

SFD Promotion Initiative

Nashik India

Final Report

This SFD Report was created through field-based research by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) as part of the SFD Promotion Initiative.

Date of production: 10/11/2015

Last update: 08/03/2016

SFD Promotion Initiative

sustainable
sanitation
alliance

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

On behalf of



Federal Ministry
for Economic Cooperation
and Development

UNIVERSITY OF LEEDS

WORLD BANK GROUP
Water

wsp
water and
sanitation program

WEDC Loughborough
University



eawag
aquatic research

Sandec
Sanitation, Water and
Solid Waste for Development

BILL & MELINDA
GATES foundation



SFD Report Nashik, India, 2015

Produced by:

Roeder, L.

©Copyright

All SFD Promotion Initiative materials are freely available following the open-source concept for capacity development and non-profit use, so long as proper acknowledgement of the source is made when used. Users should always give credit in citations to the original author, source and copyright holder.

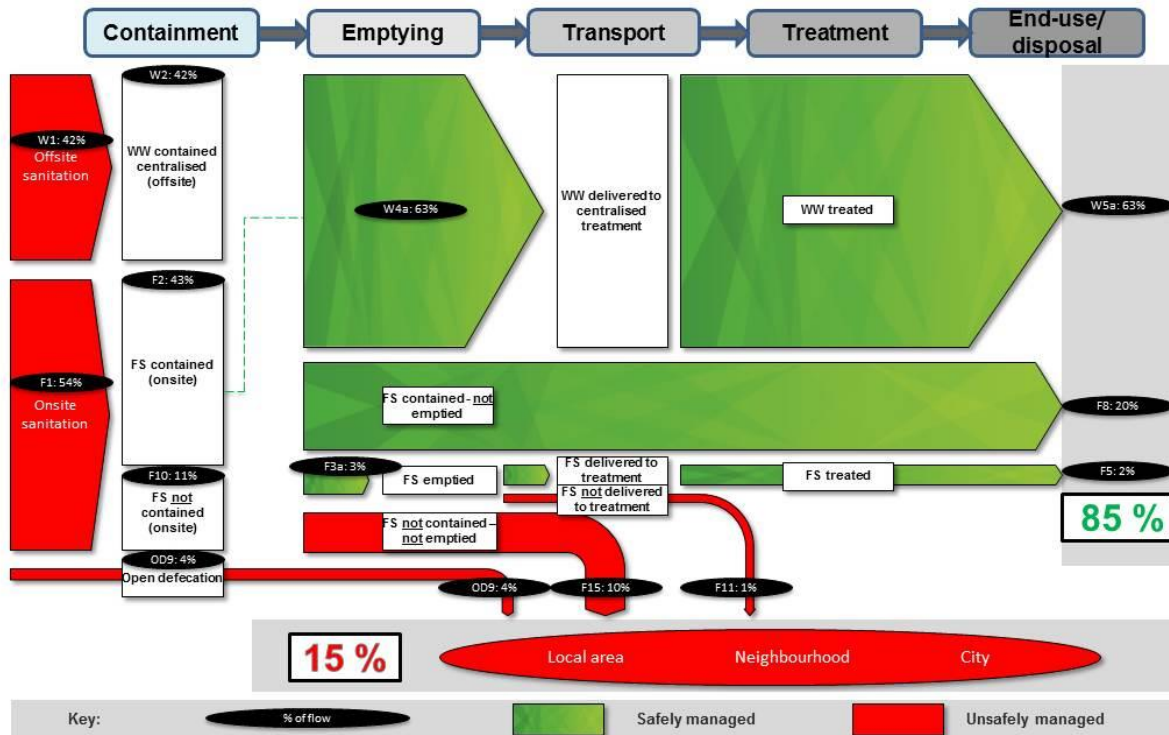
This Executive Summary and SFD Report are available from:

www.sfd.susana.org

1. The Diagram

Nashik / India (26. November 2015)
Field based

Status: REVIEWED



2. Diagram information

Desk or field based:

This SFD followed the field-based approach.

Produced by:

This SFD is prepared by Lasse Roeder with the support from Rahul Sharma, Dipti Shinde and Jitendra Yadav (all GIZ) in cooperation with Nashik Municipal Corporation.

Status:

This is a final SFD.

Date of production:

10/11/2015

3. General city information

The city of Nashik is located in the northwest of the state of Maharashtra in the Western Ghats at the source of the Godavari River with a mean elevation of about 565 meters above mean sea level.

The city is divided in 6 administrative zones and 122 wards and is administered by the Nashik Municipal Corporation (NMC). The boundary of the NMC administered area has been chosen for this SFD.

The NMC has a total population of just under 1.5 Million distributed over 259 km² (population density of about 5,800 pers./ km², as per Census 2011) with an annual growth rate of 3.3 %.

Nashik is a pilgrimage center with a diurnal floating population of about 100,000. The city additionally hosts the Simhasht Kumbh Mela Festival every 12 years which attracts about 5 Million pilgrims within one week.

4. Service delivery context

The National Urban Sanitation Policy (NUSP) was launched 2008 by the Ministry of Urban Development (MoUD). The extensive framework supports the cities' development towards generating public awareness about sanitation, achieving open defecation free (ODF) status and an integrated, city-wide sanitation system. It concedes financial support to the states and the cities for the preparation of State Sanitation Strategies (SSSs) and City Sanitation Plans (CSPs) respectively, also including decentralized onsite sanitation solutions, to first look on septage management as of importance for public health.

In 1982 the Nashik Municipal Corporation (NMC) was formed. Several departments within the NMC are involved in the management of the city sanitation and are responsible for separate services. Both centralized piped water supply and sewer network services cover nearly the complete city. About 4 % of the Nashik population relies on open defecation and an additional 17 % does not have access to latrine facilities in the household but rely on public latrines. The NMC makes the construction of septic tanks mandatory for new housing, regardless a sewer connection. The Public Works Dept. of NMC is responsible for the construction of septic tanks for public toilets. Operation and maintenance is either a responsibility of the Health Dept. of NMC or a private contractor, mandated by NMC. Collected septage is transported and emptied to sewer manholes or septage pumping stations. NMC operates seven wastewater treatment plants with a total capacity of 270 TCM daily and 15 wastewater pumping stations both with an adequate capacity. Treated wastewater is disposed of in the Godavari River running through the city.

