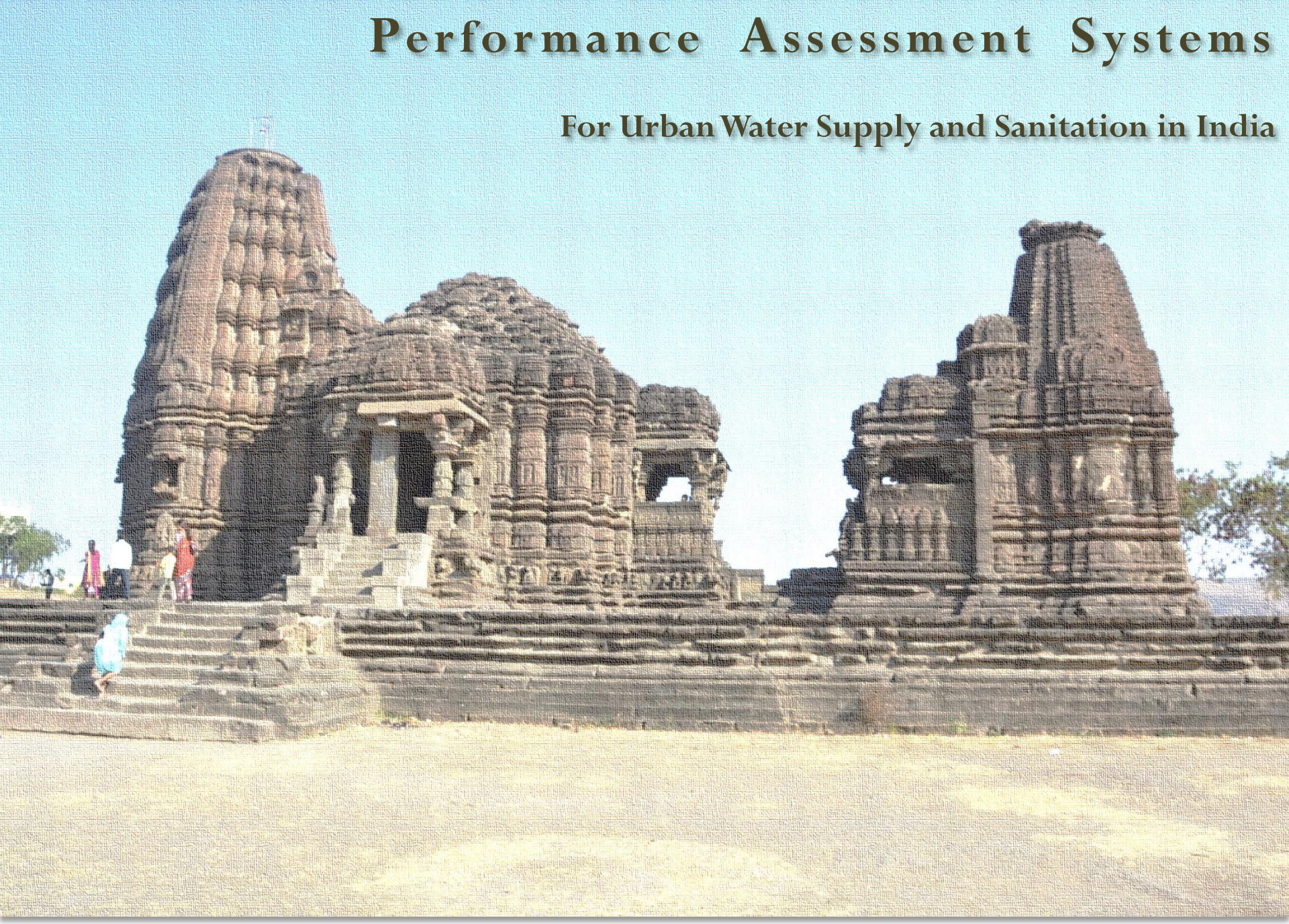
Performance Assessment Systems

For Urban Water Supply and Sanitation in India



Sanitation Assessment in ***Sinnar***, Maharashtra

CONTENTS

METHODOLOGY

General Observations

- Entire city
- Development pattern of the town
- Prevalent housing typologies

Sample Survey

- Sample Selection criteria
- Inspection of HH level sanitation facilities
- Documentation of ground conditions

Analysis

- Laboratory testing of collected samples
- Review of relevant norms and standards
- Comparisons with standards

Conclusion

- Way forward

SAMPLE SELECTION

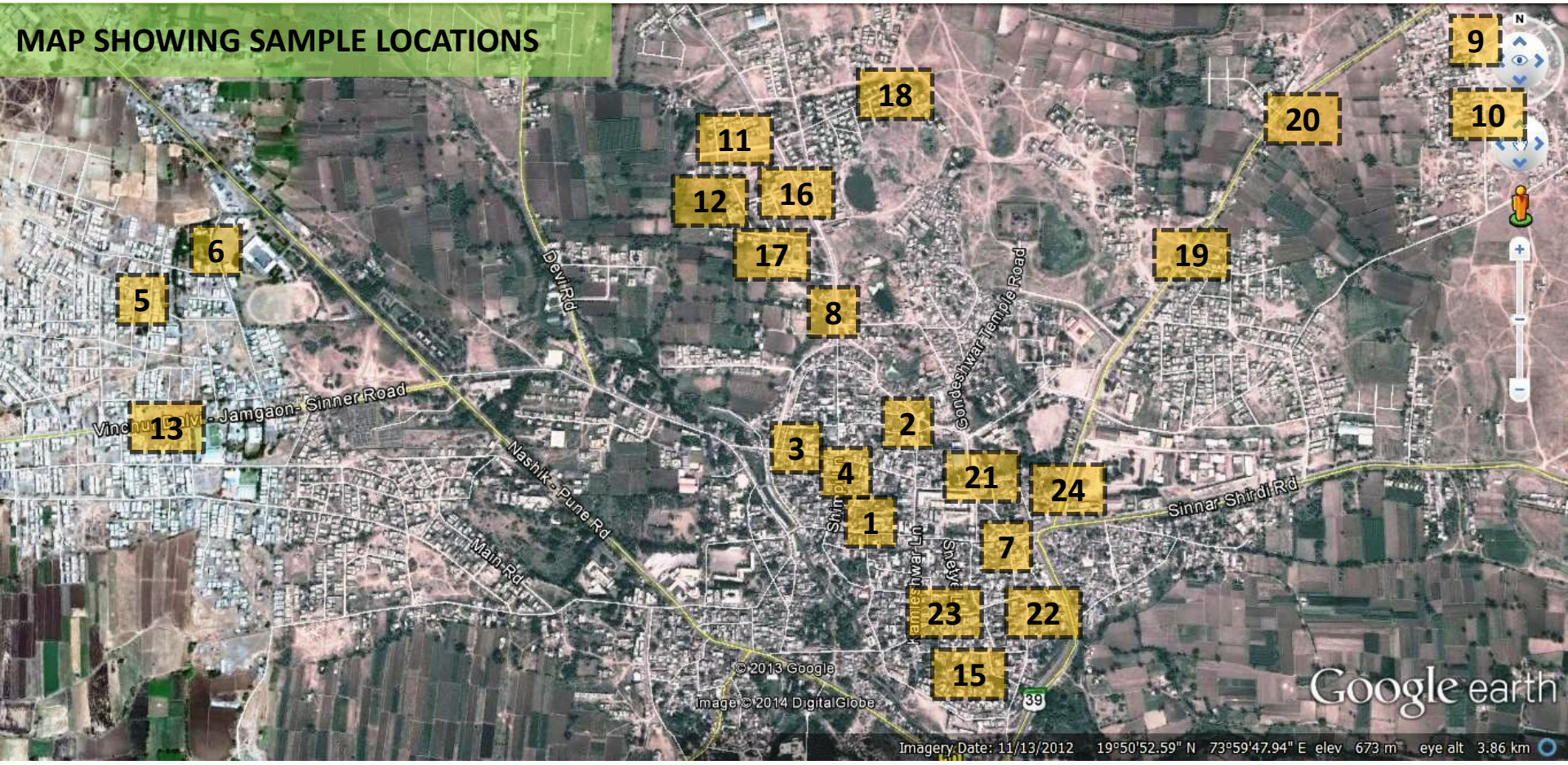
In this project for carrying out the above assessment, a total of 25 household surveys are to be carried out. For the initial stage only 10 households have been studied.

Process of Selecting samples:

Based on observations carried out during the CSP exercise, tentative clustering of various building typologies has been done. The prevalent housing typologies in Wai can be broadly classified into two types:

SR NO	BUILDING TYPOLOGY	DESCRIPTION	OBSERVATION
1	**Old Town (Samples from this typology: 14 Numbers)**	**Old Houses:** • Predominant in Old *Sinnar* town. • Character: Narrow plots with toilets inside residence. Septic tanks are located outside.	• The core of the city is densified due to which there is an issue of land avaibility for sanitation services.
2	**New town (Samples from this typology: 10 Numbers)**	**Individual Plotted Development:** • Such development in the newly developed areas • Well planned typology with proper road hierarchy and sufficient open spaces • Character: Plotted layouts with uniform plot size.	• The newly developed areas are located at the periphery of the old city. Proper guidance for implementation of sewage treatment facilities is necessary and awareness generation related to the same is important.
3	**Institutions (Samples from this typology: 5 Numbers)**	• They are predominantly present along the Mumbai – Nashik highway • Toilets are constructed within the premises and are maintained properly. But no maintenance of septic tanks was observed. • It consist of schools, administrative, colleges, Public buildings (post office, BSNL office)	---

MAP SHOWING SAMPLE LOCATIONS

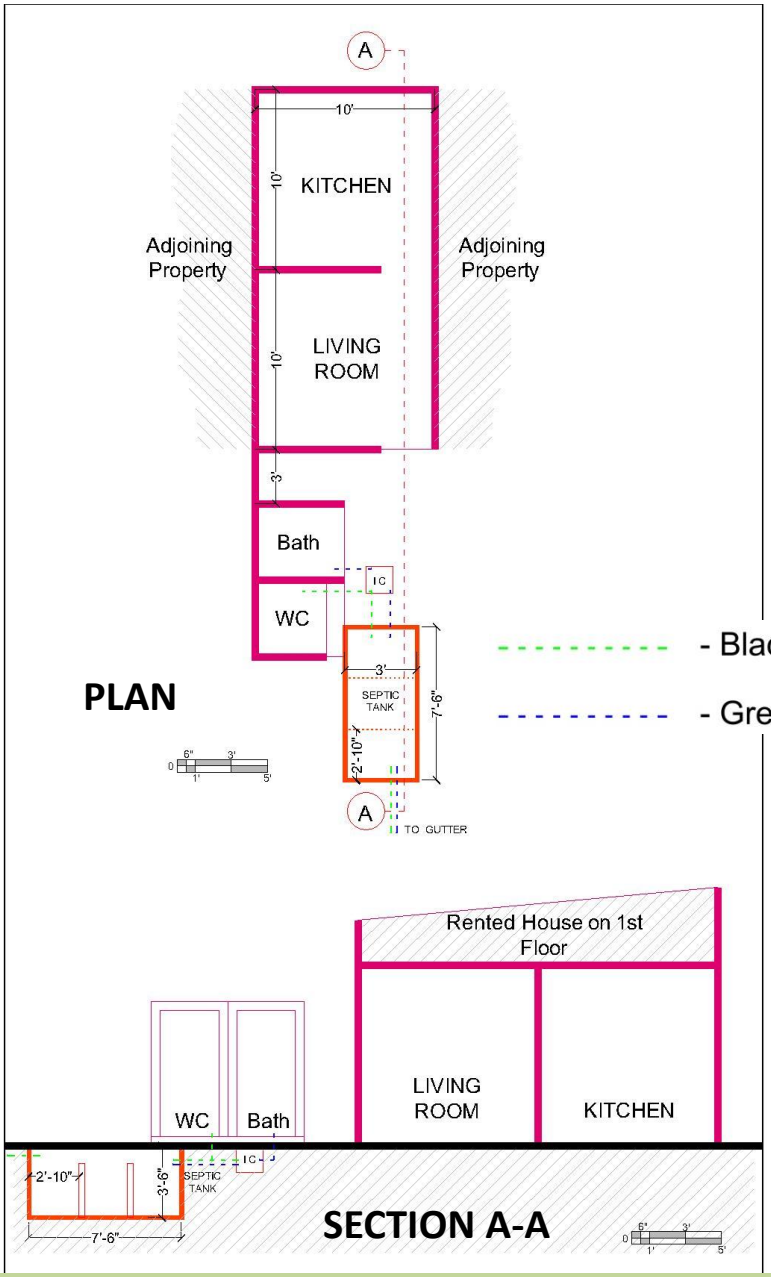


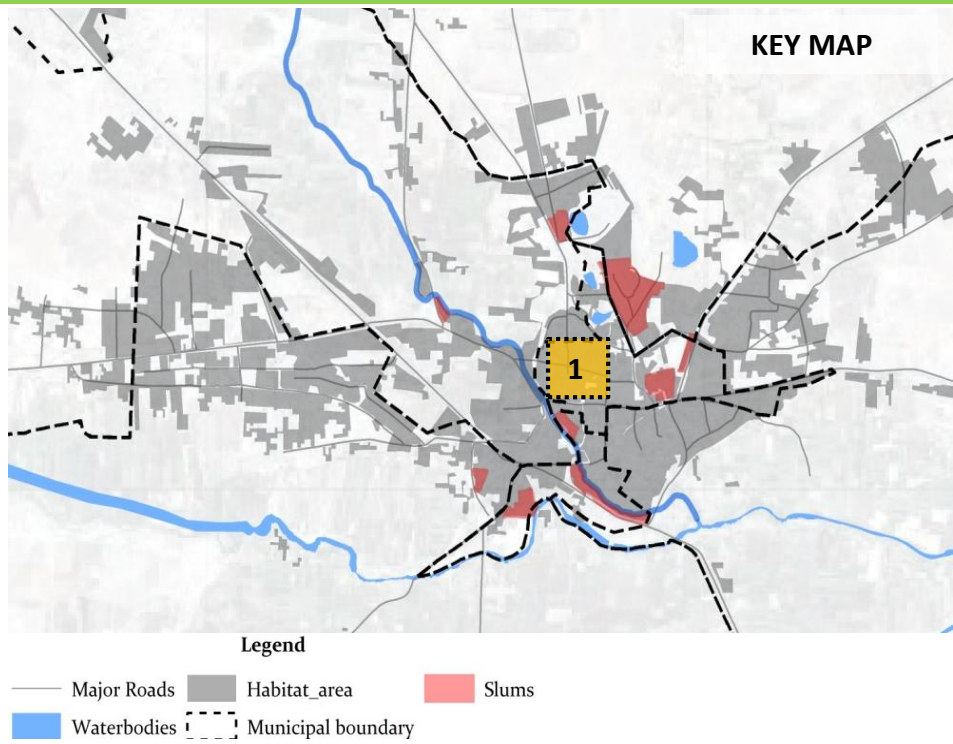
CASE NO	NAME	TYPOLOGY
1	Sampatrao Deshmukh	G
2	Pawandas Pardeshi	G
3	Gajewar Laxman	G+1
4	Krishna Pawar	G+2
5	Anant Unde	G+1
6	Ramkisan Gade	G
7	Nasir Maniyar	G
8	Rajendra Jadhav	G

CASE NO	NAME	TYPOLOGY
9	Jayram Raghu Rote	G
10	Shankuntla Satpute	G
11	Yashwant Deshmukh	G+4
12	Sanjay Badoba Avhad	G+1
13	Ishwar Zalte	G+1
14	Santosh Tambe	G
15	Pramod Lachke	G
16	Rajendra Bhadange	G

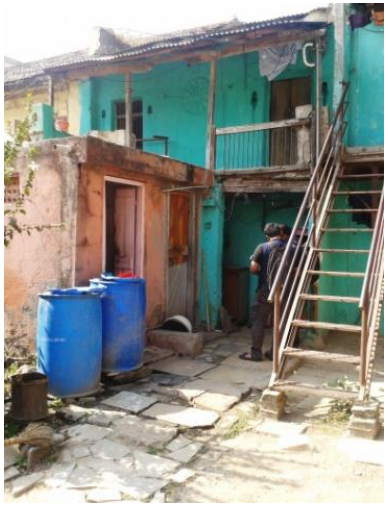
CASE NO	NAME	TYPOLOGY
17	Raghunath Aware	G
18	Kanta Deshmukh	G+1
19	Sachin Mule	G
20	Ram das Ukade	G
21	Leelawati Paredeshi	G
22	Ajay Pawar	G+1
23	Manoj Khaeldkar	G+1
24	Chandadev Ingle	G+1

CASE 1: *CHOUDA CHOWK*





CASE 1: *CHOUDA CHOWK*



CASE 1: *CHOUDA CHOWK*

Sampatrao Deshmukh

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
5	**Ground floor**	**Black water**	**Nil**	**Not Yet Cleaned (Since construction year 1998)**	**Daily**(Water) & **Weekly** (*Harpic/ detergent*)

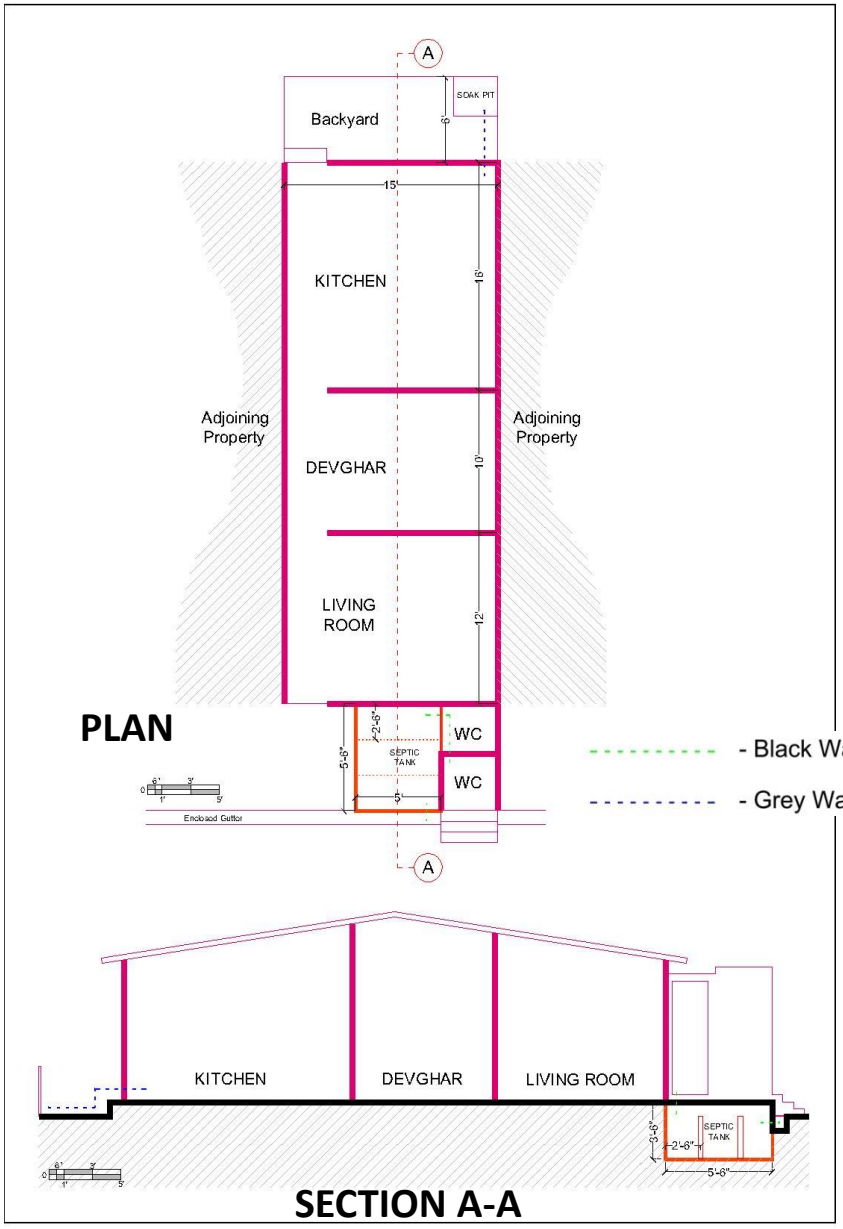
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (5 Users)	2.25	0.9	1.05	**2.13**
			Observations	**Oversized (40% Extra)**

WATER QUALITY

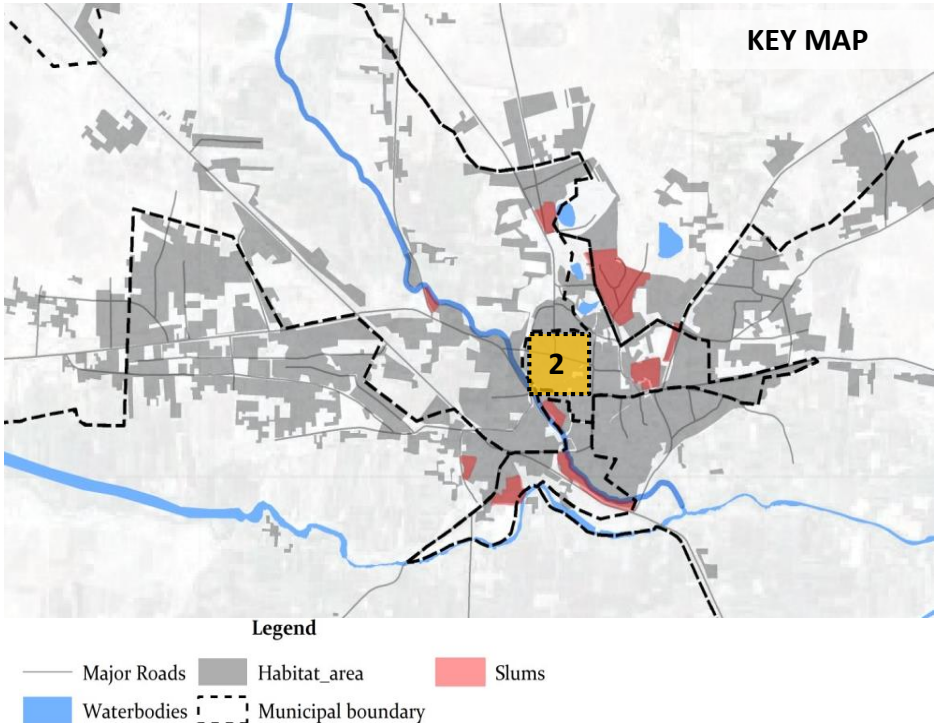
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Chouda Chowk	Black Water	--	189	--	--	507	--	--	6.23	--	392	--	

CASE 2: *KALPATARU HOSPITAL*



PLAN

SECTION A-A



CASE 2: *KALPATARU HOSPITAL*

CASE 2: *KALPATARU HOSPITAL*

Pawandas Laxman Pardeshi

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
9	**Ground floor**	**Black water**	**Nil**	**Not Yet Cleaned (Since construction year 2003)**	**Daily**(Water) & **Weekly** (*Harpic/ detergent*)

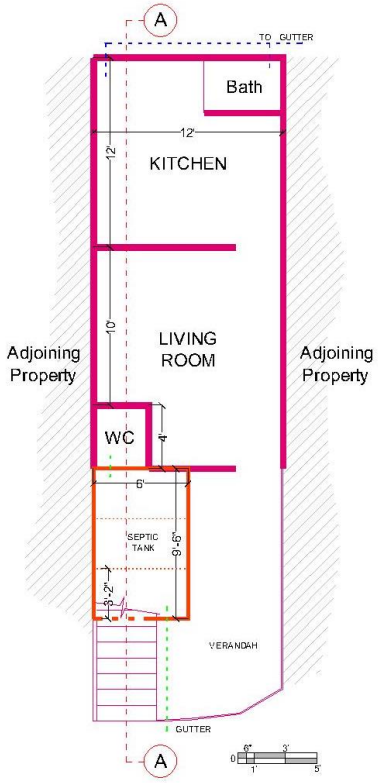
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) ***(CPHEEO)***	2	0.9	1.3	1.70	**2.34** (Two year Cleaning Interval) **3.06** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (9 Users)	1.65	1.5	1.05	**2.60**
			Observations	**Undersized (15% Smaller)**

WATER QUALITY

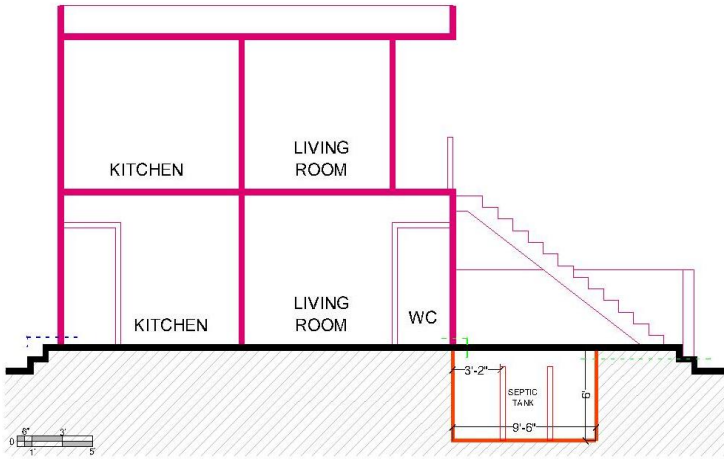
Sr No	Location, Area	Waste water	**Parameters**											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Kalptaru Hospital	Black Water	--	241	--	--	646	--	--	6.54	--	500	--	

CASE 3: *NASHIK VES*

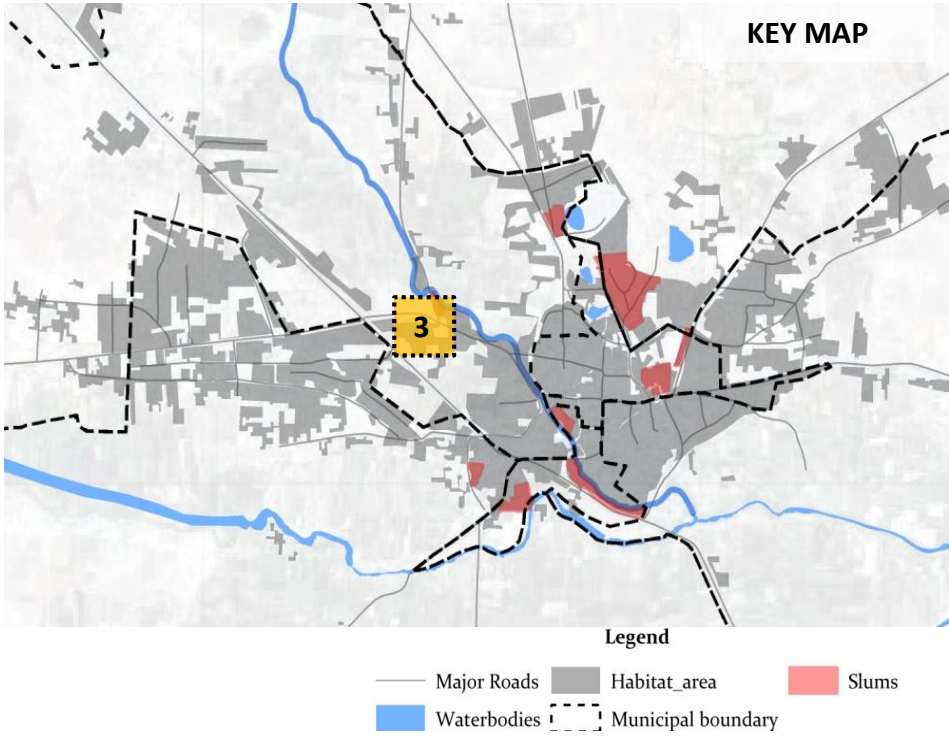


PLAN

- Black Water
- Grey Water



SECTION A-A



CASE 3: *NASHIK VES*

CASE 3: *NASHIK VES*

Gajewar Suresh Laxman

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
8	**G+1**	**Black water**	**Nil**	**Not Yet Cleaned (Since construction year 1998)**	**Daily**(Water) & **Weekly** (*Harpic/ detergent*)

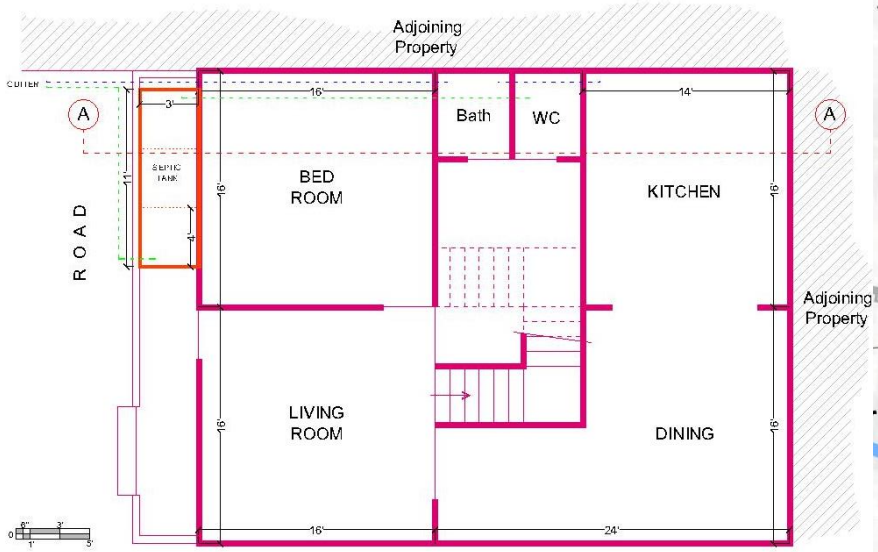
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) ***(CPHEEO)***	2	0.9	1.3	1.7	**2.34** (Two year Cleaning Interval) **3.06** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (8 Users)	2.85	1.8	1.8	**9.23**
			Observations	**Oversized (202% Extra)**

WATER QUALITY

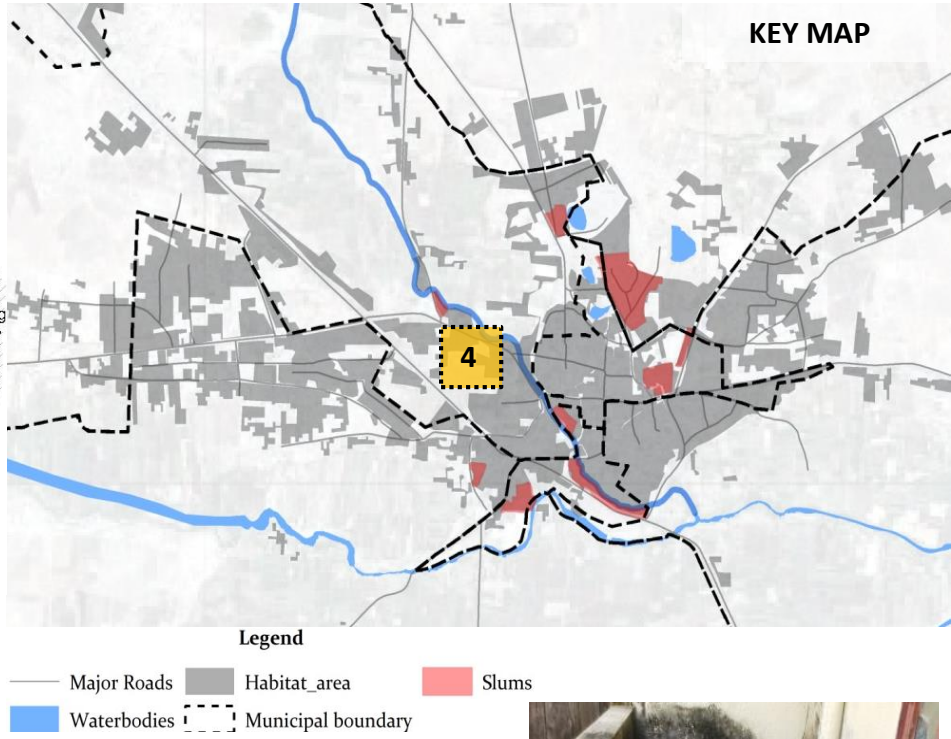
Sr No	Location, Area	Waste water	**Parameters**											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Nashik Ves	Black Water	--	195	--	--	524	--	--	6.86	--	6.86	--	

CASE 4: *SHIMPI AALI NEAR VITTHAL TEMPLE*



PLAN

SECTION A-A



- Black Water

- Grey Water

CASE 4: *SHIMPI AALI NEAR VITTHAL TEMPLE*

CASE 4: *SHIMPI AALI, NEAR VITTHAL TEMPLE*

Krishna Pawar

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
9	**G+2**	**Black water**	**Nil**	**Not yet cleaned (Since construction year 1997)**	**Daily**(Water) & **Weekly** (*Harpic/ detergent*)

