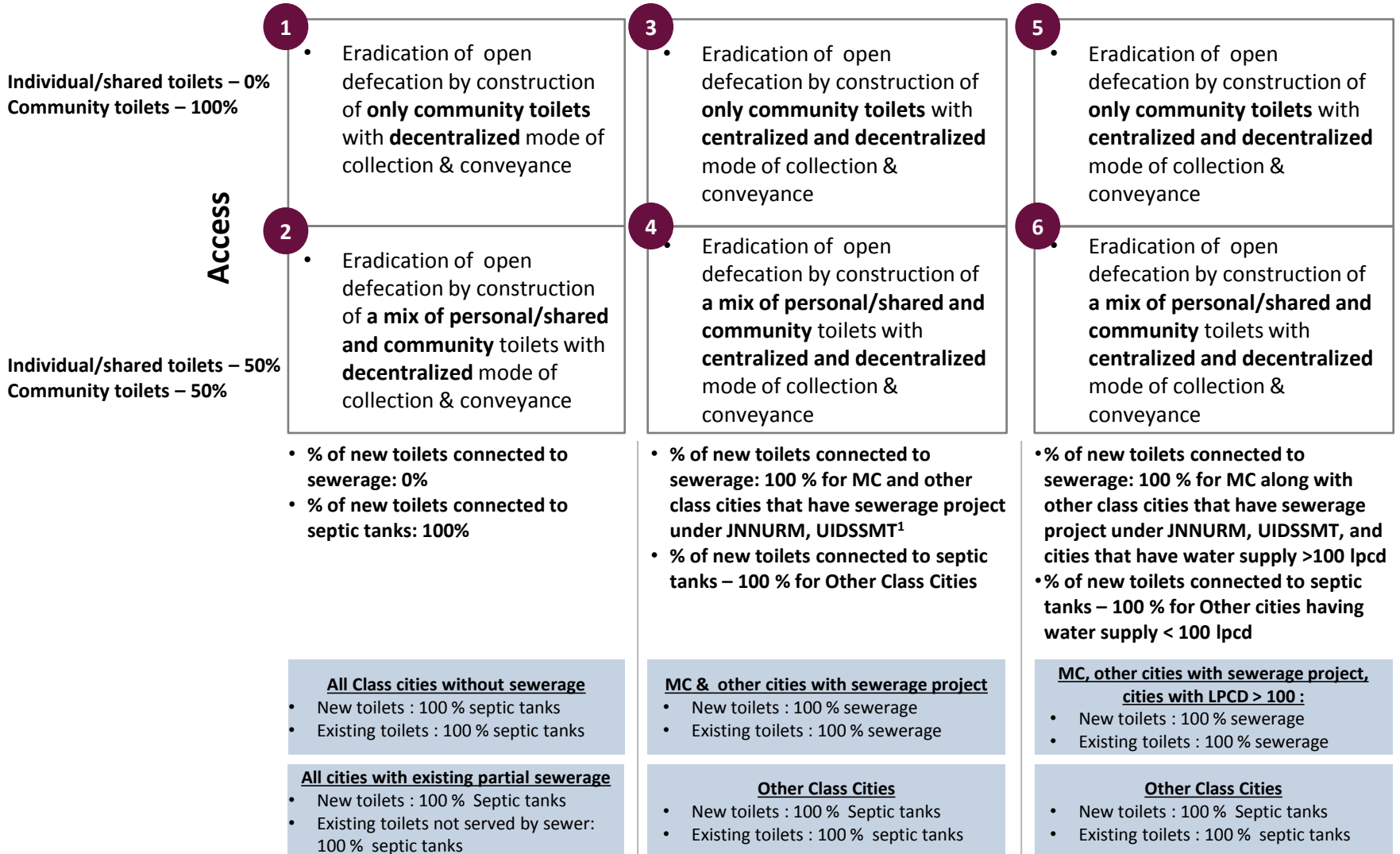
In order to size the investment requirement for business opportunities in the sanitation value chain in urban Maharashtra, we have developed a model flexible on multiple parameters of access and collection and conveyance, offering the following benefits:

- **Sizing investment requirement in specified business opportunities** – The model aggregates the size of the potential requirement in identified sanitation business opportunities
- **City wise analysis** – Leveraging census and PAS data, the model estimates the investment required across business opportunities in 247 cities of Maharashtra, split by geography
- **Flexibility to suit investor preferences:** The model is flexible along multiple parameters allowing sizing of the investment requirement across sanitation business opportunities under different scenarios which can be modified to suit investor preferences

Flexible variables	Description	Usefulness
1) % of HH practicing open defecation given access to personal/shared toilets	➤ HH practicing open defecation can be split into those getting access to personal, shared and community toilets by the user of the model based on drivers of access to type of sanitation	➤ Allows addressing various drivers of access to sanitation. These range from barriers such as space and cost constraints to policy outlook such as preference for a type of toilet and investor preferences
2) % of HH practicing open defecation given access to community toilets		
3) % of new toilets connected to sewerage network	➤ Toilets connected to method of collection and conveyance – sewerage network and septic tanks can be split depending on the drivers of such construction	➤ Allows for flexibility to incorporate investor strategy. The model can be modified depending on investor's scale of funding and preference for centralized or decentralized sanitation solution
4) % of new toilets connected to septic tanks <ul style="list-style-type: none"> • % of toilets connected to soak pits • % of toilets connected to settled sewer 	<ul style="list-style-type: none"> • Furthermore, the toilets connected to septic tanks can split into those connected to soak pits and settled sewerage to reflect the sanitation value chain for decentralized solutions 	

We have generated six likely scenarios which we believe are representative of the investment required to address sanitation gaps

Scenarios



Note: (1) Refer to Appendix

Source: Dalberg analysis

Investment required in sanitation business opportunities given our example scenarios ranges from USD ~550 million to ~1.3 billion

Investment required in business opportunities in sanitation value chain under different scenarios (in Millions USD)

Business opportunities		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
1	Construction of new individual or group toilets connected to septic tanks or sewerage	0	76	0	74	0	73
2	Construction of new CT and PT connected to septic tanks or sewerage	90	45	90	45	90	45
3	Refurbishment of septic tanks	64	64	52	52	36	36
4	O&M of community and public toilets	54	54	99	99	179	179
5	Construction of sewerage networks	0	0	358	362	593	603
6	Construction of soak pits and settled sewers	188	195	143	148	96	100
7	Fecal sludge management	16	18	14	15	13	14
8	Maintenance of sewerage networks	16	16	16	16	16	16
9	Construction of septage treatment plants	2	2	2	2	1	1
10	Construction of effluent treatment plants	114	115	86	87	72	72
11	Construction of sewerage treatment plants	0	0	99	99	179	179
12	O&M of sewerage treatment plants	25	25	25	25	25	25
Total investment requirement (USD Millions)		569	610	984	1024	1299	1342
13	Construction and O&M of community toilets	144	99	189	144	268	223
14	Integrated fecal sludge management	82	84	68	69	50	51
15	Integrated septage and effluent management	384	388	154	156	218	223
16	Construction and O&M of sewerage treatment plant	25	25	124	124	204	203

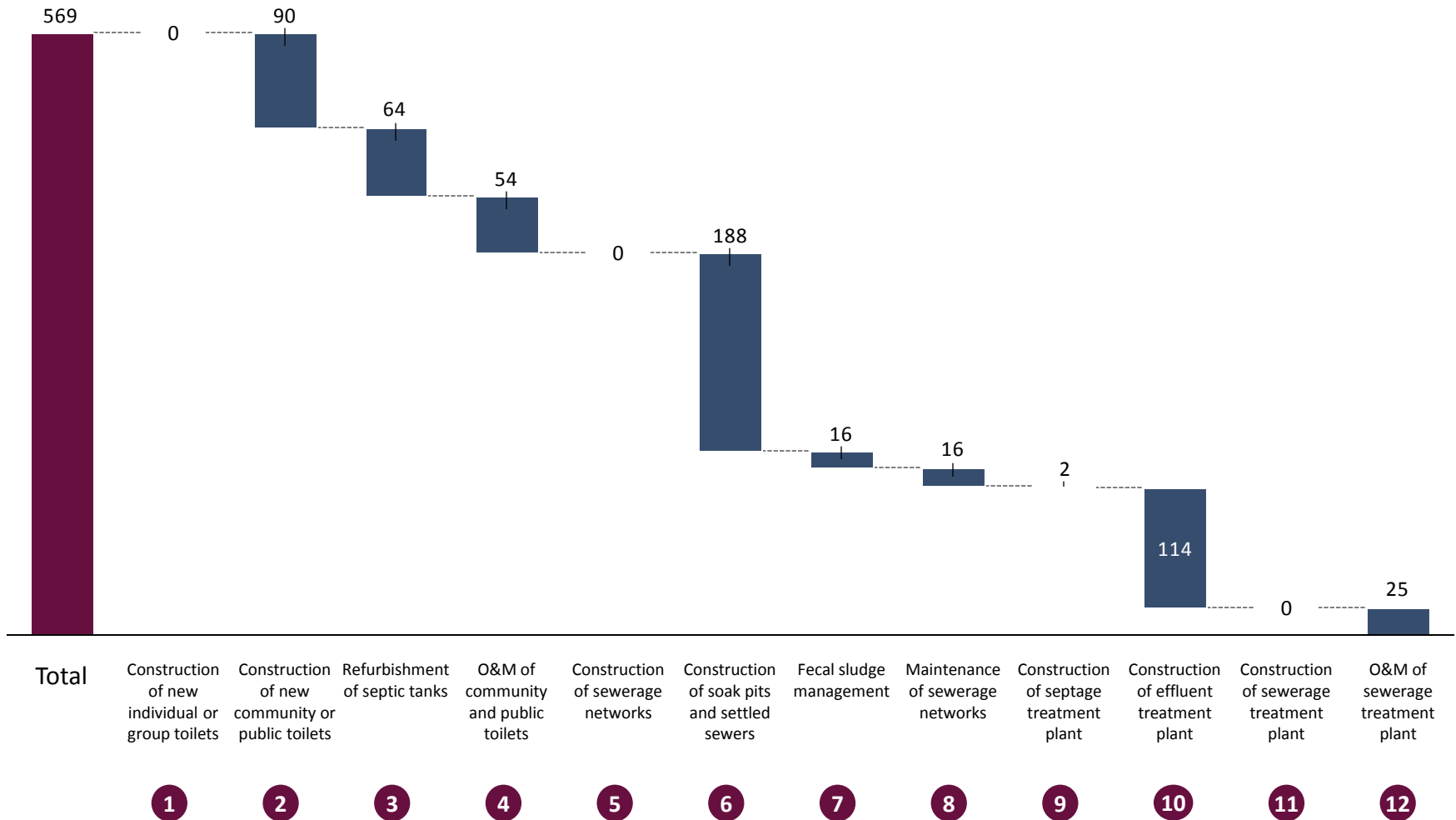
Note: (1): Refer to appendix for detailed model mechanics. (2) Cost of sewerage increases due to more towns being added to the list with full sewerage network. (3) O&M is on existing infrastructure only hence it remains constant (4) Effluent treatment refer to decentralized treatment

