



# SFD Report

## Panchgani India



### Final Report

This Level 1, Initial SFD Report was created through desk-based research using Performance Assessment System (PAS) Project database by CEPT University, Ahmedabad.

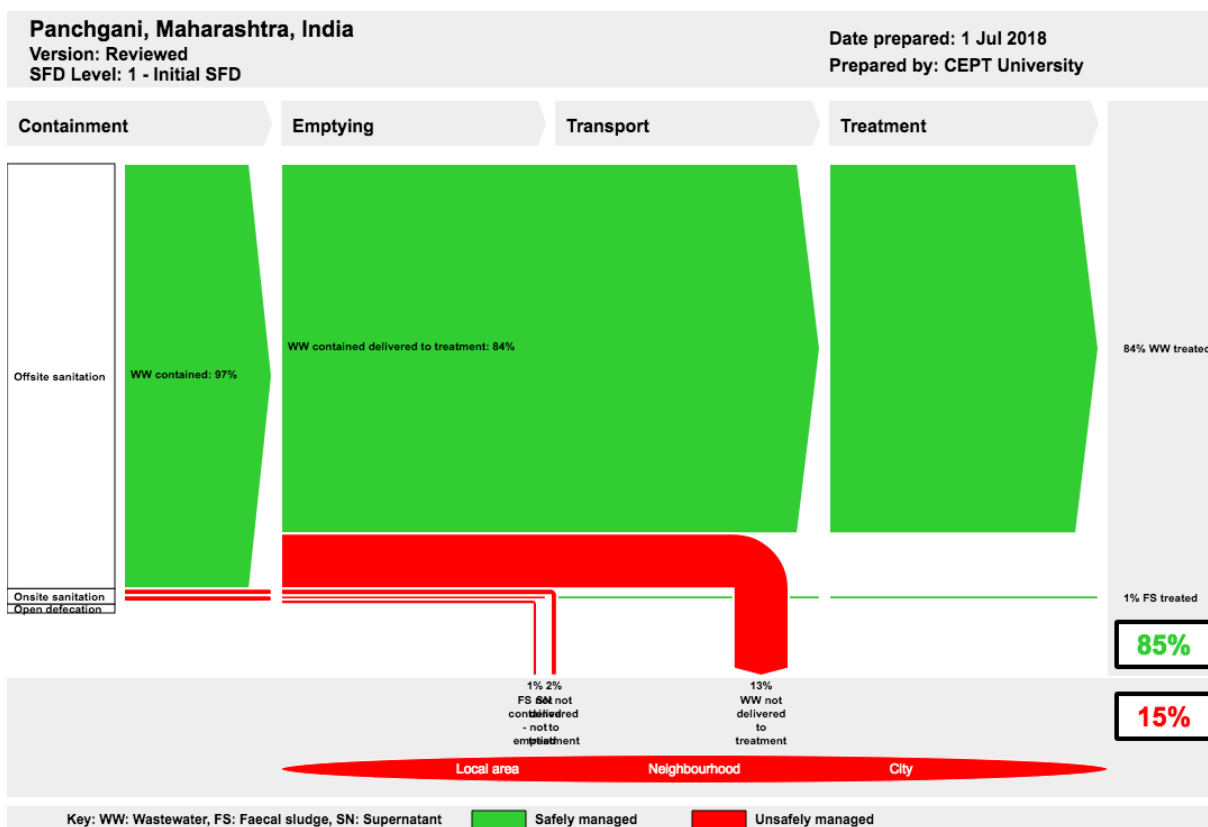
Date of production: 1st July 2018



SFD Report Panchgani, India, 2018

Produced by: Center for Water and Sanitation, CEPT University, Ahmedabad

### 1. The Diagram



### 2. Diagram information

**Desk or field based:**

This is a desk based SFD prepared to demonstrate use of SLB-PAS information for SFD generation.

**Produced by:**

PAS Project, C-WAS, CEPT University, Ahmedabad

**Status:**

This is a Final SFD

**Date of production:**

01/07/2018

### 3. General city information

Panchgani is a hill station and municipal council in Satara district of Maharashtra state. It is situated in the middle of five hills in the Sahyadri mountain ranges.

Panchgani is situated about 285 km from Mumbai and 18 km from Mahabaleshwar, another renowned hill station in Maharashtra. The city is part of Mahabaleshwar-Panchgani

Eco-Sensitive Zone declared by the Ministry of Environment and Forests, Government of India (GoI) in the year 2000 (Panchgani guidebook).

Panchgani Municipal boundary has been chosen for the SFD study. It comprises an area of 6.12 sq.km. (PAS Project, 2017).

As per Census 2011, Panchgani has a population of 14,897 persons, with a density of 2,434 persons per sq. km. Of this, 26% of the total population (3,850 persons) lives in slums (Census, 2011). As per PAS database, population of Panchgani is 15,745 in year 2016-17 (PAS Project, 2017).

Due to it being a prominent tourist destination, the city has a high percentage of floating population.

### 4. Service delivery context

“A comprehensive legal framework” to regulate wastewater disposal is absent in India. At the Union level, the Water



(Prevention and Control of Pollution) Act, 1974 and the Environment (Protection) Act, 1986 include provisions for wastewater disposal. State Pollution Control Boards are responsible for their implementation. These laws also prescribe penalty in the case for non-compliance. However, monitoring and implementation have been extremely poor. (The Environment (Protection) Act, 1986) (The Water (Prevention and Control of Pollution) Act 1974, 1974).

The National Urban Sanitation Policy (NUSP) of Government of India (GoI), 2008 was the first comprehensive policy statement on urban sanitation in India. While the NUSP recognized the entire sanitation cycle and need for addressing faecal sludge management, seems to not have seeped down to state and local governments (NUSP, 2008).

The advisory note on septage management in urban India, issued by Ministry of Urban Development (MoUD) in year 2013, recommends supplementing City Sanitation Plans (CSP) with Septage Management Sub-Plan (SMP) (Advisory, 2013). Recently, Sanitation has been on the forefront of development agenda in India. The Government of India's Swachh Bharat Mission and AMRUT programme have focused on eradicating open defecation and providing proper sanitation infrastructure in the cities. The Government of India, Ministry of Housing and Urban Affairs, has also issued a National Faecal Sludge and Septage Management Policy in year 2017. The key objective of the urban FSSM Policy is to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs such that safe and sustainable sanitation becomes a reality for all in each and every household, street, town and city (National FSSM policy, 2017).

The regulatory framework for onsite sanitation comes from the Municipal Act and Bye-laws. There are also legal instruments, related to environment pollution, that provide for safe collection and discharge of waste water. The Urban Local Body (ULB) is responsible for enforcing these regulations.

Panchgani Hill Station Municipal Council (PHSMC) is responsible for provision of sanitation service delivery in the city. The PHSMC provides emptying services of septic tanks, which is then disposed at the existing sewage treatment plant (STP) (Sanitary inspector, 2017).

### 5. Service outcomes

A brief overview of the different sanitation systems in Panchgani across the sanitation service chain, and their status is given below:

**Containment:** The vast majority of the households in the city have toilet facilities within the premises (99%), while less than 1% of the population rely on community toilets. Of this, 97% of the toilets are connected directly to the sewer system, while only 3% toilets are connected to septic tanks. Septic tanks are further connected to open or closed drains for effluent disposal. None of the individual toilets was found to be using single or double pit latrine systems or any unsafe sanitation systems.

There are three community toilets in the city having 18 functional toilet seats. Across the city, there are 14 public urinals. These are mostly situated at bus stands, railway station and market areas. All the community toilets and public toilets are connected to the existing sewerage network (PAS Project, 2017).

The city was declared Open Defecation Free (ODF) on 29th September 2015 (PAS Project, 2017).

**Emptying:** Onsite sanitation facilities are emptied by urban local government (PHSMC)



and a private agency. Septic tanks are emptied on demand basis. On average around 35 septic tanks are emptied annually out of total 140 septic tanks in the city. PHSMC operates two vacuum emptier machines for septic tank emptying (one is owned by PHSMC and other is private, but licensed by PHSMC). The capacity of these trucks is 3,000 litres each. Citizens have to submit an application for emptying of septic tanks (PAS Project, 2017).