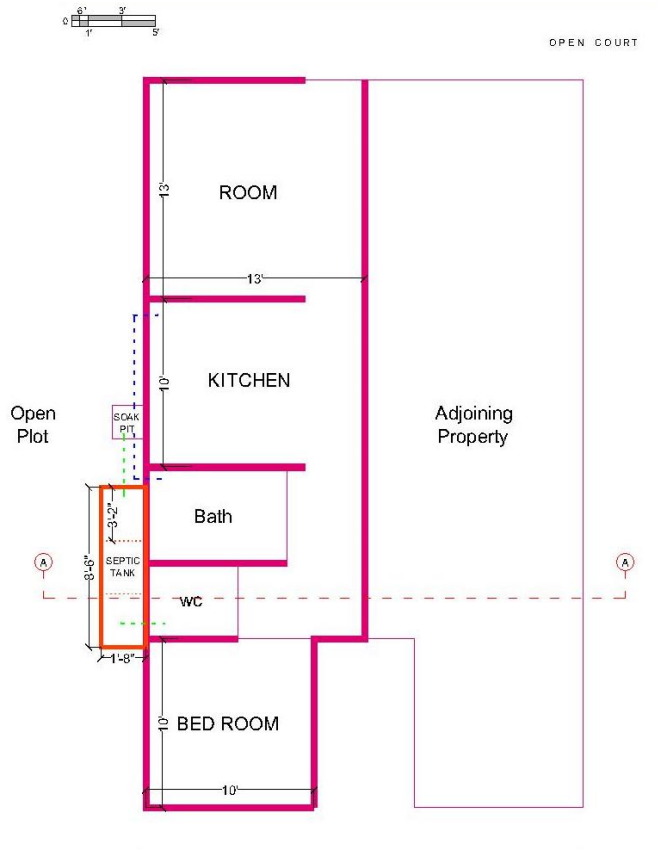
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) (*CPHEEO*)	2	0.9	1.3	1.7	**2.34** (Two year Cleaning Interval) **3.06** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (9 Users)	3.3	0.9	1.5	**4.46**
			Observations	**Oversized (46% Extra)**

WATER QUALITY

Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	Shimpi ALi	Black Water	--	--	--	--	--	--	--	--	--	--	--
2	Shimpi Ali	Grey Water	--	--	--	--	--	--	--	--	--	--	--

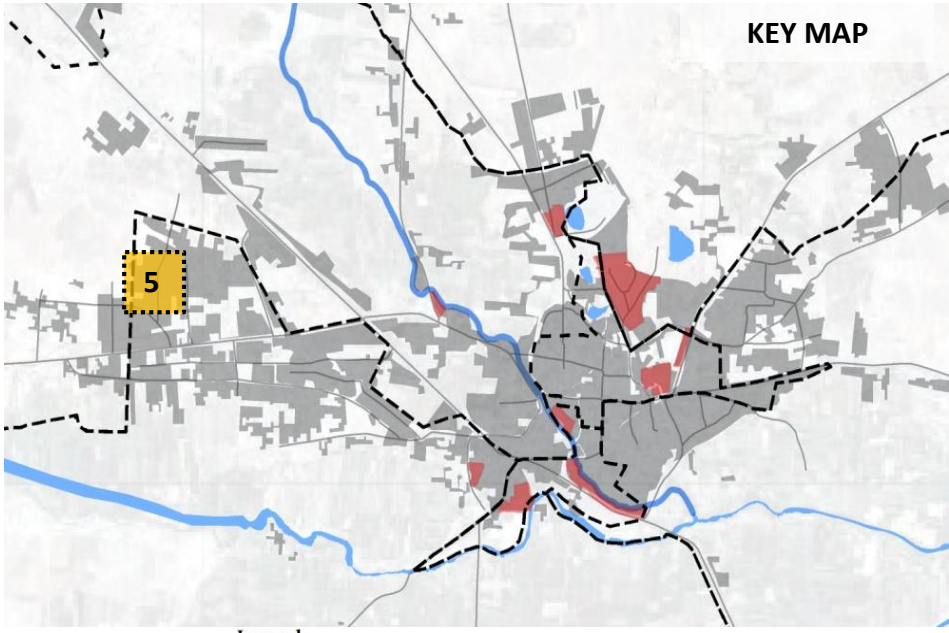
CASE 5: *DHOKE NAGAR*

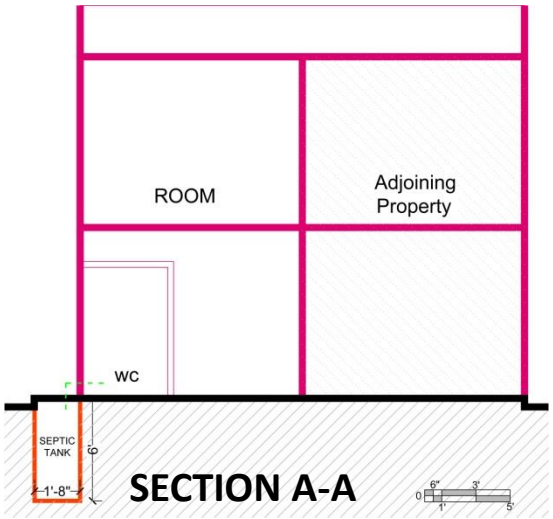


PLAN

- - - - - - - - - - - - Black Water

- - - - - - - - - - - - Grey Water





SECTION A-A

CASE 5: *DHOKE NAGAR*

CASE 5: *DHOKE NAGAR*

Anant Unde

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
5	**G + 1**	**Black water**	**Nil**	**Not yet cleaned (Since construction year 2006)**	**Daily by use of Water** (only)

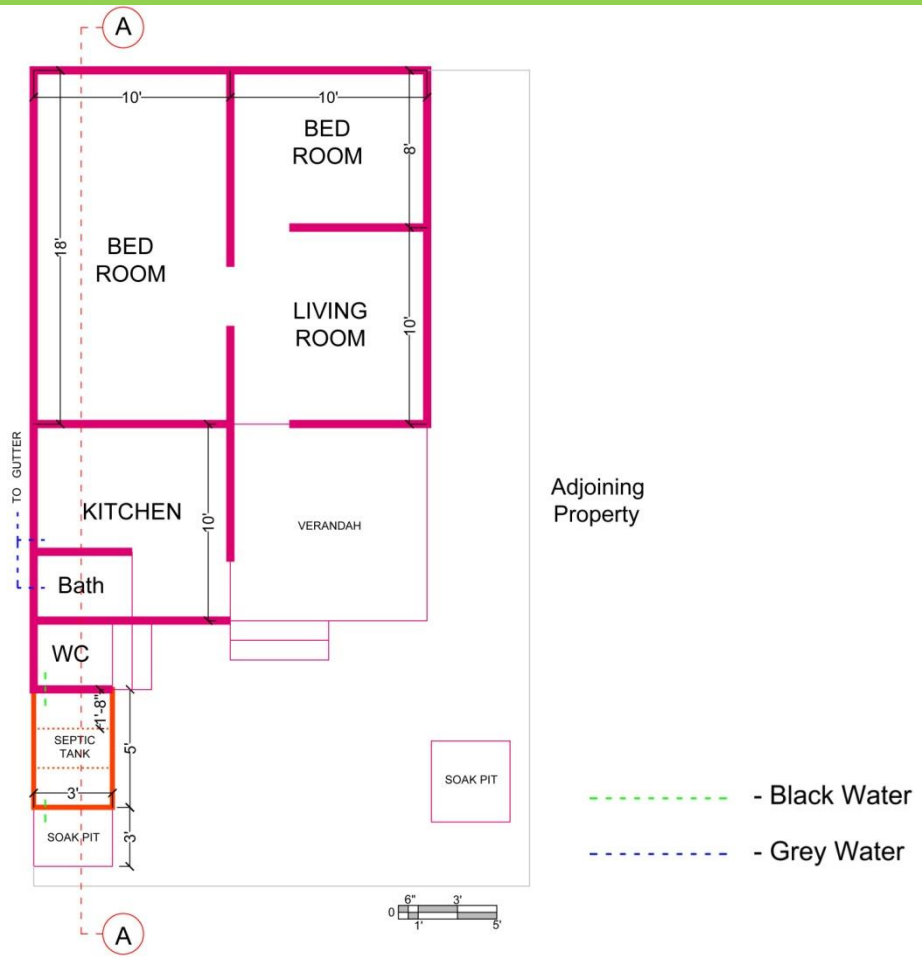
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (5 Users)	2.55	0.5	1.8	**2.30**
			Observations	**Oversized** (51% extra)

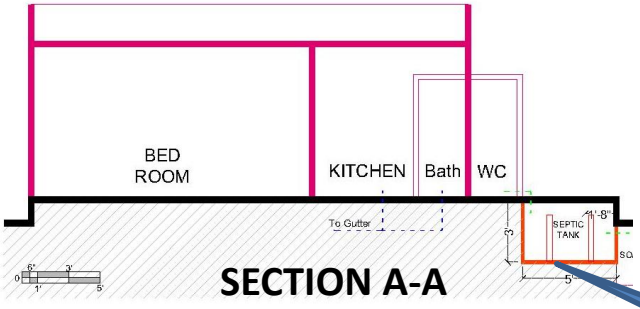
WATER QUALITY

Sr No	Location, Area	Waste water	**Parameters**											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Dhoke Nagar	Black Water	200	176	12	700	562	19.71	6.53	7.65	500	135	73	

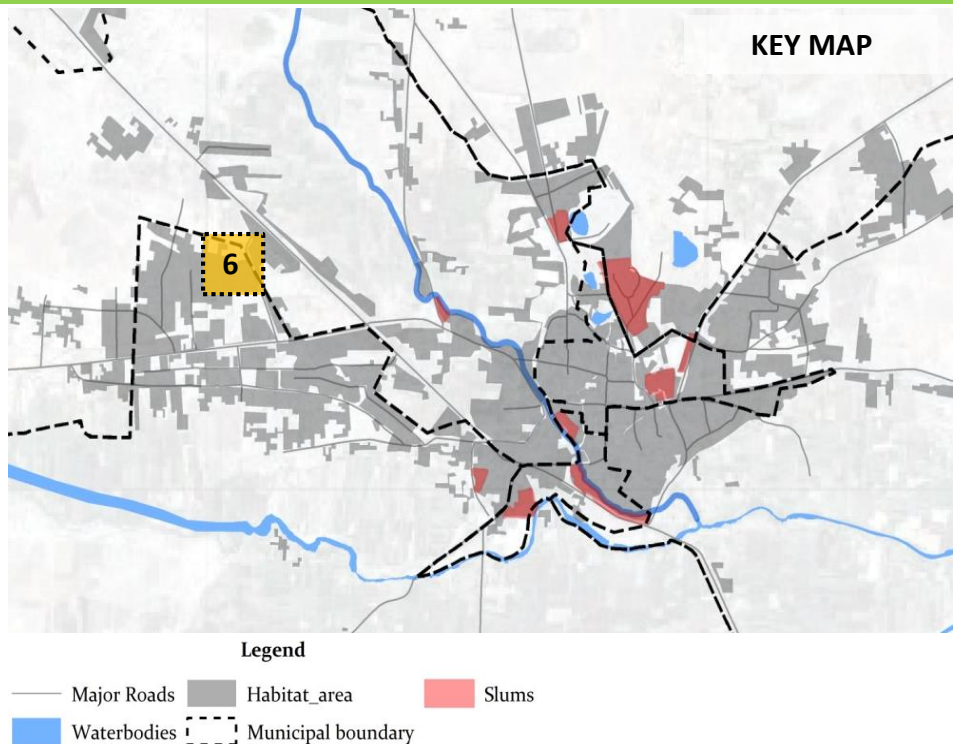
CASE 6: *KAMAL NAGAR, BEHIND GMG COLLEGE*



PLAN



SECTION A-A



CASE 6: *KAMAL NAGAR, BEHIND GMG COLLEGE*

CASE 6: *KAMAL NAGAR, BEHIND GMG COLLEGE*

Ramkisan Gade

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
7	**Ground Floor**	**Black water**	**Two times**	**Last year-Feb or March 2013**	**Daily** (Water) & **Weekly** (Harpic/ detergent)

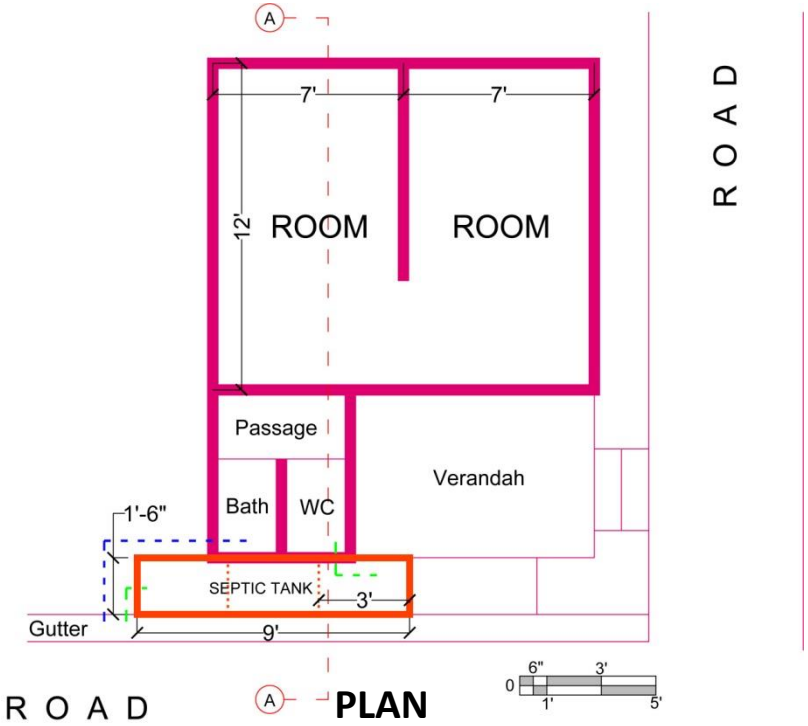
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) ***(CPHEEO)***	2	0.9	1.3	1.7	**2.34** (Two year Cleaning Interval) **3.06** (Three year cleaning interval)

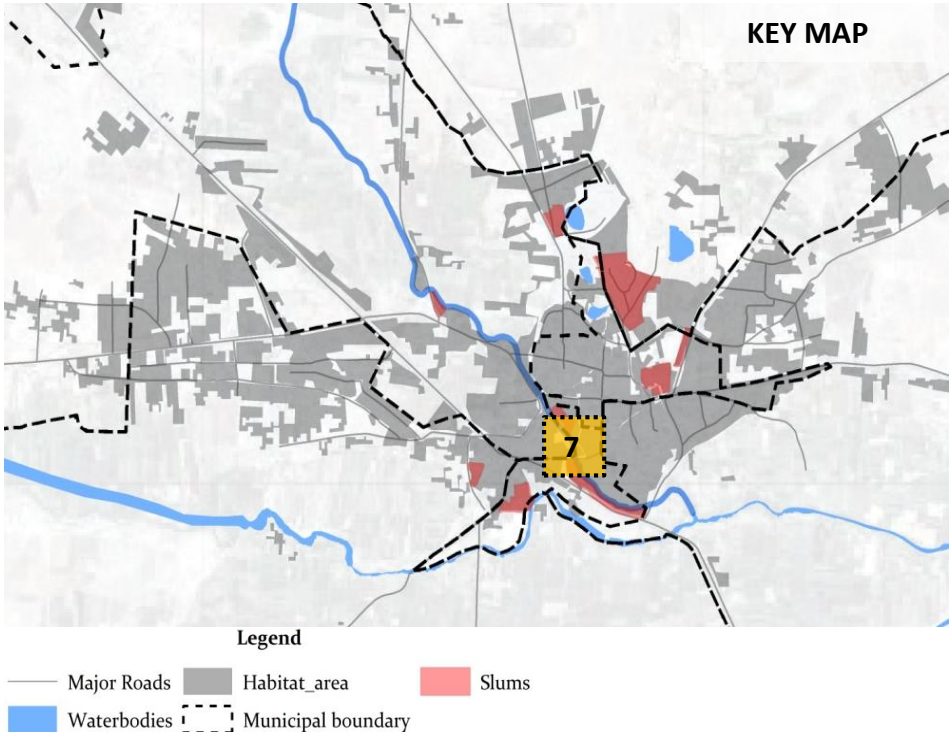
	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (7 Users)	1.5	0.9	0.9	**1.22**
			Observations	**Undersized** (60% smaller)

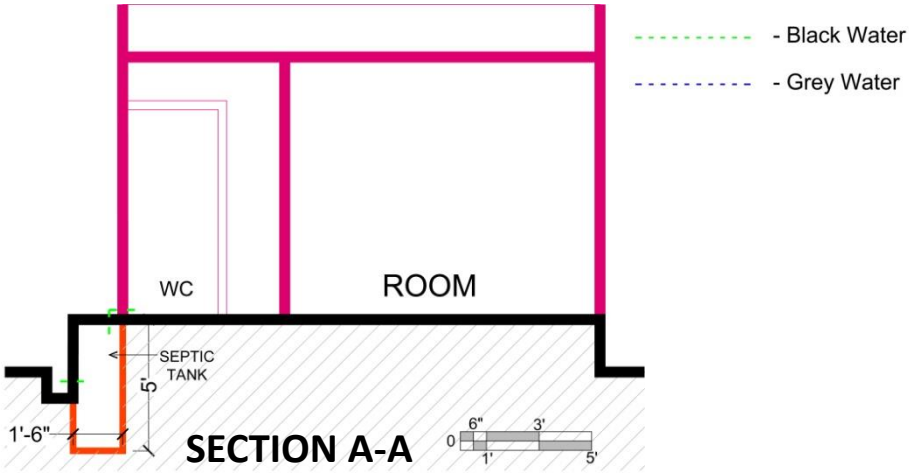
WATER QUALITY

Sr No	Location, Area	Waste water	**Parameters**											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Kamal Nagar	Black Water	--	500	--	--	1258	--	--	7.82	--	918	--	

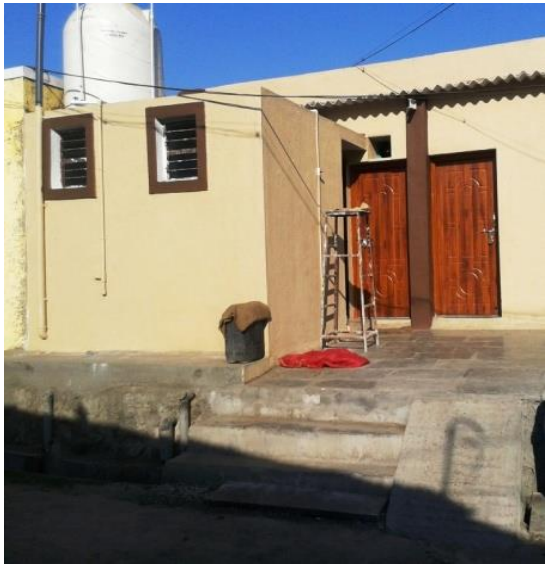
CASE 7: *TELI GALLI VAYUVESH, POST OFFICE ROAD*







CASE 7: *TELI GALLI VAYUVESH, POST OFFICE ROAD*



CASE 7: *TELI GALLI, VAYUVESH, POST OFFICE ROAD*

Nasir Hussain Maniyar

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
5	**Ground Floor**	**Black water**	**Nil**	**Not yet cleaned (Recently built- December 2013)**	**Daily by use of Water** (only)

	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

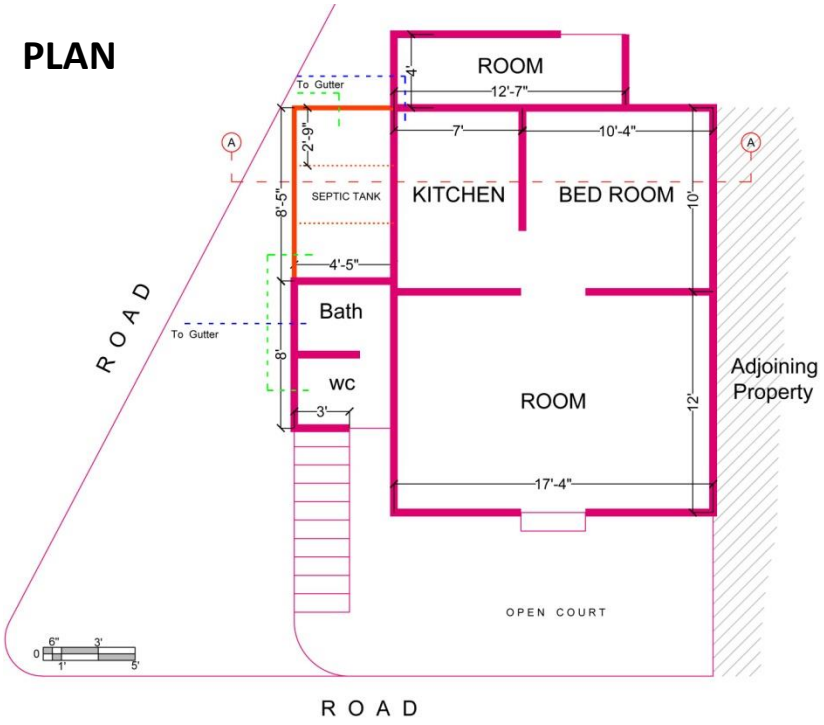
	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (5 Users)	2.7	0.45	1.5	**1.82**
			Observations	**Oversized** (20% extra)

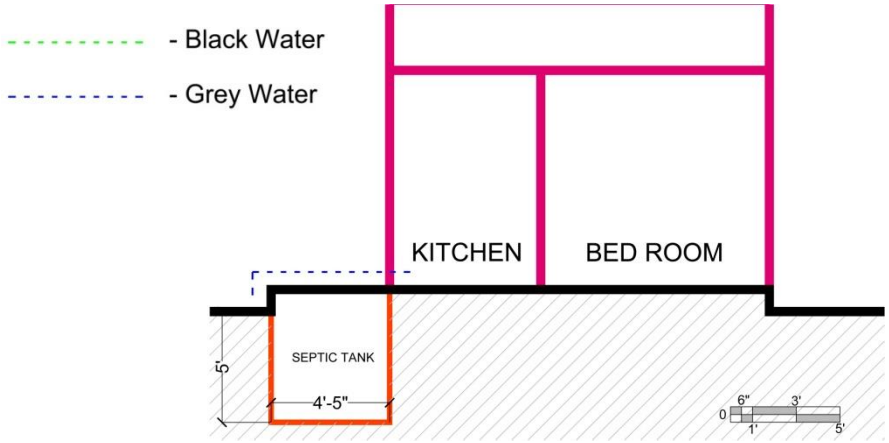
WATER QUALITY

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Teli Galli	Black Water	--	94	--	--	254	--	--	7.65	--	79	--	

CASE 8: *GANGA VES NEAR BRICK KILN*

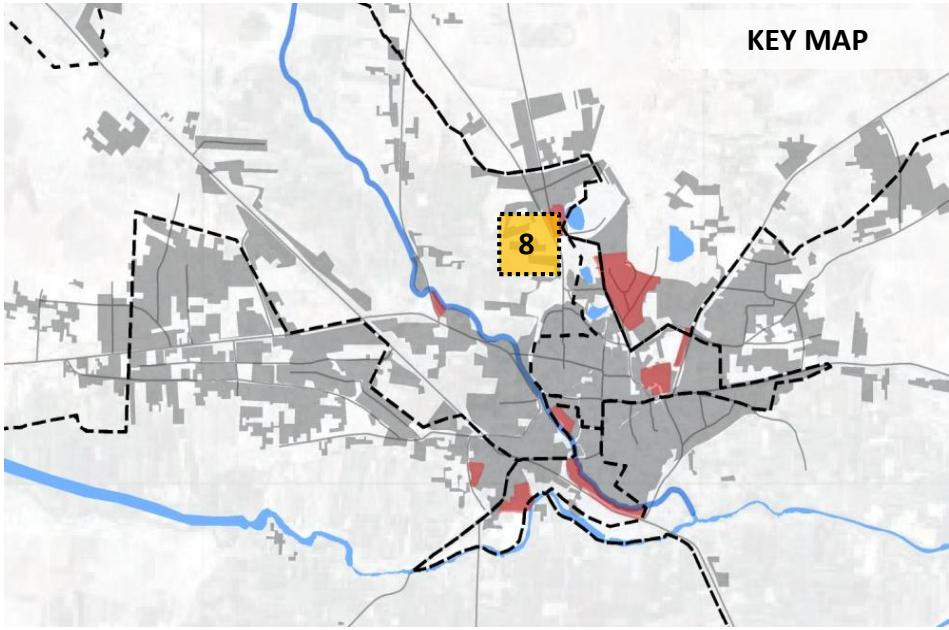
PLAN





SECTION A-A

KEY MAP



CASE 8: *GANGA VES NEAR BRICK KILN*

CASE 8: *GANGA VES NEAR BRICK KILN*

Rajendra Bhaskar Jadhav

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
4	**Ground Floor**	**Black water**	**One time**	**Two months back-(November 2013)**	**Daily** (Water) & **Monthly** (Harpic/ detergent)

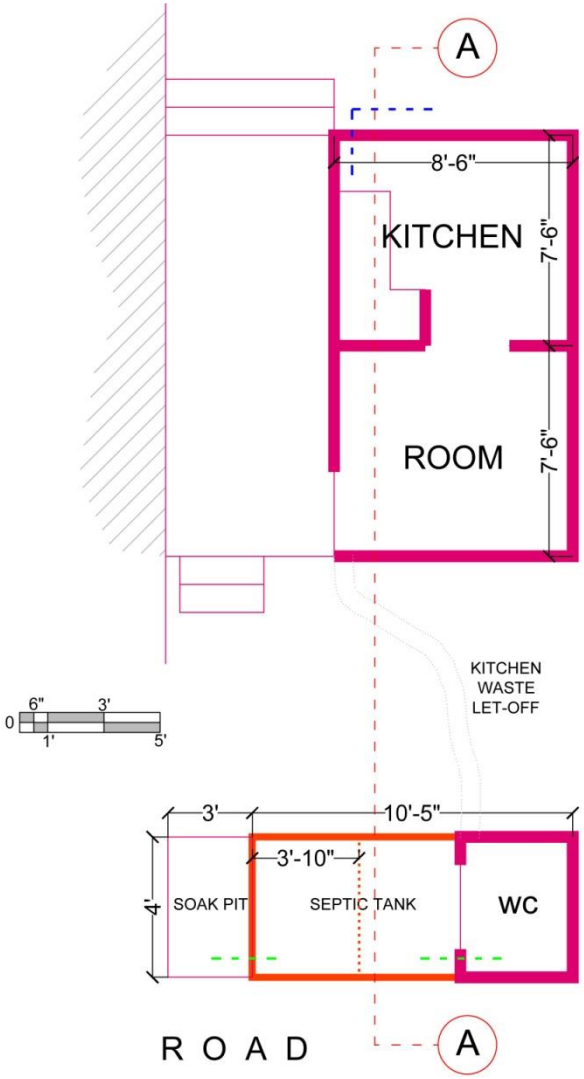
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	Length (m)	**Breadth (m)**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (4 Users)	2.53	1.32	1.5	**5.01**
			Observations	**Oversized** (230% extra)

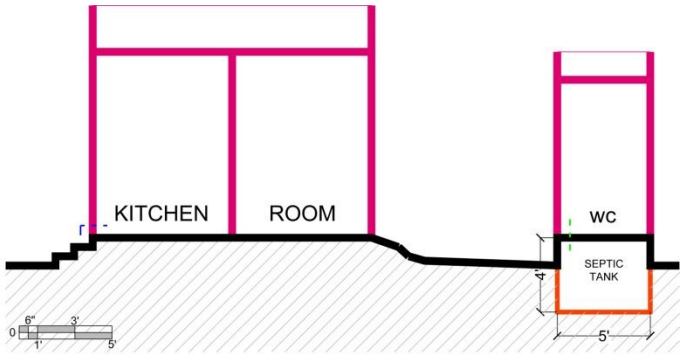
WATER QUALITY

Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	Ganga Ves	Black Water	--	--	--	--	--	--	--	--	--	--	--
2	Ganga Ves	Grey Water	--	--	--	--	--	--	--	--	--	--	--

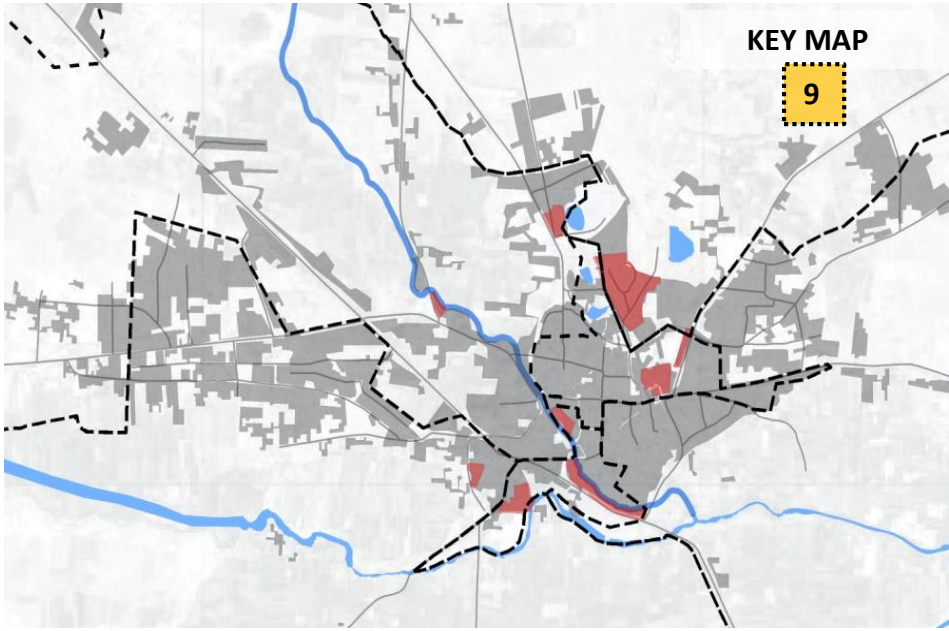
CASE 9: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*



PLAN



SECTION A-A



CASE 9: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*

CASE 9: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*

Jayram Raghu Rote

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
4	**Ground Floor**	**Black water**	**Nil**	**Not yet cleaned (Recently built-One year back 2013)**	**Daily** (Water) & **Monthly** (Harpic/ detergent)

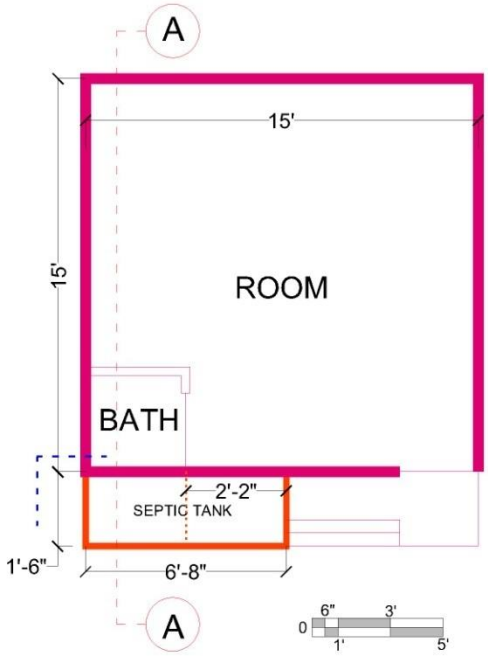
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (4 Users)	3.13	1.2	1.2	**4.51**
			Observations	**Oversized** (197% extra)

WATER QUALITY

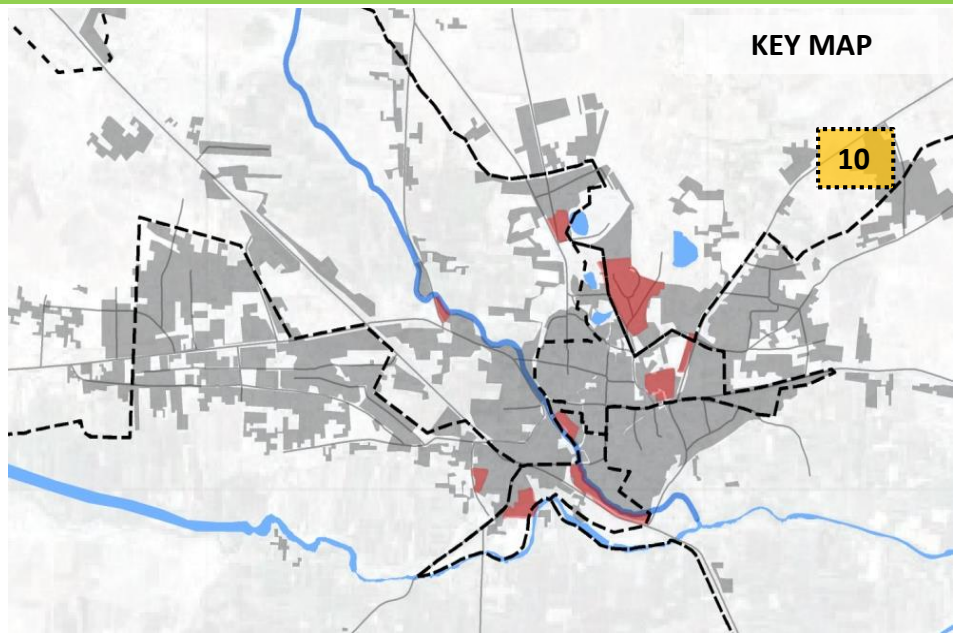
Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	Kanadi Mala	Black Water	--	--	--	--	--	--	--	--	--	--	--
2	Kanadi Mala	Grey Water	--	--	--	--	--	--	--	--	--	--	--