Source: Dalberg analysis

Total investment required for business opportunities under scenario 1 is USD ~550 million

Total investment potential in business opportunities across the sanitation value chain

In USD millions



Investment required in sanitation business opportunities given our example scenarios ranges from USD ~550 million to ~1.3 billion

Investment required in business opportunities in sanitation value chain under different scenarios (in Millions USD)

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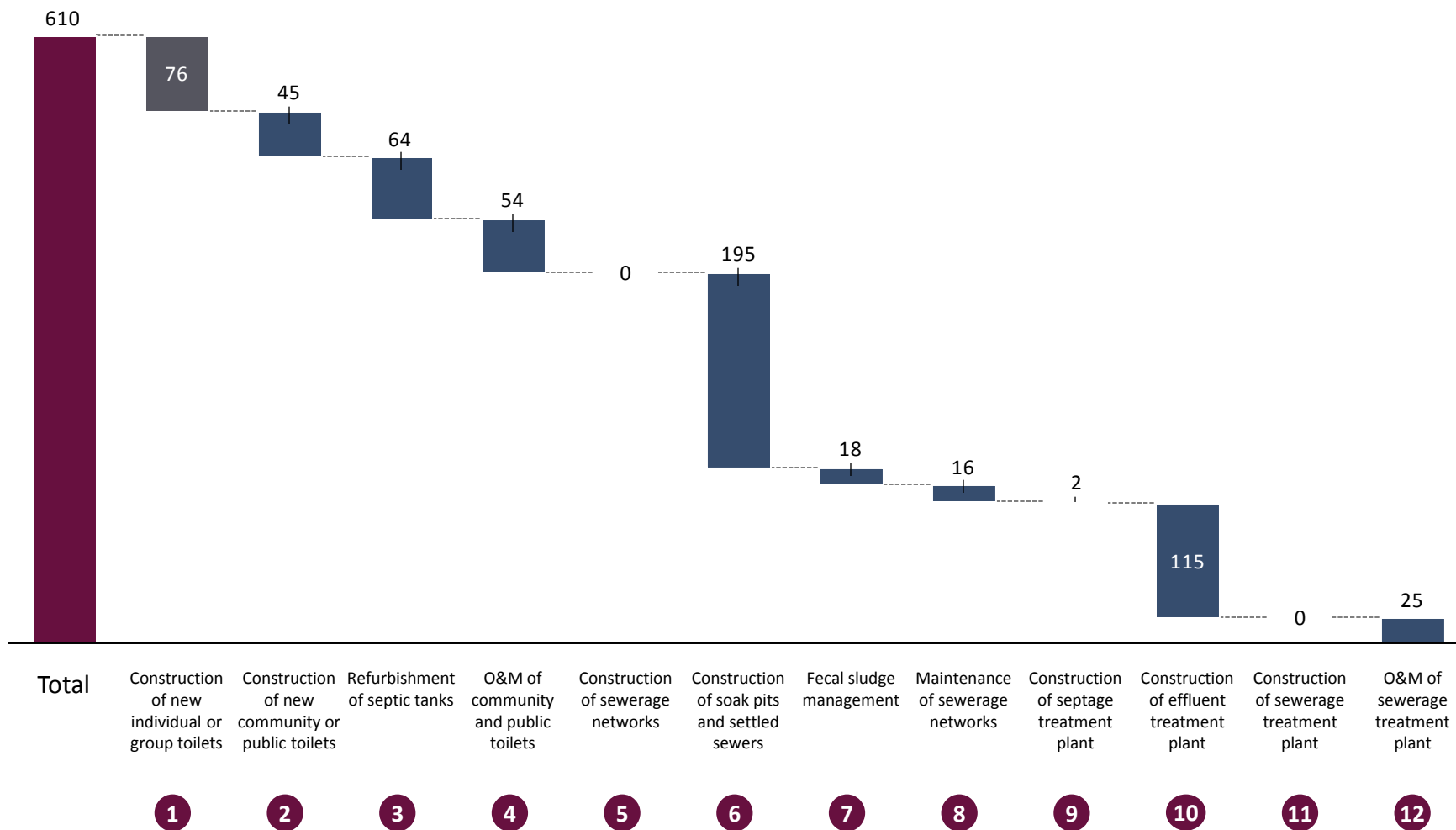
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Source: Dalberg analysis

Total investment required for business opportunities under scenario 2 is USD ~650 million

Total investment potential in business opportunities across the sanitation value chain

In USD millions



Investment required in sanitation business opportunities given our example scenarios ranges from USD ~550 million to ~1.3 billion

Investment required in business opportunities in sanitation value chain under different scenarios (in Millions USD)

Business opportunities		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
1	Construction of new individual or group toilets connected to septic tanks or sewerage	0	76	0	74	0	73
2	Construction of new CT and PT connected to septic tanks or sewerage	90	45	90	45	90	45
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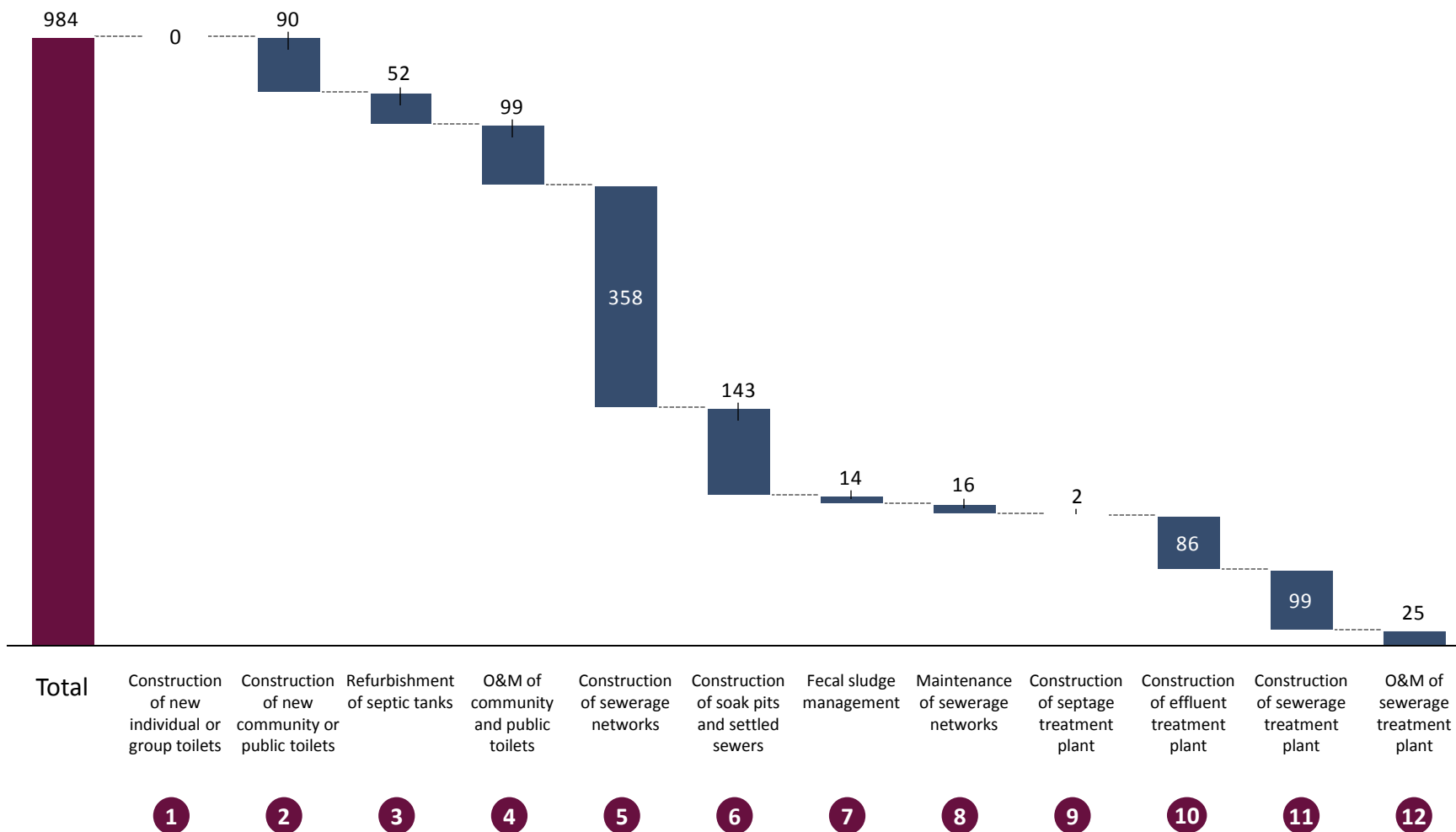
Note: (1): Refer to appendix for detailed model mechanics. (2) Cost of sewerage increases due to more towns being added to the list with full sewerage network. (3) O&M is on existing infrastructure only hence it remains constant (4) Effluent treatment refer to decentralized treatment