The fee for emptying is INR 1,000 (15 USD) for the septic tank inside city limits. For emptying tanks outside city limits, the charges are INR 2,000 (30 USD) (PAS Project, 2017).

**Transport:** The faecal sludge is considered safely managed when it is either conveyed through sewerage system and safely treated in existing STP or contained in septic tank from where it is emptied regularly with proper treatment.

As no information regarding the effluent - faecal sludge composition of onsite facilities is available, it is assumed that 50 % of the volume is faecal sludge and 50 % is effluent.

Hence, out of 3% of toilets connected to onsite sanitation systems, of which 50% would be FS in the septic tanks and 50% would be effluent from the septic tanks. Faecal sludge transported by truck mounted suction emptier trucks are discharged into nearby manhole of sewerage network or at the inlet of STP. Of total FS contained in the septic tanks, around 30% of FS is emptied annually and delivered to treatment plant while remaining FS remains in the septic tank containment only.

Septic tanks outlets are further connected to closed or open drains for effluent discharge. The effluent collected in closed drains or open drains are not delivered to the treatment plant and discharged on open land outside the city limit.

**Treatment:** PHSMC has three sewage treatment plants (STP), of which one STP of 0.5 MLD is under construction. Anoxic bio reactor technology is used in Sewage treatment plant. Total installed capacity of STPs (primary and secondary treatment) is 1 MLD. These STPs treat 87% sewage received from sewerage network and also septage discharged by the emptier trucks (Sanitary inspector, 2017).

**End-use/Disposal:** Currently, treated wastewater is not reused in Panchgani.

Around 99% of households are dependent on individual toilets and less than 1% of households are dependent on community toilets. Out of this, 97% toilets are connected to the sewerage system and rest 3% toilets are connected to septic tanks with open/closed drains. All community toilets and public toilets are connected to the sewerage system.

Of the total sewage generated, 84% sewage is treated in the two operational treatment plants. Out of 3% of toilets connected to onsite sanitation systems, 50% would be FS in the septic tanks and 50% would be effluents from the septic tanks. Of total FS contained in the septic tanks, around 30% of FS is emptied annually and delivered to treatment plant while remaining FS remains in the septic tank containment only. FS from the emptier trucks are discharged either at the nearby manhole of sewerage network or at the inlet of STP where most of it is treated in the sewage treatment plant.

Onsite sanitation systems are either connected to open or closed drains for effluent discharge. The effluent collected in closed drains or open drains not delivered to the treatment plant.

Hence, 85% of faecal sludge is safely managed while 15% is unsafely managed.

FS is considered safely managed, if it is either conveyed through sewerage system and safely



treated in STP or contained in septic tank from where it is emptied regularly with proper treatment. Faecal sludge and effluent which is not treated in STP is considered as unsafely managed.

### 6. Overview of stakeholders

The city is governed by Panchgani Hill Station Municipal Council (PHSMC) led by President and supported by 16 councillors.

PHSMC is responsible for planning, designing, and construction of sewerage network and Sewage Treatment Plant (STP). Operation and maintenance of STP is handled by private agency i.e. Aquatech Pvt. Ltd.

Maharashtra Pollution Control Board (MPCB) is responsible for waste water quality testing at STPs. Public health and sanitation service is delivered by PHSMC through the health department of the Council which is headed by the health officer. Septage management is also the responsibility of the same department (Sanitary inspector, 2017).

Water supply is entirely handled by Maharashtra Jivan Pradhikaran (MJP), a state-wide utility (Water Supply Engineer, 2017).

Apart from PHSMC, private emptying agency (viz. Chavhan cleaning services) is providing emptying services of septic tanks within and around the city.

**Table 1: Key stakeholders (Source: Compiled by PAS Project, 2017)**

Key Stakeholders	Institutions / Organizations /
Public Institutions	<ul style="list-style-type: none"> <li>Panchgani Hill Station Municipal Council (PHSMC),</li> <li>Maharashtra Jeevan Pradhikaran (MJP),</li> <li>Maharashtra Pollution Control Board (MPCB)</li> </ul>
Private Sector	<ul style="list-style-type: none"> <li>Chavhan cleaning services (Septic tank emptying services)</li> <li>Aquatech Pvt. Ltd. (O &amp; M of STP)</li> </ul>

### 7. Credibility of data

Two key sources of data are used: Census of India, 2011 and PAS Project, 2017. The data is

verified and updated through key informant interviews (KIIs) with PHSMC officials.

### 8. Process of SFD development

Data is collected through secondary sources. City officials were contacted on phone to conduct KIIs with relevant stakeholders, to fill in the gaps in data and to verify the data collected.

Limitations:

It is dependent on secondary data source.

### 9. List of data sources

For this SFD report, primary data is collected through discussions with officials of Panchgani Hill Station Municipal Council. The secondary data source is the Service Level Benchmark (SLB) database for Panchgani city collected under PAS Project, CEPT university ([www.pas.org.in](http://www.pas.org.in)) (PAS Project, 2017). The performance assessment framework developed under PAS project is operationalized through the online SLB-PAS module, a web based system for collection and analysis of water supply and sanitation services data. It includes aspects of equity and on-site sanitation to capture the ground reality in Indian cities. All cities of the states of Gujarat and Maharashtra are using this module since year 2010.

Below is the list of data sources used for the production of SFD.

Published reports and books:

- PAS Project, 2017 ([www.pas.org.in](http://www.pas.org.in))
- Census of India 2011, House listing and Housing data, Government of India
- KIIs with representatives from Government agencies: PHSMC



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## Abbreviations

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BIS	Bureau of Indian Standards
BOD	Biological Oxygen Demand
CEPT	Centre for Environmental Planning and Technology
CPHEEO	Central Public Health & Environmental Engineering Organization
CSPs	City Sanitation Plan
DMA	Directorate of Municipal Administration
EPA	Environment Protection Act
FS	Faecal Sludge
FSM	Faecal Sludge management
FSSM	Faecal sludge and Septage management
GoM	Government of Maharashtra
GR	Government Resolution
INR	Indian Rupee
JnNURM	Jawaharlal Nehru National Urban Renewal Mission
KIIs	Key Informant Interviews
KM	Kilometer
MHADA	Maharashtra Housing and Area Development Authority
MJP	Maharashtra Jeevan Pradhikaran
MLD	Million Litres per Day
MoUD	Ministry of Urban Development
MPCB	Maharashtra Pollution Control Board
MTPVD	Maharashtra Town Planning and Valuation Department
MWSSB	Maharashtra Water Supply and Sewerage Board
NUSP	National Urban Sanitation Policy
O&M	operation and maintenance
ODF	open defecation free
OSS	onsite sanitation systems
PAS	Performance Assessment System
PHSMC	Panchgani Hill Station Municipal Council
RAY	Rajiv Awas Yojana
SBM	Swachh Bharat Mission



SFD	Shit Flow Diagram
SMP	Septage Management Sub-Plan
SNA	Sujal Nirmal Abhiyan
SPS	Sewage Pumping Stations
SS	Suspended Solids
STP	Sewage Treatment Plant
UDD	Urban Development Department
ULBs	Urban Local Bodies
USD	United States Dollar
WSS	water supply and sewerage
WSSD	water supply and sanitation department
WWTP	Waste Water Treatment Plant



## 1 City context

### 1.1 Location

Panchgani is a hill station and class C municipal council in Satara district of Maharashtra state. This all-season hill station is at an elevation of 1,305 meters above sea level.

The city is located at 17° 55' 30" N Latitude and 73° 48' 0" E Longitude in the middle of five hills in the Sahyadri Mountain ranges. It is 285 KM from Mumbai and 18 KM from Mahabaleshwar, another renowned hill station in Maharashtra. It comprises an area of 6.12 sq.km (PAS Project, 2017).