The sanitation service delivery for private onsite sanitation systems is not operationalized. Septic tanks that are not directly connected to sewer lines are emptied on demand by NMC. NMC operates six faecal sludge trucks (four of them in working conditions).

Timeframes are in place for when service level benchmarks that are not yet met shall be met and investment plans are developed accordingly.

The majority of the slum population relies on public toilets operated by NMC or a private agency. The regulation that denies construction permits for households without a

septic tank within the premises raises the obstacle for the urban poor.

The current rate of network and treatment capacity extension is adequate to meet to close the existing gap and to cover future needs. The main focus lies on full coverage with the centralized sewer network.

5. Service outcomes

The Census of India from 2011 was the first census to include a section on household sanitation facilities. The questionnaire focused on the containment technologies present in the households. However, also connections to the central sewer system were noted.

- Containment: According to the census 80 % of all households have toilet facilities within their premises, with 42 % with direct connection to the sewer system, 35 % septic tanks and 3 % with pit latrines and other systems among them. Public toilets service 17% of the households and 4 % of the households rely on open defecation.
- Emptying: Most of the private septic tanks have connections to the centralized sewer network. Those without are serviced on demand by NMC for a fee of Rs. 300. Same applies to public latrines, which partly do not have sewer connections either. No private companies seem currently to be involved in the business.
- Transport: Collected septage is transported to sewer manholes or sewerage pumping stations and introduced in the sewer network. Together with the sewerage it is pumped to the five wastewater treatment plants. No hints on major leakages were found.
- Treatment: NMC operates seven wastewater treatment plants. Two treatment technologies are found in Nashik: Upflow Anaerobic Sludge Blanket (UASB) processes (with attached bio-gas power plants) and Activated Sludge Process (ASP) plants (total capacity of 270,000 m³ daily). The current treatment capacity will be augmented in the near future and is then expected to be adequate for the wastewater generation until 2021. The treatment quality complies with national standards. The formation of foam in the effluent of several treatment plants is subject of current discussions (see Figure 1).

- o End-use/ disposal: All dried faecal sludge is reported to be sold to a private agency for reuse in agriculture after drying. Treated wastewater is disposed of in the local water bodies (mainly Godavari River).

Freshwater is piped to the city of Nashik from two main sources of surface water bodies: 1) the head works of the Gangapur dam on Godavari River 15 km west of the city center from where the water is transported towards the five water treatment plants present in NMC and 2) the head works on the river Darna, located south-east of the city, pumped exclusively to the Nashik Road water treatment plant.



Figure 1: Foam formation in treated effluent of Tapovan wastewater treatment plant (Roeder 2015)

6. Overview of stakeholders

The Indian constitution classifies questions concerning the water and sanitation sector as state subjects.

Both state-level and municipality-level (Urban Local Bodies, ULBs) agencies share responsibilities for the water and sanitation sector. Several private sector organizations and development partners are also involved.

Table 1: Stakeholder sanitation sector

Stakeholders	Institutions / Organizations
Public Institutions	Nashik Municipal Corporation (NMC), Maharashtra Pollution Control Board (MPCB), Ministry of Health (MoH)
Private Sector	Sulabh International, Industrial areas
Development Partners, Donors	GIZ

Table 2 shows the NMC departments and other organizations responsible in NMC for the sanitation sector, divided in four service stages.

Table 2: Institutional framework for the sanitation sector in Nashik (GIZ 2014)

Service	Responsible agencies
Planning	Underground Drainage Dept., Public Works Dept. NMC
Implementation	Underground Drainage Dept., Public Works Dept. NMC
O & M	Underground Drainage Dept., Health Dept. NMC, private contractors
Tariff setting	Tax Dept. NMC, Private contractors

7. Credibility of data

Data sources:

Data concerning the containment facilities in Nashik was drawn from the Census of India 2011. Data concerning the further steps of the sanitation chain emptying, transport, treatment and disposal / reuse were collected from official reports (like the Service Level Status Report), secondary literature review and the outcomes of Key Informant Interviews, that were conducted during a visit of the NMC headquarters in August 2015. This data has to be regarded as mostly qualitative. No Focus Group Discussions were conducted.

Assumptions:

- o Census 2011 data was regarded as correct.
- o The treatment capacity of the existing plants is fully used and treatment is done meeting the standards.
- o The proportion of faecal sludge in onsite sanitation facilities is 50%.

Annotations:

The Census 2011 was the first census to collect data relating to the household sanitation situation (only containment-data). It is expected that, because of limited experience and technical know-how from the surveyors, the resulting data differs from the actual situation. Cross-checking with other data sources was only possible for single numbers. Concerning offsite sanitation systems, this comparison revealed such a discrepancy.

Some of the issues and challenges are listed below:

Data gaps:

- o No reliable data on the amounts of septage being emptied by suction trucks was available. A monitoring of the volumes being transported to

manholes or sewage pumping stations would be favorable.

Hydrogeological data is required for the assessment of the risk of groundwater pollution. Conditions in Nashik do not seem to favor contamination though.

8. Process of SFD development

This SFD is based on data derived from outcomes of the Census of India from 2011. Where ever possible, Census data was cross-checked with data from secondary sources such as the City Sanitation Plan, its review and the City Development Plan.

In addition, several Key Informant Interviews were conducted in the NMC headquarters for this SFD. Also field visits to Tapovan treatment plant and sanitation facilities for the Kumbh Mela Festival 2015 were made.

The SFD calculation tool was then used to calculate the single mass transfers based on the data resulting from the literature review.

Limitations of SFD:

It should also be mentioned, that CSP data is more up-to-date (2014 for the review) than Census-data. Therefore, a comparison is difficult.