Source: Dalberg analysis

Total investment required for business opportunities under scenario 3 is USD ~980 million

Total investment potential in business opportunities across the sanitation value chain

In USD millions



Investment required in sanitation business opportunities given our example scenarios ranges from USD ~550 million to ~1.3 billion

Investment required in business opportunities in sanitation value chain under different scenarios (in Millions USD)

Business opportunities		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
1	Construction of new individual or group toilets connected to septic tanks or sewerage	0	76	0	74	0	73
2	Construction of new CT and PT connected to septic tanks or sewerage	90	45	90	45	90	45
3	Refurbishment of septic tanks	64	64	52	52	36	36
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8	Maintenance of sewerage networks	16	16	16	16	16	16
9	Construction of septage treatment plants	2	2	2	2	1	1
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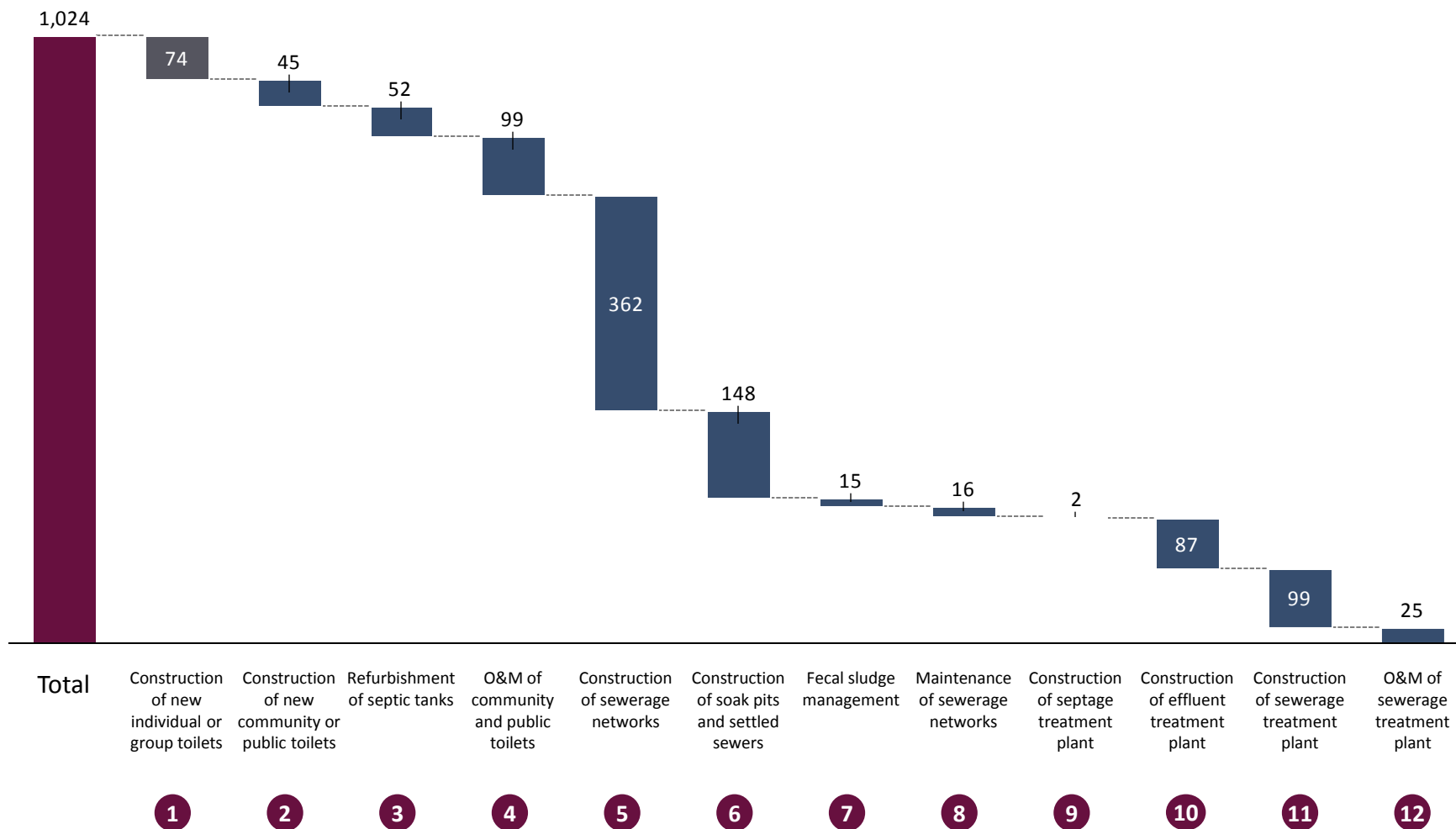
Note: (1): Refer to appendix for detailed model mechanics. (2) Cost of sewerage increases due to more towns being added to the list with full sewerage network. (3) O&M is on existing infrastructure only hence it remains constant (4) Effluent treatment refer to decentralized treatment

Source: Dalberg analysis

Total investment required for business opportunities under scenario 4 is USD ~1 billion

Total investment potential in business opportunities across the sanitation value chain

In USD millions



Investment required in sanitation business opportunities given our example scenarios ranges from USD ~550 million to ~1.3 billion

Investment required in business opportunities in sanitation value chain under different scenarios (in Millions USD)

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1	Construction of new individual or group toilets connected to septic tanks or sewerage	0	76	0	74	0	73
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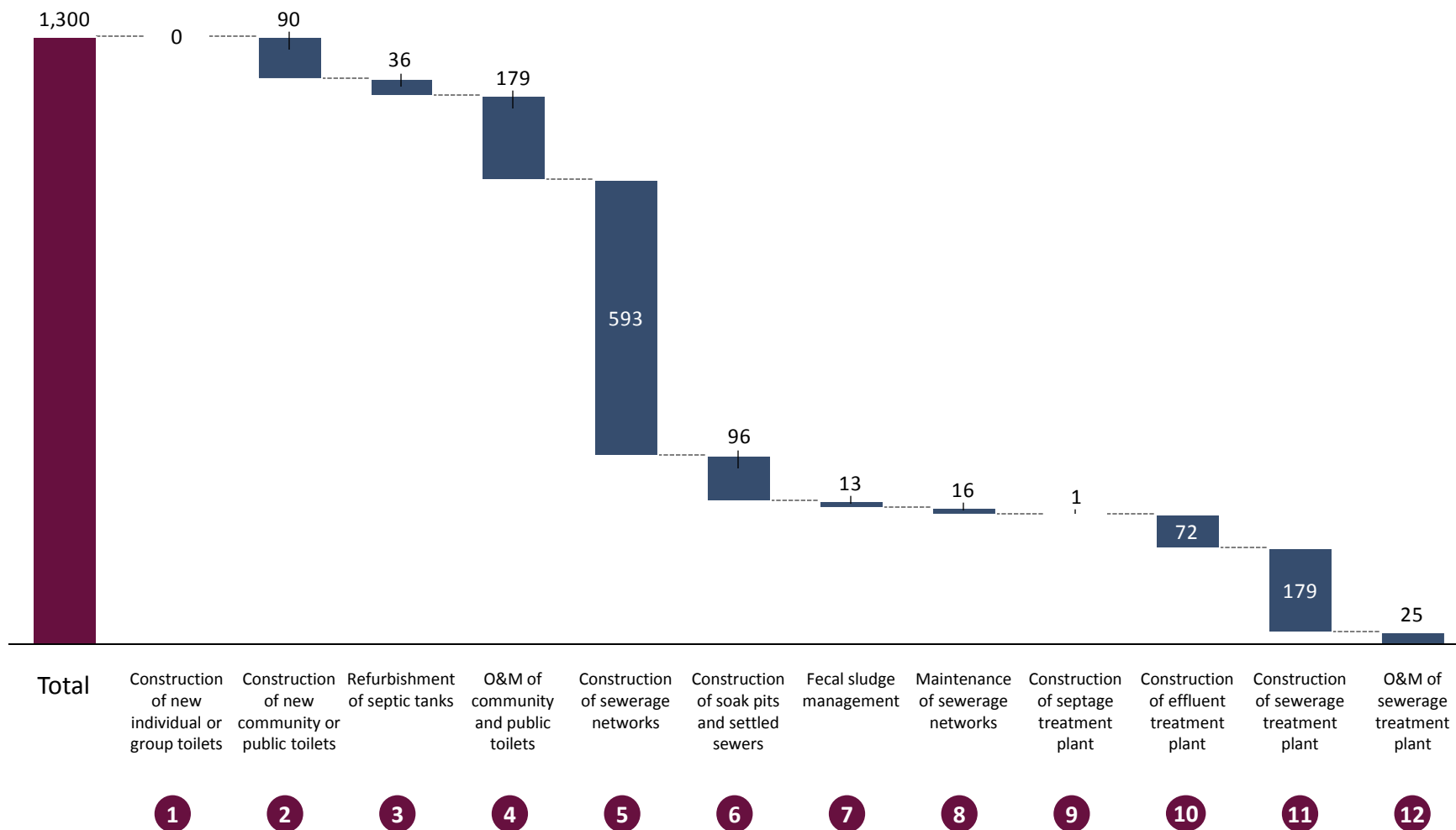
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Source: Dalberg analysis