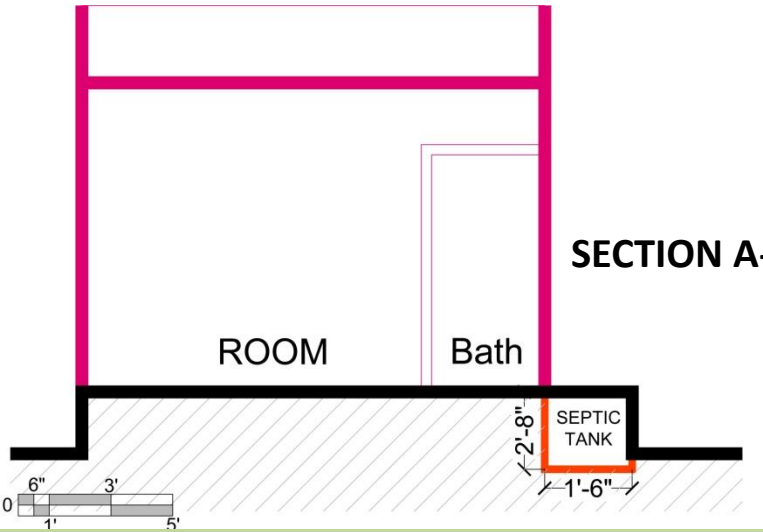
CASE 10: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*



PLAN

- Black Water
- Grey Water





SECTION A-A

CASE 10: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*

CASE 10: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*

Shakuntala Satpute

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
1	**Ground Floor**	**Black water**	**Nil**	**Not yet cleaned (Recently built-March 2014)**	**Daily** (Water) & **Monthly** (Harpic/ detergent)

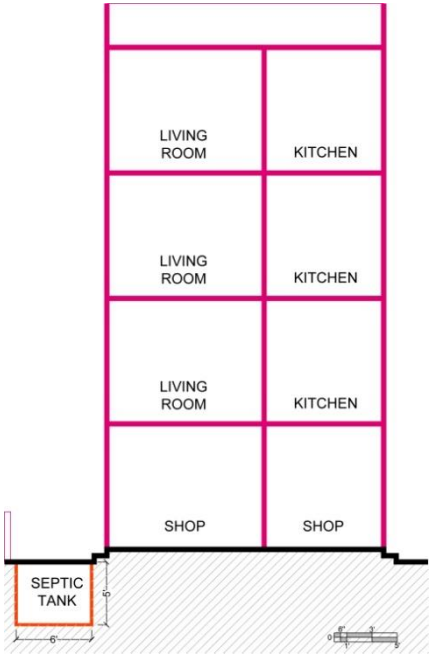
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	Length (m)	**Breadth (m)**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (1 Users)	2	0.45	0.8	**0.72**
			Observations	**Undersized** (53% smaller)

WATER QUALITY

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Kanadi Mala	Black Water	--	--	--	--	--	--	--	--	--	--	--	
2	Kanadi Mala	Grey Water	--	--	--	--	--	--	--	--	--	--	--	

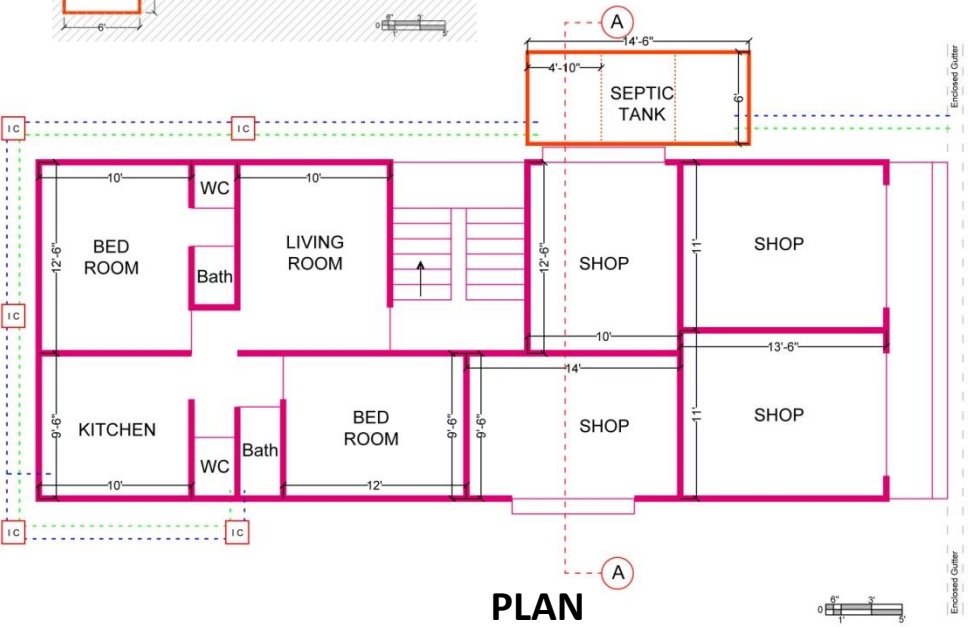
CASE 11: *DEVI ROAD, GANPATI SAW MILL*



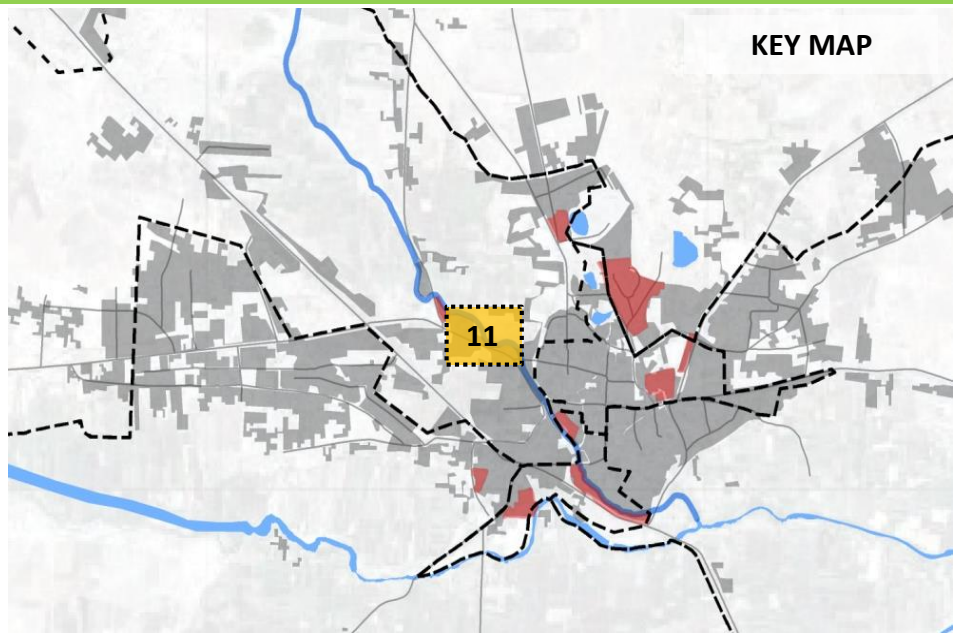
SECTION A-A

- Black Water

- Grey Water



PLAN



CASE 11: *DEVI ROAD, GANPATI SAW MILL*

CASE 11: *DEVI ROAD, GANPATI SAW MILL*

Yashwant Uttamrao Deshmukh (Abhishek Apartments)

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
34	**G+4**	**Black + Gray water**	**Nil**	**Not yet cleaned (Since construction year 2005)**	**Daily** (Water) & **Monthly** (Harpic/ detergent)

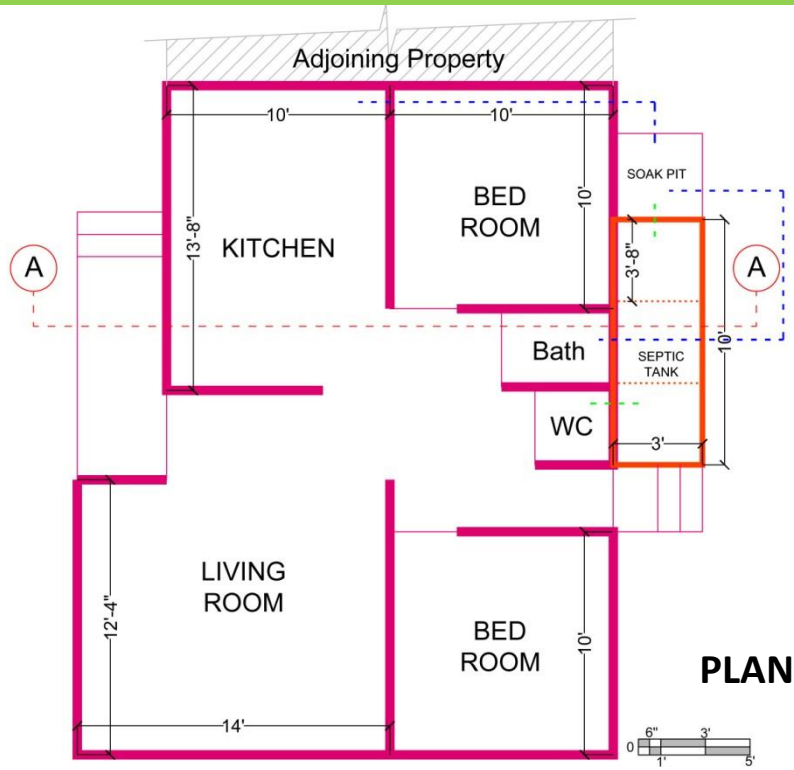
	Length (m)	Breadth (m)	Height (m) (300mm free board has been considered)		Volume of the tank (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (50 Users) ***(CPHEEO)***	5	2	1.3	1.35	**13.00** (Two year Cleaning Interval) **15.40** (Three year cleaning interval)

	Length (m)	Breadth (m)	Height (m)	Volume of the tank (Cum)
Actual Size of the tank (34 Users)	4.35	1.8	1.5	**11.75**
			Observations	**Undersized** (24% smaller)

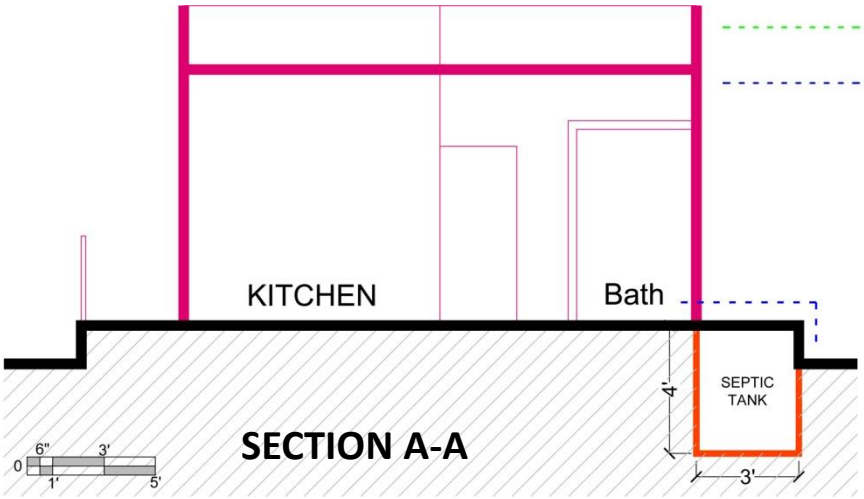
WATER QUALITY

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Devi Road	Black Water	--	224	--	--	600	--	--	6.23	--	465	--	

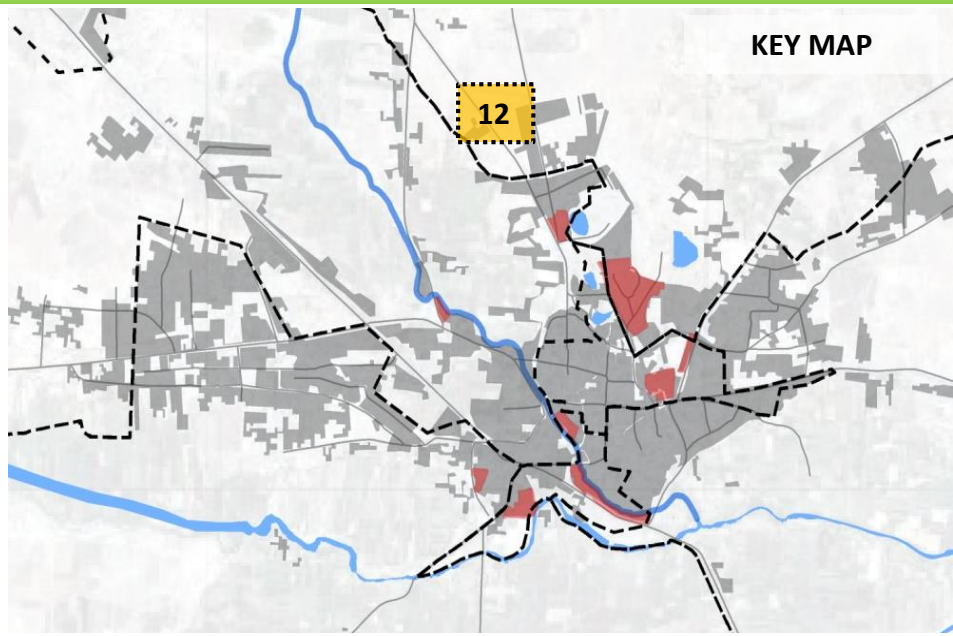
CASE 12: *TEACHERS COLONY, RAMNAGARI DEVI ROAD*



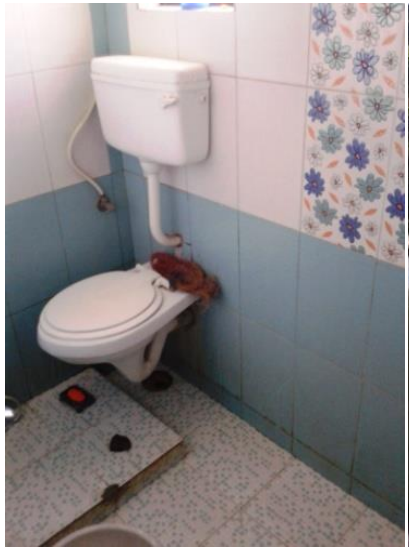
PLAN

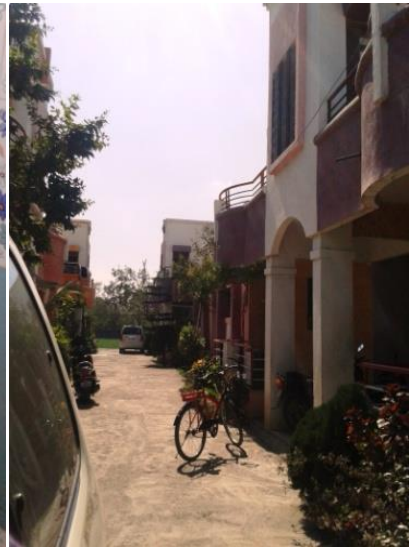


SECTION A-A



CASE 12: *TEACHERS COLONY, RAMNAGARI DEVI ROAD*





CASE 12: *TEACHERS COLONY, RAMNAGARI DEVI ROAD*

Sanjay Baloba Avhad

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
5	**G + 1**	**Black water**	**Once time**	**A year ago (Nov or Dec 2012)**	**Daily** (Water) & **Monthly** (Harpic/ detergent)

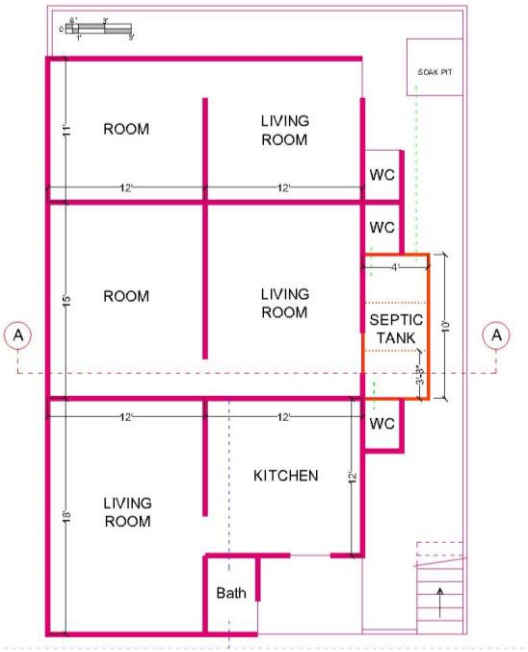
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	Length (m)	**Breadth (m)**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (5 Users)	3	0.9	1.2	**3.24**
			Observations	**Oversized** (113% extra)

WATER QUALITY

Sr No	Location, Area	Waste water	**Parameters**											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Teacher Colony	Black Water	--	165	--	--	442	--	--	6.25	--	342	--	

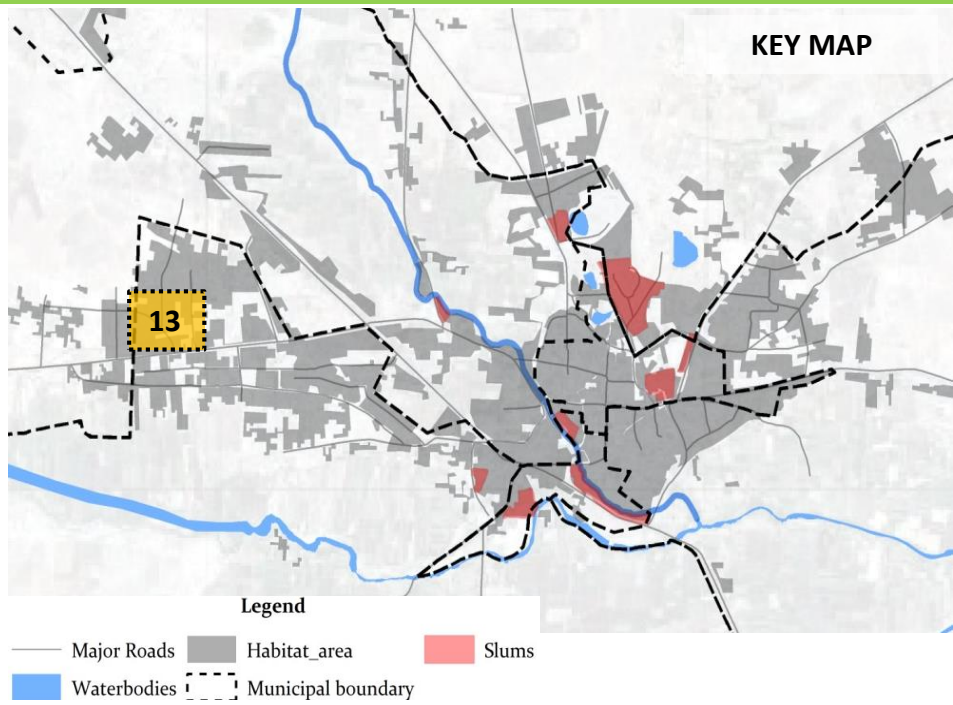
CASE 13: *SANJIVANI NAGAR, SHARADWADI ROAD*



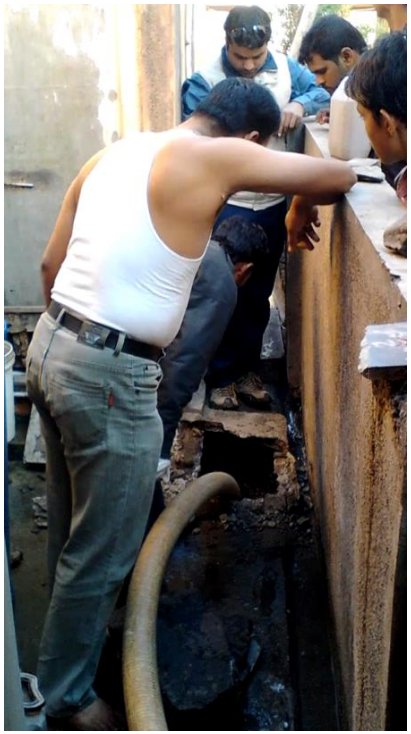
PLAN

- Black Water
- Grey Water

SECTION A-A



CASE 13: *SANJIVANI NAGAR, SHARADWADI ROAD*



CASE 13: *SANJIVANI NAGAR, SHARADWADI ROAD*

Ishwar Bhagwan Zalte

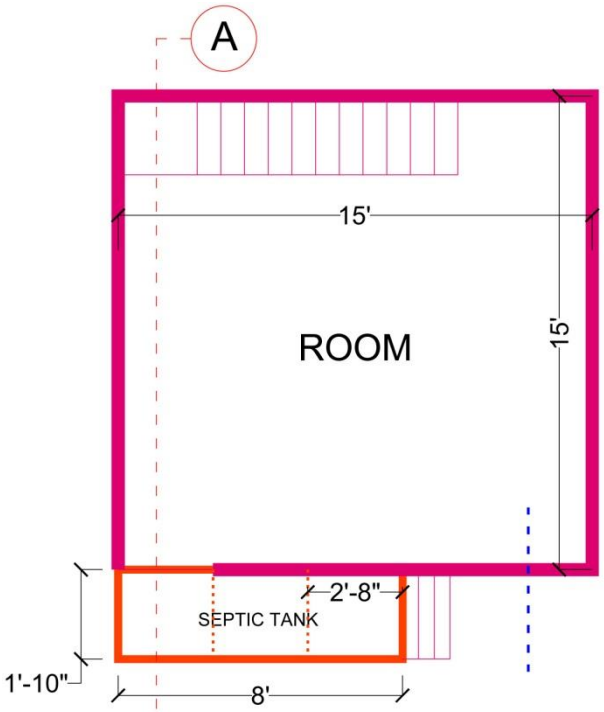
Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
4	**G + 1**	**Black water**	**Once every year**	**March 2014**	**Daily** (Water) & **Monthly** (Harpic/ detergent)

	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)
	L	**B**	**Height (m)**		**Volume of the tank** (Cum)
Actual Size of the tank (4 Users)	3	1.2	1.2		**4.32**
				Observations	**Oversized** (184% extra)

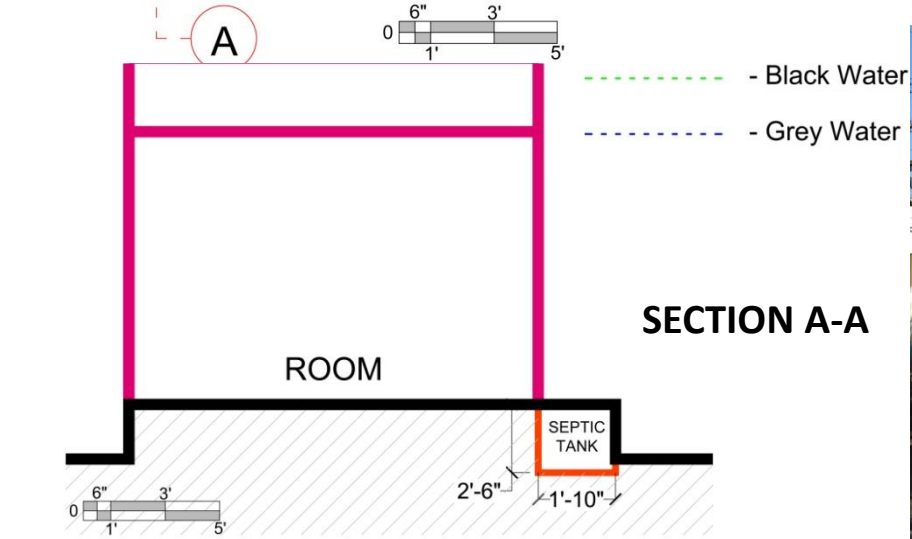
WATER QUALITY

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Sanjivani Nagar	Black Water	--	225	--	--	604	--	--	6.87	--	377	--	

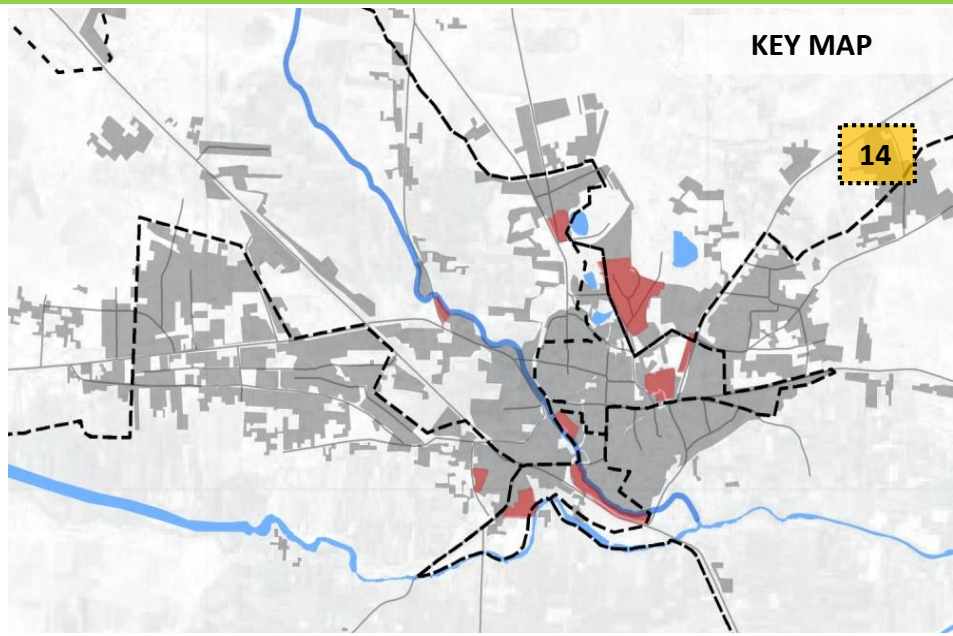
CASE 14: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*



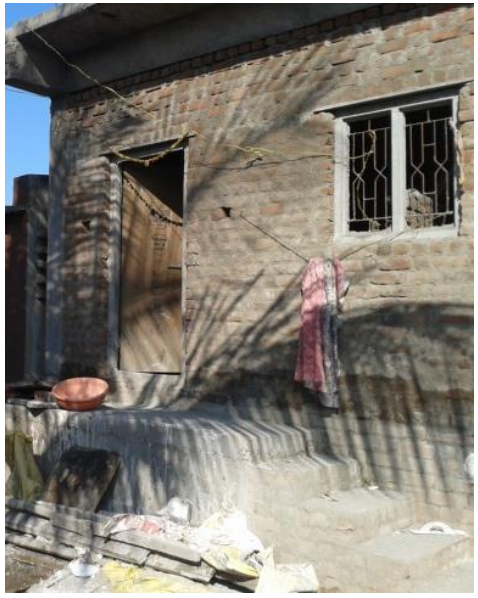
PLAN



SECTION A-A



CASE 14: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*



CASE 14: *KANADI MALA, MURLIDHAR NAGAR, PIMPRI ROAD*

Santosh Tambe

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
4	**Ground Floor**	**Black water**	**Nil**	**Not yet cleaned (Recently Built-December 2013)**	**NA**

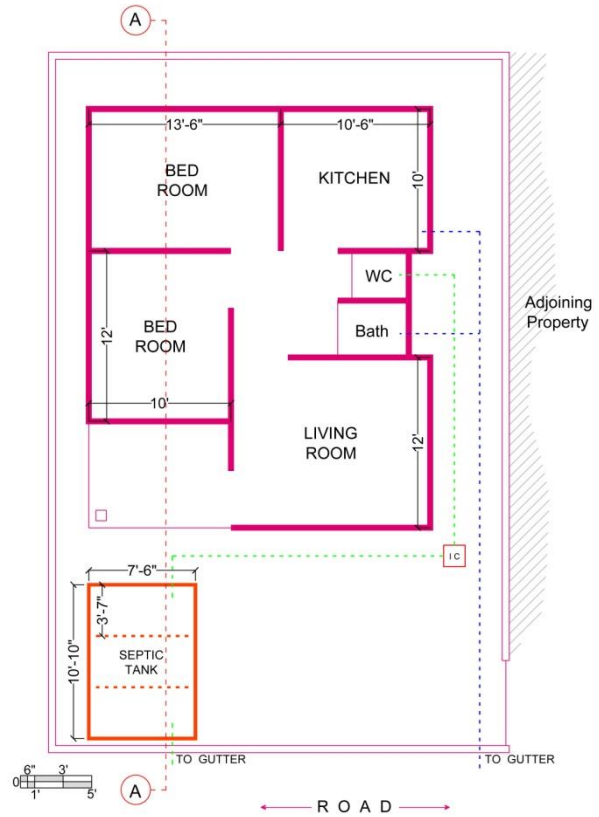
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Twoyear Cleaning Interval) **1.52** (Three year cleaning interval)

	Length (m)	**Breadth (m)**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (4 Users)	2.4	0.55	0.75	**0.99**
			Observations	**Undersized** (35% smaller)

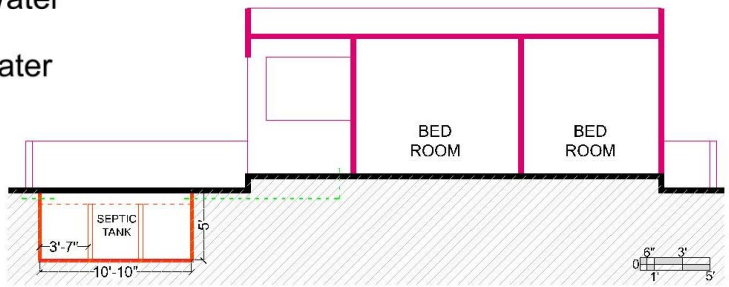
WATER QUALITY

Sr No	Location, Area	Waste water	**Parameters**											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Kanadi Mala	Black Water	--	--	--	--	--	--	--	--	--	--	--	
2	Kanadi Mala	Grey Water	--	--	--	--	--	--	--	--	--	--	--	