9. List of data sources

Below is the list of data sources used for the production of this SFD:

- Published reports:
 - Census in India 2011. HH-8 : Households by Availability of type of Latrine Facility
 - Nashik Municipal Corporation 2011b. City Sanitation Plan for Nashik
 - Nashik Municipal Corporation 2013. Revised City Development Plan for Nashik City
 - Ministry of Urban Development 2012. Service Levels in Urban Water and Sanitation Sector Status Report (2010-2011)

- Unpublished reports:

- GIZ 2014. City Sanitation Plan Update – Status Report Nashik Municipal

Nashik, India, 2015

Produced by:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Roeder, L.

© Copyright

All SFD Promotion Initiative materials are freely available following the open-source concept for capacity development and non-profit use, so long as proper acknowledgement of the source is made when used. Users should always give credit in citations to the original author, source and copyright holder.

This Executive Summary and the SFD Report are available from:

www.sfd.susana.org

SFD Promotion Initiative

sustainable
sanitation
alliance

UNIVERSITY OF LEEDS

WEDC Loughborough University

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

WORLD BANK GROUP

USE

eawag aquatic research

Sandec Sanitation, Water and Solid Waste for Development

wsp water and sanitation program

BILL & MELINDA GATES FOUNDATION

Table of Content

1	City context	1
2	Service delivery context analysis	2
2.1	Policy, legislation and regulation	2
2.1.1	Policy	2
2.1.2	Institutional roles	2
2.1.3	Service provision	3
2.1.4	Service standards	5
2.2	Planning	6
2.2.1	Service targets	6
2.2.2	Investments	7
2.3	Reducing inequity	8
2.3.1	Current choice of services for the urban poor	8
2.3.2	Plans and measures to reduce inequity	9
2.4	Outputs	9
2.4.1	Capacity to meet service needs, demands and targets	9
2.4.2	Monitoring and reporting access to services	9
2.5	Expansion	10
2.5.1	Stimulating demand for services	10
2.5.2	Strengthening service provider roles	10
3	Service Outcomes	10
3.1	Overview	10
3.2	SFD Matrix	12
3.2.1	Containment	13
3.2.2	Emptying	13
3.2.3	Transport	13
3.2.4	Treatment	13
3.2.5	End-use/ disposal	14
3.2.6	Risk of groundwater containment	14
4	Stakeholder Engagement	14
4.1	Key Informant Interviews	14
4.2	Focus Group Discussions	14



4.3	Observation of service providers	14
5	Acknowledgements	15
6	References.....	15
7	Appendix	16
7.1	Appendix 1: Stakeholder identification.....	16
7.2	Appendix 2: Tracking of Engagement.....	16
7.3	Appendix 3: SFD matrix	17

List of tables

Tab. 1: Institutional framework for the sanitation sector	3
Tab. 2: Water and Sanitation services in NMC	3
Tab. 3: Compliance with SLBs according to Service Level Status Report 2010-2011 and CSP-review	5
Tab. 4: Timeframe to achieve service delivery targets as stated in SLBs	6
Tab. 5: Identified investment needs for sewerage projects until 2041 in Million Rs. as per City Investment Plan.....	8
Tab. 6: Distribution of domestic toilet facilities	11
Tab. 7: Property-wise connections to sewer network.....	11



List of figures

Fig. 1: Administrative map of Nashik city and its ward boundaries.....	1
Fig. 2: Upflow Anaerobic Sludge Blanket (UASB) facility at Tapovan WWTP	4
Fig. 3: Toilet facilities in Nashik for the pilgrims in preparation of the Kumbh Mela festival	7

Abbreviations

ASP	Activates Sludge Process
BOD	Biochemical Oxygen Demand
CPHEEO	Central Public Health & Environmental Engineering Organisation
CSP	City Sanitation Plan
CSTF	City Sanitation Task Force
EPA	Environment (Protection) Act, 1986
KPIs	Key Performance Indicators
IS	Indian Standard
JnNURM	Jawaharlal Nehru National Urban Renewal Mission
lpcd	Litres per capita per day
masl	Metres above mean sea level
mbgl	Meters below ground level
MoUD	Ministry of Urban Development
NMC	Nashik Municipal Corporation
Rs.	Indian Rupees (Exchange rate August 2015: 1 USD \cong 65 Rs.)
SLBs	Service Level Benchmarks
SPS	Sewage Pumping Stations
STP	Sewage Treatment Plant
SS	Suspended Solids
TCM	Thousand cubic meters
UASB	Upflow Anaerobic Sludge Blanket
ULBs	Urban Local Bodies
WSSB	Water Supply and Sanitation Board
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1 City context

The city of Nashik is the capital of the Nashik District situated in the northwest of the state of Maharashtra. The city is divided in 6 administrative zones and 122 wards. Nashik city is administered by the Nashik Municipal Corporation (NMC).

NMC covers an area of 259 km² with 1,486,973 inhabitants (Census 2011). The decadal growth amounts to 38 % which equals to a population growth of 3.3 % per year (NMC 2013).

Nashik is a pilgrimage center. Every twelve years the Godavari River, running through the city, is the destination during the Simhashth Kumbh Mela. This Hindu festival attracted about 5,000,000 pilgrims when it was last held in 2003 (next Kumbh Mela festival took place in August 2015). The diurnal floating population is about 100,000 (GIZ 2014).

Nashik has seen major industrial development in the recent years, namely by auto component suppliers and engineering ancillary services.

Nashik is located in the Western Ghats at the source of the Godavari River with a mean elevation of about 565 masl.

The city features climate with high temperature variations (summer temperatures rise above 40°C while the minimum temperature in winter is below 5°C) and annual rainfalls of about 650 mm (mostly June-September, GIZ 2014).



Fig. 1: Administrative map of Nashik city and its ward boundaries (Nashik Municipal Corporation 2011b)

2 Service delivery context analysis

2.1 Policy, legislation and regulation

2.1.1 Policy

The recognition of the right to sanitation as part of the fundamental right to life under Article 21 of the Indian Constitution gives a strong mandate for sanitation in India. India has committed itself to meeting the Millennium Development Goal for sanitation.

The Water (Prevention and Control of Pollution) Act 1974 and the Environment (Protection) Act (EPA) 1986 together empower the government to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution (GIZ 2015). Most of the other states of India (including Maharashtra) have, however, not used the provisions of the EPA to introduce specific rules for managing septage (GIZ 2015).