Total investment required for business opportunities under scenario 5 is USD ~1.3 billion

Total investment potential in business opportunities across the sanitation value chain

In USD millions



Investment required in sanitation business opportunities given our example scenarios ranges from USD ~550 million to ~1.3 billion

Investment required in business opportunities in sanitation value chain under different scenarios (in Millions USD)

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5	Construction of sewerage networks	0	0	358	362	593	603
6	Construction of soak pits and settled sewers	188	195	143	148	96	100
7	Fecal sludge management	16	18	14	15	13	14
8	Maintenance of sewerage networks	16	16	16	16	16	16
9	Construction of septage treatment plants	2	2	2	2	1	1
10	Construction of effluent treatment plants	114	115	86	87	72	72
11	Construction of sewerage treatment plants	0	0	99	99	179	179
12	O&M of sewerage treatment plants	25	25	25	25	25	25
Total investment requirement (USD Millions)		569	610	984	1024	1299	1342
13	Construction and O&M of community toilets	144	99	189	144	268	223
14	Integrated fecal sludge management	82	84	68	69	50	51
15	Integrated septage and effluent management	384	388	154	156	218	223
16	Construction and O&M of sewerage treatment plant	25	25	124	124	204	203

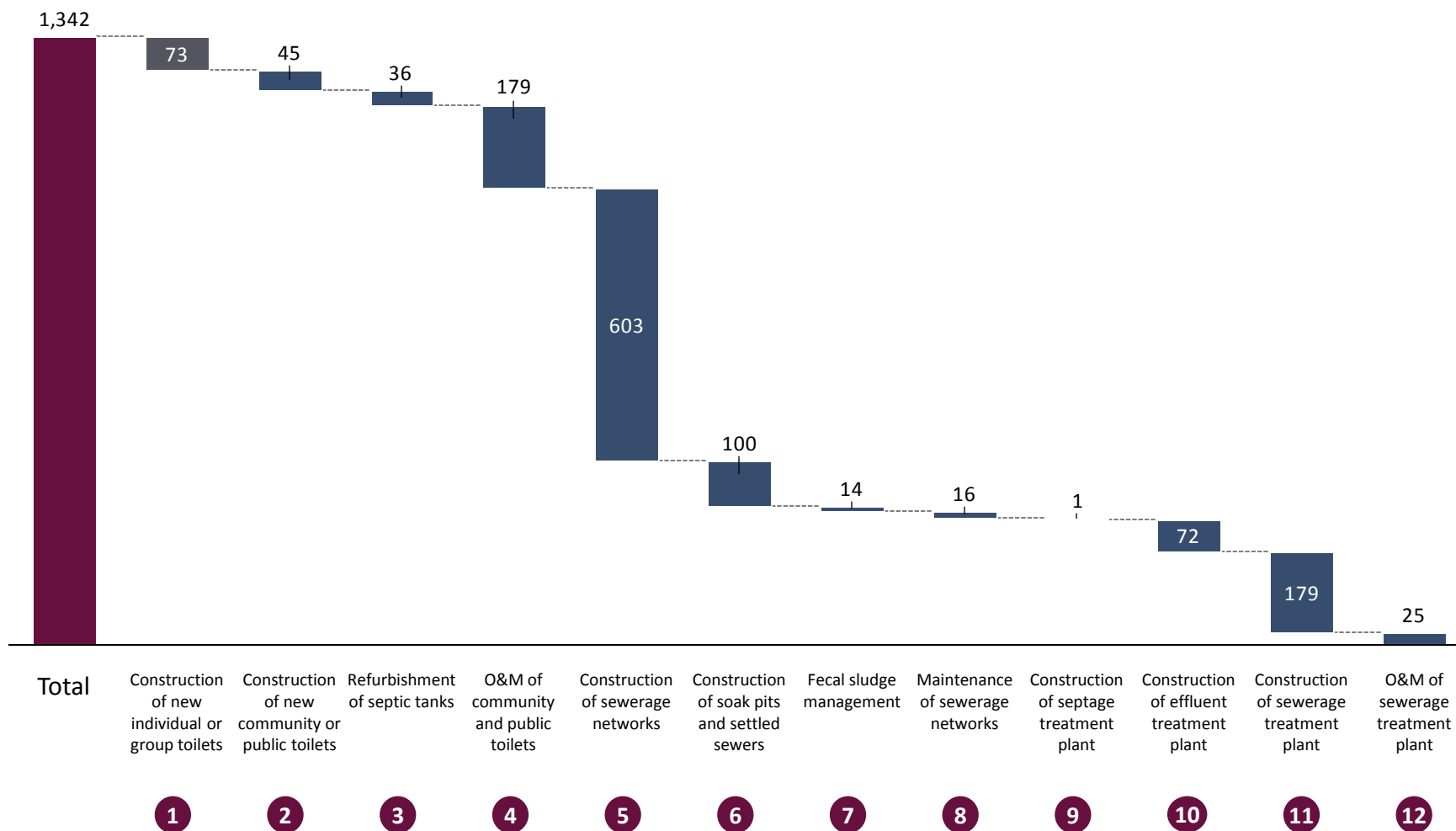
Note: (1): Refer to appendix for detailed model mechanics. (2) Cost of sewerage increases due to more towns being added to the list with full sewerage network. (3) O&M is on existing infrastructure only hence it remains constant (4) Effluent treatment refer to decentralized treatment

Source: Dalberg analysis

Total investment required for business opportunities under scenario 6 is USD ~1.3 billion

Total investment potential in business opportunities across the sanitation value chain

In USD millions

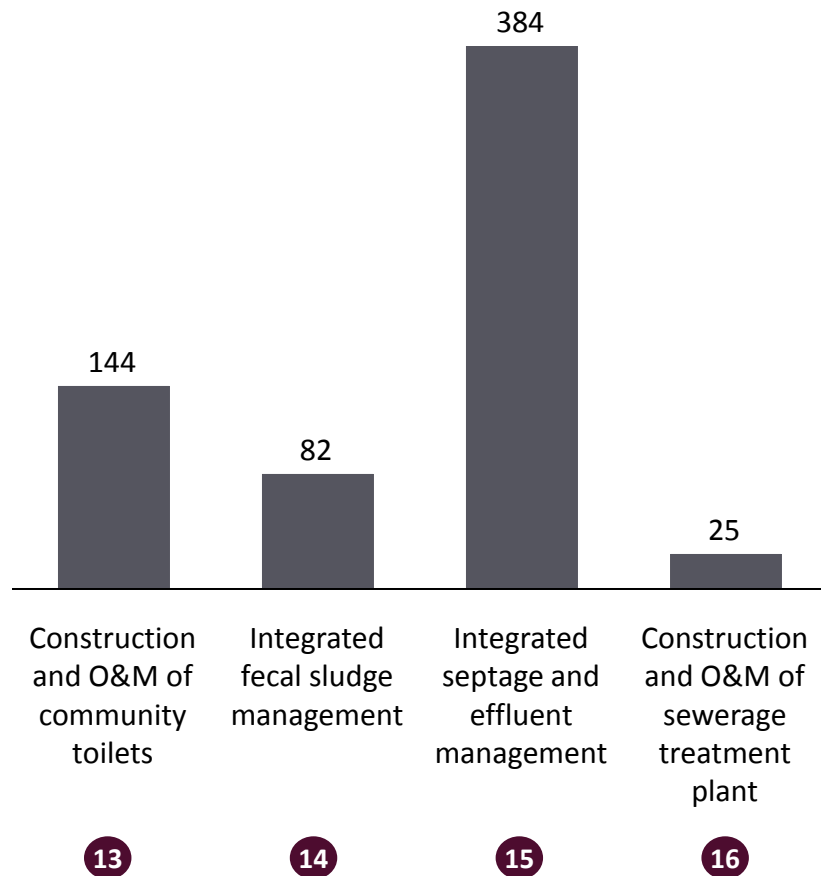


Investment requirement for integrated business opportunities under scenario 1 and 2 range from USD ~25 million to USD ~380 million

