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NAMAMI GANGE

Household Sanitation Survey Rishikesh

Identification of current onsite sanitation scenario in Nagar Nigam Area

Study conducted by :

AMS
Research | Consulting | Training

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Executive Summary

The River Ganga is a source of livelihood for over 500 million people in India. It provides drinking water and is the basis for a range of economic and agricultural activities. An intact river landscape also offers a habitat for diverse flora and fauna. The Ganges is also of considerable cultural and religious significance. A holistic and integrated strategic approach that addresses the entire river basin and considers not only the problem of the sewage generated by human settlements, but also other pressure factors has been identified as the need towards river rejuvenation. The country's National institutions and ongoing National Flagship Programmes (National Mission for Clean Ganga, Swachh Bharat Mission, AMRUT) have recognised the problem and are in the course of developing integrated solutions considering international experiences and procedures of river basin planning, coordination and steering mechanisms with the states and cities being involved in the effort.

The Indo-German Technical Cooperation project 'Support to Ganga rejuvenation' (SGR) is implemented by GIZ together with the Action "Development and implementation support to the India-EU Water Partnership", that is jointly co-financed by the German Federal Ministry of Economic Cooperation and Development (BMZ) and the European Union (EU). The SGR project follows a multi-sectoral approach that, besides urban and industrial wastewater problems, also considers other stress factors, which have an impact on River Basin Management. The thrust of the actions is on river basins with a focus on the Ganges basin in India. Measures at regional level target the states of Uttarakhand and Uttar Pradesh. The project partners are the Central Government, state governments and selected municipalities. The State Government (Urban Development Department, GoUk) has notified the Septage Management Protocol in 2017. The implementation of the Septage Management Protocol (SMP) has been given priority in all Ganga towns jointly by the State Program Management Group, Namami Gange in coordination with the Urban Development Department of Uttarakhand towards adopting a holistic and integrated approach of citywide sanitation and achieving the goals of clean Ganga. GIZ through Support to Ganga Rejuvenation (SGR) project is currently supporting implementation of SMP in Ganga towns with a focus on Rishikesh city.

The key sanitation issues and gaps have already been identified in the City Sanitation Plan of Rishikesh that was prepared by the ULB in cooperation with GIZ. After the recent boundary expansion of the ULB in 2018 the CSP was updated and a ward wise mapping of sewered and unsewered zones of the city has also been conducted in the form of a Sanitation Flow

Diagram (SFD) by GIZ. Also, under the Indo-German financial cooperation, KfW will support the construction of a sewerage network in Rishikesh and Haridwar cities.

As a step further towards implementation of Septage Management interventions in accordance with the SMP and the CSP/SFD, a detailed household survey regarding sanitation systems such as individual septic tanks or community septic tanks has been done in Rishikesh by GIZ-SGR in cooperation with the Septage Management Cell (SMC) of Rishikesh (Rishikesh Municipal Corporation, Uttarakhand Pey Jal Nigam and Uttarakhand Jal Sansthan) through surveying agency Academy of Management studies (AMS) to facilitate effective implementation of the Septage Management Protocol in Rishikesh. The survey will help in taking forward the implementation of the Septage Management Protocol in Rishikesh and will also be useful for the planned interventions for sewer connections to be taken up in the city under the KfW project.

This household sanitation survey has adopted a census approach whereby interviews were conducted with owners/users of all residential, commercial, institutional and communal properties, including both existing and under-construction sites based upon questionnaire developed by GIZ-SGR in consultation with the Nodal Officers of Urban Development Directorate and SPMG, Namami Gange, Uttarakhand. Besides, physical verification was undertaken to ascertain the nature of sanitation and septage management facilities in such properties. Individual meetings in coordination with GIZ-SGR. were held with SMC of Rishikesh (i.e. ULB, Jal Sansthan, Jal Nigam Rishikesh) and fecal/septage de-sludging vehicle operators to update and cross-check information throughout the assignment

The door-to-door survey was carried out in total 24 wards of the city that were marked as “partially covered” or “not covered” during the earlier ward-wise mapping exercise (SFD) by GIZ.. Additionally, few areas which were pointed out by Jal Sansthan as not connected to sewerage were also taken up in the survey. Geo-tagging of all the surveyed households have been done and geo-spatial maps developed. Presented ahead are some of the critical findings emerging from the present survey.