Scenic Panchgani was 'discovered' by the British during the colonial rule as a summer resort. The five hills surrounding the city are topped by a volcanic plateau, which is the second highest in Asia after the Tibetan plateau. These plateaus, alternatively known as "table land", are a part of the Deccan Plateau and they were raised by pressure between the earth plates. The area has high seismic activity, with an epicentre near Koynanagar (Panchgani guidebook)

### 1.2 Climate

The climate is pleasant throughout the year. During the coldest months of Oct- Feb, the temperature here is 20-25 °C during the day and 10-15 °C during the nights. During summer period of March-May, the temperature here is 25-30 °C during the day and 15-20°C during the night. Monsoon is usually between June-September & rainfall is approximately 65 to 80 inches. Panchgani escapes the heavy rains & fog of Mahabaleshwar and is sheltered from the East winds by Table Land. The pleasant climate makes the city a popular tourist destination throughout the year. It is also famous for the strawberry farms. A Strawberry Festival is held every year in summer. The global charity initiatives of change opened "a centre for introspection and dialogue", a 68-acre campus called Asia Plateau at Panchgani in 1967. Over the past four decades, Asia Plateau has been used for holding training programmes and conferences of Initiatives of Change (Maharashtra State Gazeteers).

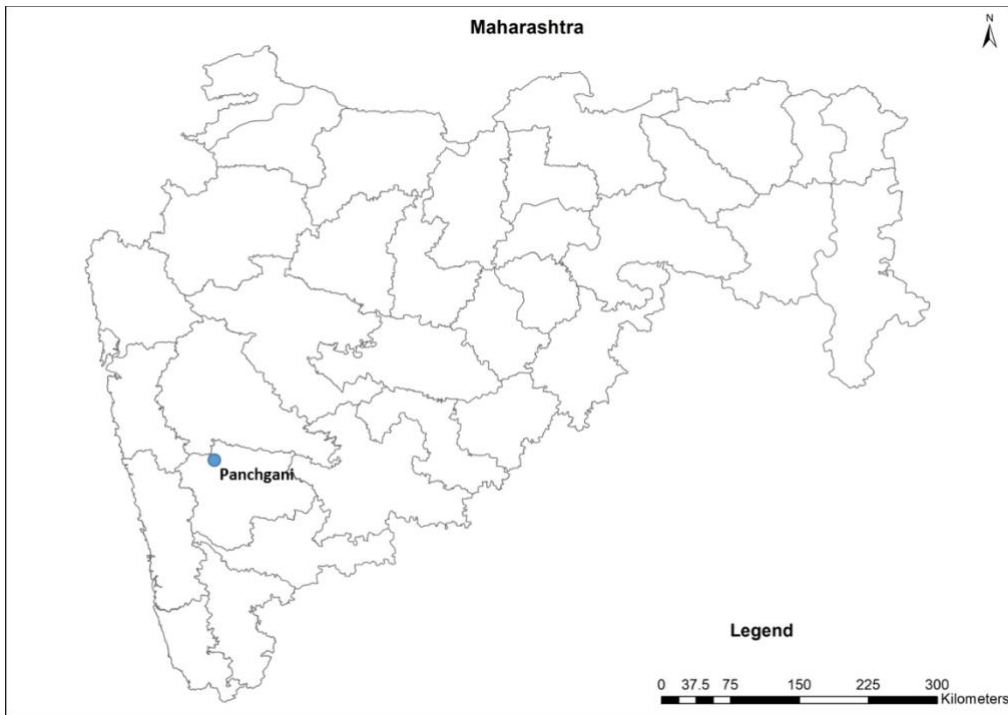
### 1.3 Demographics

The population of the city as per Census 2011 is 14,897 persons. The decadal growth rate is 12%. The density of the city is 2,434 persons per sq. km. The city comprises a huge floating population in the form of tourists. As per PAS database, the population was 15,745 in year 2016-17 (PAS Project, 2017).

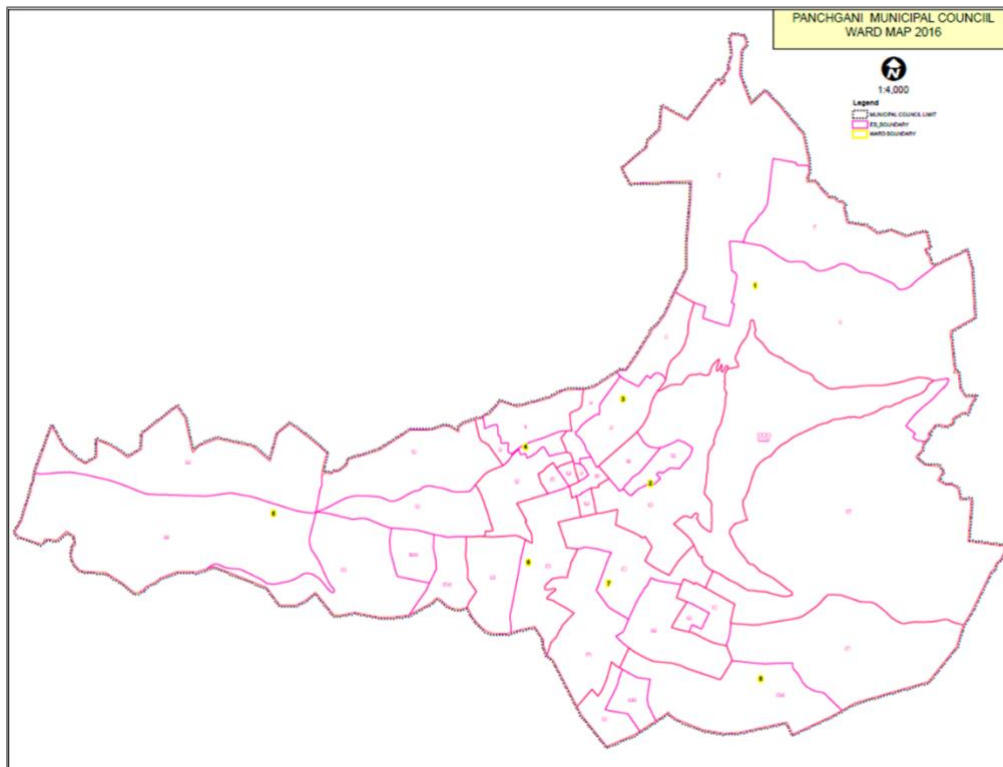
The scenic city is home to nearly 30 residential schools and also a major shooting location for Indian cinema. There are total 40 hotels in the city to cater the tourists. The city is a part of Mahabaleshwar - Panchgani Eco-Sensitive Zone declared by the Ministry of Environment and Forests in the year 2000.

The city is governed by Panchgani Hill Station Municipal Council (PHSMC) led by President Mrs Laxmi Karhadkar and supported by 16 councillors.

**Map 1 Location of Panchgani in Maharashtra**



Source: PAS Project



**Map 2 Ward map of Panchgani**

Source: Panchgani Hill Station Municipal Council



For this SFD report, two major data sources have been used. The secondary data source used is the Performance Assessment System (PAS) Project ([www.pas.org.in](http://www.pas.org.in)). This data was verified and triangulated through primary data collection from Panchgani Hill Station Municipal Council (PHSMC). The discussions were carried out with city officials of PHSMC for general information on city and Sanitation services in the city.

The Performance Assessment System (PAS) Project is about developing appropriate methods and tools to measure, monitor and improve delivery of water and sanitation in cities and towns in India. The PAS Project aims to work with state and local governments to address these constraints in the two western states of Gujarat and Maharashtra in India. The project is being implemented by the CEPT University (CEPT) with funding from the 'Bill and Melinda Gates Foundation'. Service delivery level data on water and sanitation for Panchgani available on the PAS website is used to create SFD matrix.

The performance assessment framework developed under PAS project is operationalized through the online SLB-PAS module, a web based system for collection and analysis of water supply and sanitation services data. It includes aspects of equity and on-site sanitation to capture the ground reality in Indian cities. All cities in the states of Gujarat and Maharashtra are using this module since year 2010. Consequently, other states like Chhattisgarh, Telangana, Assam and Jharkhand states have also started using PAS online module for publishing service level benchmarks (SLB).