Under the Water Act and the EPA the Central Government supports programmes and schemes for wastewater management in order to limit environmental pollution.

The Jawaharlal Nehru National Urban Renewal Mission (JnNURM) in 2005 focused (in terms of the sanitation sector) on investments in large scale centralised sewer systems. Septage management and onsite sanitation in general were not covered.

Septage management in India is traditionally mainly regarded as a 'private provision' and not as concern for public health and for city-sanitation with relevance for the ULBs (GIZ 2015). The consequence is a lack of holistic planning along the sanitation chain.

It was the National Urban Sanitation Policy (NUSP) 2008 that encourages the states and the cities to prepare State Sanitation Strategies (SSSs) and City Sanitation Plans (CSPs) respectively, also including decentralized onsite sanitation solutions, to first look on septage management as of importance for public health.

The Swachh Bharat Mission (SBM), launched in 2014, supports the goals expressed in the NUSP financially with a focus on the needs of the urban poor. The Atal Mission for Rejuvenation and Urban Transformation (AMRUT), launched in 2015, considers Septage management as one of its mission components & concedes financial support for the same. Also other missions such as Basic Services to Urban Poor (BSUP) as part of JnNURM and Rajiv Awas Yojana (RAY) address the needs of the urban poor.

2.1.2 Institutional roles

The Seventh Schedule (Article 246) of the Indian constitution classifies 'Public health and sanitation [...]' and 'Water, that is to say, water supplies, irrigation and canals, drainage and embankments [...]' as state subjects (List II, Entry 6 and List II, entry 17, respectively).

The Bombay Provincial Municipal Corporations Act (BPMC Act) 1949 provided the legal framework for the establishment of municipal corporations in the state of Maharashtra. In 1982 the Nashik Municipal Corporation (NMC) was formed. Tab. 1 shows the responsibilities for sanitation service delivery within NMC.

Tab. 1: Institutional framework for the sanitation sector (GIZ 2014)

Urban Service	Planning	Execution	O % M	Tariff fixation and collection
Water Supply	Water Supply Department, NMC	Water Supply Department, NMC	Water Supply Department, NMC	Tax Department, NMC
Sewerage	Underground Drainage Department, NMC	Underground Drainage Department, NMC	Underground Drainage Department, NMC	Tax Department, NMC
Public and Community Toilets	Public Works Department, NMC	Public Works Department, NMC	Health Department, NMC / Private contractors	NMC / Private contractors

As stated in Tab. 1 the Public Works Dept. of NMC is responsible for the construction of septic tanks for public toilets. Operation and maintenance is either a responsibility of the Health Dept. of NMC or a private contractor, mandated by NMC.

The sanitation service delivery for private onsite sanitation systems is not operationalized. Septic tanks that are not directly connected to sewer lines are emptied on demand by NMC. NMC operates six faecal sludge trucks (four of them in working conditions, Mali 2015).

2.1.3 Service provision

NMC is the sole provider of offsite sanitation services from emptying to treatment. Tab. 2 gives an overview over the sanitation and water supply services offered by NMC. Since 2011 no sewerage tax applies for the connected households (GIZ 2014).

Tab. 2: Water and Sanitation services in NMC (GIZ 2014)

	Description	unit	value
Sewerage	Length of sewer network	km	1,826
	Properties connected to sewer line (not equal to number of connections)	-	309,905
	Treatment capacity	TCM daily	270
Water Supply	Length of water supply network	km	1,898
	No. of total water connections	-	175,811
	No. of domestic water connections	-	163,957

Water is piped to the city of Nashik from two main sources of surface water bodies: 1) About 315 Thousand Cubic Meters (TCM) daily is pumped from the head works of the Gangapur dam on river Godavari 15 km west of the city center towards the five Water Treatment Plants (WTP) present in NMC and 2) about 25 TCM daily derive from the head works on the river Darna, located south-east of the city, pumped exclusively to the Nashik Road WTP (GIZ 2014).

NMC makes the construction of septic tanks mandatory and does not grant building permissions without such systems. NMC operates 6 faecal sludge trucks (4 of which are operational with volumes of 3,000, 7,000 and twice 8,000 liters) for the emptying of septic tanks. No up-to-date data is available regarding the number of septic tanks and of septic tanks connected to sewerage system. There is also no monitoring of possible involvement of private agencies engaged in the septage management business.

NMC operates seven wastewater treatment plants with a total capacity of 270 TCM daily and 15 wastewater pumping stations with an adequate capacity.



Fig. 2: Upflow Anaerobic Sludge Blanket (UASB) facility at Tapovan WWTP (August 2015, L.Roeder)

2.1.4 Service standards

The Service Level Status Report, published 2012 by the Ministry of Urban Development (MoUD), gives an overview over the compliance of the sanitation system of a city with the Service Level Benchmarks (SLBs). SLBs do only include aspects of the offsite sanitation service chain. Onsite sanitation aspects are not part of the report, apart from the coverage of toilets. The review of the CSP for Nashik includes an update of the service level status. Tab. 3 shows the service level status for sewerage benchmarks and for water supply benchmarks of importance for the sanitation sector both in 2011 (according to Service Level Status Report 2012) and 2013 (according to the review of the CSP).

Tab. 3: Compliance with SLBs according to Service Level Status Report 2010-2011 ('Status 2011') and CSP-review ('Status 2013') (MoUD 2012, GIZ 2014). Discrepancies might exist because of different data sources. In section 3 respective assumptions are made.

	Description	unit	SLB	Status 2011	Status 2013
Sewage Management	Coverage of toilets	%	100	100	83
	Coverage of sewer network services	%	100	90	96
	Collection efficiency of the sewerage network	%	100	100	66
	Adequacy of sewerage treatment capacity	%	100	60	78
	Reuse and recycling	%	20	0	25
	Quality of sewerage treatment	%	100	91	100
	Cost recovery	%	100	48	85
	Efficiency of collection of charges	%	90	71	90
Water supply	Coverage connections	%	100	88	94
	Per capita supply	lpcd	135	140	150
	Metering of connections	%	100	95	97
	Non-Revenue Water (NRM)	%	20	57	42
	Continuity of supply	hours	24	3	4
	Quality % treatment	%	100	96	80

Additionally, the Census 2011 included for the first time a questionnaire on the household sanitation situation. Only the type of latrine facility (containment) present in the households was recorded.