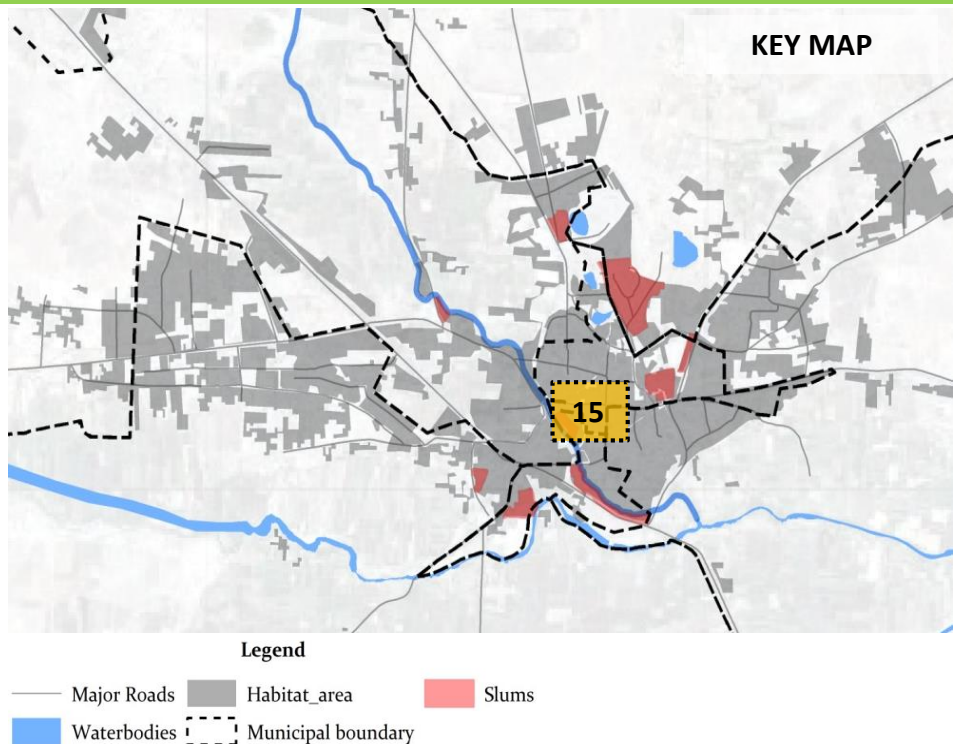
CASE 15: *BASE GALLI, TANAJI CHOLWK*



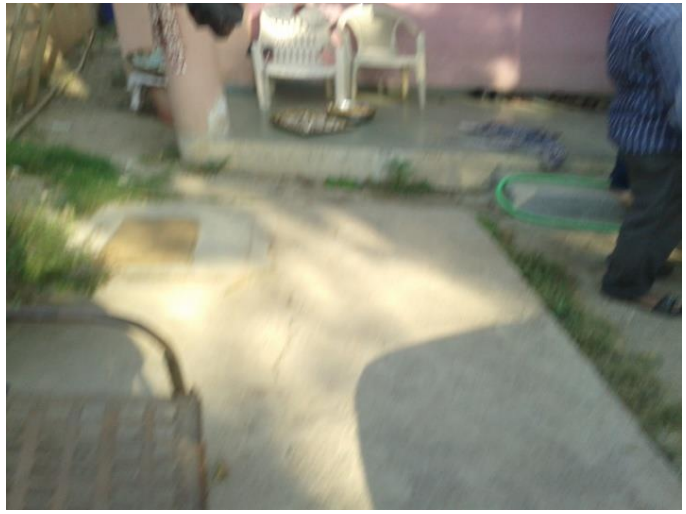
PLAN



SECTION A-A



CASE 15: *BASE GALLI, TANAJI CHOLWK*



CASE 15: *BASE GALLI, TANAJI CHOLWK*

Pramod Narayan Lachke

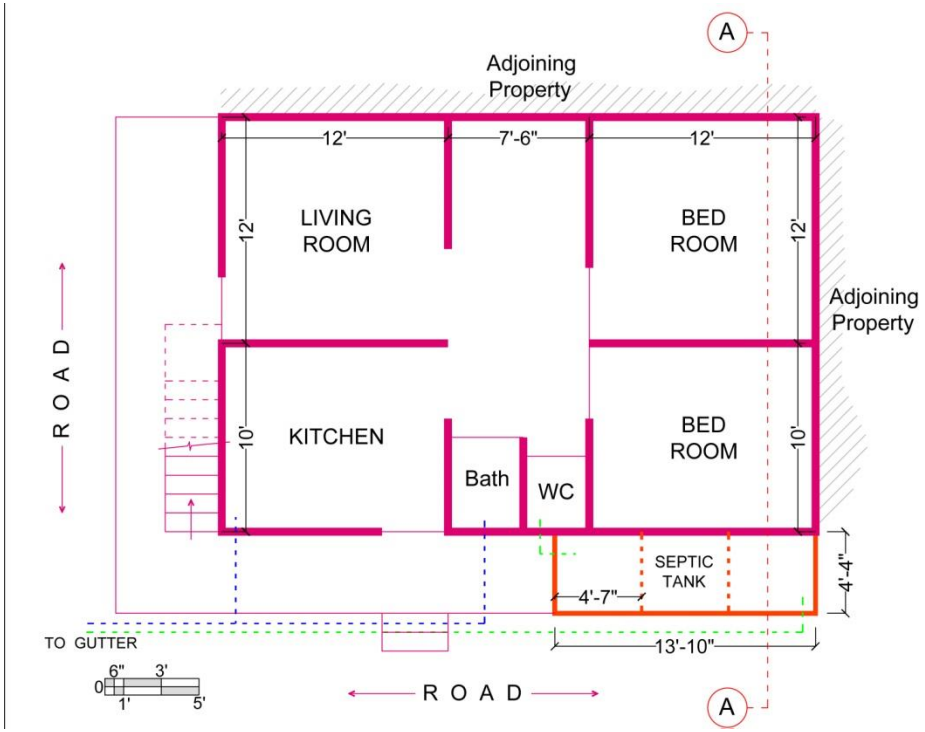
Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
8	**Ground Floor**	**Black+Grey Water**	**One time**	**Last month (Feb 2014)**	**NA**

	Length (m)	Breadth (m)	Height (m) (300mm free board has been considered)		Volume of the tank (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) ***(CPHEEO)***	2.0	0.9	1.3	1.7	**2.43** (Two year Cleaning Interval) **3.06** (Three year cleaning interval)
	L	**B**	**Height (m)**		**Volume of the tank** (Cum)
Actual Size of the tank (8 Users)	3.0	1.98	1.52		**9.04**
				Observations	Oversized (352% Extra)

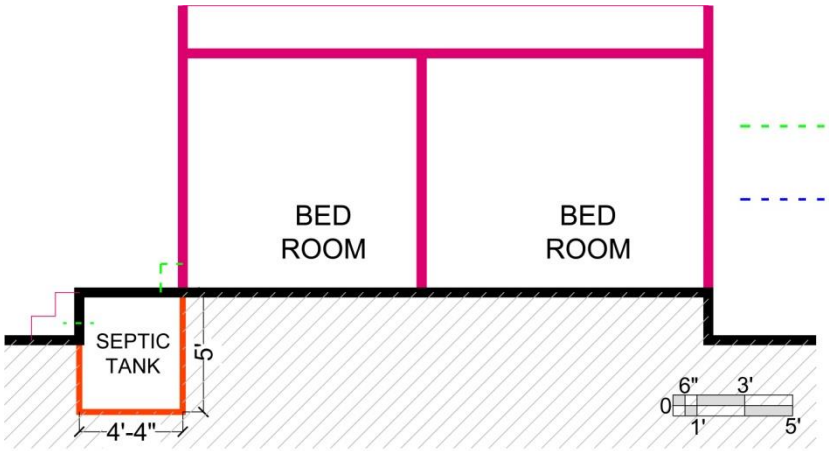
WATER QUALITY

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Base Galli	Black Water	--	246	--	--	659	--	--	7.25	--	511	--	

CASE 16: *SHREENAGAR, NAYGAON ROAD*

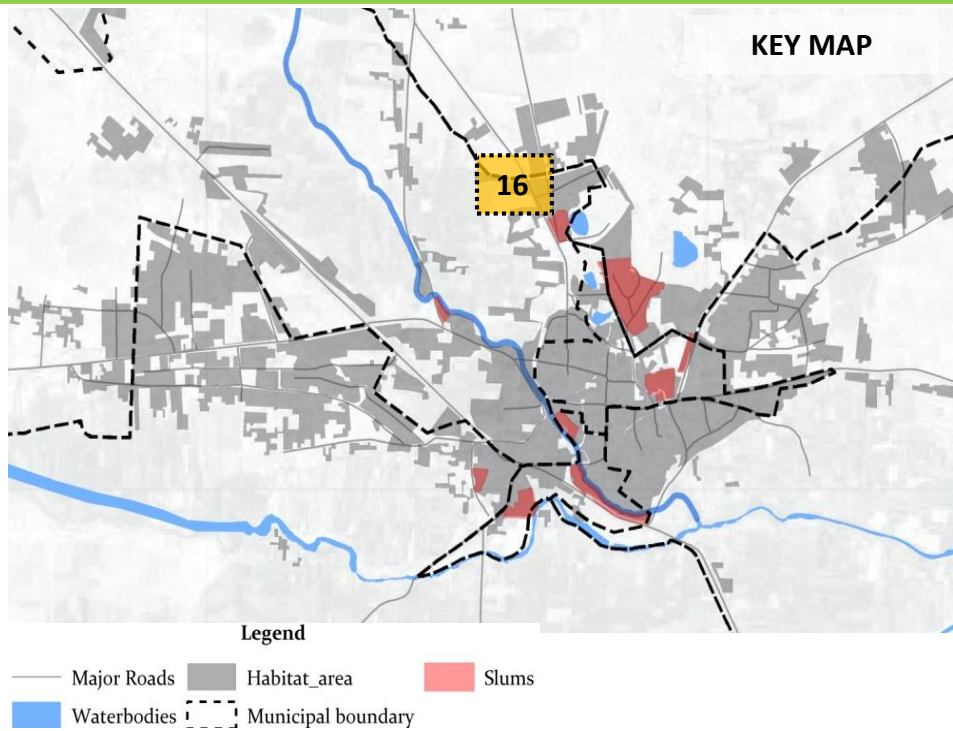


PLAN



- Black Water
- Grey Water

SECTION A-A



CASE 16: *SHREENAGAR, NAYGAON ROAD*






CASE 16: *SHREENAGAR, NAYGAON ROAD*

Rajendra Pundlik Bhadange

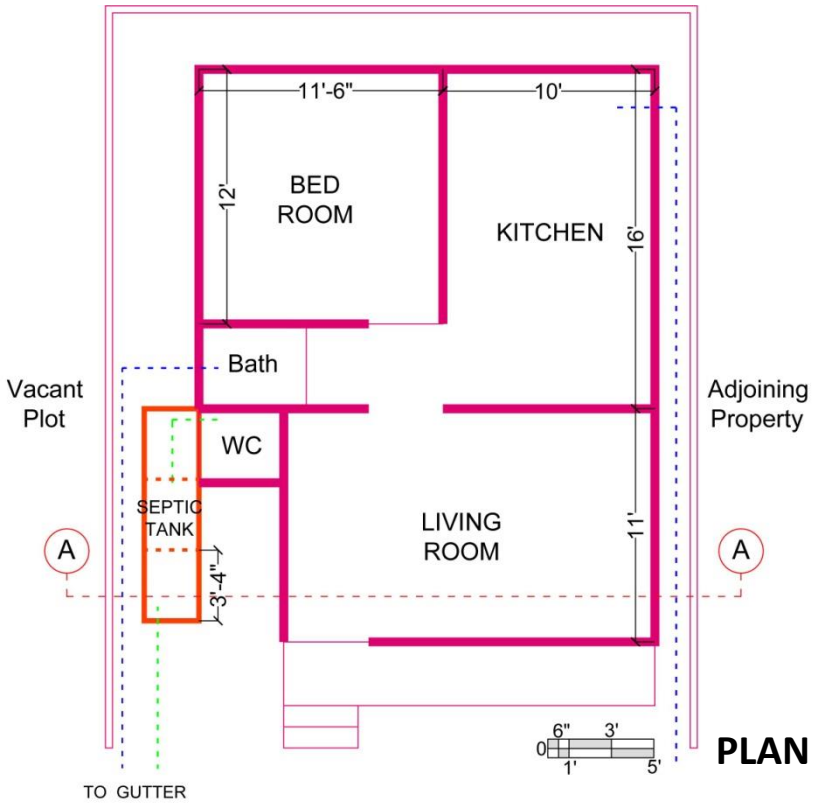
Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
9	**Ground Floor**	**Black Water**	**Nil**	**Not yet cleaned (Since construction year 2011)**	**Daily (Water) & Weekly (Harpic)**

	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) ***(CPHEEO)***	2.0	0.9	1.3	1.7	**2.34** (Two year Cleaning Interval) **2.57** (Three year cleaning interval)
	L	**B**	**Height (m)**		**Volume of the tank** (Cum)
Actual Size of the tank (9 Users)	3.91	1.06	1.52		**6.05**
				Observations	Oversized (135% Extra)

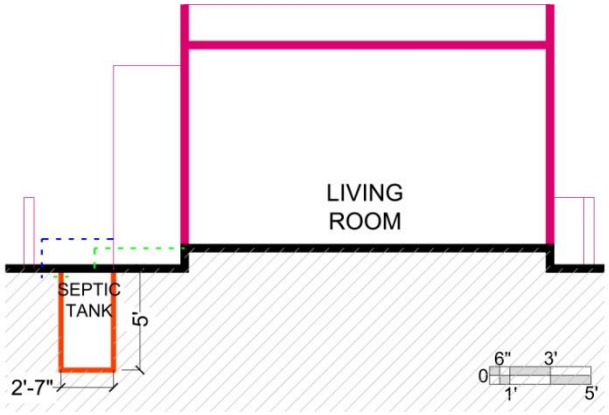
WATER QUALITY

Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	Shreenagar	Black Water	302	215	28.80	603	576	4.43	--	6.87	506	446	11.81

CASE 17: *SAILATTA NAGAR-B, HANDEMALA*

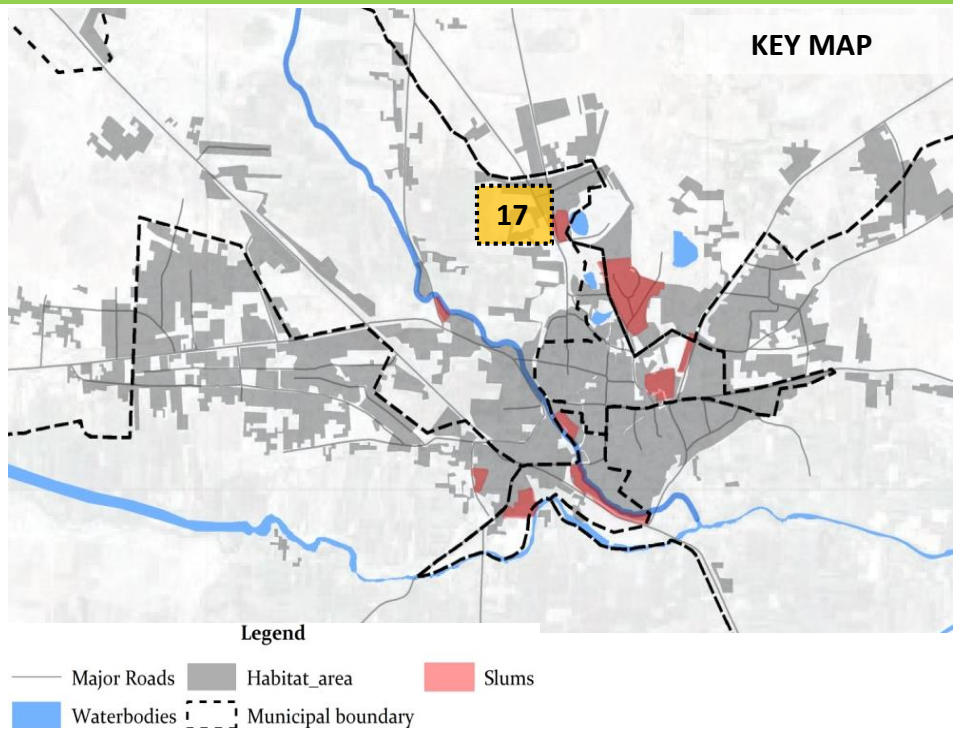


PLAN



SECTION A-A

- Black Water
- Grey Water



CASE 17: *SAILATTA NAGAR-B, HANDEMALA*






CASE 17: *SAILATTA NAGAR-B, HANDEMALA*

Raghunath Aware

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
9	**Ground Floor**	**Black Water**	**One time**	**Two years ago-2012**	**Daily (Water) & Weekly (Harpic)**

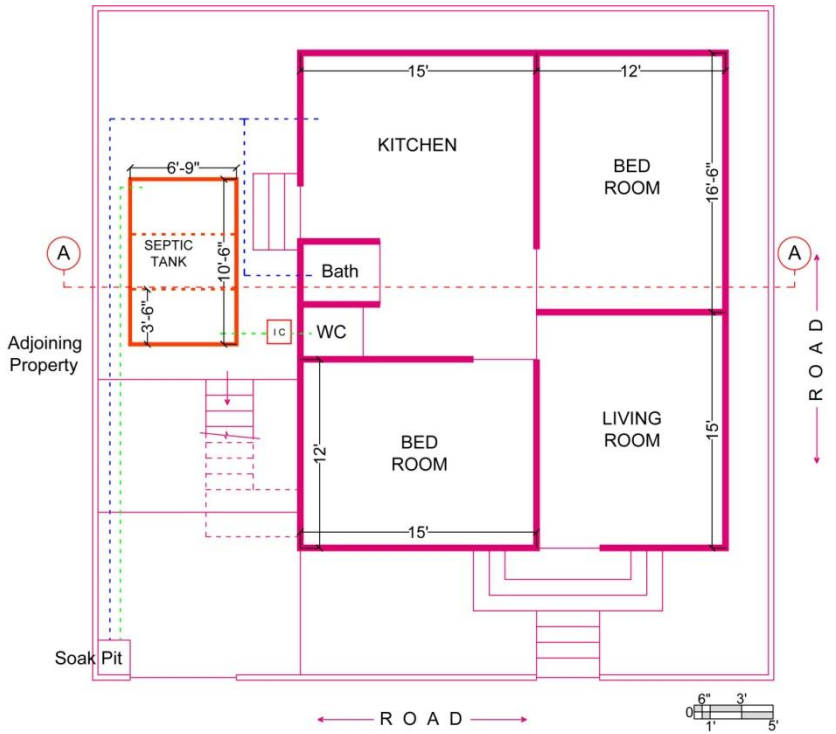
	Length (m)	Breadth (m)	Height (m) (300mm free board has been considered)		Volume of the tank (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) ***(CPHEEO)***	2.0	0.9	1.3	1.43	**2.34** (Two year Cleaning Interval) **2.57** (Three year cleaning interval)

	Length (m)	Breadth (m)	Height (m)	Volume of the tank (Cum)
Actual Size of the tank (9 Users)	2.74	0.48	1.52	**2.01**
			Observations	Undersized (22% Smaller)

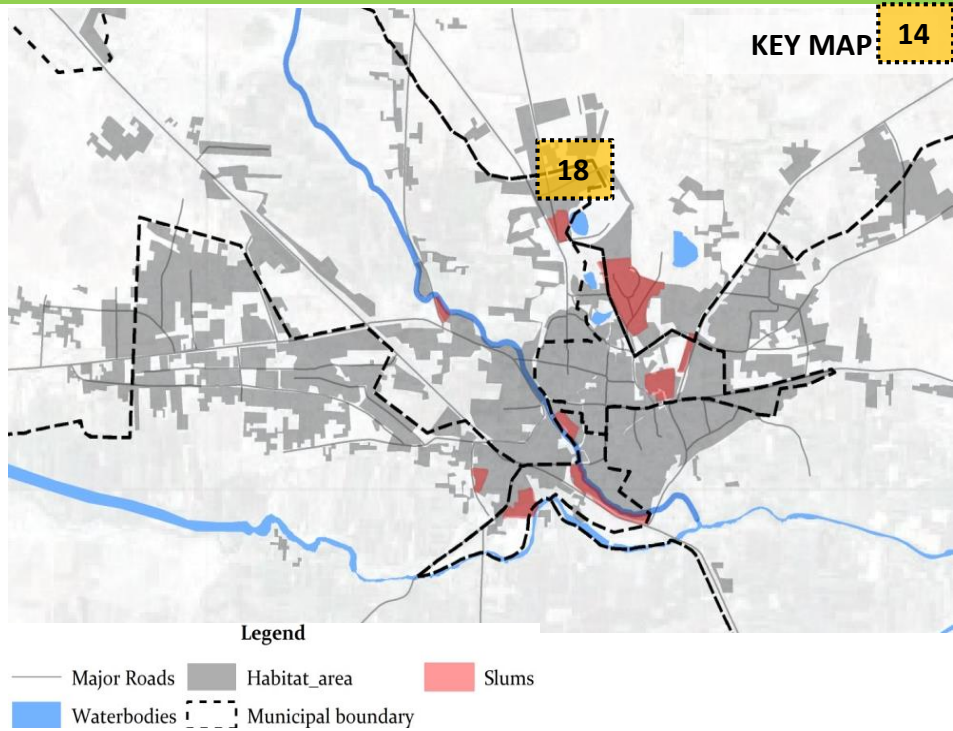
WATER QUALITY

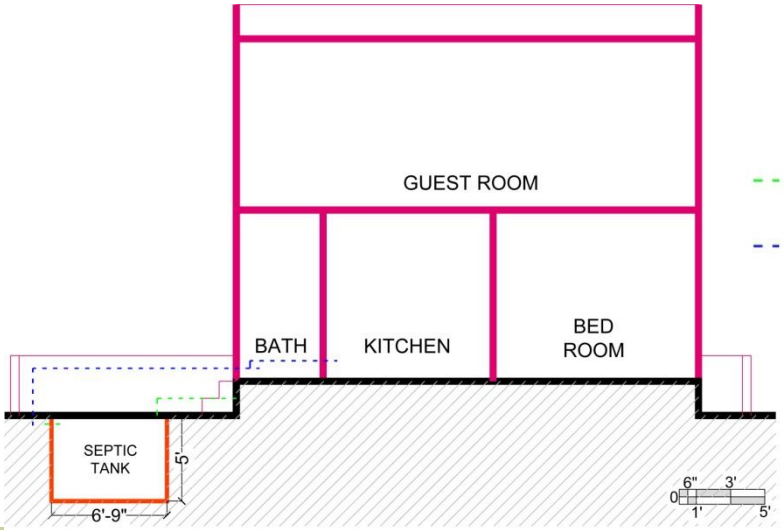
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Handemala*	Black Water	--	156	--	--	418	--	--	6.52	--	324	--	

CASE 18: *BHAIRAVNATH HOUSING SOCIETY, NAYGAON ROAD*



PLAN

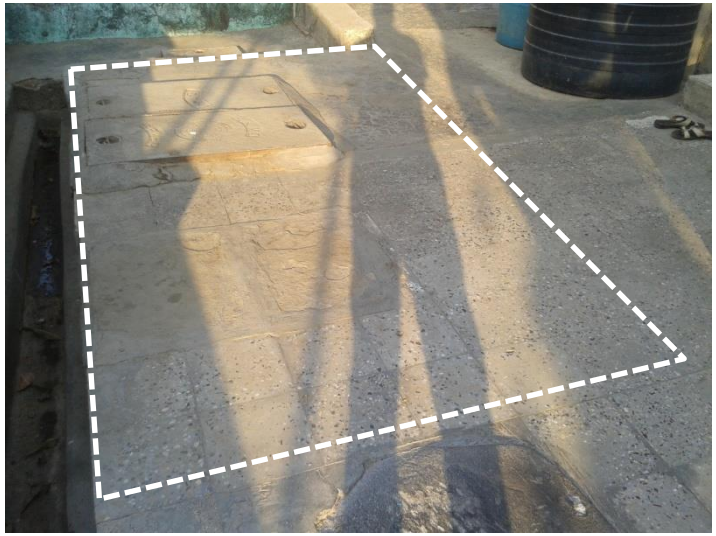




- Black Water

- Grey Water

SECTION A-A



CASE 18: *BHAIRAVNATH HOUSING SOCIETY, NAYGAON ROAD*

CASE 18: *BHAIRAVNATH HOUSING SOCIETY, NAYGAON ROAD*

Kanta Ramesh Deshmukh

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
4	**G+1**	**Black Water**	**Once in every two year**	**2013**	**Daily (Water) & Weekly (Harpic)**

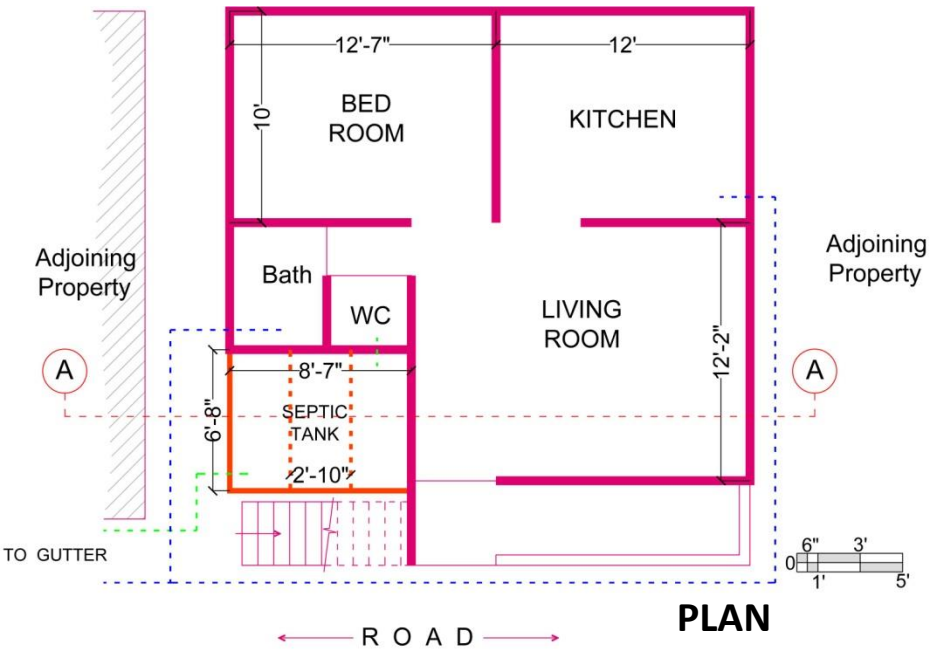
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (4 Users)	2.89	1.75	1.52	**7.73**
			Observations	**Oversized (409% Extra)**

WATER QUALITY

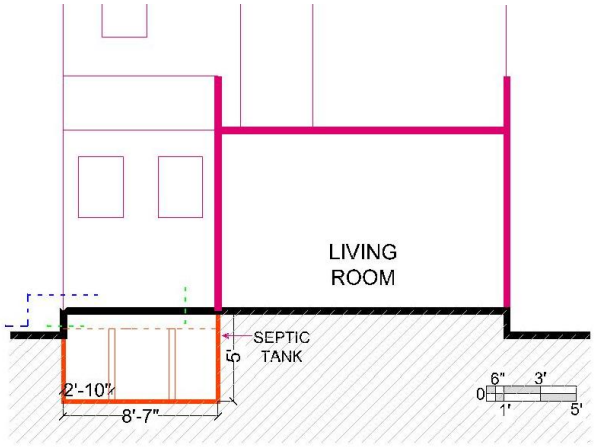
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Bhairavnath*	Black Water	--	291	--	--	780	--	--	6.96	--	604	--	

CASE 19: *JAIN NAGAR, KANADI MALA*

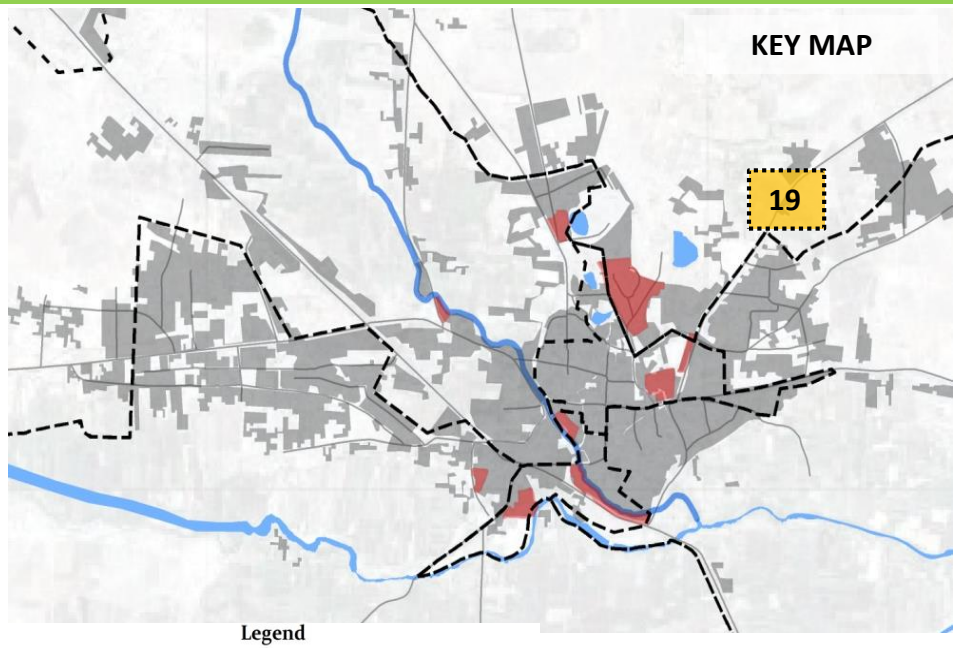


PLAN

- Black Water
- Grey Water



SECTION A-A



CASE 19: *JAIN NAGAR, KANADI MALA*







CASE 19: *JAIN NAGAR, KANADI MALA*

Sachin Suresh Mule

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
5	**Ground Floor**	**Black Water**	**Nil**	**Not yet cleaned (Since construction year 2004)**	**Daily (Water) & Weekly (Harpic)**

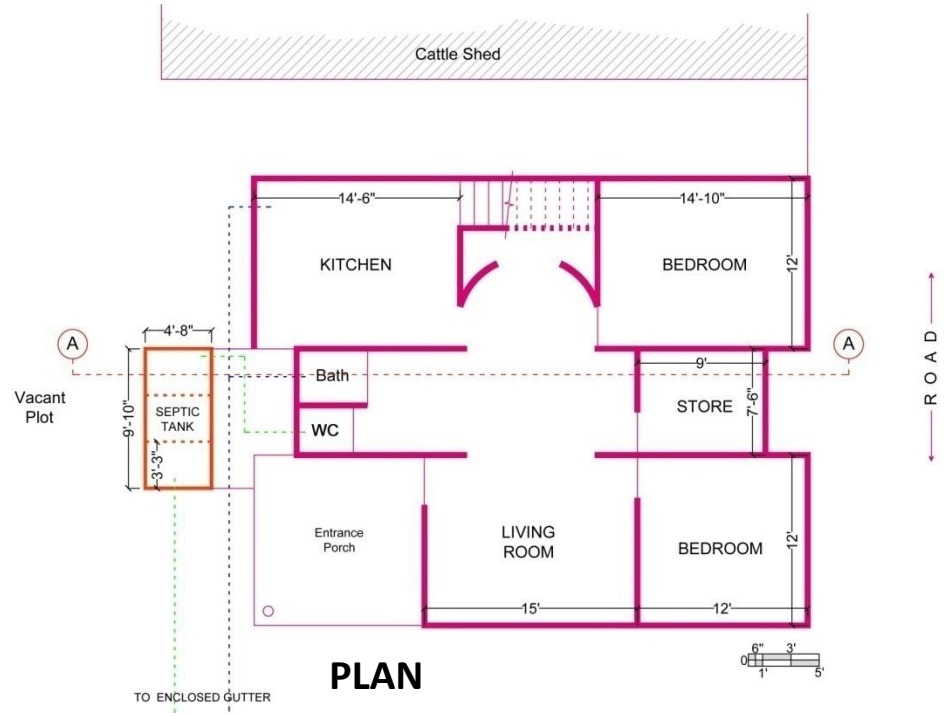
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	Length (m)	**Breadth (m)**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (5 Users)	2.31	1.73	1.52	**6.08**
			Observations	**Oversized (300% Extra)**

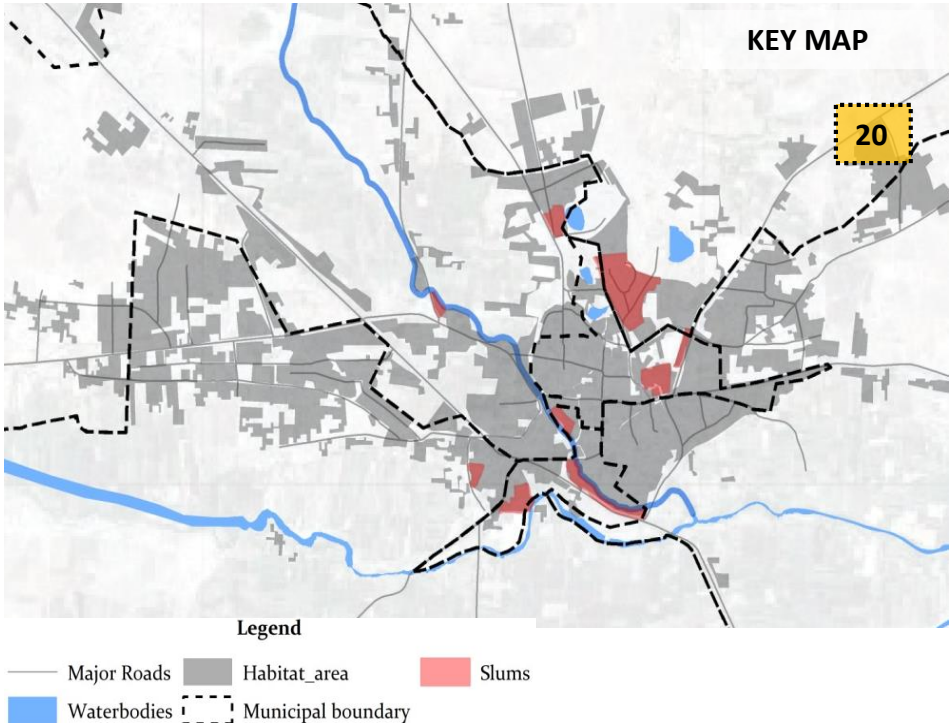
WATER QUALITY

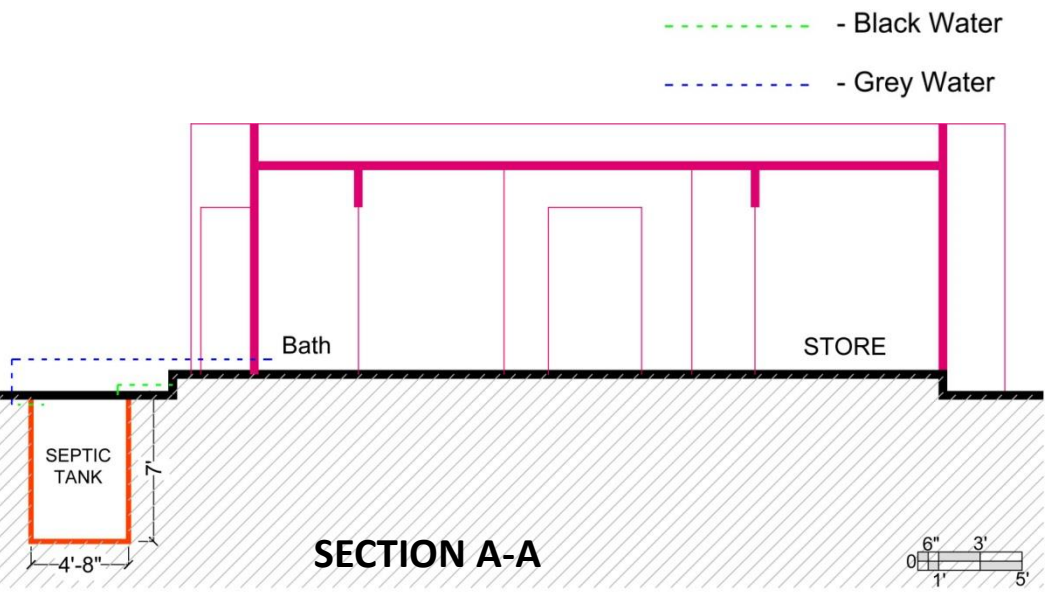
Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	*Jain Nagar*	Black Water	--	176	--	--	473	--	--	7.14	--	--	295