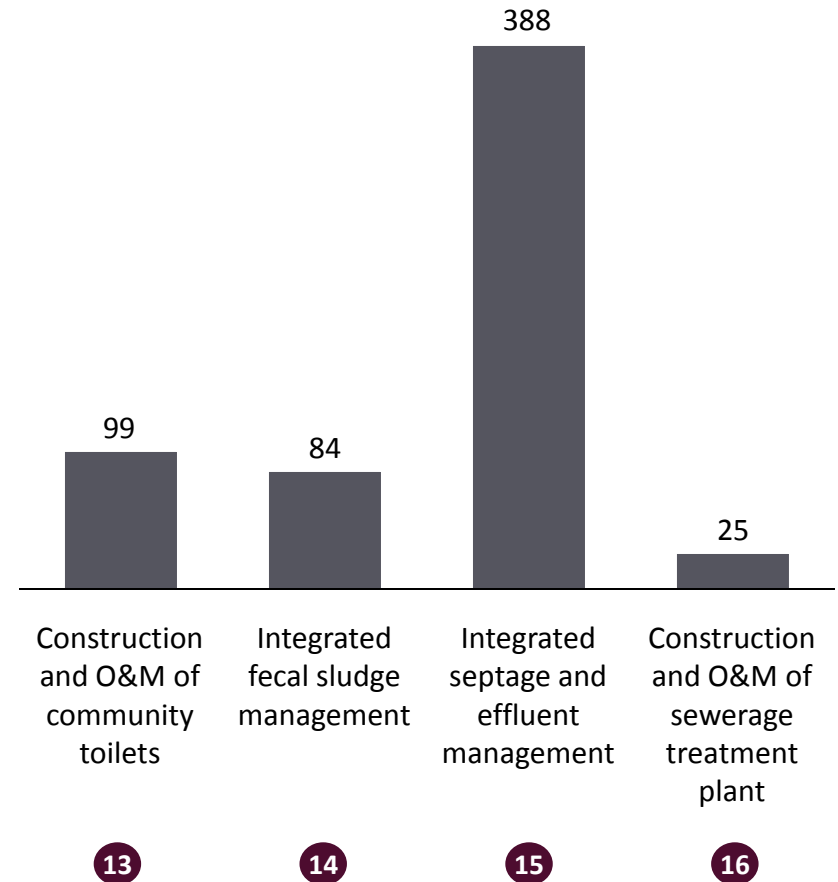
Total investment potential in Integrated business opportunities across the sanitation value chain

In USD millions. Not mutually exclusive

Scenario 1



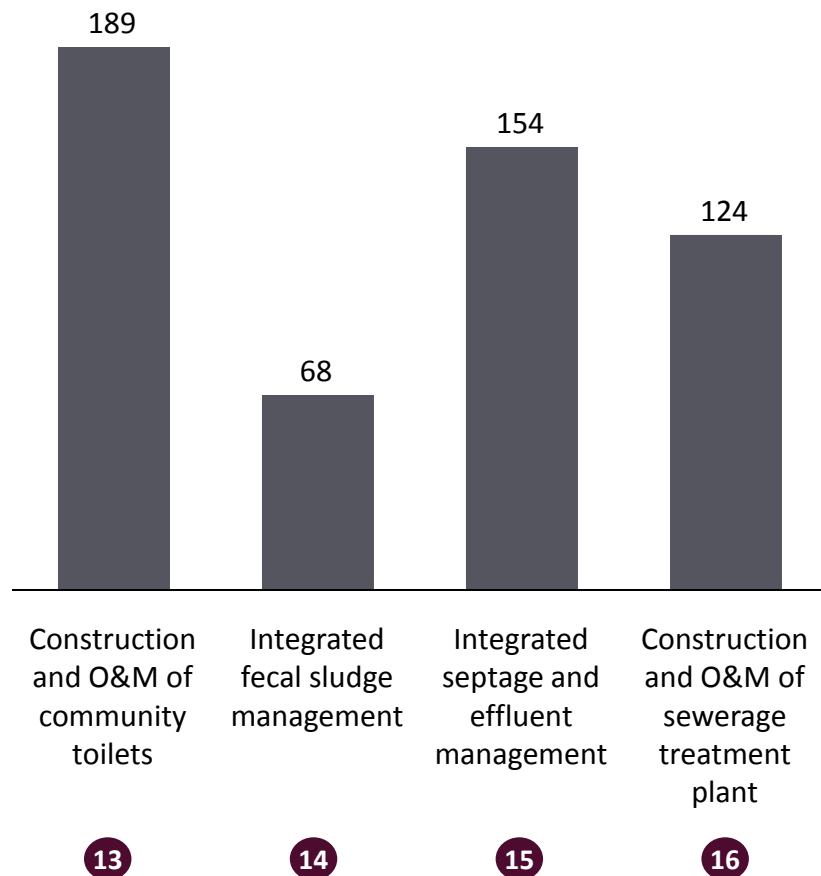
Scenario 2



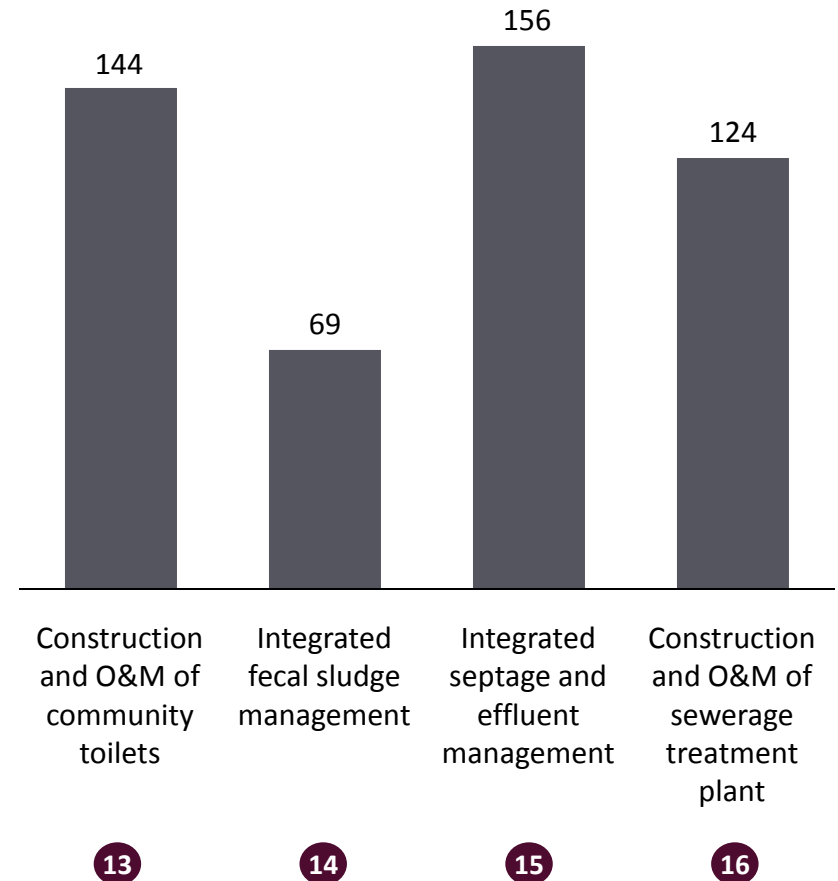
Investment requirement for integrated business opportunities under scenario 3 and 4 range from USD ~25 million to USD ~190 million

Total investment potential in Integrated business opportunities across the sanitation value chain
In USD millions. Not mutually exclusive