Status of Physical and Sanitation Infrastructure in Existing Properties

- The survey covered a total of 12,463 existing properties, which included over nine-tenth proportion of residential properties (90.4%). The rest included institutional properties (101 Nos.), commercial properties (381Nos.) and properties with mixed usage (702 Nos.).

- The residential properties comprised of mainly individual houses (11,237 Nos.) apart from 273 apartments constructed across 42 group housing societies. In all, these residential properties housed a total of 68,889 persons from 15,136 households.
- Among residential and commercial properties, those with no access to individual toilets were around 5%. This proportion was much higher in the case of commercial properties considered alone (67%). The wards with relatively higher proportion of such properties were *Ganga Vihar, Bhairav Mandir, Triveni Colony, Mansha Devi*, etc.
- Among all types of properties (i.e., residential, commercial, institutional and mixed), over one-fifth proportion are connected to sewerage network, another three-fourths rely on on-site sanitation infrastructure, while the rest 4% do not have individual toilets.
- Among the properties relying on on-site sanitation, those with "septic tank connected to soak pit" were the most common as reported in over nine-tenth (91%) of the cases. The other types of on-site sanitation infrastructure included septic tank connected to storm-water drain (3%), pit latrines (3%) and even those which had toilets directly connected to the storm-water drain.
- Overall, 268 properties, representing about 3% of the total 9,489 properties relying on on-site sanitation, were found to be discharging black-water directly into open or closed drains. This practice was much more rampant in two wards - Sarvahara Nagar and Bharat Vihar where the numbers of such properties were 101 and 84, respectively.
- Overall, 9 public toilets and 9 community toilets were found to exist in the surveyed wards. Among these, 16 were found to be functional, of which 8 were public toilets and 6 were community toilets.
- Among the households with at least one toilet within their premises which was not connected to the sewerage network, over nine-tenth (91%) were not aware of the existence of sewer line near to their property. Of those who were aware, about a half (46%) affirmed having been informed by the Nagar Nigam. All 100% of these households informed that they have agreed to connect their toilets with the sewerage network.
- A majority (77.8%) of roads connecting the main road to the property were of medium width varying from 2 metres to 5 metres. The wards with the greatest number of cases of roads with width of less than 2 metres were Shivaji Nagar, Barrage Ward and Sarvahara Nagar.
- In contravention to Standard Operation Procedures (SOPs) for cleaning of Septic Tank, which specify that the emptying frequency of septic tank/pit should not be more than 2

years in any case, over nine-tenth (91%) of all septic tanks surveyed (n=8575) were never emptied since construction. Interestingly, this figure also includes a sizeable two-fifth proportion (40.4%) of those that have not been emptied for over 10 years now. The proportion of those adhering to such SOPs was only 3.7%.

- Those who used services of suction vehicle were inquired about their satisfaction with service provider. Among these, an overwhelming majority (88%) was satisfied with the emptying services provided by private service provider.
- As regards de-sludging through the suction machine, it is done by only one vendor since the last 10 years in the city. This vendor has one Truck Mounted Vacuum Tanker which has a capacity of 5,000 litres and is equipped with motorized pump and storage tank. This vendor has recently applied for registration with the Nagar Nigam. On its part, the Nagar Nigam has designated 2 manholes where this vendor is allowed to dispose of the septage collected from the city areas.
- The amount paid by households for de-sludging activity varied from Rs. 2000/- to Rs. 6,000/- depending on the distance of house from suction vehicle garage and the size of septic tank.

Status of Physical and Sanitation Infrastructure in Under-Construction Properties

- Among the under-construction properties, the survey covered a total of 271 sites, which included mostly residential projects (95.9%). The rest included residential-cum-commercial projects (9 Nos.), and purely commercial projects (2 Nos.).
- Out of these under-construction properties, almost nine-tenth proportion (89%) had on-site sanitation system, which mainly comprised of “septic tank connected to soak pit”. One such project was found to have toilet directly connected to drain while another one had no provision of toilet.