CASE 20: *RAGHUKUL PIMPRI ROAD.*



PLAN





SECTION A-A

CASE 20: *RAGHUKUL PIMPRI ROAD.*






CASE 20: *RAGHUKUL PIMPRI ROAD.*

Ramdas Raghoji Ukade

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
2	**Ground Floor**	**Black Water**	**Nil**	**Not yet cleaned (Since construction year 2000)**	**Daily (Water) & Weekly (Harpic)**

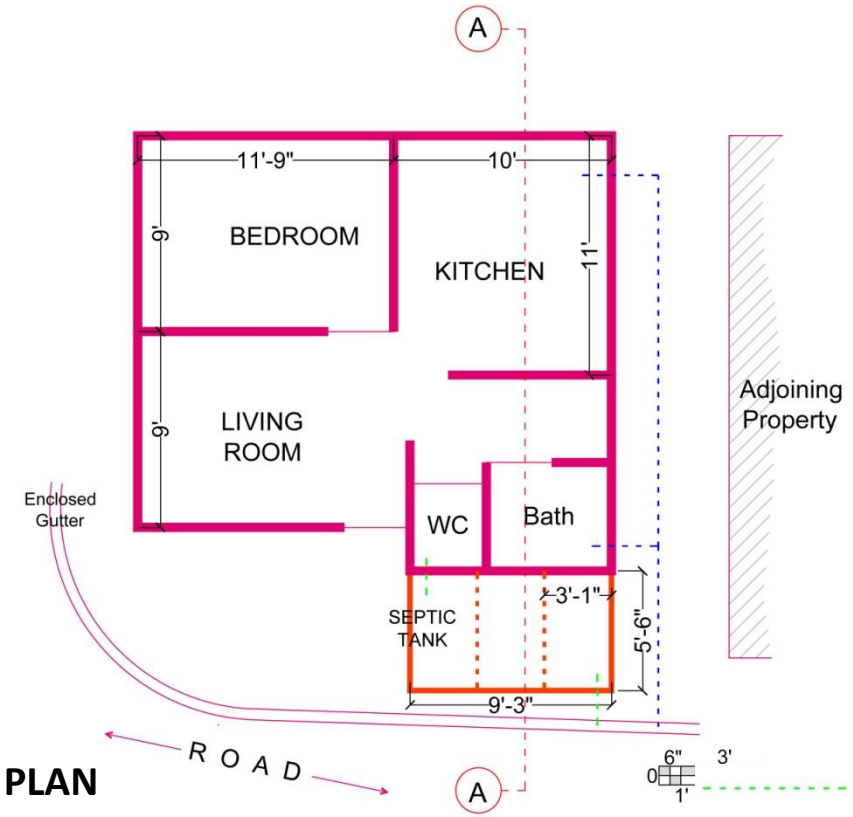
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)

	Length (m)	**Breadth (m)**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (2 Users)	2.69	1.12	2.13	**6.42**
			Observations	**Oversized (322% Extra)**

WATER QUALITY

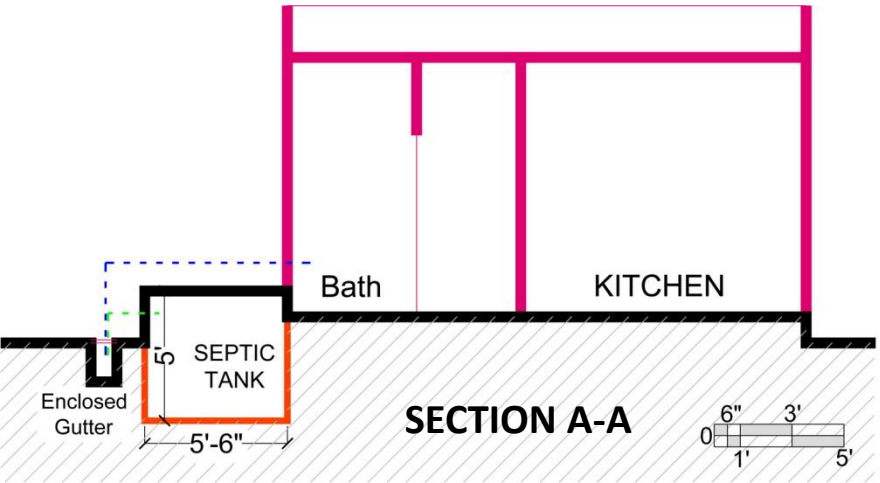
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Raghukul, Pimpri road*	Black Water	--	510	--	--	1370	--	--	7.23	--	854	--	

CASE 21: *VAWIES ROAD, OPPOSITE POST OFFICE*

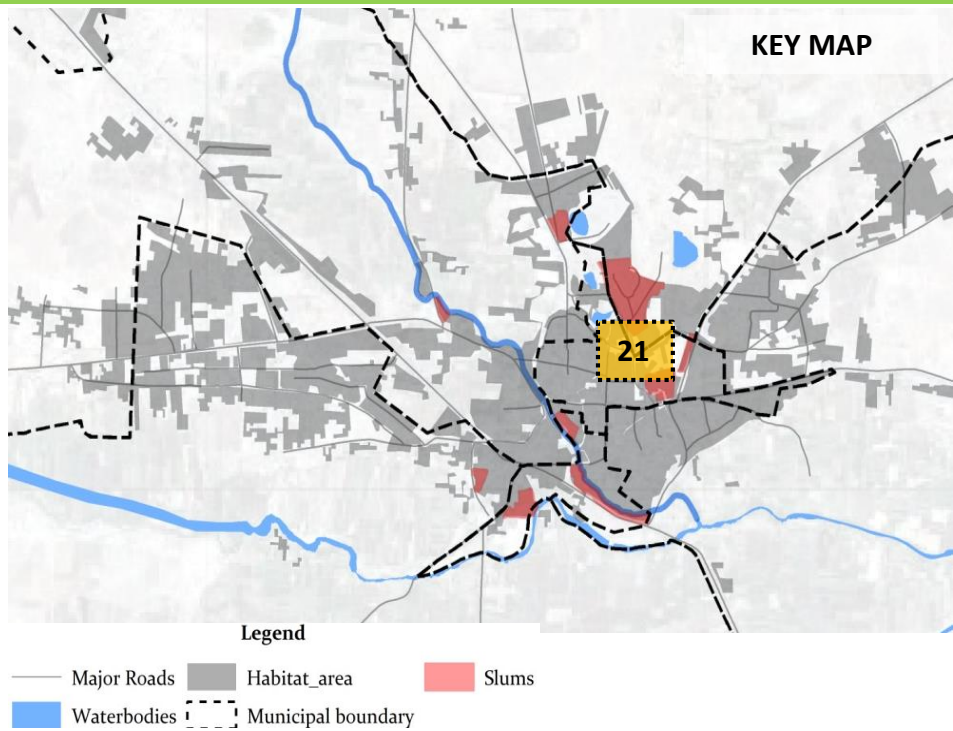


PLAN

- Black Water
- Grey Water



SECTION A-A



CASE 21: *VAWIES ROAD, OPPOSITE POST OFFICE*






CASE 21: *VAWIES ROAD, OPPOSITE POST OFFICE*

Leelawati Ramkishan Pardeshi

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
7	**Ground Floor**	**Black Water**	**Nil**	**Not yet cleaned (Since construction year 2012)**	**Daily (Water) & Weekly (Harpic)**

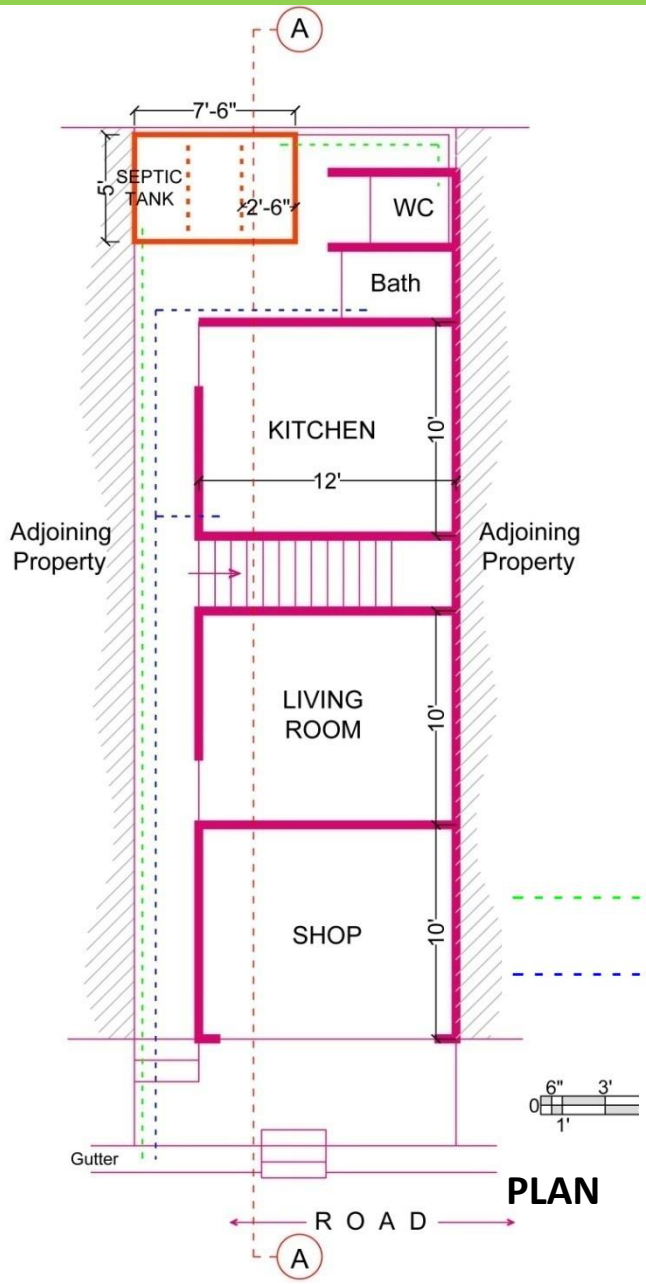
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (10 Users) ***(CPHEEO)***	2.0	0.9	1.3	1.7	**2.34** (Two year Cleaning Interval) **3.06** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (7 Users)	2.51	1.37	1.52	**5.25**
			Observations	**Oversized (72% Extra)**

WATER QUALITY

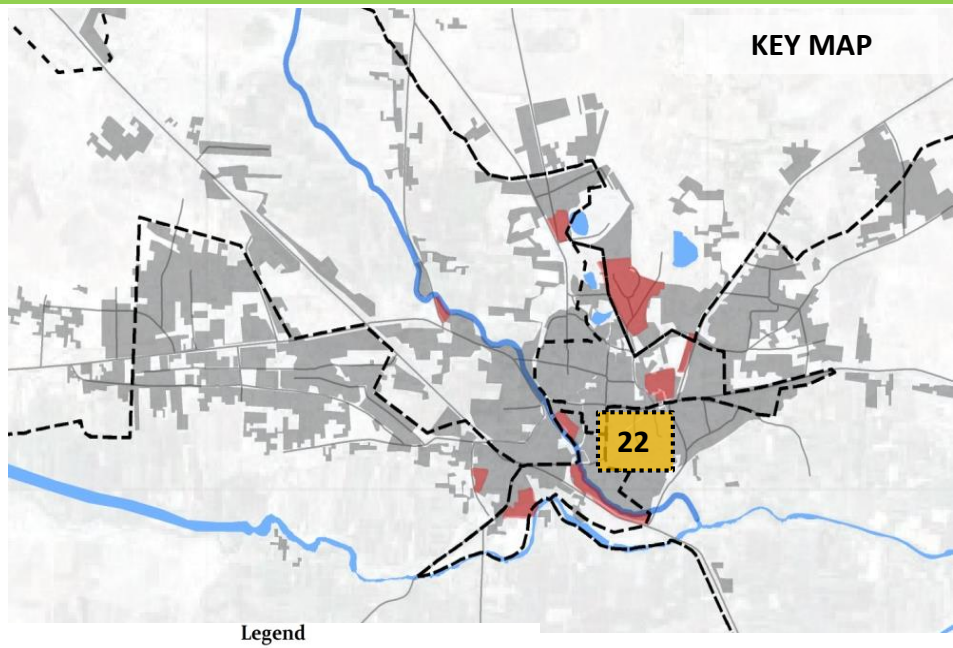
Sr No	Location, Area	Waste water	**Parameters**											
			BOD (mg/l)			**COD (mg/l)**			**pH**		**TSS (mg/l)**			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Vawies road*	Black Water	--	342	--	--	1070	--	--	6.83	--	627	--	

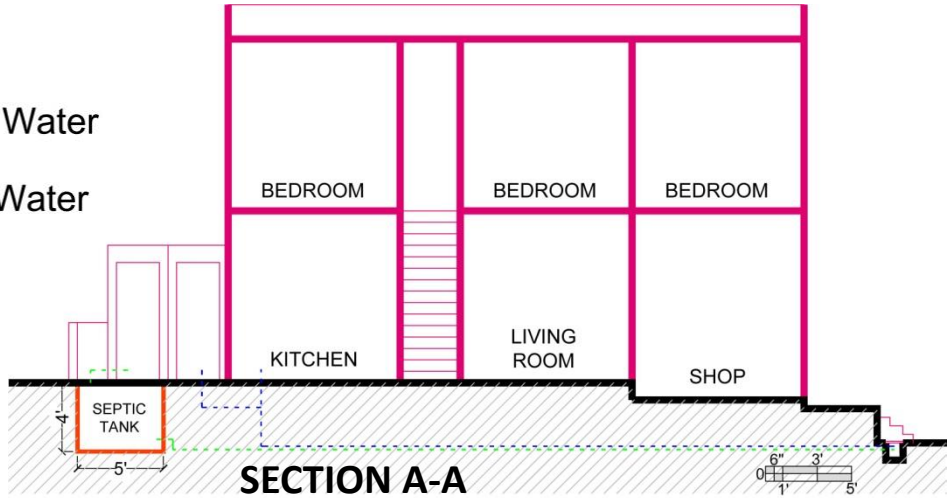
CASE 22: *KUMBHAR GALLI*



PLAN

- Black Water
- Grey Water





SECTION A-A

CASE 22: *KUMBHAR GALLI*

CASE 22: *KUMBHAR GALLI*

Ajay Pawar

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
14	**G+1**	**Black Water**	**Nil**	**Not yet cleaned (Since construction year 2004)**	**Daily (Water) & Weekly (Harpic)**

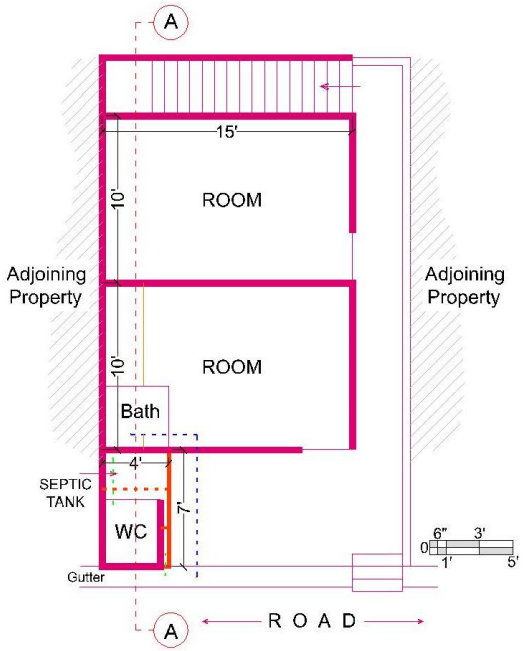
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (15 Users) ***(CPHEEO)***	2.0	0.9	1.6	2.3	**2.88** (Two year Cleaning Interval) **4.14** (Three year cleaning interval)

	Length (m)	**Breadth (m)**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (14 Users)	1.98	1.21	1.21	**2.94**
			Observations	**Undersized (29% Smaller)**

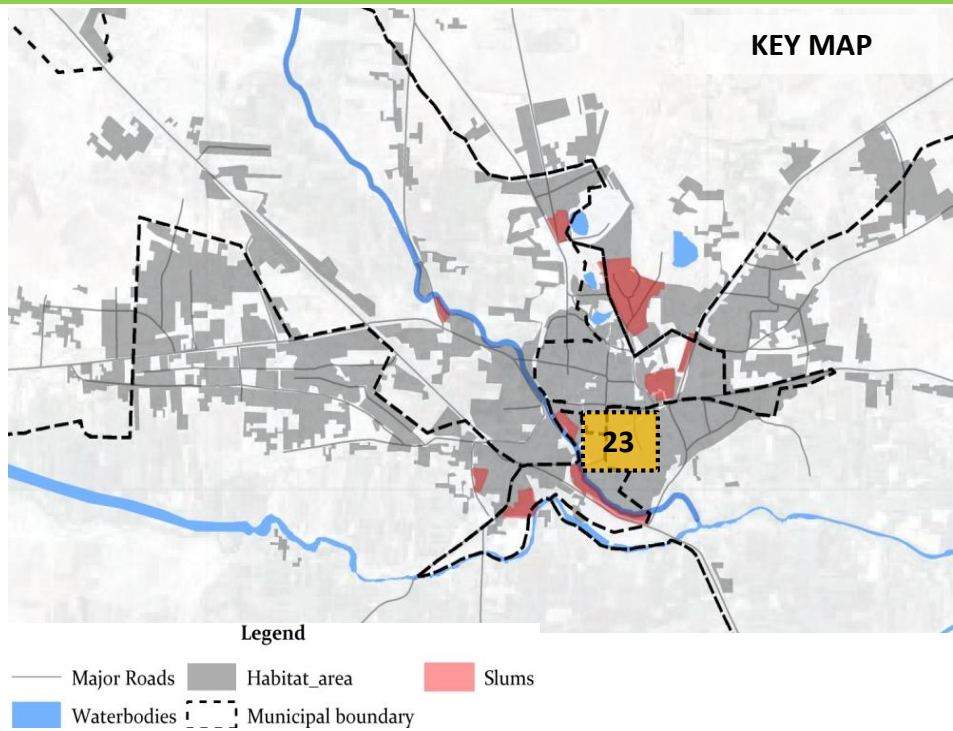
WATER QUALITY

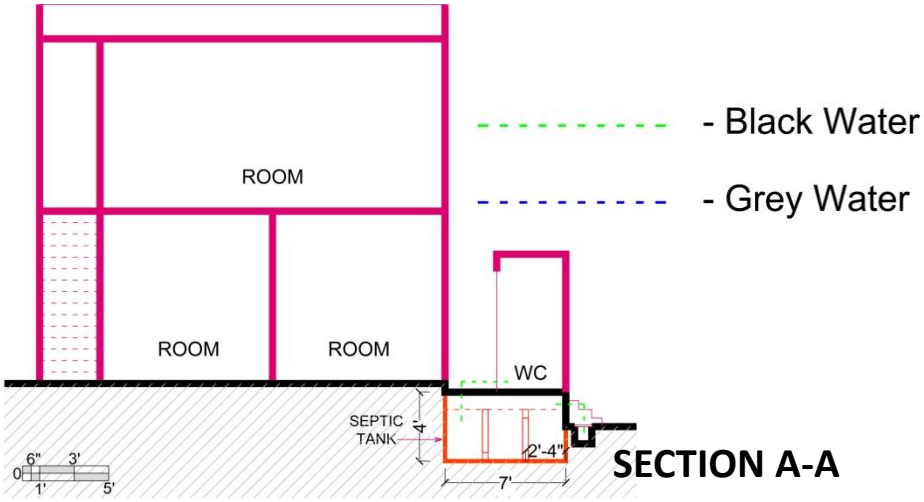
Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	*Kumbhar Galli*	Black Water	--	159	--	--	400	--	--	6.89	--	292	--

CASE 23: *SETTE GALLI*



PLAN





- Black Water

- Grey Water

SECTION A-A

CASE 23: *SETTE GALLI*






CASE 23: *SETTE GALLI*

Manoj Khedkar

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
12	**G+1**	**Black Water**	**Nil**	**Not yet cleaned (Since construction year 2013)**	**Daily (Water) & Weekly (Harpic)**

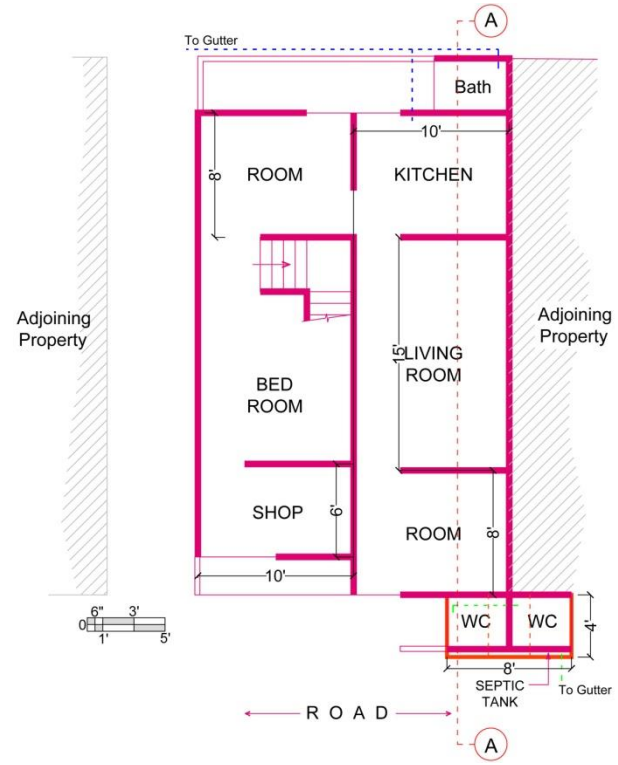
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (15 Users) ***(CPHEEO)***	2.0	0.9	1.6	2.3	**2.88** (Two year Cleaning Interval) **4.41** (Three year cleaning interval)

	L	**B**	**Height (m)**	**Volume of the tank** (Cum)
Actual Size of the tank (12 Users) (Precast ST)	1.83 (Diameter)	NA	1.21	**2.23**
			Observations	**Undersized (46% Smaller)**

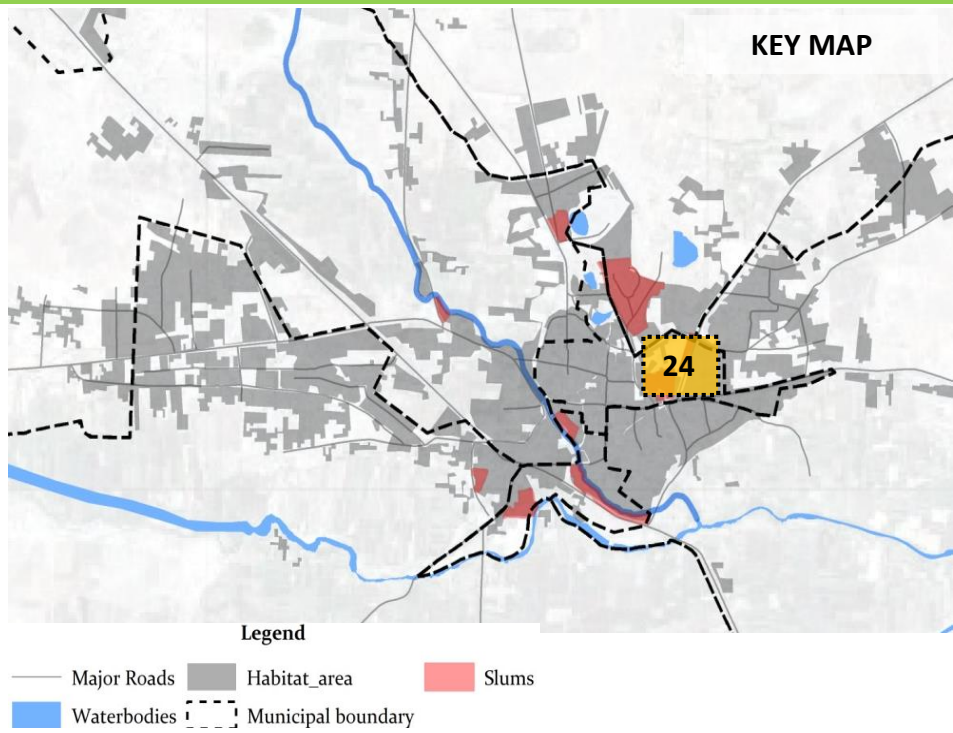
WATER QUALITY

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Sette Galli*	Black Water	--	144	--	--	389	--	--	7.14	--	121	--	

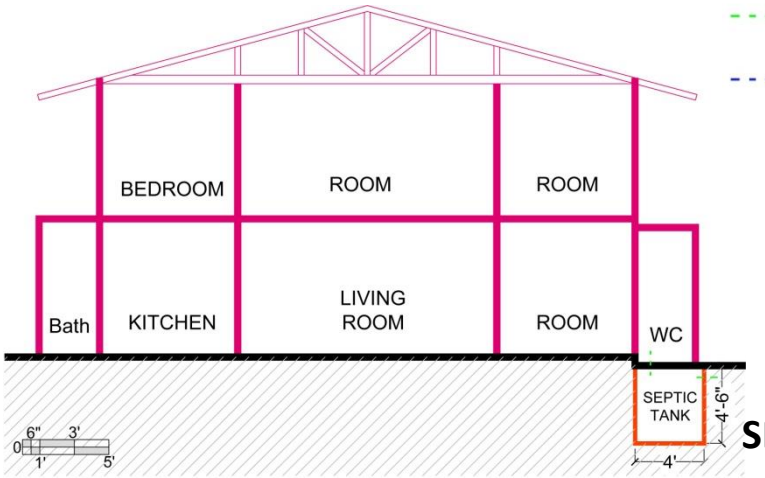
CASE 24: *LONDHE GALLI*



PLAN



- Black Water
- Grey Water



SECTION A-A

CASE 24: *LONDHE GALLI*






CASE 24: *LONDHE GALLI*

Chandadev Ingle

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
4	**G+1**	**Black Water**	**One time**	**March 2014**	**Daily (Water) & Weekly (Harpic)**

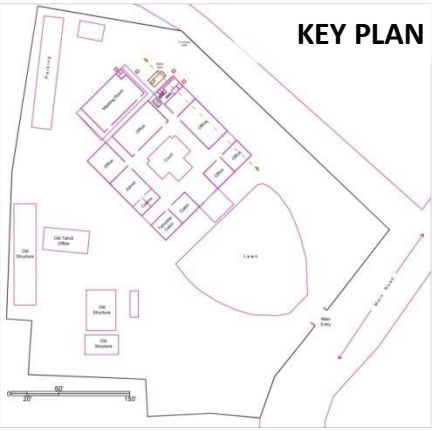
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)		**Volume of the tank** (Cum)
			(Cleaning interval - 2 year)	(Cleaning interval - 3 year)	
Recommended Size of the Septic tank (5 Users) ***(CPHEEO)***	1.5	0.75	1.3	1.35	**1.46** (Two year Cleaning Interval) **1.52** (Three year cleaning interval)
	L	**B**	**Height (m)**		**Volume of the tank** (Cum)
Actual Size of the tank (4 Users)	2.13	0.91	1.37		**2.67**
				Observations	**Oversized (76% Smaller)**

WATER QUALITY

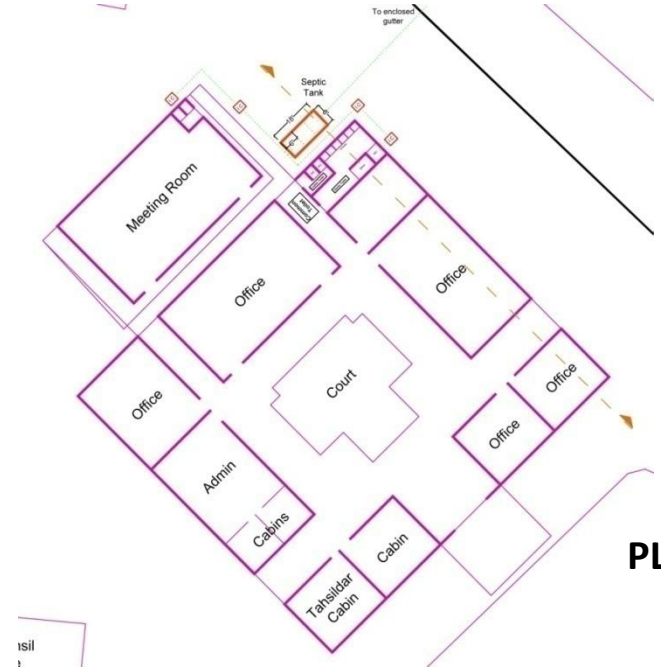
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Londhe Galli*	Black Water	--	348	--	--	940	--	--	7.23	--	292	--	

INSTITUTIONAL BUILDINGS-

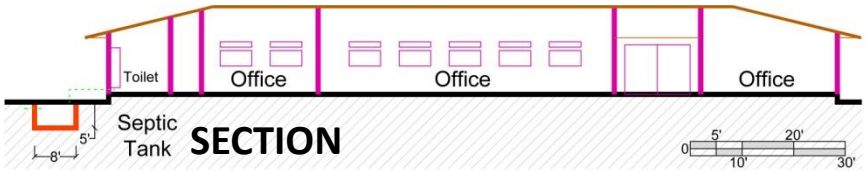
CASE 1: *TEHSHIL OFFICE*



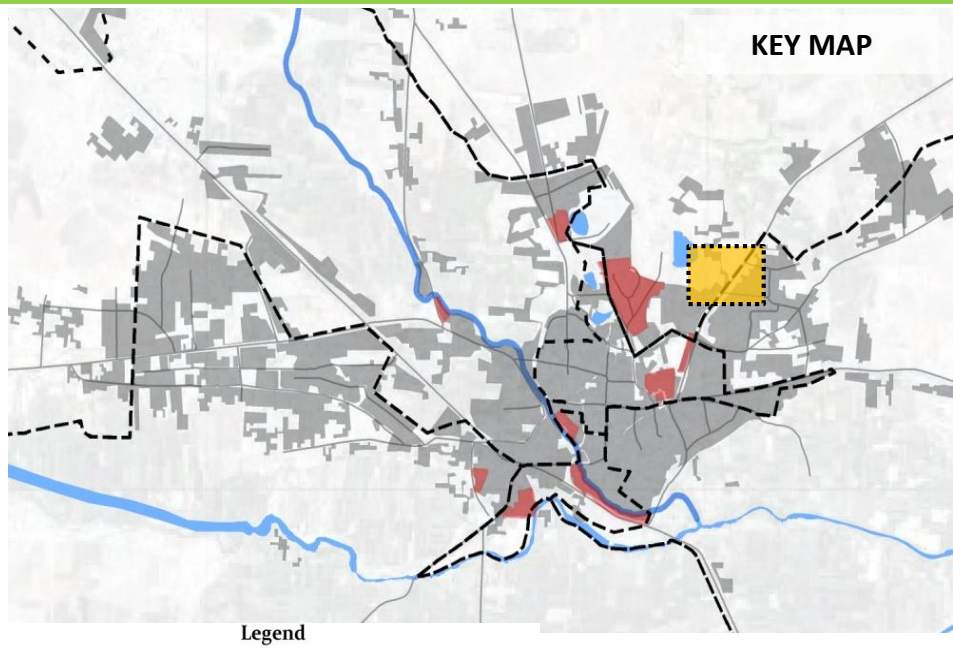
- Black Water



PLAN



SECTION



CASE 1: *TEHSHIL OFFICE*

CASE 1: *TEHSHIL OFFICE*

Mr. Patil (Nayab Tehshildar)