There is no adequate regulation and accountability of onsite sanitation system present on NMC. Monitoring mechanisms are in place but irregularly applied (Nashik Municipal Corporation 2011b).

2.2 Planning

2.2.1 Service targets

The vision concerning city-wide sanitation in the CSP for Nashik CSP is stated as to: “Capture and Treat all black and grey water to prescribed standards and incorporate recycling and re-use to conserve fresh water resources” (Nashik Municipal Corporation 2011b).

The revised CDP (draft) for Nashik from 2013 also states timeframes of when SLB-norms were to be achieved (Tab. 4).

Tab. 4: Timeframe to achieve service delivery targets as stated in SLBs (Nashik Municipal Corporation 2013)

Sanitation service chain	Parameter	Norm (according to SLB)	Timeframe to achieve norm
Containment	Coverage of toilets	100 %	2018
Transport	Coverage of sewer network services	100 %	2016
	Collection efficiency of the sewerage network	100 %	2016
Treatment	Adequacy of sewerage treatment capacity	100 %	2016
	Quality of sewerage treatment	100 %	2016
End-use / disposal	Reuse and recycling	20 %	2018
Other	Cost recovery	100 %	2016
	Efficiency of collection of charges	100 %	2016
	Redressal of Customer Complaints	80 %	2016

According to the CSP-review the parameters for the quality of wastewater treatment and the reuse and recycling ratio and complaints redress were already achieved in March 2013 (see also Tab. 3).

The SLBs issued by MoUD focus on offsite sanitation by promoting the extension of the sewer network. The management of onsite systems is not operationalized and there are no service targets concerning the emptying process of onsite sanitation systems.

2.2.2 Investments

The works under JnNURM (see section 2.1.1) were divided into two investment packages. During JnNURM-I a sum of Rs. 3.2 Billion was already invested in the 'Under Ground Sewerage'-sector. With the project additional 1,000 km of sewer network have been built raising the total sewer coverage by 30 % (Nashik Municipal Corporation 2013). Also the sewage pumping and treatment capacities have been increased to meet the current demands. Additionally, projects under 'Basic Services for Urban Poor' (BSUP) have been implemented with a volume of Rs. 3.3 Billion which also partly cover sanitation issues.

For the Kumbh Mela festival in 2015 investments of Rs. 290 Million were planned for the provision of sanitation services (GIZ 2014). No data concerning the made investments were available, though it seems service targets for the festival were met.



Fig. 3: Toilet facilities in Nashik for the pilgrims in preparation of the Kumbh Mela festival (August 2015, L.Roeder)

Tab. 5 shows the investments needed for the sanitation sector until 2041 (end of Phase-II) as stated in the draft of the revised CDP. 7 % of total investments are thus needed for the sanitation sector while 11 % are to be invested in water supply. Sanitation and water supply investments are declared as 'Priority Investments'. This means investment assistance under JnNURM Phase-II will be sought (Nashik Municipal Corporation 2013).

Tab. 5: Identified investment needs for sewerage projects until 2041 in Million Rs. as per City Investment Plan (Nashik Municipal Corporation 2013)

Component	Phase 1			Phase 2
	2012-2017	2017-2021	2021-2026	2026-2041
Sewer network	440	350	440	4.540
Refurbishment of old sewers	500	550	550	1.350
Additional Treatment capacity	600	90	2.370	2.470
Other	410	-	60	1.580
Total	1.950	990	3.420	9.940

Financial sustainability of the sanitation sector is weak. Limited progress in terms of a user charge framework is achieved. The current capacity increase causes a further increase in operation and maintenance costs (GIZ 2014).

2.3 Reducing inequity

2.3.1 Current choice of services for the urban poor

The total number of slums in Nashik is around 160, which mostly rely on public toilets (GIZ 2014). Out of these, 65 slums were subject of a study from 2014. The study showed an unequal sanitation situation in the investigated slums. Although 62 out of 65 slums are next to city sewer lines, sewer connections are seldom (GIZ 2014).

Out of the 65 slums in NMC (Nashik Municipal Corporation 2011a):

- 51 slums have access to toilets within the slum with an average toilet to person ratio of 1:65 (maximum of 1:330 in Kazichigadhi slum).
- 10 slums have access to toilet facilities in the vicinity but outside the slum (2 of them being partially covered with individual toilets).
- The inhabitants of 4 slums have no access to sanitation facilities and rely on open defecation.

NMC is in charge of the maintenance of community toilets. The maintenance of 15 out of the total 74 public toilets is however outsourced to a contracted private company (Sulabh International). The hygienic condition of 46% of the toilet blocks is regarded as poor, 51% as average and 3% as good. Toilet blocks maintained by private agencies tend to show better hygienic conditions than those under maintenance of NMC. Poor maintenance results in defecation around the existing toilet blocks (Nashik Municipal Corporation 2011a).

In case of the 15 privately maintained toilet blocks a family pays a monthly fee of Rs.15 to Rs.20 for the use of the toilets (Nashik Municipal Corporation 2011a).

2.3.2 Plans and measures to reduce inequity

The majority of the slum population of Nashik relies on community toilet facilities either operated by NMC or Sulabh International (private agency). Use of the toilets operated by NMC is free of charge, while it costs a small amount for those facilities operated by Sulabh International. There is, however, an informal agreement that the access is not denied to habitants not able to pay. Therefore, payment is mostly done on a voluntary basis.

There are currently no measures by NMC in place that support the access of the urban poor to individual household toilets such as subsidizing the construction of individual household facilities or the sewerage connection charges that apply. The regulation that denies construction permits for households without a septic tank within the premises further raises the obstacle for the urban poor. For practical reasons this regulation can only be applied to planned areas and areas with a limited housing density.