Scenario 3



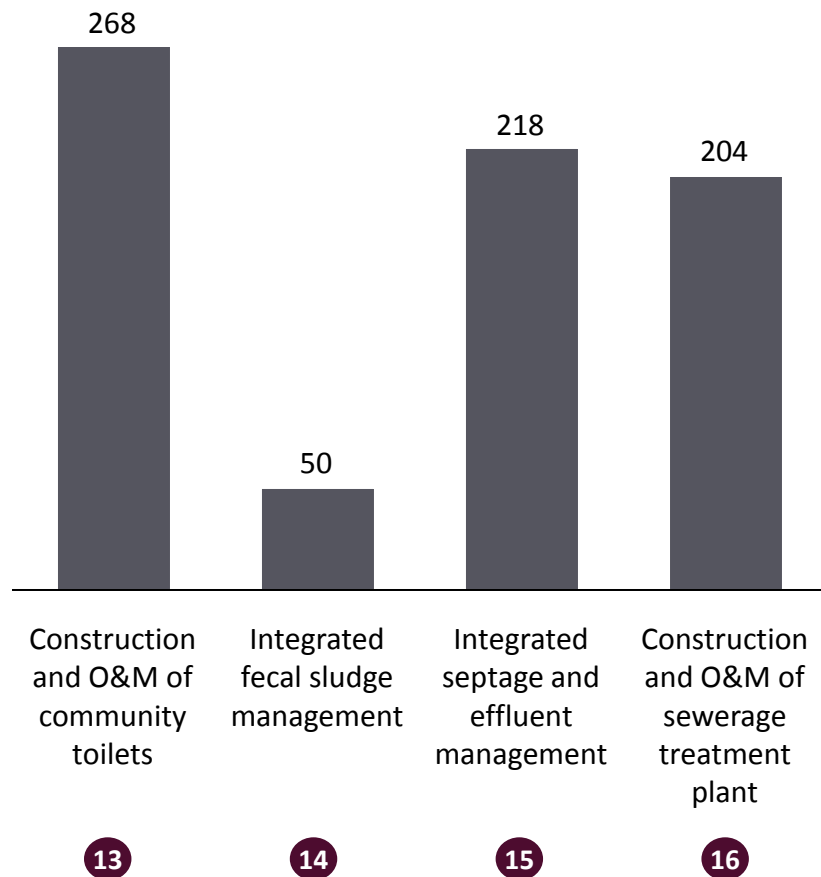
Scenario 4



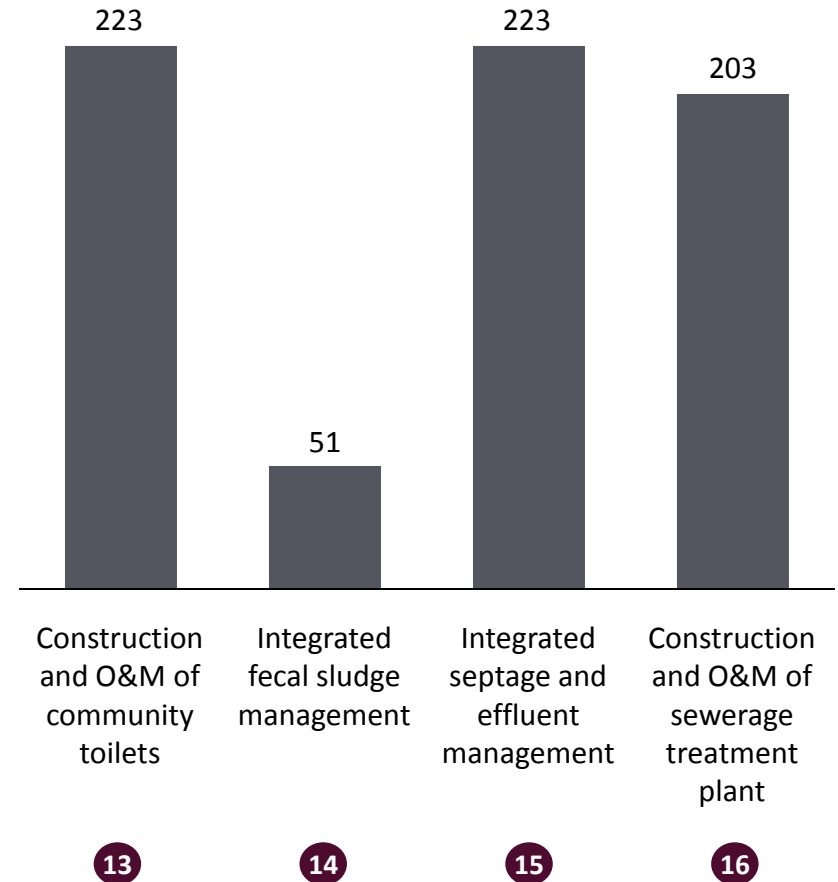
Investment requirement for integrated business opportunities under scenario 5 and 6 range from USD ~25 million to USD ~260 million

Total investment potential in Integrated business opportunities across the sanitation value chain
In USD millions. Not mutually exclusive

Scenario 5



Scenario 6



Summary of investment requirements for various scenarios

Communal facilities with Onsite Sanitation

1

- Eradication of open defecation by construction of **only community toilets** with **decentralized** mode of collection & conveyance

Investment – USD 550 Million

Communal facilities with Onsite / Sewer sanitation based on proposed projects

3

- Eradication of open defecation by construction of **only community toilets** with **centralized and decentralized** mode of collection & conveyance

Investment – USD 980 Million

Communal facilities with Onsite / Sewer sanitation based on proposed projects and availability of water supply

5

- Eradication of open defecation by construction of **only community toilets** with **centralized and decentralized** mode of collection & conveyance

Investment – USD 1.3 Billion

Private / Communal facilities with Onsite Sanitation

2

- Eradication of open defecation by construction of **a mix of personal/shared and community toilets** with **decentralized** mode of collection & conveyance

Investment – USD 610 Million

Private / Communal facilities with Onsite / Sewer sanitation based on proposed projects

4

- Eradication of open defecation by construction of **a mix of personal/shared and community toilets** with **centralized and decentralized** mode of collection & conveyance

Investment – USD 1 Billion

Private / Communal facilities with Onsite / Sewer sanitation based on proposed projects and availability of water supply

6

- Eradication of open defecation by construction of **a mix of personal/shared and community toilets** with **centralized and decentralized** mode of collection & conveyance

Investment – USD 1.35 Billion

To summarize there is potential for funders to invest across a wide range of business opportunities ...(1/2)

Business Opportunities	Source of funding							
	Government schemes	Bi/Multilateral donors	International Foundations	CSR activities	Commercial banks	Infrastructure companies	MFI	Social impact investors
1 Construction of new group/ individual toilets connected to septic tanks or sewerage	●	●	●	●			●	●
2 Construction of new CT and PT connected to septic tanks or sewerage	●	●	●	●	●		●	●
3 Refurbishment of septic tanks							●	
4 O&M of community and public toilets							●	
5 Construction of sewerage network	●	●		●		●		●
6 Construction of soak pits and settled sewer	●			●		●		
7 Fecal sludge management					●			●
8 Maintenance of sewerage networks						●		

● Current investment ● Prospective investment

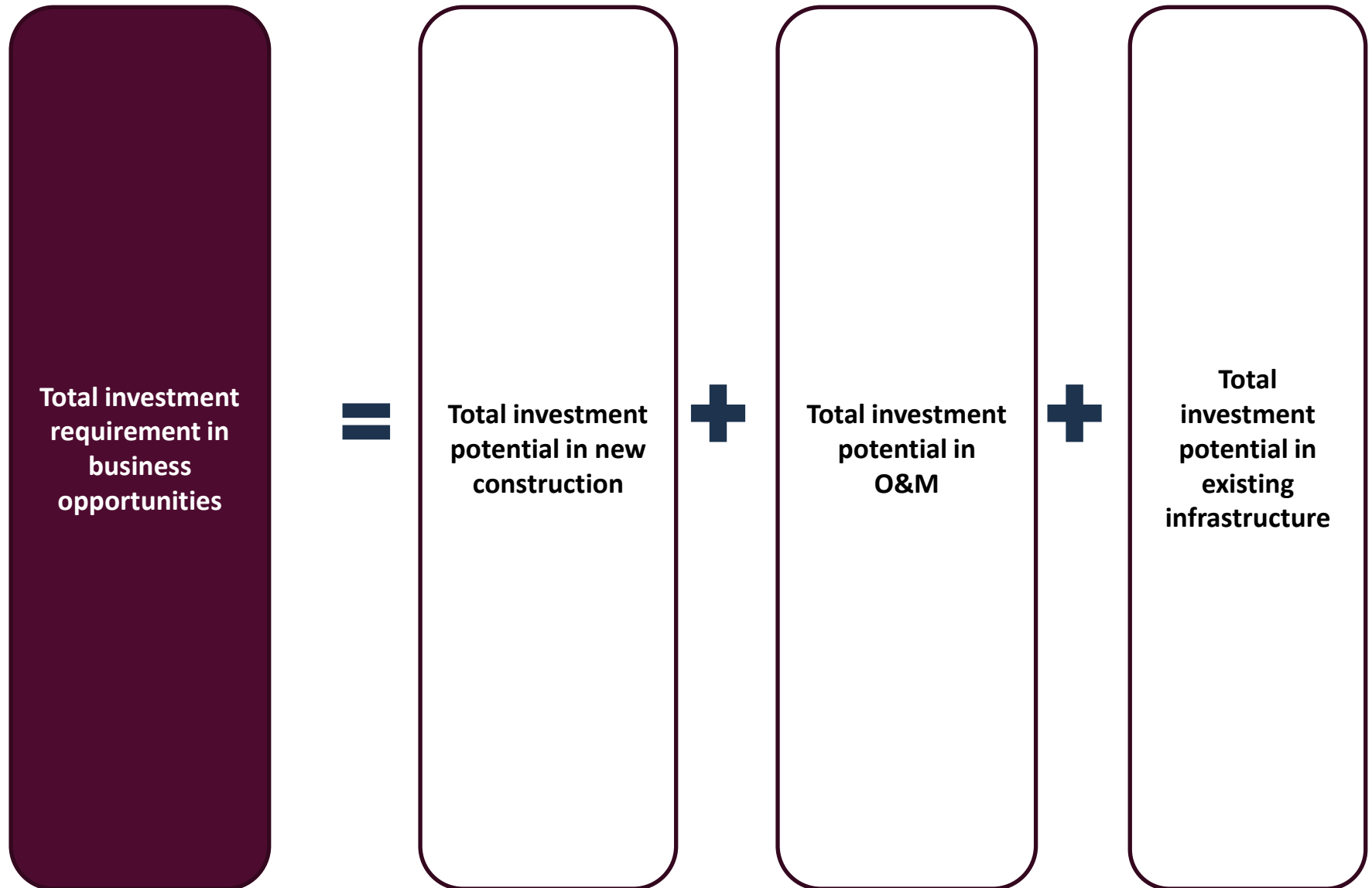
To summarize there is potential for funders to invest across a wide range of business opportunities ...(2/2)