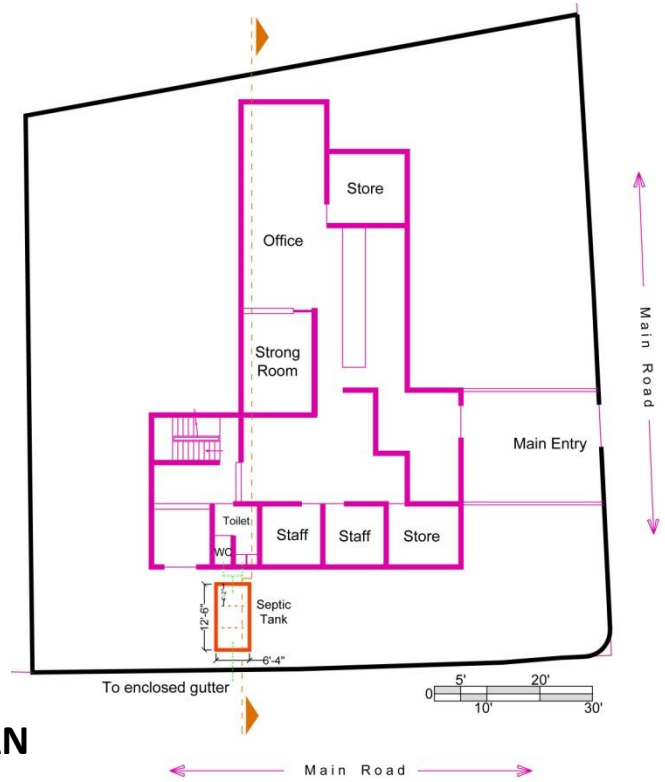
Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
277	**Ground Floor**	**Black Water**	**Nil**	**Not yet cleaned (Since construction year 2011)**	**Daily (Water) & Weekly (Harpic)**

	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)	**Volume of the tank** (Cum)
Size of the Septic tank (277 Users) (*Based on experience of experts/consultants)*	5.1	1.7	1.3 (Cleaning interval of one year)	8.52 (Cleaning interval of one year)
Actual Size of the tank (277 Users)	5.48	2.43	1.52	20.38
			Observation	**Oversized (139 Extra)**

WATER QUALITY

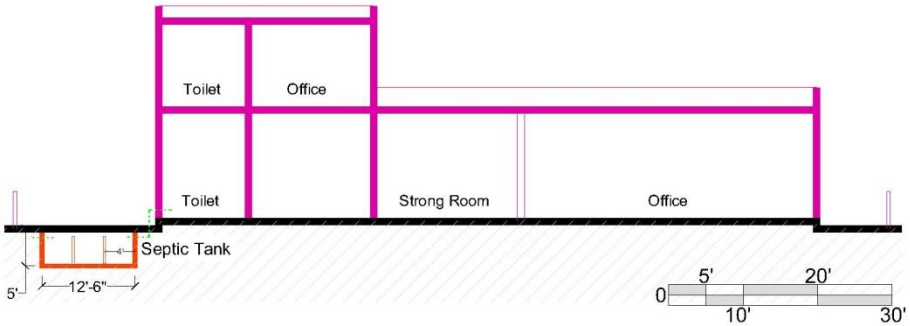
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Tehshil Office*	Black Water	246	182	26%	456	325	28.72	6.94	7.46	225	164	27.11	
2	*Tehshil Office*	Grey Water	--	--	--	--	--	--	--	--	--	--	--	

CASE 2: *POST OFFICE*

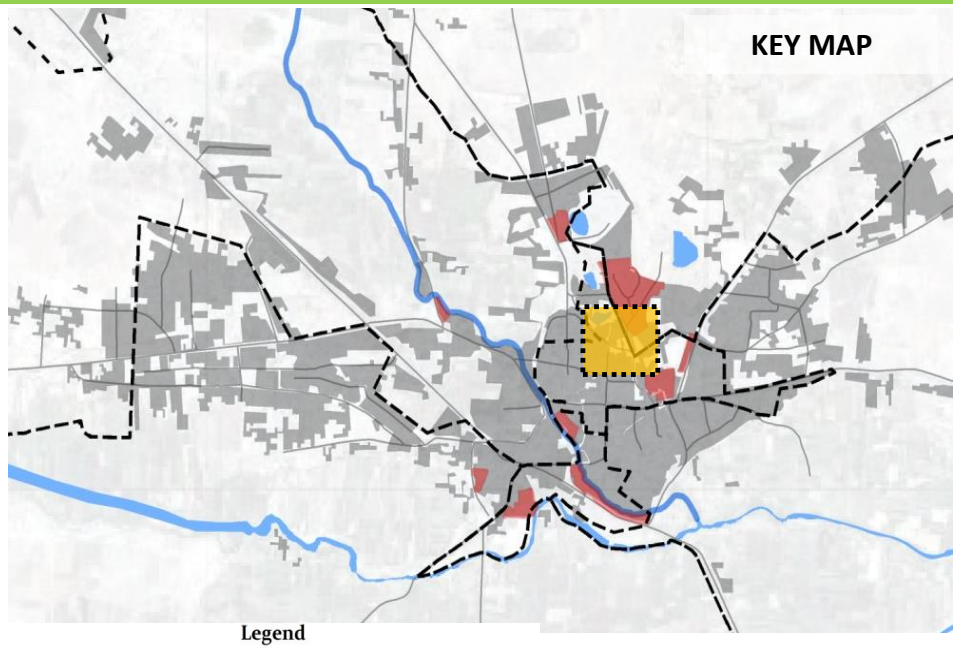


PLAN

- Black Water



SECTION



CASE 2: *POST OFFICE*

CASE 2: *POST OFFICE*

B.D.Jadhav (Post Master)

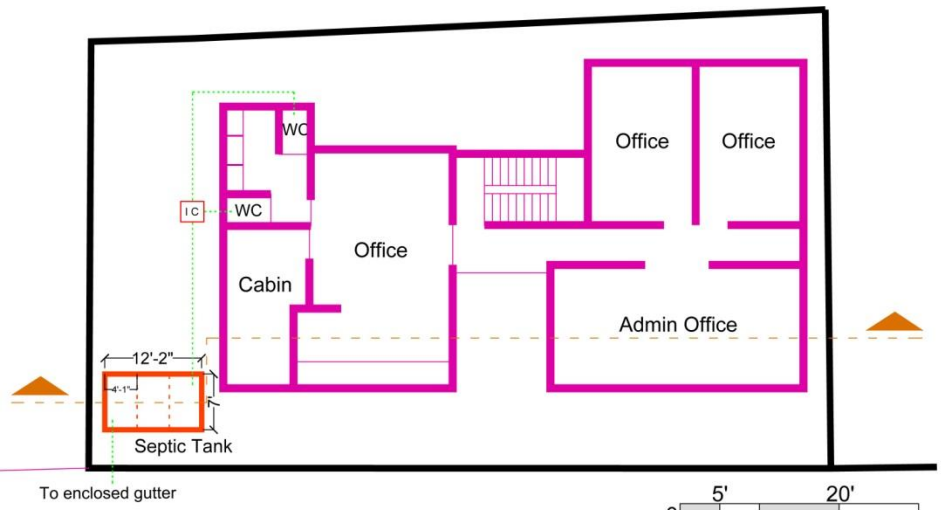
Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
15	**G+1**	**Black Water**	**Nil**	**Not yet cleaned (Since last 10-15 years)**	**Daily (Water) & Weekly (Harpic)**

	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)	**Volume of the tank** (Cum)
Recommended Size of the Septic tank (15 Users) ***(Based on experience of experts/consultants)***	1.2	0.4	1.3 (Cleaning interval of one year)	0.461 (Cleaning interval of one year)
Actual Size of the tank (15 Users)	3.65	1.37	1.52	7.64
			Observation	**Oversized (1557% Extra)**

WATER QUALITY

Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	*Post Office*	Black Water	230	192	16.52	426	382	10.32	6.45	7.23	285	201	29.47
2	*Post Office*	Grey Water	--	--	--	--	--	--	--	--	--	--	--

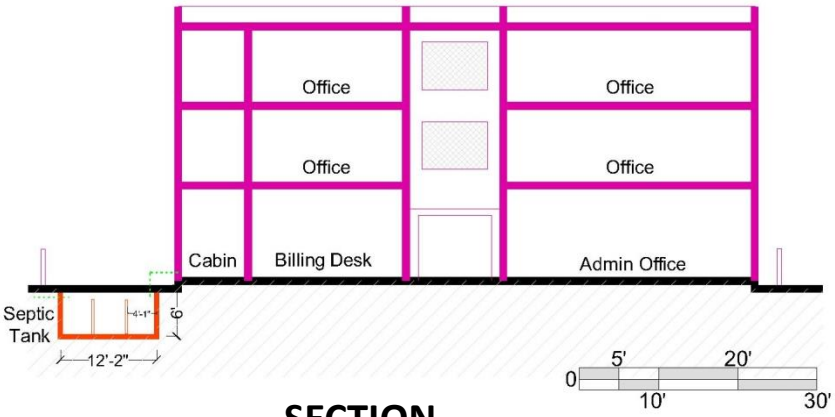
CASE 3: *BSNL OFFICE*



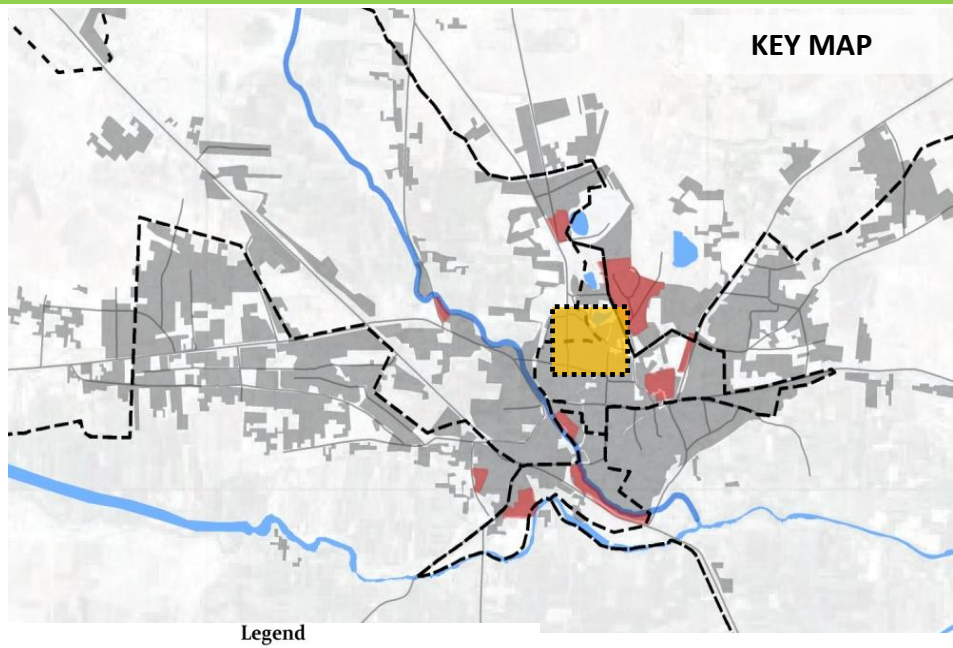
PLAN

Main Road

- Black Water



SECTION



CASE 3: *BSNL OFFICE*

CASE 3: *BSNL OFFICE*

B.D.Gaikar

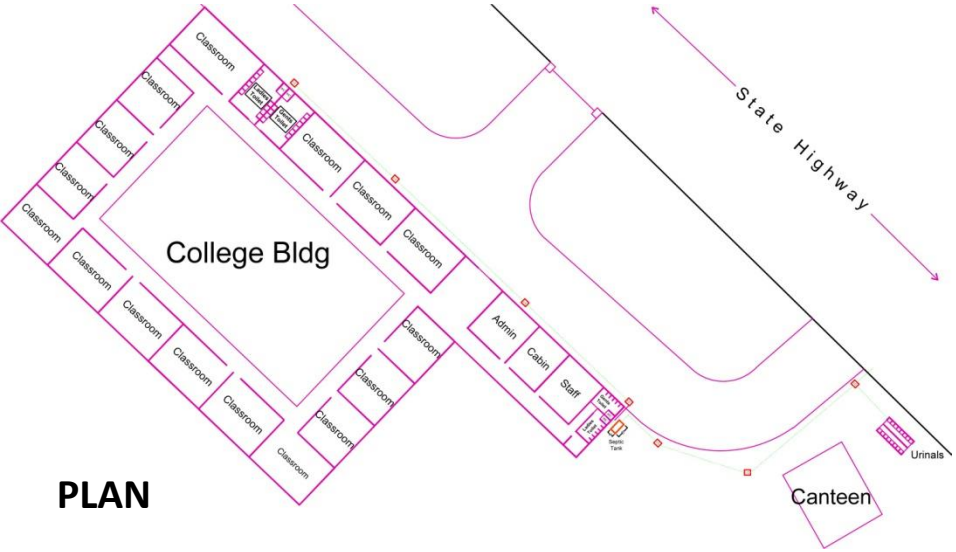
Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
36	**G+2**	**Black Water**	Nil	**Not yet cleaned (Since last 9-10 years)**	**Daily (Water) & Weekly (Harpic)**

	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)	**Volume of the tank** (Cum)
Recommended Size of the Septic tank (36 Users) (*Based on experience of experts/consultants)*	1.8	0.6	1.3 (Cleaning interval of one year)	1.44 (Cleaning interval of one year)
Actual Size of the tank (36 Users	3.70	2.13	1.82	14.46
			Observation	Oversized (904% Extra)

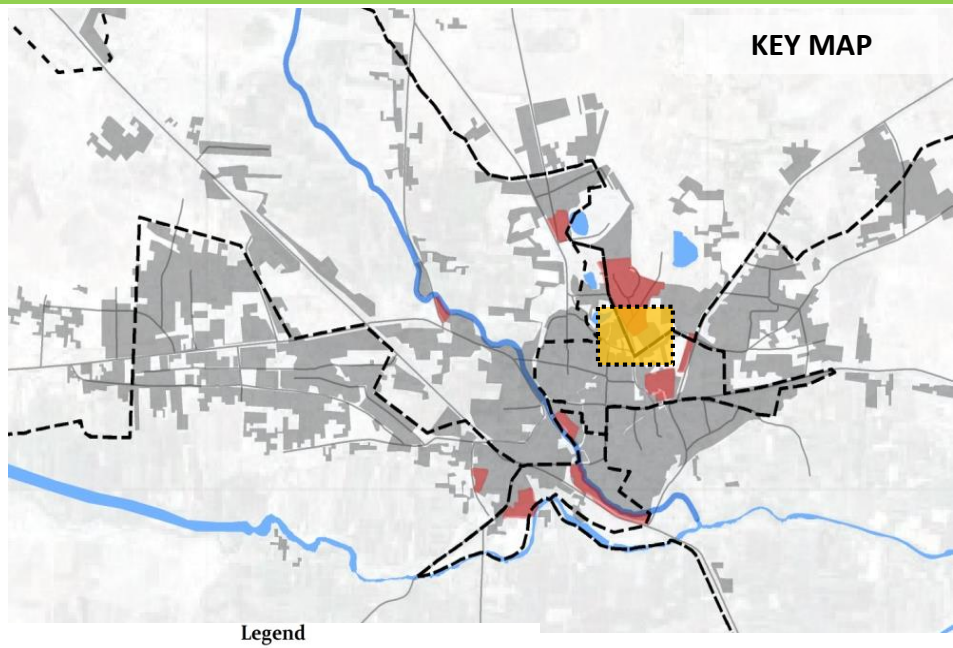
WATER QUALITY

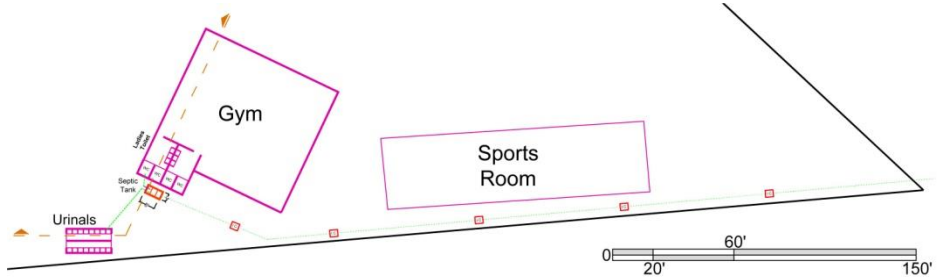
Sr No	Location, Area	Waste water	Parameters										
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)		
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction
1	*BSNL Office*	Black Water	--	302	--	--	525	--	--	7.15	--	226	--
2	*BSNL Office*	Grey Water	--	--	--	--	--	--	--	--	--	--	--

CASE 4: *GMD COLLEGE, SINNAR*



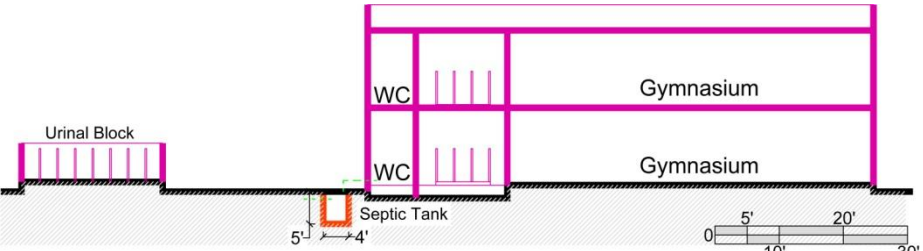
PLAN





PLAN

- Black Water



SECTION

CASE 4: *BMD COLLEGE, SINNAR*

CASE 4: *GMD COLLEGE, SINNAR*

Gayakwad

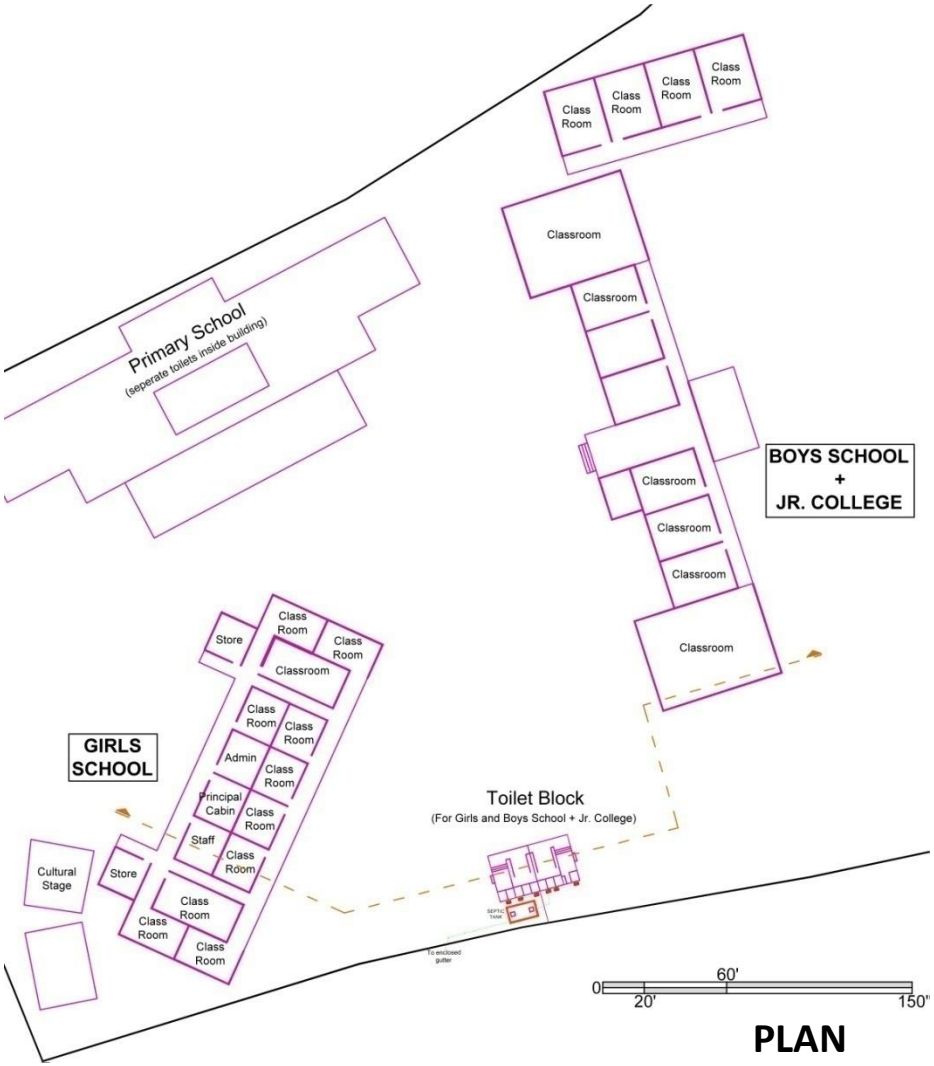
Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
500	**G+1**	**Black Water**	**Nil**	**Not yet cleaned (Since last 10-15 years)**	**Daily (Water) & Weekly (Harpic)**

	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)	**Volume of the tank** (Cum)
Size of the Septic tank (500 Users) (***Based on experience of experts/consultants)***	9.6	3.2	1.3 (Cleaning interval of one year)	30.76 (Cleaning interval of one year)
Actual Size of the tank (500 Users)	4.11	2.13	1.52	13.37
			Observation	Undersized (57% Smaller)

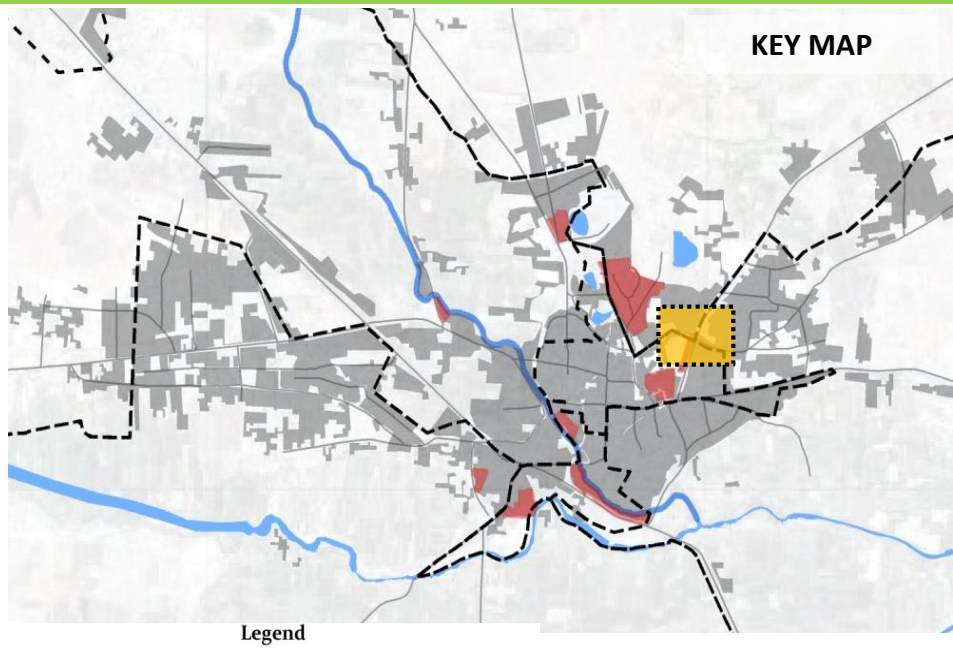
WATER QUALITY

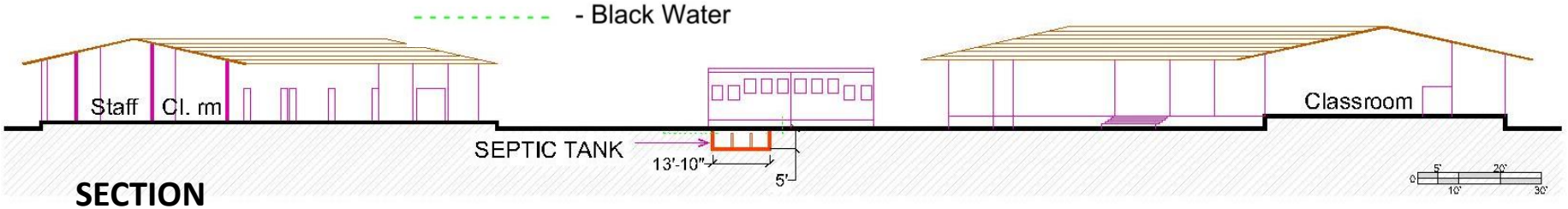
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*BMD College*	Black Water	--	--	--	--	--	--	--	--	--	--	--	
2	*BMD college*	Grey Water	--	--	--	--	--	--	--	--	--	--	--	

CASE 5: *MARATHI SCHOOL*



PLAN





SECTION

CASE 5: *MARATHI SCHOOL*

CASE 5: *MARATHI SCHOOL*

P.L.Thoke (Principal)

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	When was septic tank last emptied?	How toilet is cleaned?
951	**G**	**Black Water**	**Nil**	**Not yet cleaned (Since 10-15 years)**	**Daily (Water) & Weekly (Harpic)**

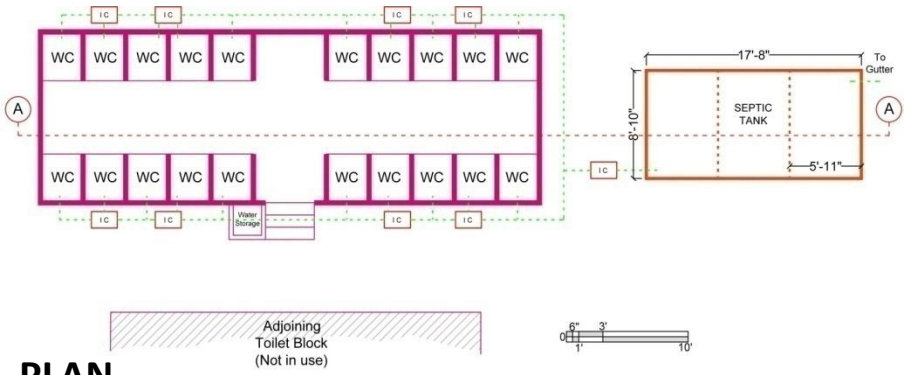
	Length (m)	**Breadth (m)**	**Height (m)** (300mm free board has been considered)	**Volume of the tank** (Cum)
Size of the Septic tank (595 Users) ***(Based on experience of experts/consultants)***	9.4	3.1	1.3 (Cleaning interval of one year)	38.04 (Cleaning interval of one year)
Actual size of the septic tank (595 Users)	4.21	2.31	1.52	14.85
			Observation	**Undersized (61% Smaller)**

WATER QUALITY

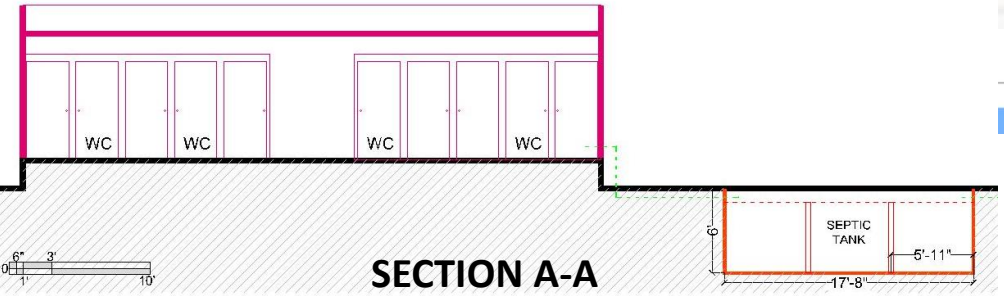
Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Marathi School*	Black Water	351	298	15	654	589	9.93	6.9	7.13	346	295	14.74	
2	*Marathi school*	Grey Water	--	--	--	--	--	--	--	--	--	--	--	

COMMUNITY TOILETS-

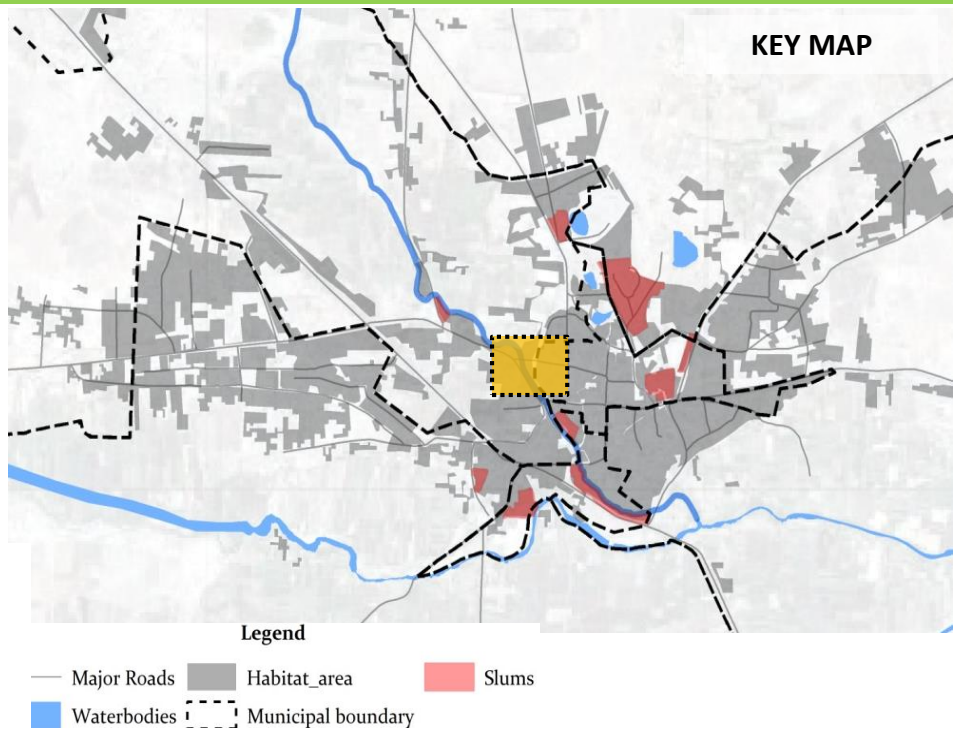
CASE 1: COMMUNITY TOILET *(Near Bail Bazar)*



PLAN



SECTION A-A



CASE 1: COMMUNITY TOILET *(Near Bail Bazar)*






CASE 1: COMMUNITY TOILET (Near Bailbazar)

The following **norms** for number of seats, urinals, bathrooms and area for washing may be adopted:

Sr. No	Type of toilets	Toilet Seats	Bath units	Urinal units	Clothes Washing area
1	Community Toilet	One seat per 50 users	One unit per 50 users	One unit per 2003-300 users	4 to 5 square meter per 10 toilet seats; Min.1.5 m x 1.2 m
2	Public toilet near railway stations (may be used at all hours)	One seat per 100 users	One unit per 70 users	One unit per 300-500 users	4 to 5 square meter per 30 toilet seats; Min.1.5 m x 1.2 m
3	Public toilet near market place/offices (will mostly be used during working hours)	One seat per 100 users	One unit per 200-300 users	One unit per 200-300 users	4 to 5 square meter 10 toilet seats; Min.1.5m x 1.2 m

Source: The guidelines for community toilet , 1995, ***Ministry of urban affairs & employment , Government of India***

Note: The numbers of toilet seats, baths, urinals and washing area given in the table have been derived from the conclusions made during and data collected from the primary survey.

Note: The number of users assumed in the further assessment is 35 persons per seat.
This assumed number of users has been concluded from the experiences and data collected during the primary survey.