PAS online module ([www.pas.org.in](http://www.pas.org.in)) for SLB is equipped with separate logins for every ULB to fill the information. After entering login details and selecting the financial year, the ULB officials can enter information related to demographics, water supply services, wastewater services and solid waste management services along with slum level details. The filled information is then used to calculate city level service level benchmarking indicators. There is also the provision for entering source of information to calculate reliability grades of these indicators. Data validation rules are inbuilt in the online checklists to ensure that data entered by city officials is correct. This data is further verified by PAS team, after which the city is allowed to "submit" the checklist. The SLB indicators are then published in state gazette as an important condition to attain performance grants under 14th finance commission.

## **2 Service delivery context description/analysis**

### **2.1 Policy, legislation and regulation**

Sustainable sanitation is not only about providing toilets. The full cycle of sanitation management consists of providing access to toilets, collection/ containment of black and grey water, conveyance, treatment and final disposal and reuse through appropriate means. The judiciary has declared sanitation as a part of fundamental right to life under Article 21 of the Constitution of India. According to the Constitution of India, water and sanitation are State subjects. Statutory powers are conferred to the State for making laws on water and sanitation.

However, the legal framework governing sanitation remains underdeveloped in India; there is no specific law on sanitation. The regulatory framework relating to sanitation comprises laws, and different national and state-level policies and programmes, which are not legally binding and susceptible to modification/withdrawal.



### 2.1.1 National Level

At the National level, the Water (Prevention and Control of Pollution) Act, 1974 and the Environment (Protection) Act, 1986 include provisions concerning wastewater disposal. State Pollution Control Boards are responsible for their implementation. The Environment (Protection) Act is an “umbrella” legislation designed to provide a framework for central government coordination of the activities of various central and state authorities established under previous laws, such as the Water Act and the Air Act. It also prescribes remedies for non-compliance. However, monitoring and implementation have been extremely poor (The Environment (Protection) Act, 1986).

The National Urban Sanitation Policy (NUSP) of Government of India (GoI), 2008 was the first comprehensive policy statement on urban sanitation in India. While the NUSP recognized the entire sanitation cycle and need for addressing faecal sludge management, this message did not percolate down to state and local governments. This is evident from the fact that there was no proposal for septage management to the central government for funding under the JNNURM programme during 2008-12 (NUSP, 2008)

Under municipal laws, owners/occupiers of buildings are also required to comply with a number of provisions, such as ensuring that no building is constructed without drainage and separation of rainwater and wastewater should be ensured. Penalties can be levied if the owner/occupier of a property is found negligent in appropriate maintenance and emptying of the septic tank and proper removal of the faecal sludge.

The Jawaharlal Nehru National Urban Renewal Mission (JnNURM) in 2005 focused (in sanitation) on investments in large-scale centralized sewer systems. Septage management and onsite sanitation, in general, were not covered.

The National Urban Sanitation Policy (NUSP) 2008 has set up an ambitious goal of providing safe sanitation to all in urban India. The specific goals of this policy are awareness generation and behaviour change, creating open defecation free (ODF) cities and integrated citywide sanitation.

The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act was enacted in the year 2013. This act prohibits employment of manual scavengers and installation of insanitary latrines. This act has become instrumental in eradicating manual scavenging from India. (Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013)

The advisory note on septage management in urban India, issued by MoUD in 2013, recommends supplementing CSPs with Septage Management Sub-Plan (SMP) as a part of the CSP, being prepared and implemented by cities (Advisory, 2013).

Recently, sanitation has been on the forefront of development agenda in India. The Government of India's Swachh Bharat Mission and AMRUT programme have focused on eradicating open defecation and providing proper sanitation infrastructure in the cities. Swachh Bharat Mission (SBM) was launched in year 2014 with a vision to ensure hygiene, waste management and sanitation across the nation. This mission will be implemented across all the cities of India and will be a tribute to Mahatma Gandhi on his 150th birth anniversary to be celebrated in the year 2019. As per the guidelines of Swachh Bharat Mission (urban) (SBMU), all the urban local bodies have to provide a toilet to all the households having no latrine within premises, and an effective solid waste management system (SBM, 2014).

The Atal Mission for Rejuvenation and Urban Transformation (AMRUT), launched in 2015, considers septage management as one of its mission components and allocates financial support for the same. (AMRUT, 2015)

At national level, MoUD and a host of research and civil society organisations jointly drafted and signed a National Declaration on Faecal sludge and Septage Management (FSSM) on 9th September 2016.


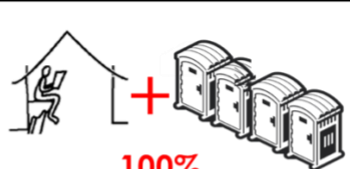
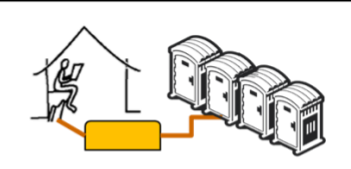


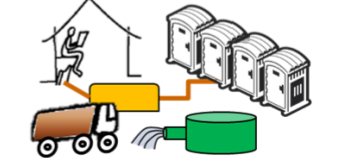


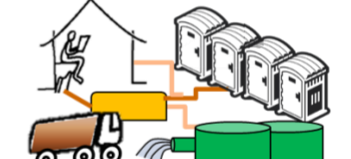
The Government of India, Ministry of Housing and Urban Affairs, has also issued a National Faecal Sludge and Septage Management Policy in year 2017. The key objective of the urban FSSM Policy is to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs such that safe and sustainable sanitation becomes a reality for all in each and every household, street, town and city (National FSSM policy, 2017).

### 2.1.2 State Level

Maharashtra adopted the guiding principles of NUSP in its Sujal Nirmal Abhiyan (SNA), a vision statement for the urban water supply and sanitation sector. SNA prescribes certain measures, mainly addressing community/public latrines, but falls short of addressing the entire FSM chain.

In May 2008, water supply and sanitation department (WSSD) of Maharashtra issued a Government Resolution (GR) which has guidelines for constructing toilets. The GR stated that every city should follow standards prescribed by the National Building Code, 2005. The Urban Development Department, GoM, issued a GR encouraging cities to develop plans to recycle and reuse at least 20 percent of waste water generated.

For the implementation of the Swachh Bharat Mission (SBM), Government of Maharashtra has launched “Swachh Maharashtra Mission” at the state level to run until 2nd October 2019. Swachh Maharashtra Mission in urban areas is being implemented by Urban Development Department (UDD) through a dedicated Swachh Maharashtra Mission Directorate. The Government of Maharashtra also has state level guidelines for septage management and handbook for cities to become open Defecation free. On 2<sup>nd</sup> October 2017, urban Maharashtra was declared as open defecation free by President of India. As a long-term vision, GoM aims to move towards improved sanitation by encouraging access to own toilets with safe management of faecal waste. With many new toilets being built under SMMU, cities have to face increased challenges in disposing the faecal waste. For creating awareness about the need of own toilets and safe and regular management of faecal waste SMMU has identified the whole process of ‘granting’ ODF status to cities. In order to encourage ULBs for taking into consideration entire service chain of sanitation, GoM has developed the concept of ODF, ODF+ and ODF++ cities under the Swachh Maharashtra Mission (SMM) program. ODF+ cities are those cities where 80% of residential properties will have access to own toilets and remaining population will have access to public/community toilets and there would also be safe collection, conveyance and treatment / disposal of faecal sludge and septage. At the city level, the Mission is being implemented by Urban Local Bodies (ULB) (SMM, 2014).