Business Opportunities	Source of funding							
	Government schemes	Bi/Multilateral donors	International Foundations	CSR activities	Commercial banks	Infrastructure companies	MFI	Social impact investors
9 Construction of septage treatment plants				●		●		
10 Construction of effluent treatment plants				●	●	●		
11 Construction of sewerage treatment plants	●	●				●		
12 O&M of sewerage treatment plants						●		
13 Construction and O&M of community toilets			●	●	●		●	●
14 Integrated fecal sludge management plan (IFSM)		●	●		●	●		●
15 IFSM and construction of settled sewers connected to effluent treatment plant		●						●
16 Construction and operation of sewerage treatment plants			●		●			●

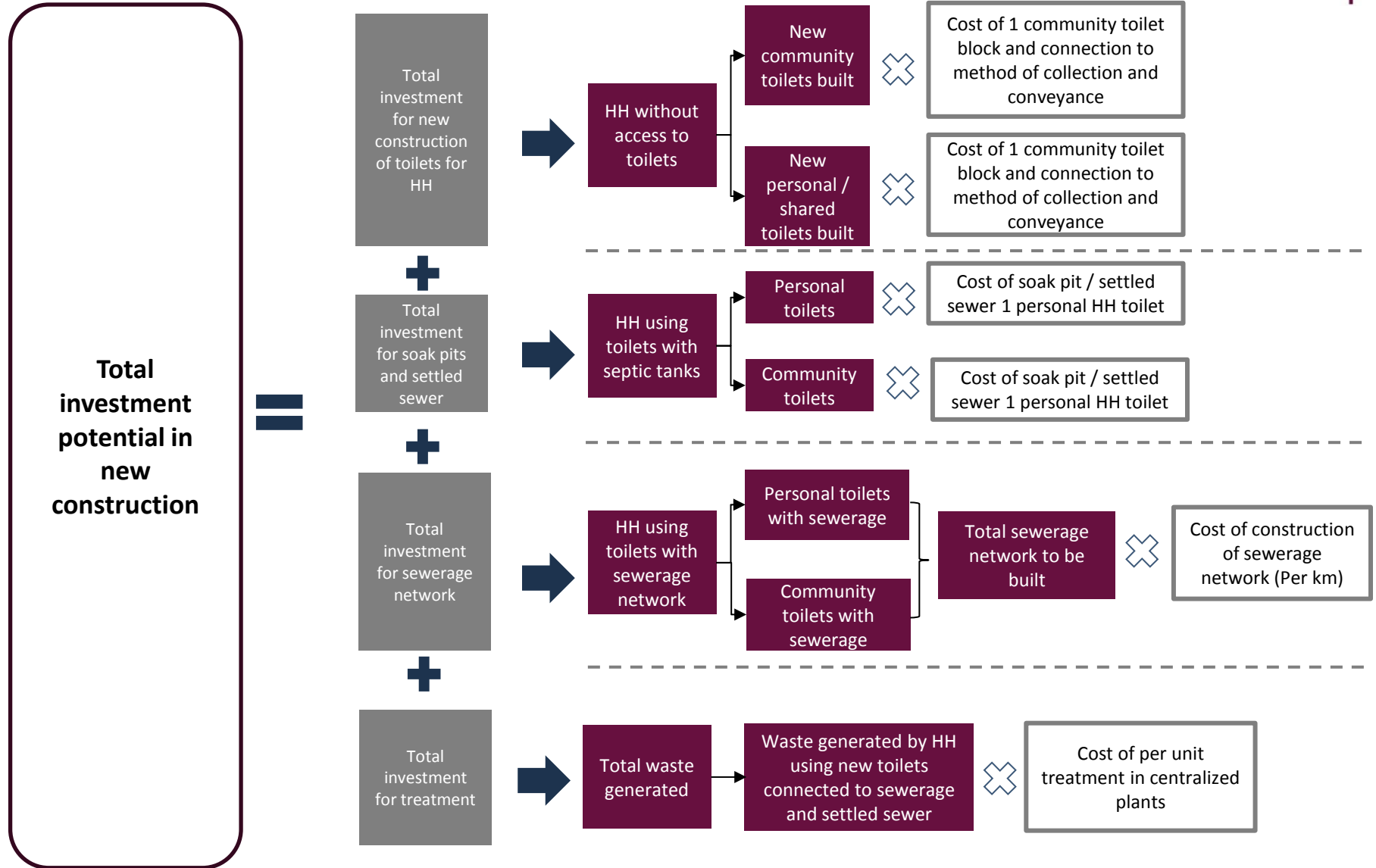
Outline

- Current state of sanitation in urban Maharashtra
- Business opportunities
- Investment requirements
- **Annexures**
 - **Model aspects**
 - Background data

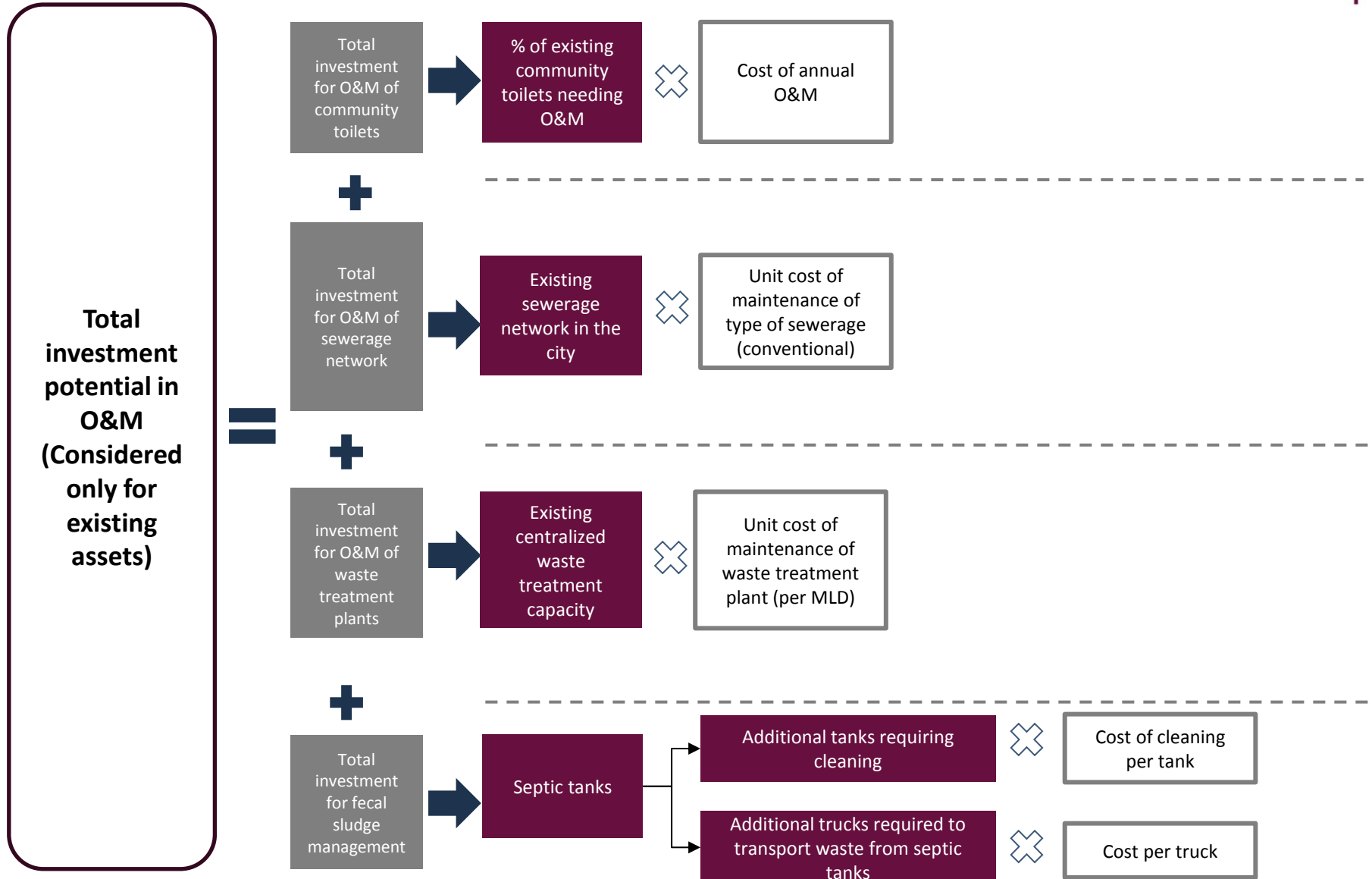
Potential investment requirement across the business opportunities was sized by breaking out the sanitation value chain