In all the further calculations, even though the number of users per seat have been assumed as per the learning's from the primary surveys, the methodology used for calculating the volume of septic tanks is based on the CPHEEO guidelines and the IS Code

CASE 1: COMMUNITY TOILET *(Near Bail Bazar)*

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	How toilet is cleaned?
700	Community toilet	Black water	Once In Every week	Daily

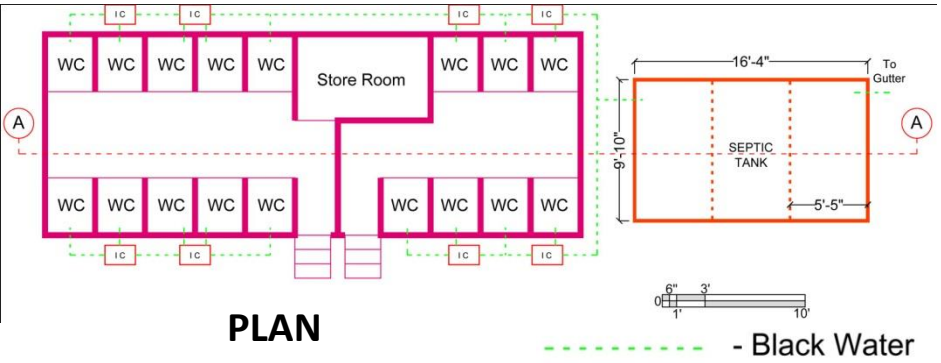
	Length (m)	Breadth (m)	Height(m) (300 mm free board has been considered)	Volume of the septic tank (Cu m)
Actual Size of the tank	5.38	2.69	1.8	**26.04**
Size of the Septic tank (700 Users) (Calculated based on certain assumption for same has been mentioned in previous slide ***(Based on experience of experts/consultants)***	13.66	4.55	1.30	**80.80** (Cleaning interval of one year)

References:
Indian Standards (2470 (PART 1) -1958), " Code of practices for installation of septic tanks", Design criteria and construction *(Second revision)*
The capacities are recommended on the assumption that the discharges from only WC will be treated in the septic tank.

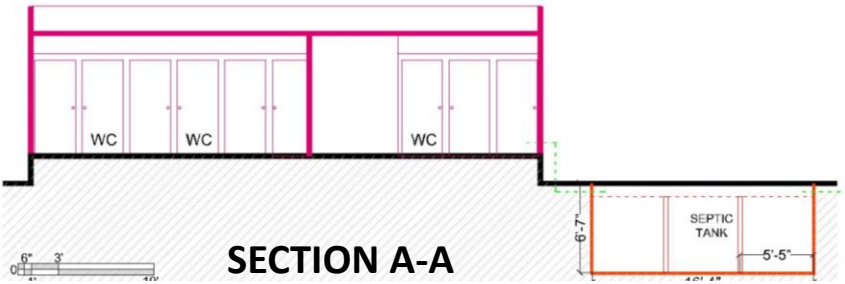
Undersized (68% Smaller)

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	*Bail Bazar*	Black water	--	465	--	--	1140	--	--	7.62	--	296	--	

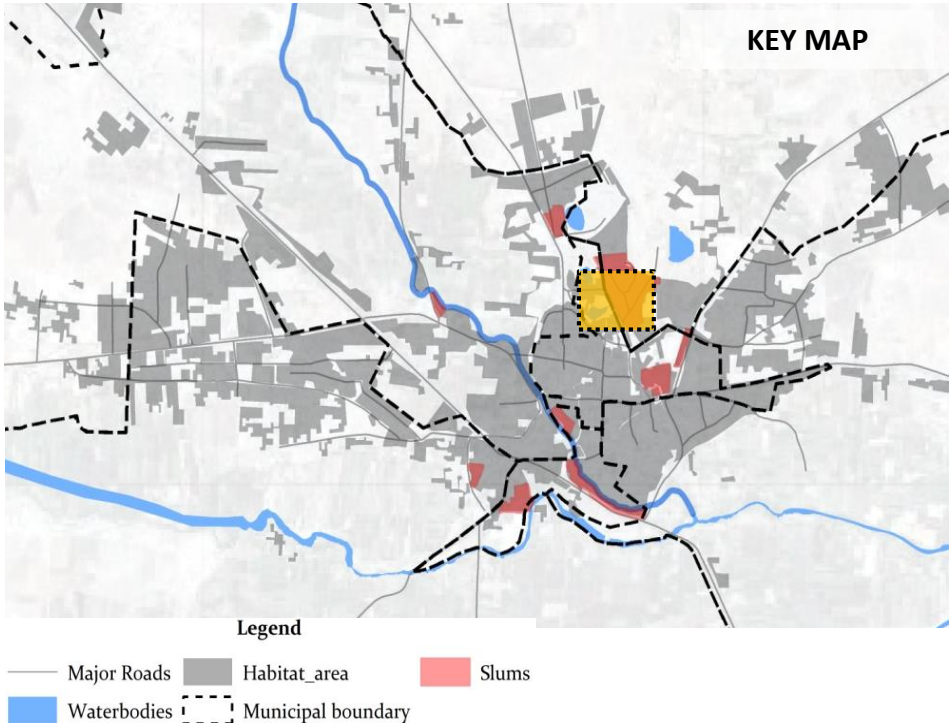
CASE 2: COMMUNITY TOILET AT KHADAKPURA



PLAN



SECTION A-A



CASE 2: COMMUNITY TOILET AT KHADAKPURA

CASE 2: COMMUNITY TOILET AT KHADAKPURA

Users	Building type	Inputs to septic tank	Cleaning frequency of the tank	How toilet is cleaned?
595	Community toilet	Black water	Once In Every Week	Daily

	Length (m)	Breadth (m)	Height(m) (300 mm free board has been considered)	Volume of the septic tank (Cu m)
Actual Size of the tank	4.97	2.99	2.00	**29.94**
Recommended Size of the Septic tank (595 Users) (Calculated based on certain assumption for same has been mentioned in previous slide ***(Based on experience of experts/consultants)***	12.59	4.20	1.30	**68.74** (One year Cleaning Interval)

References:
Indian Standards (2470 (PART 1) -1958), " Code of practices for installation of septic tanks", Design criteria and construction (Second revision)
The capacities are recommended on the assumption that the discharges from only WC will be treated in the septic tank.

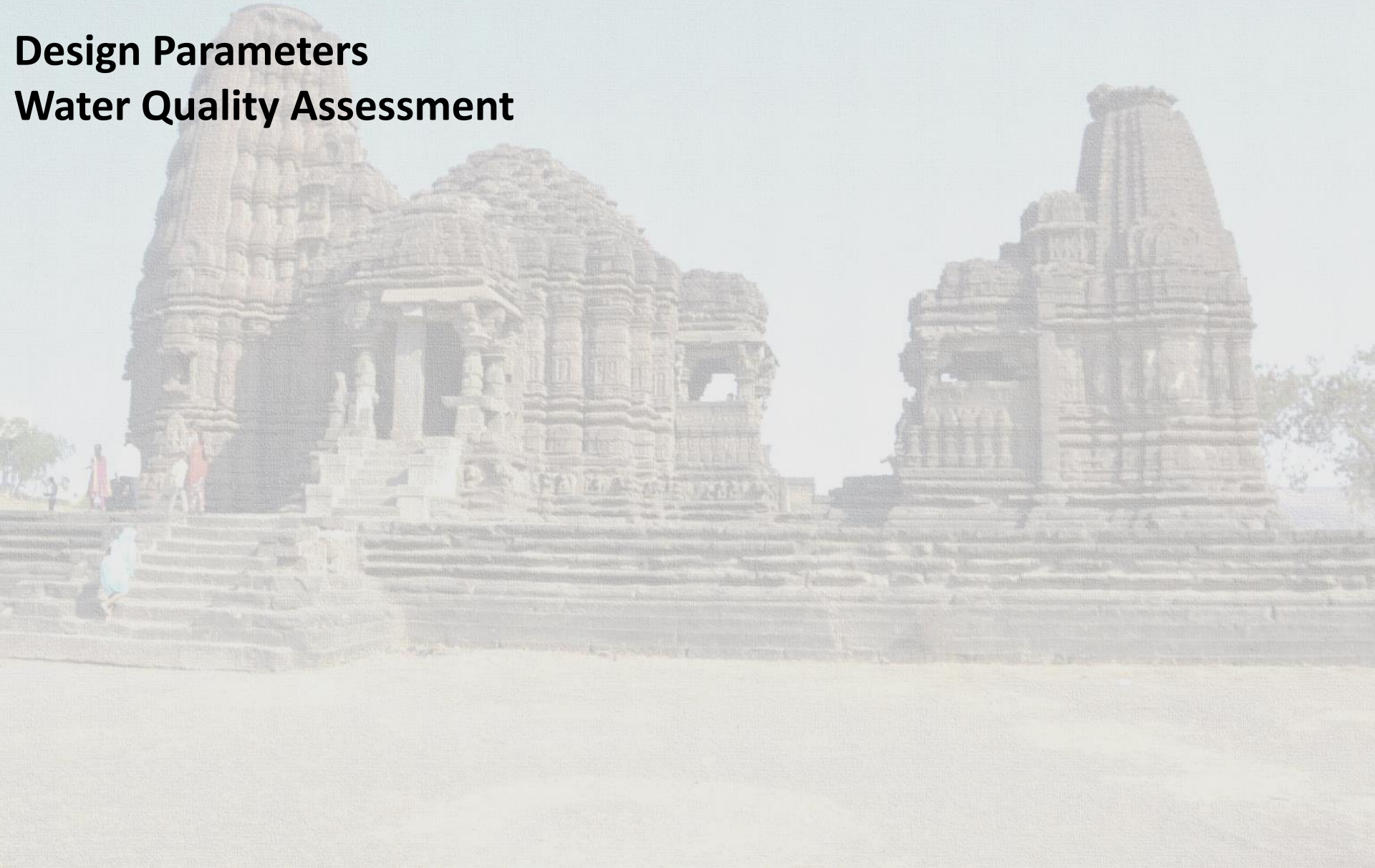
Undersized (56% Smaller)

Sr No	Location, Area	Waste water	Parameters											
			BOD (mg/l)			COD (mg/l)			pH		TSS (mg/l)			
			Inlet	Outlet	% Reduction	Inlet	Outlet	% Reduction	Inlet	Outlet	Inlet	Outlet	% Reduction	
1	Khadakpura	Black Water	--	246	--	--	720	--	--	7.32	--	332	--	

ANALYSIS-

Design Parameters

Water Quality Assessment



GENERAL OBSERVATION-SEPTIC TANKS

VENTILATION PIPES:
In some of the cases no ventilation pipes have been provided to the septic tanks. This is leading to significant odour problems in the vicinity

ACCESSIBILITY:
In few cases the septic tanks are not accessible for maintenance and repairs. This is probably due to location of them below the toilet blocks

OUTFALL:
In newly developed areas effluents from the septic tank are let off into soak pits or nearby areas. In the old city areas these effluents are let-off directly into open/ closed gutters.

DESIGN:
In almost all the cases that we have identified the septic tank is rectangular in shape. Only in one case, the septic is precast and circular in shape

METHOD OF CONSTRUCTION:
Only in a single case, the septic is precast and circular in shape. Rest all the cases have septic tanks constructed on-site

BAFFLES:
In all the cases the septic tanks have been provided with two baffles which separate the tanks into 3 compartments (seen in precast as well)

INPUTS TO SEPTIC TANK:
In all the cases only black water is let-off into the septic tanks. The grey water is directly let-off into nearby drains

MAINTENANCE:
For timely maintenance of the septic tanks adequate number of openings have been provided. The problem is that the openings have been permanently sealed leading to breakage and no re-usability of the lid

MATERIALS:
Almost all the septic tanks in the cases studied have been constructed in brick masonry with cement plastering and RCC lid on top

ANALYSIS- General Observations

Septic Tank Cleaning	Out of the total cases studied the septic tanks were never cleaned in 9 cases, in 2 cases it was cleaned once and in 1 case the septic tank was cleaned more than two times.
Construction Material of Septic Tank	In all the cases studied the septic tanks were built in brick masonry with a concrete slab on the top.

Following table shows the septic tank cleaning practices in Wai town (Based on samples):

Case No	Year of Constrcution Septic tank	Age of Septic tank	Cleaning Frequency of the septic tank	When was the septic tank last emptied?
1	15 years old	15	Nil	Not Yet Cleaned (Since construction year 1998)
2	10 Years back	10	Nil	Not Yet Cleaned (Since Construction year 2003)
3	15 years back	15	Nil	Not Yet Cleaned (Since construction year 1998)
4	1997	16	Nil	Not Yet Cleaned (Since construction year 1997)
5	2006	7	Nil	Not Yet Cleaned (Since construction year 2006)
6	25 years ago	25	Two times	Last Year- Feb or March 2013
7	Dec-13	6 Month	Nil	Not Yet Cleaned (Recently built-2013)
8	5 to 6 years back	5	One time	2 Months Back (November 2013)
9	1 year	1	Nil	Not Yet Cleaned (Recently built-2013)
10	Recenlty Constrcuted	3 Month	Nil	Not yet cleaned (Recently Built-March 2014)
11	2005	8	Nil	Not yet cleaned (Since construction year 2005)
12	2008-09	5	One time	a year ago-Non or Dec 2012

**Not cleaned indicates the septic tank has not been cleaned till date

*** It has also been observed that the general awareness of the people in the cases studied related to the use of toilets and the maintenance of Septic tanks is lacking.**

Cont……

ANALYSIS- General Observations

Cont……

Case No	Year of Construction Septic tank	Age of Septic tank	Cleaning Frequency of the septic tank	When was the septic tank last emptied?
13	2002	11	Once in ever year	Mar-14
14	Dec-13	6 month	Nil	Recently Built-Dec 2013
15	2009	4	One time	Feb-14
16	2011	2	Nil	Not yet cleaned (Since construction year 2011)
17	2004	9	One time	Two years ago- 2012
18	1993	20	Once in every two year	2013
19	2004	9	Nil	Not yet cleaned (Sicne construction year 2004)
20	2000	13	Nil	Not yet cleaned (Since construction year 2000)
21	2012	1	Nil	Not yet cleaned (Since construction year 2012)
22	2004	9	Nil	Not yet cleaned (Since construction year 2004)
23	2013	6 Month	Nil	Not Yet cleaned (Since construction year 2013)
24	2009	4	One time	Mar-14

**Not cleaned indicates the septic tank has not been cleaned till date

*** It has also been observed that the general awareness of the people in the cases studied related to the use of toilets and the maintenance of Septic tanks is lacking.**

ANALYSIS- Design Parameters of septic tank

RESIDENTIAL PROPERTIES					Volume of the Septic tank (cum)				
Case No	Building type	Users (Actual)	Users considered	Age of septic tank (Year)	Actual	AS PER CPHEEO manual (2013) (Cleaning interval of three years)	When was the septic tank last emptied??	Observations	PERCENT **(Small/ Bigger)
1	Individual plot (G+1)	5	5	15	2.13	1.52	Not cleaned	Oversized	+ 40%
2	Individual plot (G)	10	10	10	2.60	2.57	Not cleaned	Undersized	-15%
3	Individual plot (G+1)	10	10	15	9.23	2.57	Not Cleaned	Oversized	+ 202%
4	Bungalow (G+2)	10	10	16	4.46	2.57	Not Cleaned	Oversized	+ 46%
5	Bungalow (G+1)	5	5	7	2.30	1.52	Not cleaned	Oversized	+ 51%
6	Bungalow (G)	7	10	25	1.22	2.57	Not cleaned (More than two years)	Undersized	- 60%
7	Individual plot (G)	5	5	6 Month	1.82	1.52	Not yet cleaned	Oversized	+ 20%
8	Individual plot (G)	5	5	5	5.01	1.52	Not cleaned (More than two years)	Oversized	+ 230%

Continued….

**The observations made related to the size of the Septic tank have been calculated in percent (over or under sized). To calculate this percentage the required volume for a three year interval period as per CPHEEO guidelines have been considered as the appropriate size. The volume of the existing septic tank has been compared to the volume proposed by the guidelines.

ANALYSIS- Design Parameters of septic tank

RESIDENTIAL PROPERTIES					Volume of the Septic tank (cum)				
Case No	Building type	Users (Actual)	Users considered	Age of septic Tank (Year)	Actual	AS PER CPHEEO manual (2013) (Cleaning interval of three years)	When was the septic tank last emptied??	Observations	PERCENT **(Small/ Bigger)
9	Individual plot (G)	5	5	1	4.51	1.52	Not yet cleaned	Oversized	+ 197%
10	Individual plot (G)	5	5	3 Month	0.72	1.52	NA	Undersized	- 53%
11	Apartment (G+4)	50	50	8	11.75	15.40	Not yet cleaned	Undersized	- 24%
12	Individual plot (G+1)	5	5	5	3.24	1.52	Once in 2 years	Oversized	+ 113%
13	Individual plot (G+1)	4	11	Under Construction	4.32	1.52	Once in a every year	Oversized	+ 184%
14	Individual plot (G)	4	6 month	2014	1.52	0.99	NA	Undersized	- 35%
15	Individual plot (G)	8	4	5	9.04	2.57	Feb 2014	Oversized	+ 195%
16	Individual plot (G)	9	2	3	6.05	2.57	Not Yet Cleaned	Oversized	+ 135%
17	Individual plot (G)	9	9	10	2.01	2.57	2012	Undersized	- 22%
18	Bungalow (G+1)	4	20	21	7.73	1.52	2009	Oversized	+ 409%

Continued….

**The observations made related to the size of the Septic tank have been calculated in percent (over or under sized). To calculate this percentage the required volume for a three year interval period as per CPHEEO guidelines have been considered as the appropriate size. The volume of the existing septic tank has been compared to the volume proposed by the guidelines.

ANALYSIS- Design Parameters of septic tank

RESIDENTIAL PROPERTIES					Volume of the Septic tank (cum)				
Case No	Building type	Users (Actual)	Users considered	Age of septic tank (Year)	Actual	AS PER CPHEEO manual (2013) (Cleaning interval of three years)	When was the septic tank last emptied??	Observations	PERCENT **(Small/Bigger)
19	Individual plot (G+1)	5	5	9	6.08	1.52	Not Cleaned	Oversized	+ 300%
20	Individual plot (G)	2	5	13	6.42	1.52	Not Cleaned	Oversized	+ 322%
21	Individual plot (G)	7	10	1	5.25	2.57	No cleaned	Oversized	+ 72%
22	Individual plot (G+1)	14	15	9	2.94	4.41	Not cleaned	Undersized	- 29%
23	Individual plot (G+1)	12	15	6 Month	2.23	4.41	Not Cleaned	Undersized	-46%
24	Individual plot (G+1)	4	5	4	2.67	1.52	2014	Oversized	+76%

**The observations made related to the size of the Septic tank have been calculated in percent (over or under sized). To calculate this percentage the required volume for a three year interval period as per CPHEEO guidelines have been considered as the appropriate size. The volume of the existing septic tank has been compared to the volume proposed by the guidelines.

Cleaning Frequencies of the Septic Tanks:

Out of the total cases studied the septic tanks can be divided into 3 categories on the basis of their cleaning frequencies:

a.) Tanks never cleaned or cleaned before 5 years: 19 cases
b.) Recently constructed and never cleaned: 2 cases
c.) Regularly cleaned Septic tanks (once in 2 years/ every year): 3 cases

•*Above conclusions show there is severe need of spreading awareness related to cleaning and proper maintenance of the septic tanks in the users.*

Size of the Septic Tanks:

Out of the total cases studied the septic tanks can be divided into 3 categories on the basis of the sizes

a.) Oversized Septic Tanks: 16 cases
b.) Undersized Septic Tanks: 7 cases
c.) Adequately sized Septic Tanks: 1 case

** The conclusions related to the size of the septic tanks is derived by comparing the existing volume of the septic tank with the minimum required size as per standards*

ANALYSIS- Comparison of Design Parameters of septic tank

As per IS Code		Current Practices Observed	
Parameter	**Criteria**	**Y/N**	**Observation from the case studies**
Design	Usually the design of a septic tank must be rectangular or circular Rectangular Tanks: length must be 2 to 4 times the width Circular: Diameter must be 1.35 meter (minimum)	Y	Design of the septic tanks observed has been as per the standards. Majority of the septic have followed the minimum dimensions
Construction Technique/ Materials	The walls and floor of the septic tank must be of thickness to provide adequate strength and water tightness. Thickness: for brick work 200 mm thick with 12 mm thick plaster, for stone masonary minimum thickness must be 370 mm	Y	All the cases have the septic tanks built in brick masonary and are built as per standards
No. of Baffles	If ST volume exceeds 2000 litres, tank must be divided into two chambers. It must be divided using a fixed durable partition. Suitable openings must be provided to the partitions (100 to 150mm opening/dia)	Y	Mostly the septic tanks have 2 baffles and 3 compartments with adequate openings in the partitions
Openings	Each compartment of the tank must have an opening (Rect. - min 455x610 mm/ Circ. -min. 500 mm dia.) Cover to this opening: RCC or of Cast Iron Must be removable and must be sealing the opening properly	P-Partial	In all the cases, the septic tanks have adequate number of openings. The problem is that the opening have been sealed, which leads to breakage in case of maintenance

* The above table shows a comparison between the design parameters as per the IS Code with the observations made of the cases studied in the site visit

ANALYSIS- Design Parameters of septic tank

As per IS Code		Current Practices Observed	
Parameter	**Criteria**	**Y/N**	**Observation from the case studies**
Ventilation	Every tank must have a ventilation pipe (50mm dia) with a suitable cage/ mesh on top Height of pipe: 2m if tank is 20 mtr or more away from building, 2m above building top if tank is closer than 20 mtr to the building	Y	In several cases the septic tanks have ventilation pipes, but ventilation pipes are below 2 meter from the building height. Some of the people really complain about the odour problem due to in efficiency of the septic tank.
Accessibility/ Location	Location should be open to sky, as far as possible from the exterior wall of a building, should not be located in swampy areas or flood prone areas	N	Locations are as per standards and mostly the septic tanks are accessible
Outfall of ST	Effluent should not be let-off into an open channel drain or water body	N	Effluents in most of the cases is let-off into open/ closed drains. In few cases it is let-off into soak pits (newly developed areas)
Cleaning Practices	Large tanks must be cleaned on half yearly/ yearly basis. For domestic tanks cleaning must be done once in two years	N	Very few septic tanks are regularly cleaned. Awareness related to cleaning of septic tanks is less

Y – as per IS Code and N – not as per the standards

ANALYSIS- Design Parameters of septic tank

INSTITUTIONAL BUILDINGS					Volume of the Septic tank (cum)				
Case No	Building type	Users (Actual)	Users considered	Age of septic tank (Year)	Actual	*Calculated Based on experience of experts/ Consultants (Cleaning interval of one year)*	When was the septic tank last emptied??	Observations	PERCENT **(Small/ Bigger)
1	*Tehshil* Office (G)	277	277	3	20.38	8.52	Not yet cleaned (Since construction year 2011)	Oversized	+139%
2	Post office (G+1)	15	15	42	7.64	0.46	Not yet cleaned (Since last 10 years)	Oversized	+1557
3	BSNL Office	36	36	40	14.46	1.44	Not yet cleaned (Since last 9-10 years)	Oversized	+904%
4	BMD college (G+1)	500	500	45	13.37	30.76	Not Yet cleaned (Since last 10-15 years)	Undersized	-57%
5	Marathi School (G)	595	595	55	14.85	38.04	Not yet cleaned (Since last 10-15 years)	Undersized	-61%

1.) To calculate the sewage generated in each of the cases, the unit considered for is 20 lpcd

Size of the Septic Tanks:

Out of the total cases studied the septic tanks can be divided into 3 categories on the basis of the sizes

a.) Oversized Septic Tanks: 3 cases

b.) Undersized Septic Tanks: 2 cases

** The conclusions related to the size of the septic tanks is derived by comparing the existing volume of the septic tank with the minimum required size as per standards*

ANALYSIS- Design Parameters of septic tank

COMMUNITY TOILET				Volume of the Septic tank (cum)				
Case No	**Area**	**Total number of seats**	**Users considered**	**Actual**	***Calculated Based on experience of experts/ Consultants (Cleaning interval of one year)***	**When was the septic tank last emptied??**	**Observations**	**PERCENT** **(Small/Bigger)
1	*Bail Bazaar*	20 (35 persons per seats)	700	26.04	80.80	Once in a ever week	Undersized	- 68%
2	*Khadakpura*	17 (35 persons per seat)	595	29.94	68.74	Once in a every week	Undersized	- 56%

1.) To calculate the volume of sewage generated in each of this case only the W.C's in the Community toilets have been considered

2.) To calculate the sewage generated in each of the case, the users considered are 35 persons/ toilet seat

3.) In both the cases, the cleaning frequency of the septic tanks is once in a month/ two months. As both the septic tanks are undersized as per the sewage generated, the septic tanks are filled frequently.

Notes:

*The septic tank reduces BOD up to 50% ***. (Source-CPHHEO manual 2013, Chapter 9, Section 9.1.2.2)***

****Conventional Septic tank removal efficiency -*** if properly designed and with proper septage removal frequency can effectively remove about 40-50% BOD and 50-70% TSS***. (Source-CPHHEO manual 2013, Chapter 9, Section 9.1.2.3)***

****For comparing the BOD results of samples, few samples were collected from Inspection chambers to analyze Inlet BOD. It varied in the range of 100 to 600. It was considered as influent BOD value against which effluent values were compared. It is considered only for cases in residential areas. This has been explained in the next slide.***

Sample Collection Technique

ANALYSIS- Functioning of septic tanks

RESIDENTIAL PROPERTIES				QUALITY ASSESSMENT		
Case study No.	Cleaning Frequency of ST	When septic tank last emptied?	Inlet BOD (mg/l)	Outlet BOD (mg/l)	% (Reduction of BOD)	Note
1	Nil	Not Yet Cleaned (Since construction year 1998)	--	189	--	Septic tank inlet pipe is concealed
2	Nil	Not Yet Cleaned (Since Construction year 2003)	--	241	--	Septic tank inlet pipe is concealed
3	Nil	Not Yet Cleaned (Since construction year 1998)	--	195	--	Septic tank inlet pipe is concealed
4	Nil	Not Yet Cleaned (Since construction year 1997)	Sample not collected due to inaccessibility			
5	Nil	Not Yet Cleaned (Since construction year 2006)	Sample not collected due to inaccessibility			
6	Two times	Last Year- Feb or March 2013	--	500	--	Septic tank inlet pipe is concealed
7	Nil	Not Yet Cleaned (Recently built-2013)	--	94	--	Septic tank inlet pipe is concealed
8	One time	2 Months Back (November 2013)	Sample not collected due to inaccessibility			
9	Nil	Not Yet Cleaned (Recently built-2013)	Sample not collected due to inaccessibility			
10	Nil	Not yet cleaned (Recently Built-March 2014)	Sample not collected due to inaccessibility			
11	Nil	Not yet cleaned (Since construction year 2005)	--	224	--	Septic tank inlet pipe is concealed
12	One time	a year ago-Non or Dec 2012	--	165	--	Septic tank inlet pipe is concealed
13	Once in ever year	Mar-14	--	225	--	Septic tank inlet pipe is concealed
14	Nil	Recently Built-Dec 2013	Sample not collected due to inaccessibility			
15	One time	Feb-14	--	246	--	Septic tank inlet pipe is concealed

ANALYSIS - Functioning of septic tanks

RESIDENTIAL PROPERTIES				QUALITY ASSESSMENT		
Case study No.	Cleaning Frequency of ST	When septic tank last emptied?	Inlet BOD (mg/l)	Outlet BOD (mg/l)	% (Reduction of BOD)	Note
16	Nil	Not yet cleaned (Since construction year 2011)	**302**	215	28.80	Functioning well, it has been recently constructed. (In 2011)
17	One time	Two years ago- 2012	--	156	--	Septic tank inlet pipe is concealed
18	Once in every two year	2013	--	291	--	Septic tank inlet pipe is concealed
19	Nil	Not yet cleaned (Since construction year 2004)	--	176	--	Septic tank inlet pipe is concealed
20	Nil	Not yet cleaned (Since construction year 2000)	648	510	21.29	Defunct, Septic tank has not been cleaned past 15 years
21	Nil	Not yet cleaned (Since construction year 2012)	405	342	**15.55**	Defunct, Septic tank has not been cleaned past 2 years
22	Nil	Not yet cleaned (Since construction year 2004)	316	159	22.43	Defunct Septic tank has not been cleaned past 10 years
23	Nil	Not Yet cleaned (Since construction year 2013)	--	144	--	Septic tank inlet pipe is concealed
24	One time	Mar-14	**402**	346	31.34	Functioning well, the owner of the property is cleaning septic tank once every year.

For comparing the BOD results of samples, few samples were collected from Inspection chambers to analyze Inlet BOD. It varied in the range of 100 to 600. It was considered as influent BOD value against which effluent values were compared. It is considered only for cases in residential areas.

•As per the CPHEEO standards, a septic tank generally reduces the BOD levels around 25 - 50%. In the cases studied, in case no. 16 and 24, the reduction of BOD has been as per the standards. This shows that these two septic tanks are working efficiently. The reason for this is that the septic tanks are newly constructed and are regularly cleaned.

• In other cases the BOD reduction level is very less – indicates that the septic tanks are not working efficiently and are not cleaned regularly.

ANALYSIS- Functioning of septic tanks

INSTITUTIONAL BUILDINGS	QUALITY ASSESSMENT				
Institutional	**Inlet BOD (mg/l)**	**Outlet BOD (mg/l)**	**% (Reduction of BOD)**	**When was the septic tank last emptied??**	**Note**
Tehshil Office (G)	246	182	26.01	Not yet cleaned (Since construction year 2011)	Functioning Well, Recently Constructed past 2 years
Post office (G+1)	230	192	16.52	Not yet cleaned (Since last 10 years)	Defunct, not cleaned past 10 years
BSNL Office	--	302	--	Not yet cleaned (Since last 9-10 years)	Septic tank inlet pipe is concealed
BMD college (G+1)	Sample not collected due to inaccessibility				
Marathi School (G)	351	298	15.09	Not yet cleaned (Since last 10-15 years)	Defunct, not cleaned past 12 years

- As per the CPHEEO standards, a septic tank generally reduces the BOD levels around 25 - 50%.
- In the cases studied, in case no. 1, the reduction of BOD has been as per the standards. This shows that this septic tank is working efficiently. The reason for this is that the septic tank is recently constructed and is regularly cleaned.
- In other cases the BOD reduction level is very less – indicates that the septic tanks are not working efficiently and are not cleaned regularly.

ANALYSIS- Functioning of septic tanks

COMMUNITY TOILET		QUALITY ASSESSMENT		
Name	**Inlet BOD (mg/l)**	**Outlet BOD (mg/l)**	**% (Reduction of BOD)**	**Note**
Bail Bazar	--	465	--	Septic tank inlet pipe is concealed
Khadakpura	--	246	--	Septic tank inlet pipe is concealed

- As per the CPHEEO standards, a septic tank generally reduces the BOD levels around 25 - 50%.
- In both the cases studied, collecting samples of the inlet was not possible due to concealed inlet pipes. Due to this the efficiency of the septic tanks could not be analyzed.

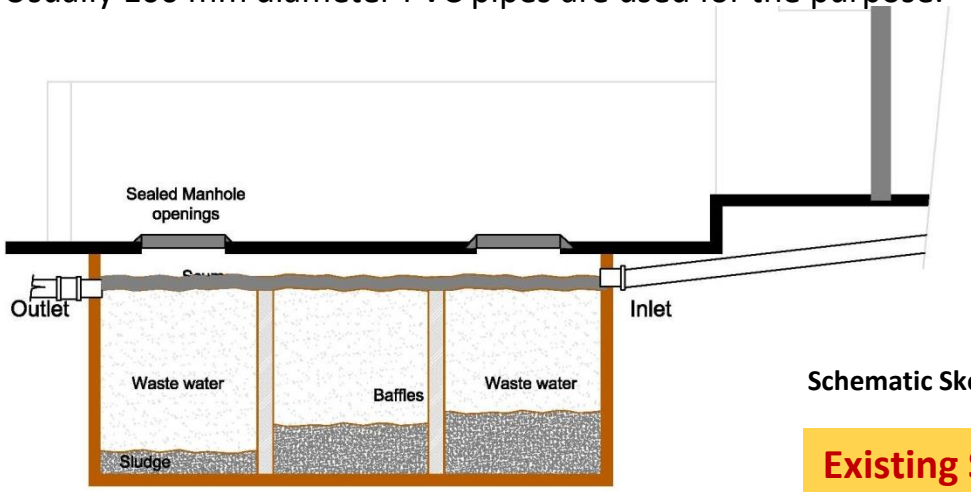
Septic Tank Improvements

SUGGESTIONS- RELATED TO USE OF SEPTIC TANK

Cleaning Practices	As per standard, after every usage the toilet must be flushed using 2 to 3 buckets of water to maintain
Septic Tank Cleaning	For creating awareness related to the cleanliness of septic tanks people should be made aware of the desired practices through IEC material, septic tank cleaning manuals.
Construction Material of Septic Tank	Locally available materials are being used for construction of septic tanks. No changes in this practice is required.
Design of the Septic Tank	Design of septic tanks should be as per standards. Also, the local contractors should be trained to acquaint them with the best practices in constructing septic tanks.
Accessibility	Removable lids must be used instead of sealing the openings with fixed tiles. Even though the cost of the tiles (Rs. 200 approx.) is half than the concrete lid (Rs. 600), breaking the tile every time cleaning the septic tank proves expensive.
Input to the Septic Tank	As per standards, both black and grey water can be let-off into the septic tank

SUGGESTIONS- related to design parameters

1.) Inlet/ Outlet Pipe: As per best practices for construction of a septic tank, it is advisable to use a T- junction pipe joint at both the inlet and outlet of the septic tank. Usually 100 mm diameter PVC pipes are used for the purpose.