A DPR was prepared which aims at redeveloping the slums and providing individual housing with individual toilet facilities (GIZ 2014).

2.4 Outputs

2.4.1 Capacity to meet service needs, demands and targets

A comparison of the SLB compliance during the service level status report 2010-2011, during the CSP 2011 and during the review of the CSP 2014 (see Tab. 3) does not give reliable overview over the growth of the sanitation aspects reported in the SLBs.

The number of connected properties was raised from 268,000 to about 310,000 in between 2009 and 2013 (corresponds to a growth of 4 % per year, Nashik Municipal Corporation 2013). The growth in numbers of sewer connections seems adequate to follow the growth rate, not regarded the current gap in connections.

A gap assessment from 2013 shows the need for about 20 km of new sewer network per year in until 2021 in order to obtain and maintain full coverage. The current rate of network extension seems to be adequate to close the existing gap and to cover future needs (Nashik Municipal Corporation 2013).

The current treatment capacity of 270 TCM daily is adequate for the current wastewater generation and for the wastewater generation expected by the year 2021. Only minor improvements will be needed until 2026 (Nashik Municipal Corporation 2013).

NMC area is divided into six sanitation divisions. One suction truck is planned to service each of the sections. However, since 2011 only four of the six trucks are operating. According to NMC officials the capacity of the four trucks in operation is still adequate.

O&M capacities do not grow at the same pace as the physical capacities. A user charge framework is needed in order to provide adequate O&M for the existing and to-be-built infrastructure (GIZ 2014).

2.4.2 Monitoring and reporting access to services

The conditions of the user interfaces (toilets) are regarded as private responsibility. No central monitoring is conveyed. The construction of new septic tanks is surveyed by the town

planning department at NMC. There is no monitoring of the existing septic tanks in place. However, the status of septic tanks that are not connected to the sewer system is checked during the emptying process by NMC-trucks. No monitoring of the amount of septage being transported by the NMC trucks is in place.

NMC is obliged to send a monthly report regarding the SLB performance to the MoUD. The reports seem not to be sent every month but still rather regularly. The reliability of the SLB assessment is a challenge. The revision of the City Development Plan (draft) regards the reliability of such SLB data as partly insufficient. It means a timeframe for improving reliability which targets at achievement for all SLB parameters by 2018 (GIZ 2014).

2.5 Expansion

2.5.1 *Stimulating demand for services*

One of the main goals of the National Urban Sanitation Policy (NUSP) is awareness generation and behavior change for the sanitation sector.

The CSP states actions for five goals to be taken in order to improve the overall access to toilets. One of the main goals is to 'Drive behavior change through awareness campaigns and branding initiatives'. Four actions are carved out in order to achieve this goal (Nashik Municipal Corporation 2011b):

1. Initiate a Slum level sanitation campaign to eliminate open defecation
2. Initiate a Trader-support campaign in commercial areas to eliminate open urination
3. Initiate a school campaign to impart positive behaviors on civic duties, sanitation and toilet use
4. Standardize branding (logos, painting, signage) for Public Toilets and Community Toilets

The CSP review from 2014 however identifies limited progress with the proposed actions.

2.5.2 *Strengthening service provider roles*

NMC is the main stakeholder on public level. The only private public toilet service provider active in Nashik is Sulabh International which is operating and maintaining several public toilets on a BOT-model.

Until 2014 a trial process was undertaken in order to evaluate the possibility for private agencies to become active in the emptying business for septic tanks. The trial process expired in 2014 and no decision on the basis of the findings has so far been made (Hire 2015).

Official programs and the CDP predominantly aim at expanding the centralized sewer network (Vanjari 2015).

3 Service Outcomes

3.1 Overview

This report is conducted as a field-based-assessment of the sanitation situation in Nashik, Maharashtra, India. This SFD resorts to the City Sanitation Plan for Nashik 2011, its Review from 2014, the service level status report 2010-2011, and the Indian Census 2011 data. The Census 2011 data is regarded as correct, unless marked otherwise. Where possible, the Census data is replaced with reliable and more up-to-date data from other sources.

The objective of the present SFD was to strictly follow the methodology of the BMGF-financed SFD promotion project and thereby provide the possibility to compare outcomes and conclude on improvements. An overview over the sanitary situation is provided in the following.

In the National Sanitation rating, 2010-11 Nashik was ranked 42nd out of 423 Indian and cities (equalling to rank 4 on state level) with a score of 45.91, which indicates a 'Need for considerable Improvement'.

Tab. 6 shows the distribution of access to toilet facilities for households in NMC. The vast majority of the NMC households have toilet facilities within the premises, while 17% of the population rely on public toilets and 2% on open defecation (both most present in poor areas of the city, i.e. slums, see section 2.3.1).

Tab. 6: Distribution of domestic toilet facilities (Census 2011, does not sum up to 100 % because of rounded values)

Origin category	unit	value
Households	%	80
Public toilets	%	17
Open defecation	%	4

According to Census 2011, 42% of the total of 319,100 households in NMC are connected directly to the sewer system, while 35% of the households have septic tanks installed within their premises. 2% of the households with facilities within the premises rely on pit latrines or other type of latrines. All the public toilets are connected to septic tanks.

Onsite sanitation facilities are emptied both by NMC and by private operators. NMC owns six suction trucks, one for each division, of which only four are operational (Nashik Municipal Corporation 2011b). The septage is transported for discharge either to a sewage pumping station or to the nearest sewer manhole. The fee for emptying of a septic tank is Rs. 300 per apartments.

Tab. 7 shows how the total amount of sewer connections is distributed among the different types of properties.