Volume 2 of this report consist of (i) Ward wise maps of properties (Annexure-4), (ii) ward wise maps of roads (Annexure-5), (iii) household database (Annexure-6) and Survey questionnaire (Annexure-7).

It is hoped that the insights generated from the study would be useful for the executing agencies in devising ways to enhance the effectiveness of existing septage and wastewater management interventions and devise suitable mechanisms to ensure that holistic and integrated approaches of river basin management are applied towards Ganga rejuvenation.

1. Introduction

1.1 Background

The River Ganga is a source of livelihood for over 500 million people. It provides drinking water and is the basis for a range of economic and agricultural activities. An intact river landscape also offers a habitat for diverse flora and fauna. Despite considerable efforts to improve water quality, pollution in the Ganges has not decreased, in some areas it has, indeed, increased in recent years. A holistic and integrated strategic approach that addresses the entire river basin and considers not only the problem of the sewage generated by human settlements, but also other pressure factors has yet to be implemented. The country's National institutions through the ongoing National Flagship Programmes (National Mission for Clean Ganga, Swachh Bharat Mission, AMRUT) have recognised the problem and are in the process of developing integrated solutions considering international experiences and procedures of river basin planning, coordination and steering mechanisms with the states and cities being involved in the effort. GIZ- Support to Ganga Rejuvenation (SGR) project also follows a multi-sectoral approach that, besides urban and industrial wastewater problems, also considers other stress factors, which have an impact on River Basin Management.

National and State Governments, cities, and wastewater utilities have now begun to address the management of septage or the sludge that accumulates inside septic tanks and other onsite sanitations systems. Ministry of Housing and Urban Affairs (MoHUA) launched the National Faecal Sludge and Septage Management Policy, 2017 with an objective to set the context, priorities and direction for states and cities to facilitate nationwide implementation of FSSM in India. As a step further towards devising state specific faecal sludge and septage management strategies, the State Government of Uttarakhand (Urban Development Department) has notified the Septage Management Protocol, 2017 for it's strict enforcement in the urban areas of Uttarakhand. The implementation of the Septage Management Protocol (SMP) has been prioritized in all Ganga towns since 2018, jointly by the State Program Management Group, Namami Gange in coordination with the Urban Development Department of Uttarakhand towards adopting a holistic and integrated approach of citywide sanitation and achieving the goals of clean Ganga. At the city level, the ULBs along with wastewater utilities (Jal Nigam, Jal Sansthan) have set up Septage Management cell (SMC) and are in the process of execution of septage/faecal sludge management interventions in line with the state septage management protocol. Currently, GIZ under the ongoing SGR project is further supporting implementation of SMP in Ganga towns with specific focus in Rishikesh city.

The challenge Rishikesh faces is twofold: (1) The existing sewerage system is both technologically obsolete and insufficient in terms of scope. Also, only about 50% of the households have sewerage network in the city (SFD Report, 2019). (2) Rishikesh does not have an organized septage management system although a substantial part of the population is dependent on onsite sanitation facilities. This increases the risk of unhygienic maintenance practices with negative repercussions on water quality of local water sources. Currently, there is limited data and information on FSSM at state and city level which constraints FSSM programmatic interventions. In order to implement FSSM programme in the towns/cities, it is crucial to understand the existing practices, structure, regulatory framework, capacities, awareness level, and gaps in the FSSM value chain.

To support the concerned authorities in the city of Rishikesh, GIZ in cooperation with SPMG, UDD and Rishikesh SMC has conducted the household sanitation survey and geo-spatial mappings through Academy of Management Studies (AMS) to identify unsewered households in the city as well as to collect information on certain features of onsite sanitation facilities. This study assesses the current FSSM scenario and generates critical information that will facilitate in developing a roadmap for implementation of FSSM in the city of Rishikesh through the Septage Management Cell of the city.

1.2 FSSM Value Chain Scenario

Faecal sludge management (FSM) is a management system that safely collects, transports, and treats faecal sludge (also called septage) from pit latrines, septic tanks or other onsite sanitation facilities (OSSF). Septage management covers the entire service chain starting from design of septic tank, collection, conveyance, safe treatment and reuse or safe disposal of septage. Proper treatment and management of faecal sludge/septage is integral to safe sanitation practices.