<b>ODF</b>	 <p>No visible OD, faeces</p>	 <p><b>100%</b> 100% access to own/community/ public toilet</p>	 <p>All toilets connected to disposal system</p>
<b>ODF+</b>	 <p>No visible OD, faeces</p>	 <p><b>&gt;80%</b>      <b>&lt;20%</b> At least 80% access to own toilet; rest CT/PT</p>	 <p>All toilets connected to disposal system; safe collection conveyance and treatment</p>
<b>ODF++</b>	 <p>No visible OD, faeces</p>	 <p><b>&gt;95%</b>      <b>&lt;5%</b> At least 95% access to own toilet; rest CT/PT</p>	 <p>All toilets connected to disposal system; safe collection conveyance and treatment including effluent/grey water</p>

### 2.1.3 City Level

At the city level, ULB is responsible for the provision of basic services like water, sewerage and solid waste. The ULB is required to provide proper sanitation services including safe collection, conveyance, treatment and disposal/reuse (PHSMC).

Panchgani was declared Open Defecation Free in the first phase of Swachh Maharashtra Mission (Urban) on 29th September 2015 (ODF, 2016).

## 2.2 Institutional roles

Management and delivery of urban basic services are governed by various institutions. The following are the institutions responsible for policy making, service provision and regulation of urban services (CEPT University, 2013):

1. Urban Development Department (UDD)
2. Water supply and sanitation Department (WSSD)
3. Maharashtra Jeevan Pradhikaran (MJP)
4. Maharashtra Pollution Control Board (MPCB)
5. Panchgani Hill Station Municipal Council (PHSMC)

### 2.2.1 State level

In Maharashtra, at the state level, three departments/agencies play a crucial role related to policy making and oversight of septage management in ULBs. The Urban Development Department (UDD) and its unit the Directorate of Municipal Administration (DMA) look after the overall urban development policy, staffing, budgets and monitoring of ULB's performance. Policies regarding sanitation/septage management are also formed by this department. The Water Supply and



Sanitation Department (WSSD) formulates policies and guidelines for water supply and sanitation in rural and urban areas. There is thus, some overlap in this function with UDD. The Maharashtra Water Supply and Sewerage Board (MWSSB) was established as per MWSSB Act 1976 for Rapid development and proper regularization of water supply and sewerage services in the State. MWSSB was subsequently named as Maharashtra Jeevan Pradhikaran (MJP) in 1997. MJP is responsible for Planning, designing and implementation of water supply and sewerage schemes in rural and urban areas of the state, including facilitation for necessary financial provisions.

The Maharashtra Pollution Control Board (MPCB), a state-level environmental regulator is limited to monitoring of pollution of surface water bodies. ULBs are informed about the quality of water in lakes and rivers and asked to take appropriate actions. MPCB does not have any role in regulating faecal sludge management in cities.

### 2.2.2 City level

At city level, ULB is responsible for providing water and sanitation services. ULBs are required to play a dual role of the service provider (providing drains, cleaning drains, constructing and maintaining public toilets and community toilets, etc) and of a regulator (ensuring compliance to building bylaws, ensuring proper discharge of wastewater to drains etc.). In larger cities, there are separate departments that perform these dual roles – the Town Planning Department, Drainage Department and Public Health Department (PHSMC).

However, in performing these dual roles, ULBs are constrained by limited staff and technical capacity. Recruitment of sanitary workers (*Safai Karmacharis*) in the ULBs is guided by rules framed by the state government and ULBs do not have much flexibility.

Septic tank/pit emptying is done only when it is full, and that is once in six to ten years. ULBs do provide the emptying service and dump the septage at nearest manhole or at sewage treatment plant for proper treatment.

The following table summarizes the roles and responsibilities of various institutions:

**Table 2: Institutional roles and responsibilities (CEPT University, 2013)**

Institution	Roles and responsibilities
Urban Development Department (UDD)	Allocation of budget, regular monitoring and functioning of ULBs. Approval of municipal budgets, funding of CSPs and other proposals.
Water supply and sanitation Department (WSSD)	Preparation of state urban sanitation strategies, policy, guidelines, schemes.
Maharashtra Jeevan Pradhikaran (MJP)	Key financing vehicle. Plans and constructs urban Infrastructure. However, it is not involved in the management of onsite sanitation systems.
Maharashtra Pollution Control Board (MPCB)	Advises state on pollution related standards and policies. Monitoring of treatment plants. Key regulator for pollution related issues.
Panchgani Hill Station Municipal Council (PHSMC)	Planning, designing, implementation, operation and maintenance (O&M) of urban infrastructure. Development control. Overall management of the civic services in the city. Responsible for septage emptying, transportation and disposal.

The following table shows the responsibilities for sanitation service delivery within PHSMC.

**Table 3: Institutional framework for the sanitation sector (CEPT University, 2013)**

Urban Service	Planning	Execution	O & M	Tariff fixation and collection
<b>Water Supply</b>	MJP	MJP	MJP	MJP
<b>Sewerage</b>	Health department PHSMC	Health department PHSMC	Health department PHSMC Aquatech Pvt. Ltd. for O & M	Tax Department PHSMC
<b>Onsite sanitation</b>	Health department PHSMC	Health department PHSMC	Health Department PHSMC, Private contractors	PHSMC / Private contractors
<b>Public and Community Toilets</b>	Health department PHSMC	Health department PHSMC	Health Department PHSMC	PHSMC

As stated in Table 3, Health department of PHSMC is responsible for the Planning and execution of sewerage and onsite sanitation services. Operation and maintenance is the responsibility of the Health department as well as ULB.

### 2.3 Service provision

PHSMC is the service provider for water and sanitation services in Panchgani city. The following table gives an overview of existing sanitation and water supply services in the city.

#### 2.3.1 Water supply services

The water source for Panchgani city is Vena Lake, which is 20 km away from the city. The water supply scheme was started in 1968-69. Water supply is privatized and being operationalized by Maharashtra Jivan Pradhikaran (MJP). Total 2 MLD water flows by gravity from source. Out of total 2,638 water connections, 2,533 are metered. The metered connections are charged through telescopic rates (Water Supply Engineer, 2017).

#### 2.3.2 Sanitation services

The majority of households, businesses and institutions are connected to the sewerage system. There are a few areas that have partial on-site sanitation system. Phase 2 of the sewerage project was completed in year 2017 and this has resulted in a major increase in sewerage connections. The majority of households that were connected to on-site sanitation systems are now provided with sewerage connections. Presently, around 97% households are connected to conventional underground sewerage system while remaining households (3%) are connected to septic tanks. The septic tanks are further connected to open or closed drains for effluent discharge. Out of 675 slum households in the city, 525 households have individual toilets. Majority of households in slums are also connected to the sewerage systems.

PHSMC operates one vacuum emptier truck of capacity 3,000 litres for the emptying of septic tanks. The private operator licensed by city government also operates another vacuum emptier.

The drainage and sewerage system was established during the British times. Recently, the new underground drainage system is laid at a cost of INR 159.8 lakhs (Approx. 233000 USD) under Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT).



There are three sewage treatment plants (STP) in the city, two functional and one under construction. One with capacity 0.35 MLD situated at Shivaji Nagar, other with 0.65 MLD capacity located at Siddharth Nagar are functional STP and third with capacity of 0.5 MLD located in Gavtan area is under construction. Anoxic bio reactor technology is being used in STPs. Total operational installed capacity of STPs is 1 MLD. These STPs are operationalized and maintained by the private agency named Aquatech Pvt. Ltd.

Panchgani has total 40 hotels. Out of these, five larger hotels have facility to treat sewage in their own premises. The treated wastewater is further reused at their own gardens. Another 5-6 hotels are connected to septic tanks which are cleaned by ULB every year. Remaining hotels are connected to sewerage system.

There are total 30 boarding/ residential schools in the city. Out of these, 6 have their own sewage treatment plants and rest are connected to sewerage system. Commercial areas such as shopping centres and public areas such as bus stands and tourist locations have facility of e-toilets. Total 11 functional e- toilets are present. Out of these 11 e-toilets, 4 are connected to sewerage system and remaining is having their own biodigester facility (Sanitary inspector, 2017).