Tab. 7: Property-wise connections to sewer network (Nashik Municipal Corporation 2011b)

description	%age of total number of connections
Residential	85
Commercial / Institutional	14

Industrial	1
------------	---

The sanitary situation along the sanitation chain looks as follows:

- The most common **Containment** technology in NMC is septic tank, which is largely connected to the sewer network, followed by direct discharge into the centralized sewer and pit latrines. Open defecation plays a very limited role.
- **Emptying** of the onsite sanitation facilities is organized by NMC, operating four vacuum trucks. Key Informant Interviews (KIIs) with NMC officials showed that the trucks operated by NMC are mainly emptying public latrines and only casually full containment facilities in private households (Hire 2015). There is no knowledge on if manual emptying is practiced. As drinking water is mainly piped to the households, no negative effects on the health of the community are expected.
- The **Transport** of the septage from onsite sanitation facilities to manholes in the sewer network is managed by vacuum trucks. No private agencies seem to be active in the sector. In the sewer systems the sewage is pumped via 15 Sewage Pumping Stations (SPS) to the WWTPs.
- **Treatment:** NMC is operating four wastewater treatment sites with a total of seven treatment plants and a total capacity of 270 TCM daily (Mali 2015). Two other treatment plants will start operation soon and will raise the treatment capacity to 360 TCM daily. Two treatment technologies are found in Nashik: Upflow Anaerobic Sludge Blanket (UASB) processes (with attached bio-gas power plants) with a total capacity of 242 TCM daily and Activated Sludge Process (ASP) plants with a capacity of 118 TCM daily (both capacities valid after extension). According to the updates City Sanitation Plan the capacity is adequate both in quantity and in quality (GIZ 2014). All wastewater entering the treatment plants is expected to be treated appropriate. For onsite sanitation treatment is also partly taking place inside the containment technology. Adequacy of treatment is largely dependent on the planning and structure of the facility and therefore difficult to estimate.
- **End-use / Disposal:** The sludge from the treatment plants is further treated in drying beds and then sold to a private agency that distributes it further to farmers of the region where it is used as soil fertilizer. All the dried sludge is reported to be reused in such way. The effluent of the WWTPs meets the design standards for BOD and SS and is discharged into the water bodies. The use of river water for irrigation purposes further downstream is contrary to a statement in the review of the City Development Plan not regarded as reuse (Nashik Municipal Corporation 2013).

The NMC is aiming at strengthening the existing offsite sanitation system by improving the sewer network and by augmenting the treatment capacity of the WWTPs already in operation (GIZ 2014).

3.2 SFD Matrix

The information for this SFD is mainly derived from the Census of India 2011 data, the City Sanitation Plan, its review, the Service Level Status Report and Key Informant Interviews (KIIs). Data from the Census is regarded as correct and is used for the compilation of the

SFD. In the following, assumptions made in order to produce the SFD are explained along the sanitation chain.

3.2.1 Containment

According to the Census of India 2011 42 % of all households in NMC have toilet facilities directly connected to the sewer network. It is assumed that all interfaces (toilets) and all sewer connections are fully functional.

In order to obtain a new building permission it is mandatory to include a septic tank in the premise. Further 35 % of the households have septic tanks within their premises and 17 % of the households rely on public latrines, which are all said to be septic tanks (total of 52 %).

Pit latrines (VIP latrines in the census) represent the toilet facilities for 1 % of the households (Census 2011).

Open pits account to less than 1% of the population (Census 2011).

So-called night soil latrines and service latrines are translated to fully lined tanks and represent the toilet system for 1% of the population (Census 2011).

The Census states an open defecation rate of 4 %.

3.2.2 Emptying

The assumption that 80% of the total of 52% of the households relying on septic tanks are connected to the sewer (GIZ 2014) results in a total of 42 % of households connected to the sewer network via a septic tank. This correlates with the number of total connections mentioned in the CSP Review. 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. Together with the households with direct connections to the sewer this sums up to 63 % of wastewater delivered to centralized treatment plants.

Septic tanks from public latrines are emptied by NMC trucks. It is assumed that private septic tanks that are not connected to the sewer system are not emptied by the NMC trucks (see section 3.1) and are connected to the open ground.

Private pit latrines are not emptied by NMC trucks. Latrines without pit but with direct disposal in open drain or with a bucket that is emptied manually (called 'Night soil' and 'service latrines' in the Census) are regarded as not containing the faecal sludge.

3.2.3 Transport

All collected wastewater in the sewer is assumed to be conveyed to the treatment plants. The same applies to faecal sludge that is disposed into manholes by NMC trucks (see assumptions in section 3.1).

3.2.4 Treatment

The installed treatment capacity in the city of Nashik is adequate to service all households. Reports show qualitative appropriate treatment. Therefore, all wastewater and faecal sludge entering the WWTPs is expected to be treated adequately. Foam formation in the effluent of Tapovan WWTP is a current problem (Matale 2015).

3.2.5 End-use/ disposal

All dried faecal sludge is sold to a private agency for reuse in agriculture after drying (Matale 2015). Treated wastewater is disposed of in the local water bodies (Nashik Municipal Corporation 2013).

3.2.6 Risk of groundwater containment

About 94 % of the population is covered with adequate quantity of piped freshwater. Being situated in a hilly region, Nashik is not likely to have very high groundwater tables. The highest water tables are reported at 8 mbgl (Nashik Municipal Corporation 2011b). With very limited information available a low risk of pollution of groundwater is assumed.

4 Stakeholder Engagement

4.1 Key Informant Interviews

Key Informant Interviews (KIIs) were conducted in accordance with the methodology to verify the information retrieved from various reports. Aim of the interviews was the validation and the actualization of data derived from the reports.

Interviews with NMC officials were conducted at the NMC headquarters at Rajiv Gandhi Bhavan, Sharanpur Road, in Nashik between 19th and 21st August 2015.

Single interviews were conducted with the following persons:

- Mr. R. K. Pawar, Nashik Municipal Corporation (NMC)
- Mr. U. B. Pawar, Nashik Municipal Corporation (NMC)
- Mr. Bajirao G. Mali, Nashik Municipal Corporation (NMC)
- Mr. Shivkumar R. Vanjari, Nashik Municipal Corporation (NMC)
- Mr. Sanjay R. Matale, Mahajan Brothers
- Dr. Sachin Hire, Nashik Municipal Corporation (NMC)

The SFD is based on data from the years 2011-2014. Validation and update of the information were done through the interviews. Information was to be corrected.

The CSP from 2011 partly relied on interviews conducted with NMC-officials. The list of the officials interviewed is stated in Annexure II of the CSP.