There is poor or no septage management in Indian cities, though, (i) there is enough evidence to prove the adverse impacts of lack of septage management on public health and environment and, (ii) there are legislative provisions to enforce septage management in the country. The experience across the country shows that the standards related to construction of septic tanks, periodic de-sludging, transport and disposal are not followed by households and urban local bodies over the years resulting in poor septage management. It is imperative that a proper scientific management of faecal matter/septage is practiced for attaining clean and hygienic cities and the septage/faecal sludge from septic tanks/pits/toilets does not pollute the Environment, river and other water bodies.

1.2.1 National

The National Urban Sanitation Policy (NUSP) has accorded high importance to planning and implementation of actions for the organized and safe management of faecal matter from on-site

installations. The importance of safe and hygienic facilities with proper disposal and proper operations & maintenance (O&M) of all sanitary facilities has been emphasized. Development of a Septage Management Plan as a part of City Sanitation Plans (CSP) has also been recommended.

To address the issue, the Ministry of Housing and Urban affairs (MoHUA), Government of India has launched the "National Faecal Sludge and Septage Management Policy" in 2017 with the overall vision that all Indian cities and towns become totally sanitized, healthy and liveable and ensure sustenance of good sanitation practices with improved Onsite Sanitation Services together with faecal sludge and septage management to achieve optimum public health status and maintain clean environment with special focus on the poor.

The National Mission for Clean Ganga (NMCG), Ministry of Jal Shakti through its flagship program 'Namami Gange' focuses on effective abatement of pollution and rejuvenation of the River Ganga by adopting a river basin approach to promote inter-State and inter-sectoral co-ordination for comprehensive planning and management.

1.2.2 State

The State of Uttarakhand is a mountainous state in the north of India. It occupies a total land area of 53,484 sq km, which is 1.73 per cent of India's total land area. According to Census 2011, the total population of Uttarakhand is 10,116,752, with a majority of the population (69.45 per cent) living in rural areas. Administratively, the State is divided into 13 districts, 78 sub-districts, 74 statutory towns, 41 Census towns and 16,793 villages. There are 92 Urban Local Bodies (ULBs), which include six Nagar Nigams, 42 Nagar Palika Parishads, and 44 Nagar Panchayats.

In accordance with the provisions of Water Supply and Sewerage Act, 1975/ Municipalities Act, 1916, Urban Development Directorate in coordination with Uttarakhand Jal Sansthan and GIZ formulated "Protocol for Septage Management" which has been notified by the State Government (Urban Development Department), for enforcement in the cities/towns of Uttarakhand vide G.O. No. 597/iv(2)-UD-2017-50/16 dated 22nd May 2017.

The state's septage management protocol guides the state and cities in ensuring scientific septage management in terms of collection, transportation, treatment, disposal and reuse of septage/faecal sludge. The clear guidelines of the protocol enable the state and city officials in upgrading their septage management and identifying concrete investment projects. For effective implementation of the protocol and inter departmental coordination every ULB has been mandated to create a Septage Management Cell (SMC) comprising of ULBs, Jal Nigam, Jal Sansthan. In February 2018, the State Government declared Uttarakhand as open defecation free (ODF) state.

1.2.3 Rishikesh City

Geographic location:

Figure 1: Location Uttarakhand

The holy city of Rishikesh lies on the bank of river Ganga in a transition zone between Shivalik Himalayas and the alluvial plains associated with polycyclic landscape. The region is predominantly surrounded by the flatter river basin of Song River and their tributaries flanked by the Matcher mountain range on South, Barkot forest range on the West, River Ganga and the edge of steeply rising Siwalik range on the East and Muni ki Reti Nagar Palika Parishad in the North. Rishikesh have an elevation of 372 metres above mean sea level. The local climate is Humid subtropical.