**Table 4: Water and Sanitation services in PHSMC (SLB-Panchgani, 2017)**

	Description	Unit	Value (2016-17)
Sanitation	Households with toilets	No.	2,685
	Households with sewer connections	No.	2600
	Households with toilet connected to septic tanks	No.	85
	Estimated number of septic tanks cleaned annually (ULB and Private operators)	Number	35
	Treatment capacity	MLD	1.0
Water Supply	Length of water supply network	km	23
	Domestic water connections	No.	2,386
	Non domestic water connections	No.	305
	Public taps	No.	12

Photo 1: Sewage treatment plant



Source: Panchgani Hill Station Municipal Council

Table 5: Key stakeholders (Source: Compiled by PAS Project, CEPT University, 2017) (PAS Project, 2017)

Key Stakeholders	Institutions / Organizations
Public Institutions	<ul style="list-style-type: none"> <li>Panchgani Hill Station Municipal Council (PHSMC),</li> <li>Maharashtra Jeevan Pradhikaran (MJP),</li> <li>Maharashtra Pollution Control Board (MPCB)</li> </ul>
Private Sector	<ul style="list-style-type: none"> <li>Chavhan cleaning services (Septic tank emptying services)</li> <li>Aquatech Pvt. Ltd. (O &amp; M of STP)</li> </ul>

## 2.4 Service standards

The Ministry of Urban Development (MoUD) launched the Service Level Benchmarking (SLB) initiative covering water, sanitation, solid waste management and storm water drainage in year 2009. Service level benchmarking has been developed and published by the MoUD, which seeks to (i) identify a minimum set of standard performance parameters for the water and sanitation sector that are commonly understood and used by all stakeholders across the country; (ii) define a common minimum framework for monitoring and reporting on these indicators and (iii) set out guidelines on how to operationalize this framework in a phased manner (MoUD, 2015). However, the SLB indicators of the Government of India are focused only on conventional underground sewerage systems and onsite sanitation system is not captured in these indicators (PAS Project, 2017).

Table 6 shows the SLB status for sewerage and water supply services in Panchgani city for the year 2016-17 (PAS Project, 2017).

Table 6: Service level benchmarking status for sewerage and for water supply indicators in 2016-17 (SLB-Panchgani, 2017)

Description	Definition	unit	Benchmark	Status FY 2016-17
<b>Wastewater Management</b>				
Coverage of toilets	This indicator denotes the extent to which citizens have access to a toilet (whether individual or community) in a	%	100	100

Description	Definition	unit	Benchmark	Status FY 2016-17
	service area. The toilets would include those in the category of residential, commercial, industrial and institutional properties.			
Coverage of sewage network services	Total number of properties with individual toilet connections to sewerage network as a percentage of total number of properties in the city.	%	100	97
Collection efficiency of the sewerage network	Quantum of wastewater collected at the intake of the treatment plant to the quantity of total wastewater generated in the city.	%	100	84
Adequacy of sewage treatment capacity	Adequacy is expressed as secondary treatment capacity available as a percentage of normative wastewater generation.	%	100	84
Reuse and recycling	Quantity of wastewater that is recycled or reused after secondary treatment as a percentage of quantity of wastewater received at the treatment plant.	%	20	0
Quality of sewage treatment	Quality of treatment is measured as a percentage of WW samples that pass the specified secondary treatment standards, that is, treated water samples from the outlet of STPs are equal to or better than the standards lay down by the GoI agencies for secondary treatment of sewage.	%	100	100
Cost recovery	The extent of cost recovery is expressed as wastewater revenues as percentage of wastewater expenses, for the corresponding time period.	%	100	0.56
Efficiency of collection of charges	Efficiency in collection is defined as current year revenues collected, expressed as a percentage of total operating revenues, for the corresponding time period.	%	90	21
<b>Water supply</b>				
Coverage of water supply connections	Total number of households in the service area that are connected to the water supply network with direct service connections, as a percentage of the total number of households in that service area. Service area implies a specific jurisdiction in which service is required to be provided.	%	100	88
Per capita supply	Total water supplied to consumers expressed by population served per day.	lpcd	135	74
Metering of connections	The total number of functional metered water connections expressed as a percentage of the total number of water supply connections (including public stand post connections)	%	100	96
Non-Revenue Water (NRW)	This indicator highlights the extent of water produced which does not earn the utility any revenue. This is computed as the difference between the total water produced (ex- treatment plant) and the total water sold expressed as a percentage of the total water produced.	%	20	26

Description	Definition	unit	Benchmark	Status FY 2016-17
	NRW comprises: a) Consumption which is authorized but not billed, such as public stand posts; b) Apparent losses such as illegal water connections, water theft and metering inaccuracies; and c) Real losses which are leakages in the transmission and distribution networks.			
Continuity of supply	Continuity of supply is measured as: Average number of hours of pressurized water supply per day. Water pressure should be equal to or more than a head 7 metre (m) at the ferrule point/ metre point for the connection (7m head corresponds to the ability to supply to a single storey building)	hours	24	1.80
Quality of water supplied	Percentage of water samples that meet or exceed the specified potable water standards as defined by the CPHEEO. The sampling regimen should meet standards and norms laid down.	%	100	100

However, the current framework for service level benchmarking under the PAS Project includes questions for onsite sanitation system. To capture the service performance of different sanitation systems, a revised set of indicators termed ‘San Benchmark’ have also been developed covering all components of the sanitation service chain. San Benchmarks provides a new framework for performance assessment of citywide sanitation by capturing the onsite sanitation systems along with the conventional sewerage systems. It also considers effluent and grey water management along with fecal sludge and septage management because these can cause adverse impact on health and lead to environment pollution. The detailed report of San Benchmark is available on PAS website. (<http://pas.org.in/Portal/document/UrbanSanitation/uploads/SAN%20Benchmarks%20Citywide%20assessment%20of%20sanitation%20service%20deliveryIncluding%20on-site%20sanitation.pdf>)

**Table 7: Revised sanitation indicators-San Benchmark (PAS Project, 2017)**

Sanitation Revised Indicators	Definition	Unit	Status FY 2016-17
<b>Mixed Indicators</b>			
Coverage of households with adequate sanitation system	Percentage of households with individual or group toilets connected with adequate sanitation systems (sewer network/ septic tank / double pit system) to total households in the city.	%	99
Collection efficiency of sanitation system (weighted average)	Weighted average of collection efficiency of each sanitation system, weighted by share of households dependent on each sanitation system.	%	87
Adequacy of treatment capacity of sanitation system (weighted average)	Weighted average of adequacy of treatment plant capacity (for sewage, fecal sludge and septage and grey water) available for each sanitation system, weighted by share of households dependent on each sanitation system.	%	77
Extent of reuse and recycling in sanitation system (weighted average)	Weighted average of extent of reuse of treated wastewater and sludge after adequate treatment as a percentage of wastewater and sludge received at the treatment plant, weighted by share of household dependent on each sanitation system.	%	0
Quality of treatment of sanitation system	Weighted average of quality of treatment of each sanitation system, weighted by share of households dependent on each sanitation system.	%	100

### 3 Service Outcomes

Service outcome analysis is based on secondary sources. Two key sources of data are PAS Project, 2017 (PAS Project, 2017), and Census of India, 2011 (Census, 2011). The data is verified and updated by key informant interviews (KIIs).

#### 3.1 Overview

##### 3.1.2 Containment

The vast majority of the households in Panchgani city have toilet facilities within the premises (99%), while less than 1% of the population rely on community toilets. Of this, 97% of the toilets are connected directly to the sewer system, while only 3% toilets are connected to septic tanks. Septic tanks are further connected to open or closed drains for effluent disposal. None of the individual toilets was found to be using single or double pit latrine systems.

There are three community toilets in the city having 18 functional seats. Across the city, there are 14 public urinals. These are mostly situated at bus stands, railway station and market areas. All the community toilets are connected to the sewerage network (PAS Project, 2017).

Panchgani has total 40 hotels. Out of these, five larger hotels have facility to treat sewage in their own premises. The treated wastewater is further reused at their own gardens. Another five or six hotels are connected to septic tanks which are cleaned by the ULB every year. Remaining hotels are connected to sewerage system.