4.2 Focus Group Discussions

The visit of Nashik was done in late August 2015. Because of the Kumbh Mela festival in the last days of August 2015 (see section 1) there was no possibility to arrange a Focus Group Discussion with ward councilors. Informal interviews with inhabitants of Nashik who gave their clear opinion about the sanitary situation in their ward were conducted.

Three public representatives are members of the City Sanitation Task Force (CSTF) of Nashik, which was formed in the context of the CSP process. These representatives can be a good contact for future SFD-related work.

4.3 Observation of service providers

A field visit to the Tapovan waste water treatment plant was made. This gave a clearer sight on the treatment situation in Nashik. Through observations of the treatment processes, and of the operation & maintenance status and interview with employees of the service provider and the treatment quality stated in various reports was roughly checked.

Information regarding the existing treatment process and the progress of construction were updated, which led to a considerable benefit for the insight of the sanitation system.

5 Acknowledgements

This SFD is dedicated to the citizens of Nashik. It wouldn't be possible without the support of the following people (alphabetical order):

- Dr. Sachin Hire, Nashik Municipal Corporation (NMC)
- Mr. Bajirao G. Mali, Nashik Municipal Corporation (NMC)
- Mr. Sanjay R. Matale, Mahajan Brothers
- Mr. R. K. Pawar, Nashik Municipal Corporation (NMC)
- Mr. U. B. Pawar, Nashik Municipal Corporation (NMC)
- Mr. Rahul Sharma, Gesellschaft für Internationale Zusammenarbeit (GIZ)
- Ms. Dipti Shinde, Gesellschaft für Internationale Zusammenarbeit (GIZ)
- Mr. Jitendra Yadav, Gesellschaft für Internationale Zusammenarbeit (GIZ)
- Mr. Shivkumar R. Vanjari, Nashik Municipal Corporation (NMC)

6 References

1. Census of India 2011. HH-8 : Households by Availability of type of Latrine Facility
2. Central Public Health & Environmental Engineering Organisation 2013. Manual on Sewerage and Sewage Treatment Systems. Third Edition – Revised and Updated
3. Hire 2015. Personal communication with Dr. Sachin Hire, Health Officer, Nashik Municipal Corporation, in person. August 2015
4. Mali 2015. Personal communication with Mr. Balajirao G. Mali, Executive Engineer of NMC (wastewater treatment), in person. August 2015
5. Matale 2015. Personal communication with Mr. Sanjay R. Matale, Senior Chemist, Mahajan Brothers, in person. August 2015
6. Nashik Municipal Corporation 2011a. Draft City Sanitation Plan Volume IV: Slum Mapping– Summary Report. September 2011
7. GIZ 2014. City Sanitation Plan Updation – Status Report Nashik Municipal Corporation. March 2014
8. GIZ 2015. Sanitation Management – Implementation Framework
9. Ministry of Urban Development 2008. National Urban Sanitation Policy – Towards City Wide Sanitation
10. Ministry of Urban Development 2012. Service Levels in Urban Water and Sanitation Sector – Status Report (2010-2011). First Edition, January 2012

11. Ministry of Urban Development 2015. SLB performance data. Available from: <<http://moud.gov.in/servicelevel>>. [10 August 2015].
12. Nashik Municipal Corporation 2011b. City Sanitation Plan for Nashik – Updated Status Report
13. Nashik Municipal Corporation 2013. Draft Report on Revised City Development Plan for Nashik City June 2013
14. Vanjari 2015. Personal communication with Mr. Shivkumar Ramchandra Vanjari, Executive Engineer NMC (Sewer Network), in person. August 2015

7 Appendix

7.1 Appendix 1: Stakeholder identification

Name of organization	Name of contact person	Position
NMC	Mr. R. K. Pawar	Superintending Engineer (Mechanical), NMC
NMC	Mr. U. B. Pawar	Superintending Engineer (Sewerage), NMC
NMC	Mr. Bajirao G. Mali	Executive Engineer of Nashik Municipal Corporation, Wastewater treatment
NMC	Mr. Shivkumar R. Vanjari	Executive Engineer of Nashik Municipal Corporation, Sewer Network
Mahajan Brothers	Mr. Sanjay R. Matale	Senior Chemist
NMC	Dr. Sachin Hire	Health Officer, Nashik Municipal Corporation

7.2 Appendix 2: Tracking of Engagement

Stakeholder	Date of Engagement	summary of outcomes
Mr. R. K. Pawar	19.08.2015	The SFD approach has been presented, followed by a discussion about the general sanitation situation in the city.

Mr. U. B. Pawar	19.08.2015	The SFD approach has been presented, followed by a discussion about the general sanitation situation in the city.
Mr. Balajirao G. Mali	19.08.2015	NMC operates four suction trucks. These trucks are only in charge of servicing public toilets. Amount of private households without connection to sewer network: <3%. The total capacity of the waste water treatment plants (WWTP) was augmented in the past five years to 270 MLD. All WWTP in NMC have chlorination facilities. NMC has a contract with one agency to which the dried sludge is sold. The agency then distributes it further to farmers.
Mr. Shivkumar Ramchandra Vanjari	19.08.2015	The total coverage is about 82% of the town area. Planned areas of NMC are completely covered with the sewer network. Unplanned areas not covered are proposed to get coverage within the framework of the CDP. The aim is 100% coverage. The urban poor mostly rely on public toilets, which are all equipped with septic tanks. The septic tanks are emptied by NMC trucks and the septage is transported to manholes. No private households are serviced by NMC trucks.
Mr. Sanjay R. Matale	19.08.2015	Monitoring of effluent concentration of Tapovan STP is done daily. NMC and the operating agency see a problem of foam formation throughout the treatment process and in the effluent.
Dr. Sachin Hire	20.08.2015	NMC conducted a trial process with a private agency operating suction trucks and servicing private households in Nashik until 2014. Evaluation of the trial process is still ongoing and therefore no decision on the basis of the outcomes was so far made. The NMC trucks mainly service public latrines, only occasionally private households.

7.3 Appendix 3: SFD matrix