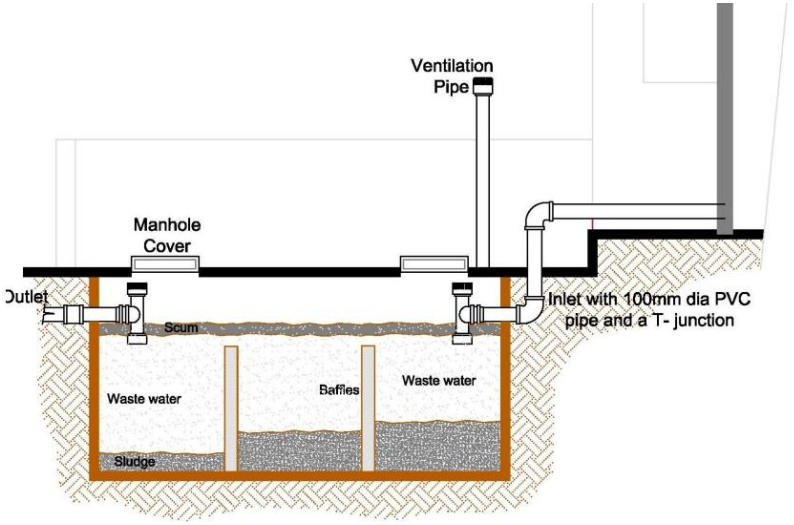
Schematic Sketch

Existing Situation

Proposed Situation

For efficient working of the septic tanks the methods adopted for constructing a Septic tank must be as shown in the adjacent diagram.

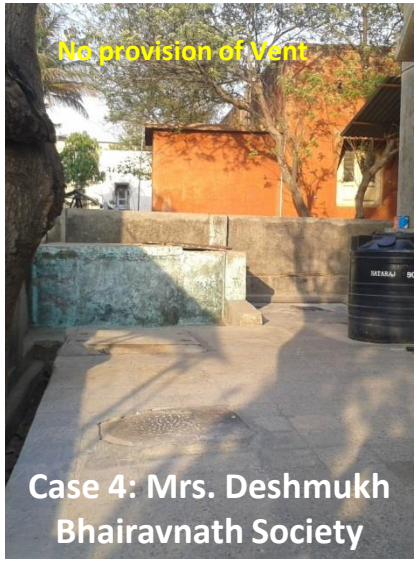
* The use of T-junction pipes in the inlet and outlet help **avoid the choking/ blocking** of the sludge flow through the pipes due to the gathered scum.

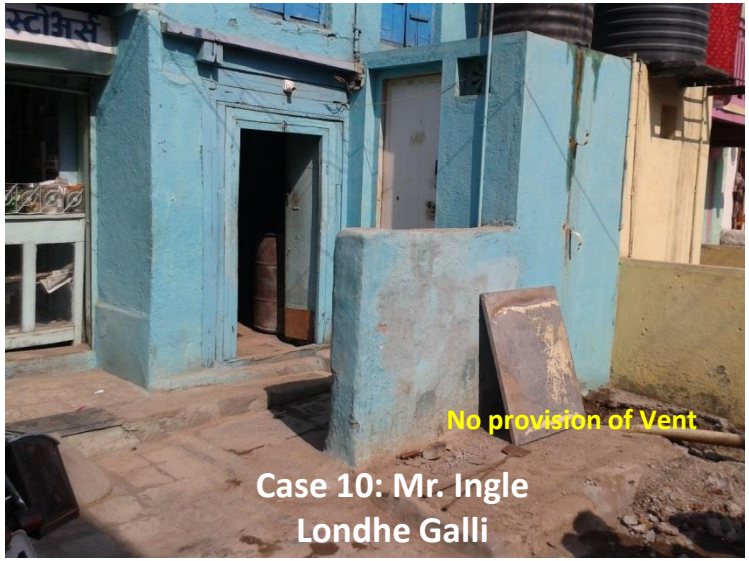


Schematic Sketch

SUGGESTIONS- related to design parameters

2.) Ventilation Pipes: In the cases studied, in several cases the ventilation pipes required for the septic tanks is absent. In a few cases ventilation pipes have been provided above the inspection chambers only.

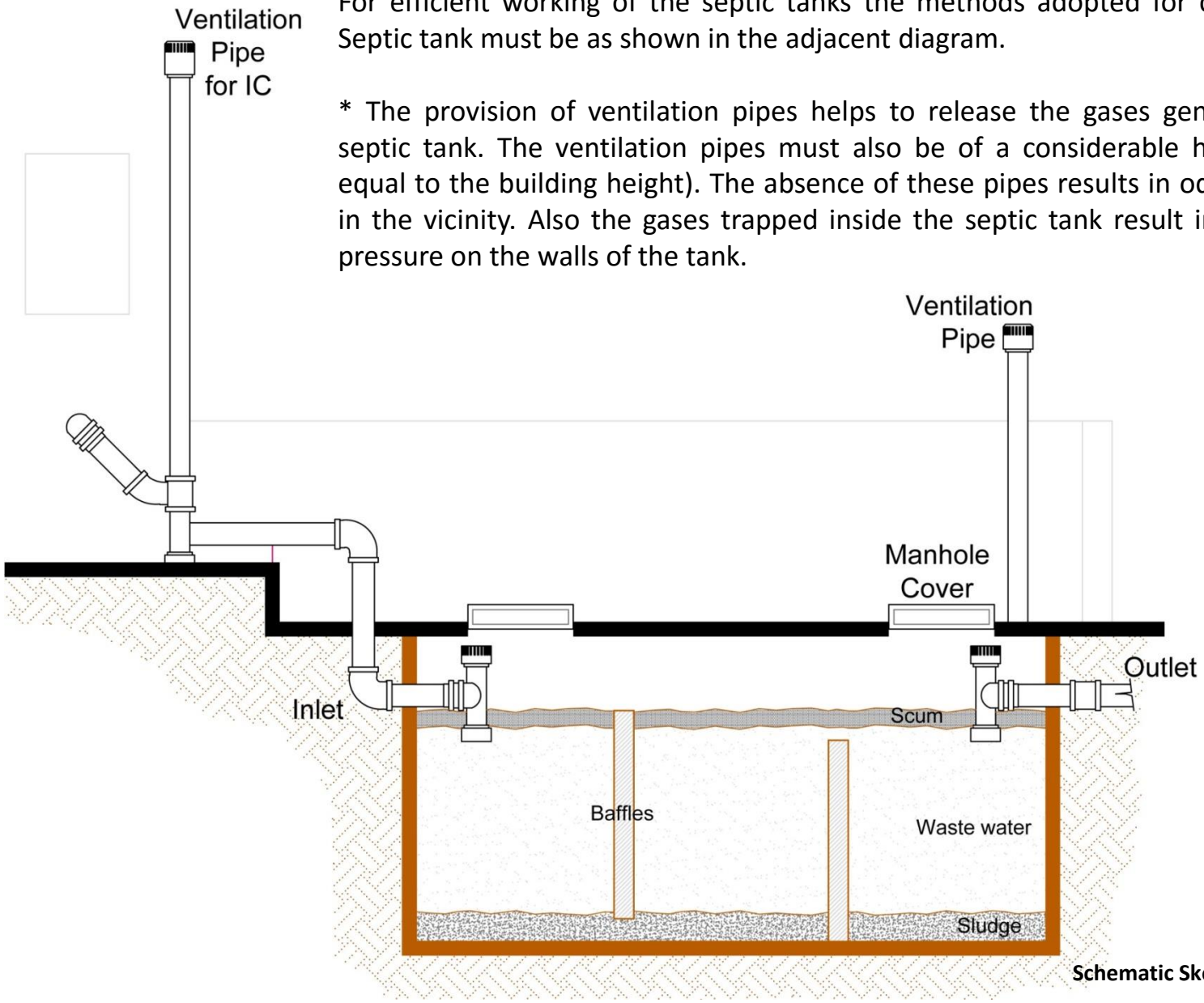




2.) Ventilation Pipes: (contd)

For efficient working of the septic tanks the methods adopted for constructing a Septic tank must be as shown in the adjacent diagram.

* The provision of ventilation pipes helps to release the gases generated in the septic tank. The ventilation pipes must also be of a considerable height (usually equal to the building height). The absence of these pipes results in odour problems in the vicinity. Also the gases trapped inside the septic tank result into additional pressure on the walls of the tank.

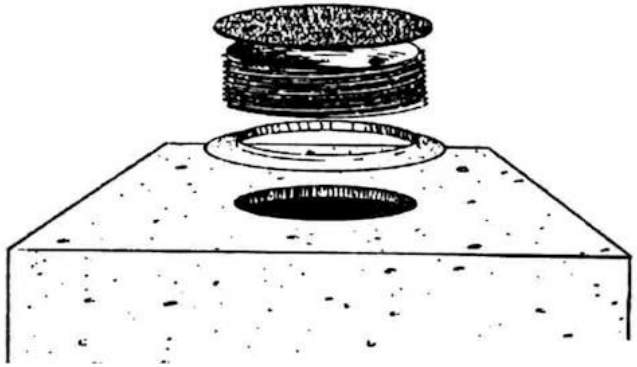


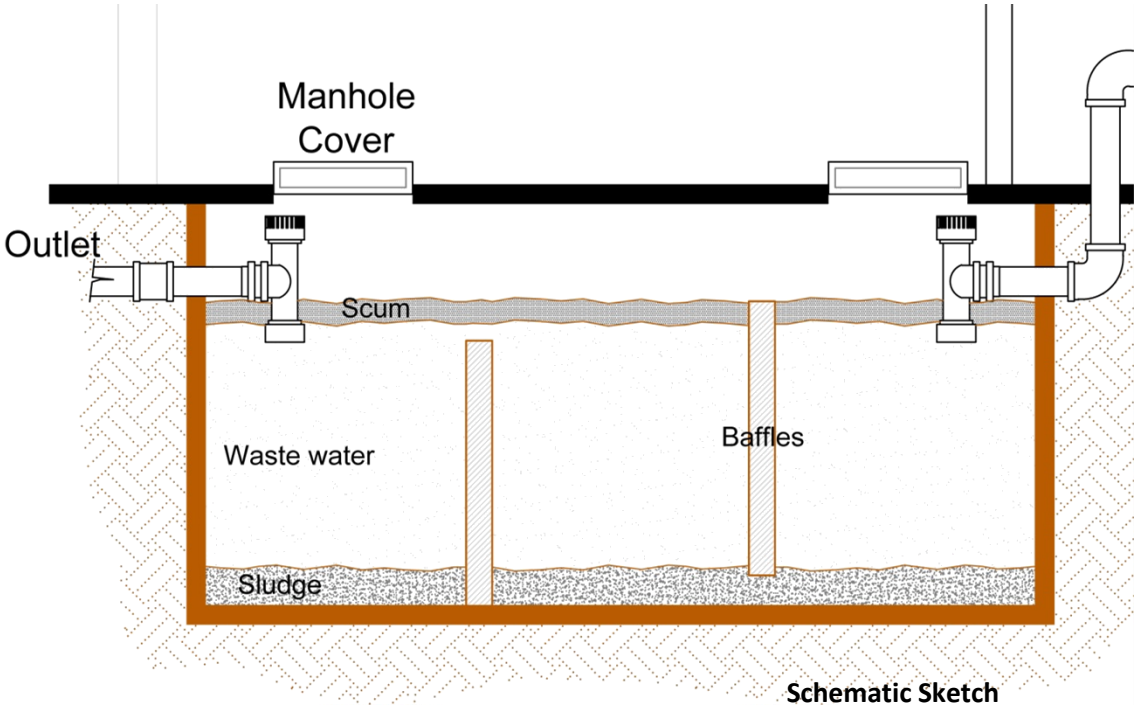
Schematic Sketch

3.) Openings of the Septic Tanks:

Adequate number of openings for a septic tank is very necessary for the maintenance and cleaning purpose.
In few cases the septic tanks had no accessibility due to the location of septic tanks below the toilet block.

Ideally a septic tank must have atleast two manholes of adequate size and must be covered properly with a concrete lid. This opening help for keeping the maintenance of the septic tanks and the lids prevent odour problems as well as any mishaps/ accidents.





Schematic Sketch

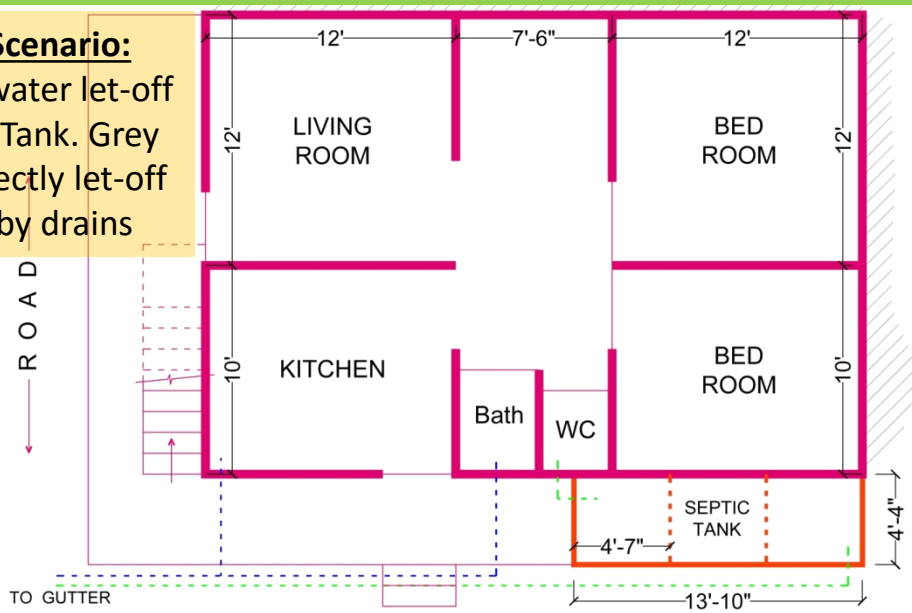
SUGGESTIONS- related to design parameters

4.) Solutions for oversized Septic Tanks:

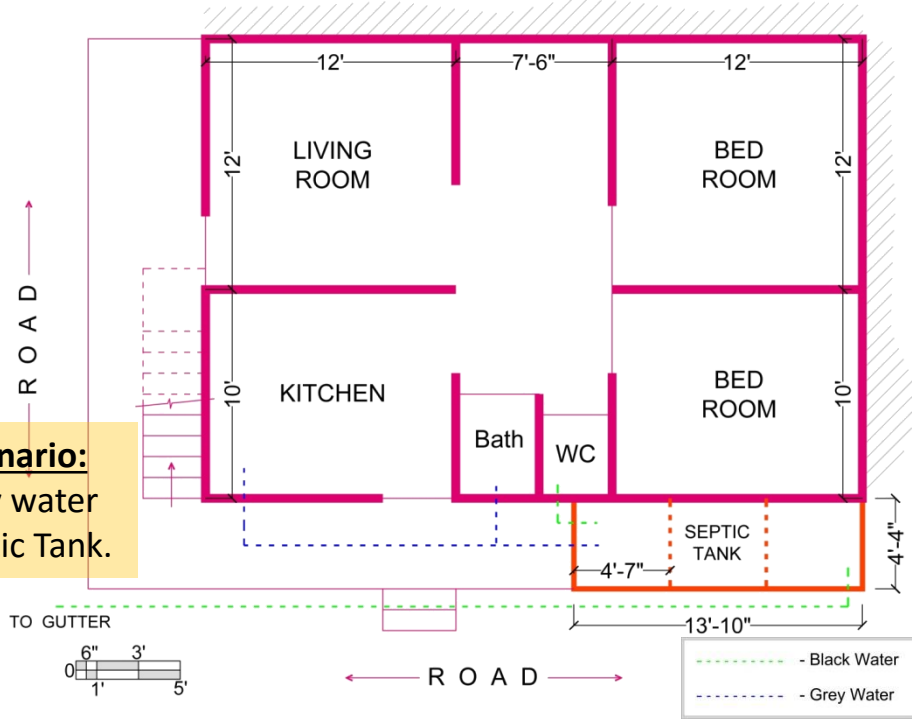
In a few cases studied, it was observed that the septic tanks are oversized as compared to the actual required sizes as per the standards.
To make proper use of the volume of the septic tanks the grey water generated in the households can also be let off into the septic tanks.

Only precaution that need to be taken is to minimize the use of chemicals and acids to clean the bathrooms and for washing purpose. These chemicals hamper the biological process in the septic tanks.

Existing Scenario:
Only Black water let-off into Septic Tank. Grey water is directly let-off into nearby drains



Proposed Scenario:
Black and Grey water let-off into Septic Tank.



COSTING DETAILS

Improvements in Septic Tanks are suggested as a case study, for case no. 16. And cost required for respective improvements is estimated here.

(Costs are taken from Schedule of Rates (SoR), Satara, however for certain items/ works for which costs are not included in SoR, they are taken from local masons/ contractors)

	Items required for the improvements of septic tank			
Sr No	**Installation of ventilation pipe**	**Criteria (IS CODE:2470)**	**Amount (INR)**	**Reference**
1	PVC pipe	100 mm dia (Not less than 50 mm dia)	83	**IS CODE 2470 (Part 1) :**Generally the ventilating pipe may extend to a height of about 2 m when the septic tank is at least 20 m away from the nearest building and to a height of 2 m above the top of the building when it is located closer than 20 metres. The ventilating pipe may also be connected to the normal soil ventilating system of the building where so desired. **SOR 2012-13 (Pune Region):** Section H- Miscellaneous works Local Market rate-130/m
2	Cage of mosquito proof mesh	Mosquito proof mesh	35-50	Local Market Rate
3	Access opening & cover	• For Rectangular- Not less than 455x600 mm • For circular- Not less than (circular opening) 500 mm dia	600 (Rectangular R.C.C)	**IS CODE 2470 (Part 1) :** Section 3.4.9-Access opening & cover , Page no. 12 **Local Market Rate**

(contd..)

COSTING DETAILS

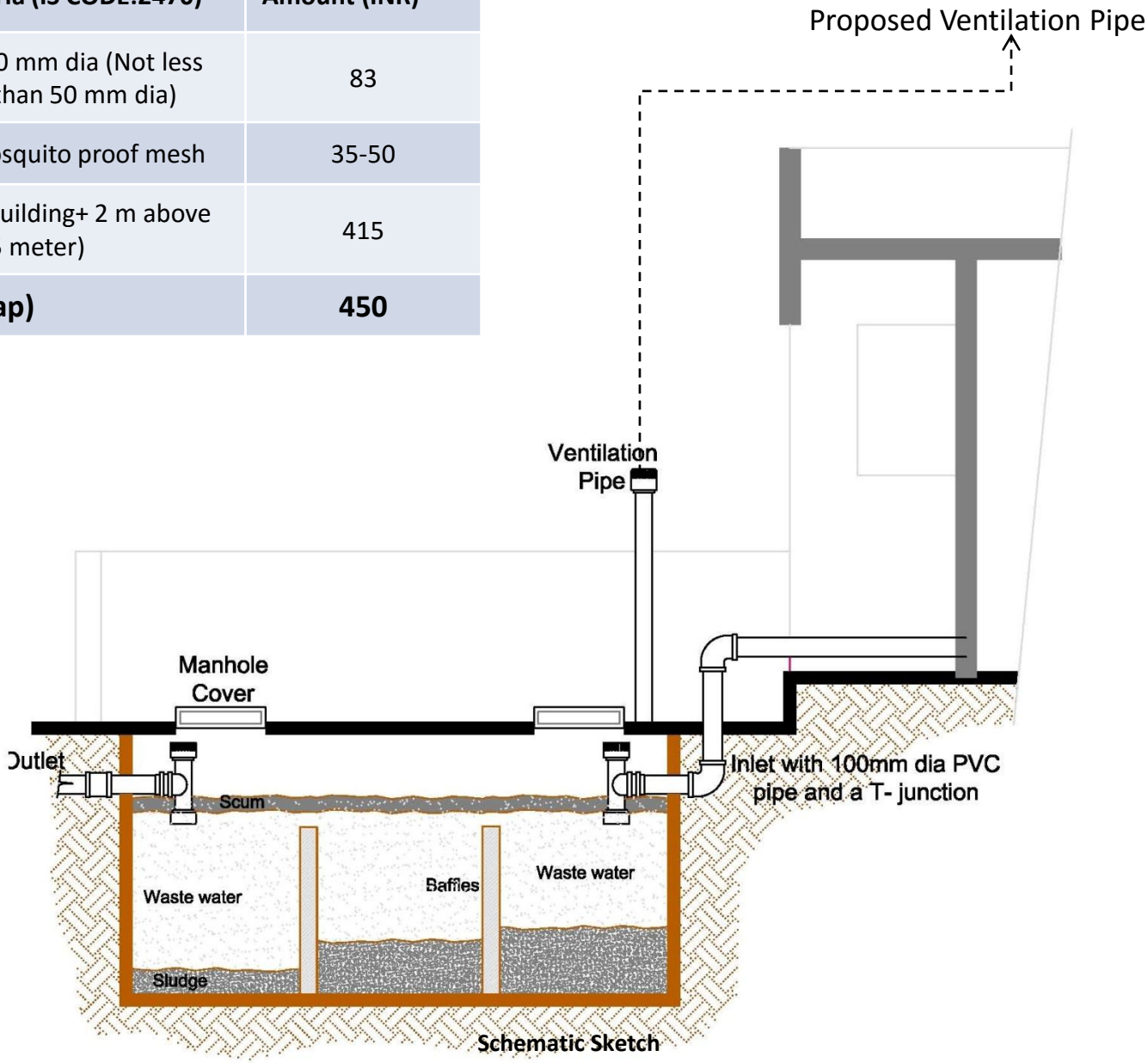
	Items required for the improvements of septic tank			
Sr No	**Installation of ventilation pipe**	**Criteria (IS CODE:2470)**	**Amount (INR)**	**Reference**
4	T junction	100 mm dia	115	Local market rate (2014)
5	L junction	100 mm dia	95	Local market rate (2014)

COSTING DETAILS

1. INSTALLATION OF VENTILATION PIPE

Installation of ventilation pipe	Criteria (IS CODE:2470)	Amount (INR)
PVC pipe	100 mm dia (Not less than 50 mm dia)	83
Cage of mosquito proof mesh	Mosquito proof mesh	35-50
Requirement of PVC pipe= height of building+ 2 m above from the building height (5 meter)		415
Total (INR) (PVC+Cap)		**450**

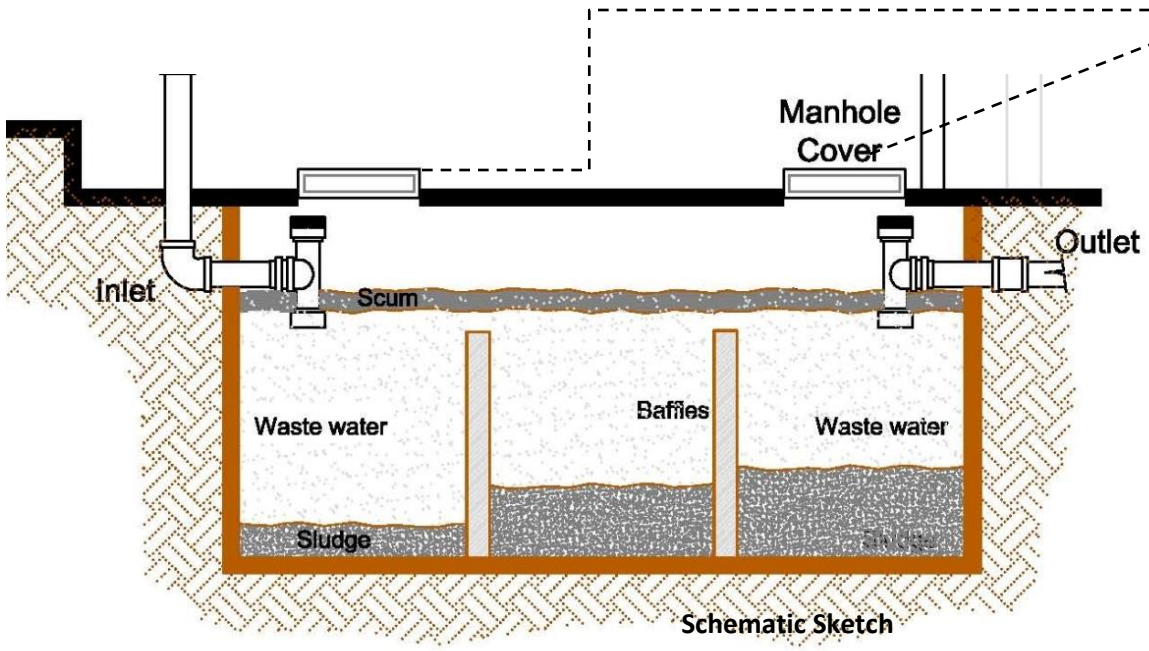
No provision of Vent



COSTING DETAILS

2. ACCESS AND OPENING COVER

Installation of cover	Criteria (IS CODE:2470)	Amount (INR)
Access opening & cover (1 Nos.)	• For Rectangular- Not less than 455x600 mm • For circular- Not less than (circular opening) 500 mm dia	600 (R.C.C) Local Market rate
Total cost (In Rs.) (Two number of manholes required)		1200



Note: in this case due to constraint of space (WC constructed over the septic tank) only one access can be provided.

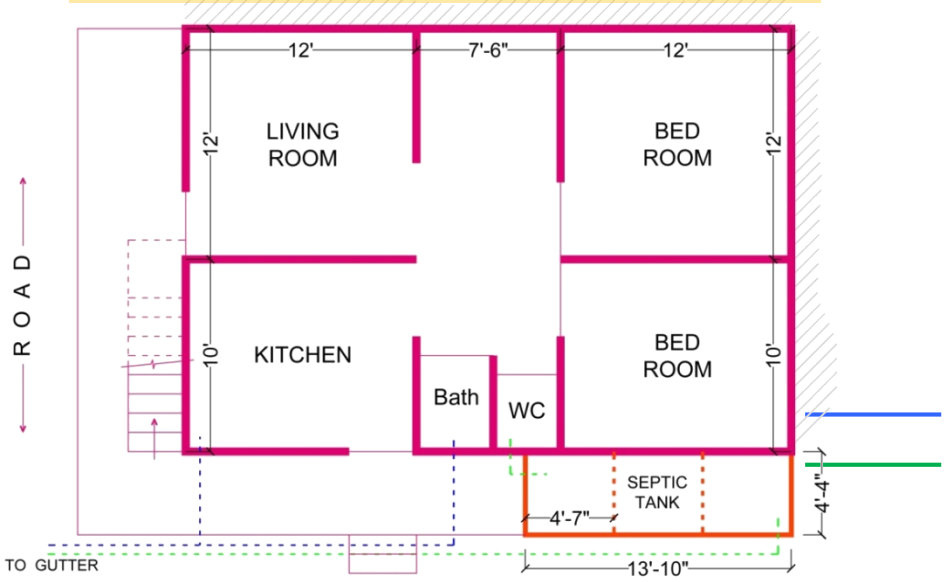
COSTING DETAILS

3. CONNECT GREY WATER PIPE TO SEPTIC TANK (SOLUTION OF FOR OVERSIZED SEPTIC TANKS)

Installation of PVC pipe to combine (Grey water)	Criteria (IS CODE:2470)	Amount (INR)
Inlet pipe (PVC Pipe-required 5 meter)	100 mm dia	415
1 T Joint	100 mm dia	115
1 L joint (2 nos.)	100 mm dia	190
Total (INR)		**720**

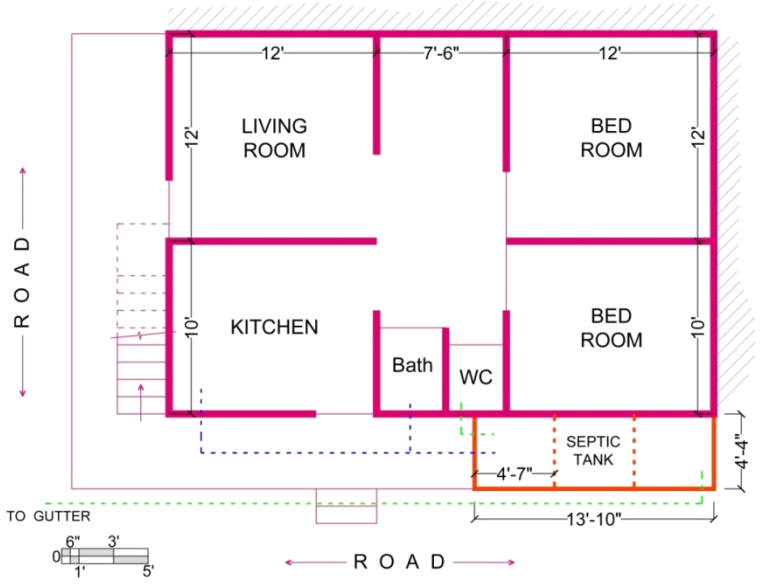
Existing Scenario:

Only Black water let-off into Septic Tank. Grey water is directly let-off into nearby drains



Proposed Scenario:

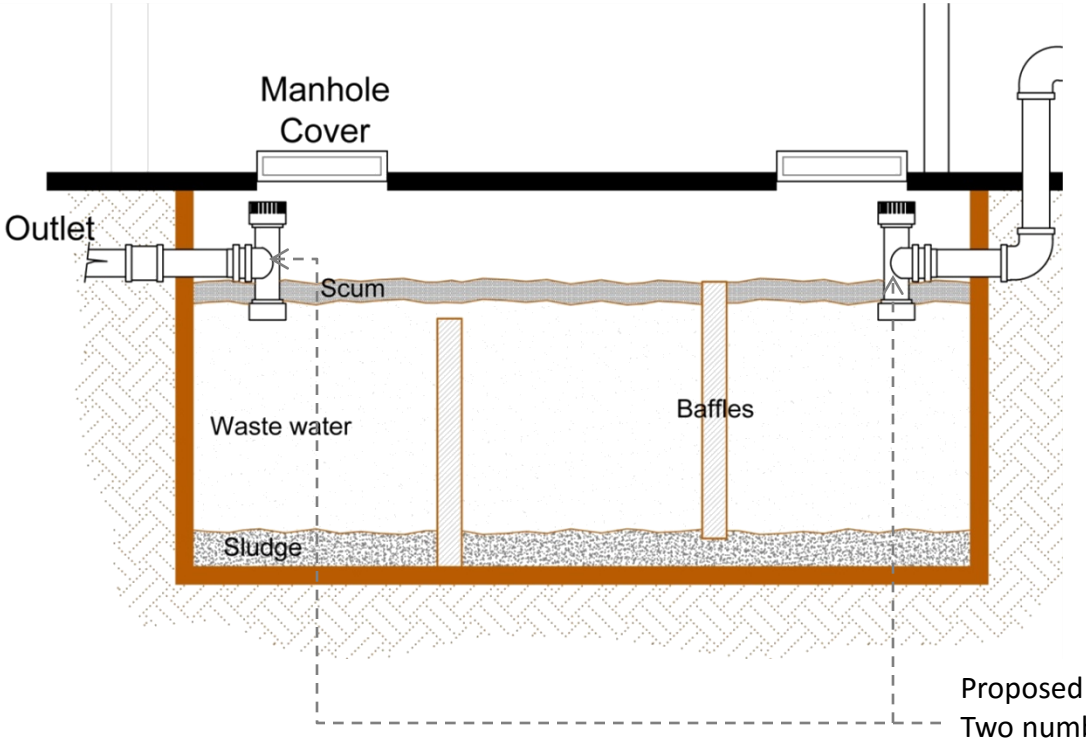
Black and Grey water let-off into Septic Tank.



COSTING DETAILS

4. CONSTRUCTION OF T JUNCTION AND NECESSARY PIPE CONNECTIONS

Installation of ventilation pipe	Criteria (IS CODE:2470)	Amount (INR)
PVC pipe (1 m)	100 mm dia (Not less than 50 mm dia)	83
2 T Joint	100 mm dia	230
Total (INR)		**313**



Proposed T Junction:
Two number of T Junction required

COSTING DETAILS FOR CASE NO. 16

Sr no	Improvements	Cost (INR)
1	Installation of ventilation pipe	450
2	Access & Opening cover	1,200
3	Connect Grey Water pipe to septic tank	720
4	Construction of T junction	313
	TOTAL COST	2,683

In this case, there is no ventilation pipe for the septic tank and the openings do not have a removable cover. Also the inlet, outlet of the septic tank do not have a T-junction PVC pipe and the grey water is not let-off in the septic tank. To implement all the above works, the costing has been given as follows