There are total 30 boarding/residential schools in the city. Out of these, six have their own sewage treatment plants and rest are connected to sewerage system. Commercial areas such as shopping centres and public areas such as bus stands and tourist locations have facility of e-toilets. Total 11 functional e- toilets are present. Out of these 11 e-toilets, four are connected to sewerage system and remaining hotels are having their own biodigester facility (Sanitary inspector, 2017).

The Panchgani city was declared Open Defecation Free (ODF) on 29th September 2015 (PAS Project, 2017).

##### 3.1.3 Emptying

Onsite sanitation facilities are emptied by PHSMC and Private agency. Septic tanks are emptied on demand basis. On an average around 35 septic tanks are emptied annually out of total 140 septic tanks in the city. PHSMC operates two vacuum emptier machines for septic tank emptying (One owned by PHSMC and other is private, but licensed by PHSMC). The capacity of these trucks is 3000 litres each. Citizens have to submit an application for emptying of septic tanks (PAS Project, 2017).

The fee for emptying is INR 1,000 (15 USD) for the septic tank inside city limits. For emptying tanks outside city limits, the charges are INR 2,000 (30 USD) (PAS Project, 2017).

##### 3.1.4 Transportation

The faecal sludge is considered safely managed, when it is either conveyed through sewerage system and safely treated in STP or contained in septic tank from where it is emptied regularly with proper treatment.

As no information regarding the effluent - faecal sludge composition of onsite facilities is available, it is assumed that 50 % of the volume is faecal sludge and 50 % is effluent.



Hence, out of 3% of toilets connected to onsite sanitation systems, 50% would be FS in the septic tanks and 50% would be effluents from the septic tanks. Faecal sludge transported by truck mounted suction emptier trucks are either discharged into nearby manhole of sewerage network or at the inlet of STP. Of total FS contained in the septic tanks, around 30% of FS is emptied annually and delivered to treatment plant while remaining FS remains in the septic tank containment only.

Septic tanks outlets are connected to closed or open drains. The effluent collected in closed drains or open drains are not delivered to the treatment plant and discharged on open land outside city limit.

### *3.1.5 Treatment and disposal*

PHSMC has three sewage treatment plants (STP), of which two STPs are operational and one STP of 0.5 MLD is under construction. Anoxic bio reactor technology is used in sewage treatment plant. Total operated installed capacity of STPs (primary and secondary treatment) is 1 MLD. These STPs treat 87% of sewage received from sewerage network and also septage collected by emptying of septic tanks (Sanitary inspector, 2017). Due to inadequate treatment plant capacity and losses in the sewer network, 13% of sewage is currently disposed of in environment without any treatment.

The treated wastewater from STP meets the standards laid down by the pollution control board for Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Suspended Solids (SS), and is further discharged into the water bodies. Wastewater quality tests are conducted every month, sample copy of test results in terms of quality parameters of treated wastewater is given in Appendix 3. Currently, treated wastewater is not reused in Panchgani.

## **3.2 SFD Matrix**

The SFD selection grid and matrix used to produce the graphic are shown in Figure 1 and Figure 2 respectively.

### *3.2.1 SFD Matrix Explanation*

In Panchgani city, around 99.3% of households are dependent on individual toilets and less than 1% of households are dependent on community toilets. Out of this, 97% toilets are connected to the sewerage system and rest 3% toilets are connected to septic tanks with open/closed drains. All community toilets and public toilets are connected to the sewerage system. 84% of sewage collected through network is currently treated in the two sewerage treatment plants.

Out of 3% of toilets connected to onsite sanitation systems, 50% would be FS in the septic tanks and 50% would be effluents from the septic tanks, assuming 50:50 as FS and effluent. Of total FS contained in the septic tanks, around 30% of FS is emptied annually and delivered to treatment plant while remaining FS remains in the septic tank containment only. Faecal sludge from the emptier trucks are discharged either at the nearby manhole of sewerage network or at the inlet of STP, which is 100% treated in the sewage treatment plant.

In Panchgani, onsite sanitation systems are either connected to open or closed drains for effluent discharge. The effluent collected in closed drains or open drains is not delivered to the treatment plant.



List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)										
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow	
No onsite container. Toilet discharges directly to destination given in List B	T1A1C1				Significant risk of GW pollution Low risk of GW pollution						Not Applicable
Septic tank					Significant risk of GW pollution Low risk of GW pollution	T1A2C6					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution						
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution						Significant risk of GW pollution Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution Low risk of GW pollution	
Unlined pit										Significant risk of GW pollution Low risk of GW pollution	
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution Low risk of GW pollution	
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										Significant risk of GW pollution Low risk of GW pollution	
Toilet failed, damaged, collapsed or flooded											
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded											
No toilet. Open defecation	Not Applicable										Not Applicable

Figure 1: SFD selection grid

Panchgani, Maharashtra, India, 1 Jul 2018. SFD Level: 1 - Initial SFD

Population: 15745

Proportion of tanks: septic tanks: 50%, fully lined tanks: 100%, lined, open bottom tanks: 100%

System label	Pop	W4a	W5a	F3	F4	F5	S4e	S5e
<b>System description</b>	Proportion of population using this type of system	Proportion of wastewater in sewer system, which is delivered to centralised treatment plants	Proportion of wastewater delivered to centralised treatment plants, which is treated	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated	Proportion of supernatant in open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
T1A1C1 Toilet discharges directly to a centralised combined sewer	97.0	87.0	100.0					
T1A2C6 Septic tank connected to open drain or storm sewer	3.0			30.0	100.0	100.0	0.0	0.0

Figure 2: SFD matrix

### 3.2.2 Risk of groundwater contamination

The water table, in general, is deep, varying from 24 to 60 metres below ground level. The water table varies in Gavthan area and in outskirts of the city. No faecal coliform contamination is observed in ground water. The rock type is weathered basement. Sanitation facilities in the city are mostly

located far from the groundwater sources. No drinking water is produced from any of the ground water sources. Hence there is very low risk of groundwater contamination in the city (Satara district ground water profile, 2013) (Water Supply Engineer, 2017).

### 3.3 SFD Graphic

This report was prepared to demonstrate use of SLB-PAS information for SFD report production.

The SFD graphic is shown in Figure 3. This shows that 85% of the population are connected to a sanitation system in which the excreta generated is safely managed, while 15% of the population are connected to a system in which the excreta is unsafely managed. The vast majority of the population (97%) use offsite sanitation, with 87% of the wastewater generated being delivered to treatment and treated, as indicated by the 84% wastewater treated on Figure 3. The unsafely managed fraction is due to inadequate treatment plant capacity and losses in the sewer network, with 13% of wastewater generated currently being discharged to the environment without any treatment.