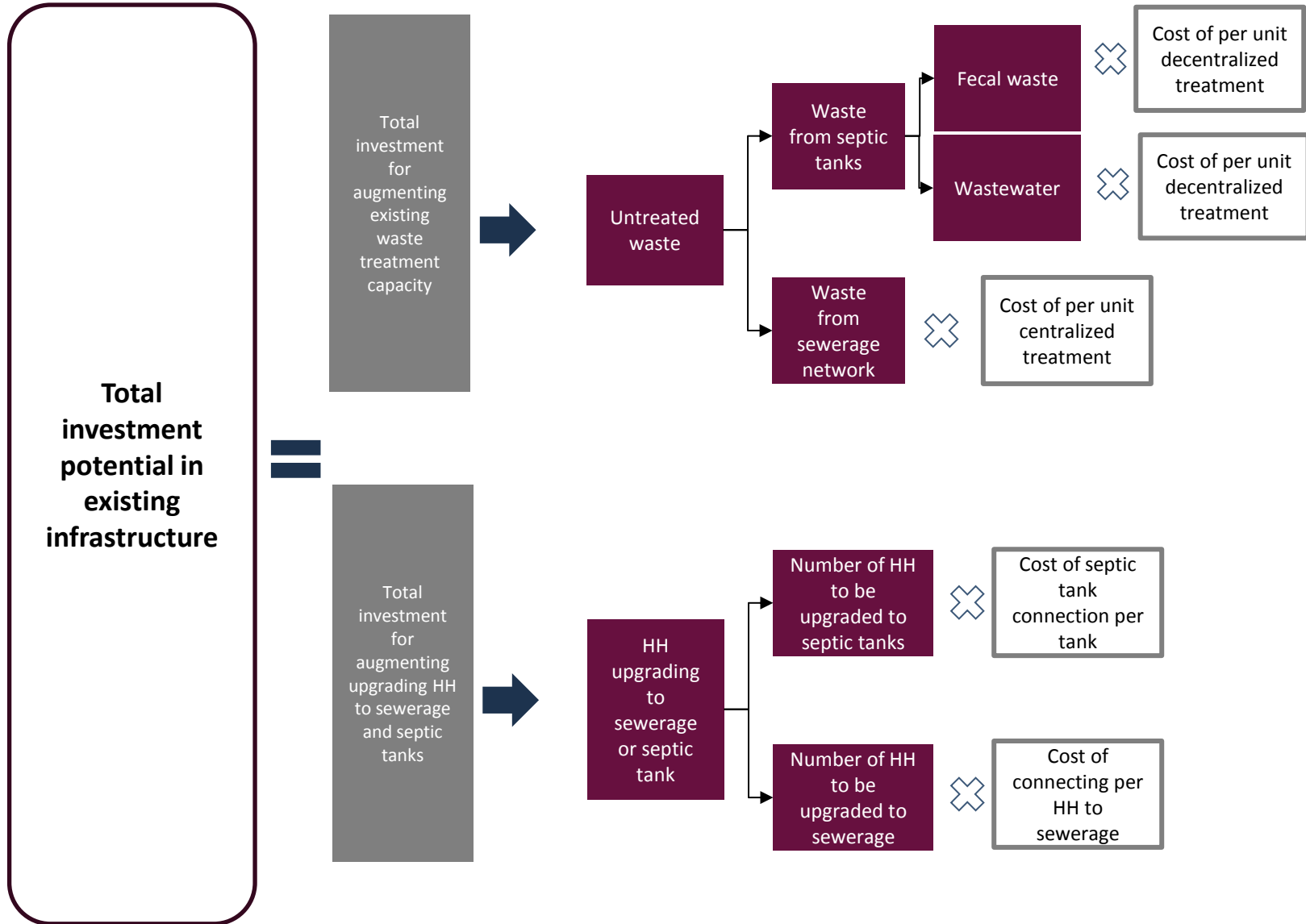
Potential investment requirement across the business opportunities was sized by breaking out the sanitation value chain...(1/3)



Potential investment requirement across the business opportunities was sized by breaking out the sanitation value chain...(2/3)



Potential investment requirement across the business opportunities was sized by breaking out the sanitation value chain...(3/3)



Outline

- Current state of sanitation in urban Maharashtra
- Business opportunities
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- **Annexures**
 - Model aspects
 - **Background data**

List of JNNURM and UIDSSMT cities in Maharashtra

Class of city	Name of city	Scheme
Municipal Corporation	Akola	UIDSMMT
Municipal Corporation	Amravati	UIDSMMT
Municipal Corporation	Greater Mumbai	JNNURM
Municipal Corporation	KalyanDombivli	JNNURM
Municipal Corporation	Kolhapur	UIDSMMT
Municipal Corporation	Nanded	JNNURM
Municipal Corporation	Nashik	JNNURM
Municipal Corporation	Navi Mumbai	JNNURM
Municipal Corporation	Pimpri Chinchwad	JNNURM
Municipal Corporation	Pune	JNNURM
Municipal Corporation	Thane	JNNURM
Class A	Ambarnath	JNNURM
Class A	Chandrapur	UIDSMMT
Class A	Panvel	UIDSMMT
Class B	Daund	UIDSMMT
Class B	Kamtee	UIDSMMT
Class B	Kulgaon	JNNURM
Class C	Alibagh	UIDSMMT
Class C	Ambad	UIDSMMT
Class C	Malwan	UIDSMMT
Class C	Pachgani	UIDSMMT
Class C	Sawner	UIDSMMT
Class C	Shirur	UIDSMMT
Class C	Vengurle	UIDSMMT
NP	Shirdi	UIDSMMT

List of cities in Maharashtra with availability of water greater than 100 LPCD

Class	City	LPCD
Municipal Corporation	Ahmednagar	127.9
Municipal Corporation	Bhiwandi	109.56
Municipal Corporation	Jalgaon	106.26
Municipal Corporation	KalyanDombivli	164.58
Municipal Corporation	Kolhapur	128.99
Municipal Corporation	Nagpur	102.87
Municipal Corporation	Navi Mumbai	247.98
Municipal Corporation	Pimpri Chinchwad	146.63
Municipal Corporation	Pune	229.91
Municipal Corporation	Sangli	134.51
Municipal Corporation	Thane	187.18
Class A	Achalpur	92.17
Class A	Ambarnath	135.88
Class A	Barshi	92.98
Class A	Bhusawal	97.76
Class A	Chandrapur	125.7
Class A	Ichalkaranji	132.38
Class A	Panvel	173
Class A	Satara	126.85
Class A	Wardha	146.92
Class A	Yavatmal	168.5
Class B	Baramati	149.32
Class B	Chiplun	112.84
Class B	Hinganghat	102.5
Class B	Islampur	137.98
Class B	Jaisingpur	109.62
Class B	Kamtee	107.73
Class B	Karad	172.03
Class B	Kopergaon	117.28
Class B	Kulgaon	134.27

Class	City	LPCD
Class B	Lonavala	333.21
Class B	Majalgaon	144.1
Class B	Pandharpur	187.92
Class B	Ratnagiri	122.91
Class B	Sangamner	97.36
Class B	Shirpur	147.25
Class B	Talegaon	116.35
Class B	Vita	97.27
Class C	Alandi	95.67
Class C	Alibagh	164.46
Class C	Biloli	100.69
Class C	Brahmapuri	96.93
Class C	Daryapur	102.01
Class C	DevlaliPravara	100
Class C	Gevrai	100.83
Class C	Indapur	90.4
Class C	Jawhar	100.49
Class C	Jejuri	148.06
Class C	Kagal	117.32
Class C	Kalmeshwar	96.32
Class C	Kannad	179.18
Class C	Karjat	129.83
Class C	Karmala	95.9
Class C	Katol	141.57
Class C	Khed	100.7
Class C	Khuldabad	132.25
Class C	Kurduwadi	126.46
Class C	Mahabaleshwar	170.72
Class C	Mahad	121.98
Class C	Malkapur	109.01

Class	City	LPCD
Class C	Mangalwedhe	118.45
Class C	MatheranGiristhan	111.97
Class C	Mhaswad	91.15
Class C	Morshi	120.19
Class C	MurudJanjira	101.72
Class C	Paithan	110.67
Class C	Parola	90.3
Class C	Pathardi	102.66
Class C	Pen	117.82
Class C	Rajapur	136.51
Class C	Roha	121.06
Class C	ShendurjanaGhat	95.28
Class C	Shirur	120.51
Class C	Shrivardhan	100.6
Class C	Sonpeth	110.26
Class C	Tuljapur	95.94
Class C	Uran	94.12
Class C	Vajapur	102.19
Class C	Wai	140.14
NP	Kankavali	99.8
NP	Malakapur	123.05