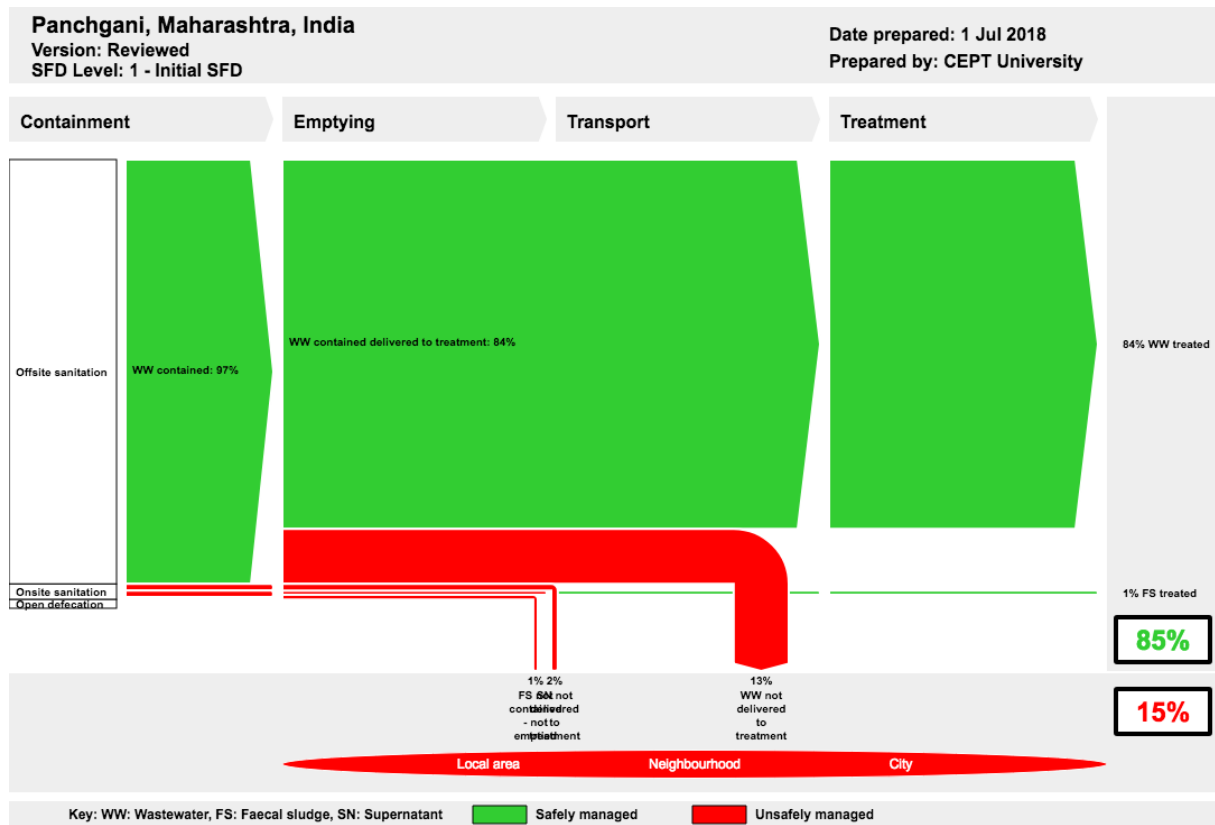


Figure 3: SFD graphic



## 4 Stakeholder Engagement

### 4.1 Key Informant Interviews

The SFD is prepared from the PAS data base for the year 2016-17. Every year ULBs fill the detailed checklist on PAS web-portal for water, sanitation, storm water and solid waste management sector. Handholding support is provided to cities by All India Institute of Local Self Government (AIILSG), Mumbai and PAS team during data entry process. Data validation rules are inbuilt in the checklists to ensure that data entered by city officials is correct. This data is further verified by PAS team, after which the city is allowed to “submit” the checklist. The key performance indicators generated from PAS database is then gazetted at state level every year.

Key informant interviews (KII) were conducted with concerned ULB officials to verify available data and collect more detailed data requirement.

The KIIs and data collected helped in understanding the existing situation and upcoming development plans in the sanitation sector.



## 5 Acknowledgements

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## 7 Appendix

### Appendix 1: Stakeholder identification

No.	Stakeholder group	In Panchgani context
1	City council / Municipal authority / Utility	Panchgani Hill station Municipal Council
2	Ministry in charge of urban sanitation and sewerage	Urban Development Department, GoM
3	Ministry in charge of urban solid waste	Urban Development Department, GoM
4	Ministries in charge of urban planning finance and economic development.	Urban Development Department, GoM
5	Service provider for construction of onsite sanitation technologies	Local masons
6	Service provider for emptying and transport of faecal sludge	Chavhan cleaning services (Septic tank emptying services)
7	Service provider for operation and maintenance of treatment infrastructure	Aquatech Pvt. Ltd. (O & M of STP)
8	Market participants practising end-use of faecal sludge end products	N/A
9	Service provider for disposal of faecal sludge	Panchgani Hill station Municipal Council Chavhan cleaning services (Septic tank emptying services)

### Appendix 2: Tracking of Engagement

Name of organisation	Name of contact person	Designation	Date of engagement	Purpose of engagement
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	9-5-2016	Data collection
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	10-5-2016	Data collection
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	11-5-2016	KII
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	30-5-2016	Data collection
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	16-6-2016	Data collection
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	29-6-2016	KII
PHSMC	Mr. Nikhil Pawar	Engineer, PHSMC	29-6-2016	KII
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	4-7-2016	Data collection
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	20-6-2018	Data collection
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	27-6-2018	KII
PHSMC	Mr. Ganesh Kasurde	Sanitary Inspector, PHSMC	01-7-2018	KII
PHSMC	Mr. Nikhil Pawar	Engineer, PHSMC	27-6-2018	KII

**Appendix 3: Sample copy of quality test result of sewage treatment plant of city**



Lab Approved by MoEF, New Delhi. Lab NABL Accredited - Chemical Field.

"Shree", K 3/4, S. No. 10, Erandawane Housing Society, Opposite Deenanath Mangeshkar Hospital, Pune 411 004.  
• Tel.: 020 - 25460202, 25460203, 25460023, 25460033. • Email : kmn@hespl.co.in / md@hespl.co.in • www.hespl.co.in

**ANALYSIS REPORT**

F/LAB/04/01/17.12.2012

<b>CLIENT'S NAME &amp; ADDRESS</b> Aquatech Solutions Pvt. Ltd Kothrud Pune	<b>REPORT NO</b>	HS/LAB/WA/1130A
	<b>DATED</b>	5/11/2016
	<b>LAB REFERENCE NO</b>	HS/LAB/WA/630A
	<b>DATE OF SAMPLING</b>	02/11/2016
	<b>DATE OF ANALYSIS</b>	02/11/2016

DETAILS OF SAMPLE	SAMPLE COLLECTED BY	NATURE	LOCATION
Domestic water Sample	The Client	Untreated / Treated	0.65 MLD STP Panchgani

**RESULTS OF ANALYSIS**

SR NO	DESCRIPTION	UNIT	RESULT	
			Untreated	Treated
1	pH	---	7.42	7.68
2	Suspended Solids	mg/lit	205.00	31.00
3	Total Dissolved Solids	mg/lit	1860.00	1136.00
4	Chemical Oxygen Demand	mg/lit	325.00	81.00
5	Biochemical Oxygen Demand	mg/lit	178.00	34.00
6	Oil & Grease	mg/lit	8.00	NIL

For HORIZON SERVICES

*Manoj Kumar*  
(LAB INCHARGE)



Lab Approved by MoEF, New Delhi. Lab NABL Accredited - Chemical Field.

\*Shree\*, K 3/4, S. No. 10, Erandawane Housing Society, Opposite Deenanath Mangeshkar Hospital, Pune 411 004.  
• Tel.: 020 - 25460202, 25460203, 25460023, 25460033. • Email : kmn@hespl.co.in / md@hespl.co.in • www.hespl.co.in

**ANALYSIS REPORT**

F/LAB/04/01/17.12.2012

<b>CLIENT'S NAME &amp; ADDRESS</b> Aquatech Solutions Pvt. Ltd Kothrud Pune	<b>REPORT NO</b>	HS/LAB/WA/1134A
	<b>DATED</b>	5/11/2016
	<b>LAB REFERENCE NO</b>	HS/LAB/WA/631A
	<b>DATE OF SAMPLING</b>	02/11/2016
	<b>DATE OF ANALYSIS</b>	02/11/2016

DETAILS OF SAMPLE	SAMPLE COLLECTED BY	NATURE	LOCATION
Domestic water Sample	The Client	Untreated / Treated	0.35 MLD STP Panchgani

**RESULTS OF ANALYSIS**

SR NO	DESCRIPTION	UNIT	RESULT	
			Untreated	Treated
1	pH	---	7.21	7.62
2	Suspended Solids	mg/lit	167.00	27.00
3	Total Dissolved Solids	mg/lit	1759.00	1035.00
4	Chemical Oxygen Demand	mg/lit	342.00	71.00
5	Biochemical Oxygen Demand	mg/lit	164.00	30.00
6	Oil & Grease	mg/lit	7.00	NIL

For HORIZON SERVICES

*M. Naigalkar*  
(LAB INCHARGE)