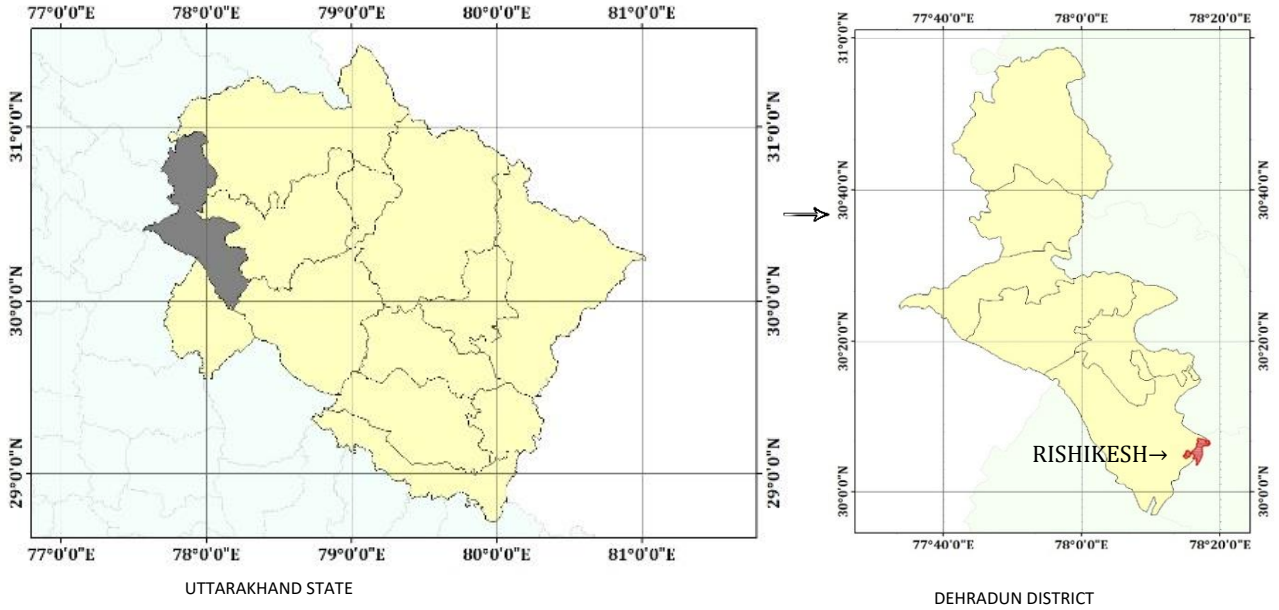


Figure 2: Location Dehradun District

Brief history of Rishikesh:

According to mythology, the sage Raibhya Rishi sat on the banks of the Ganga and performed Spartan penance. He was delighted when the lord appeared in the form of Rishikesh, thus giving the place its present name. Over the ages, saints have mediated at this pacific place with the soaring mountains looking down and the graceful Ganga flowing beside. One of the most prominent spiritual leaders in modern times, Adi Shankaracharya, traversed this land in the 9th century AD. The Shankaracharya's pilgrimage into the hills was later collated into the great pilgrim circuit as Chardham yatra and gave a heightened sense of holiness to this land of the Gods. Thence forward, Rishikesh has been the stepping stone and the first terminus on a list of holy shrines and sites stretching across the lofty Himalayas. It has also recognized itself as the Yoga Capital of the world.

Connectivity:

Rishikesh is well connected to major cities by National Highway no. 7 (starts at Fazilka of Punjab to Mana pass of Uttarakhand state of 845kms length) and National Highway no. 34 (which runs from Gangotri dham of Uttarakhand state to Lakhnadon of Madhya Pradesh state). Rishikesh is situated

in Tehri-Garhwal region of Uttarakhand about 50 kms south-east from state capital Dehradun and 23.2 kms North of Haridwar.

Rishikesh (station code: RKSH @ 372 metres above MSL) lies in Moradabad division of Northern Railway zone, currently this Railway station is connected with an individual broad-gauge branch line from Haridwar with only about three trains daily. A new 125 kms long Rishikesh to Karna-Prayag Railway line has been initiated and project is under construction.

Jolly Grant Airport of Dehradun serves as the nearest airbase which is 20kms far from Rishikesh.

Administrative division:

Rishikesh is a Class 1 census town of Dehradun District of Uttarakhand state (7th most populous). Since April 2017, it was upgraded from Rishikesh Municipality (Nagar Palika Parishad) to which now governed by Rishikesh Municipal Corporation (Nagar Nigam). Subsequently the governed municipal area, population and wards have been expanded from 10 sq. kms, 70,499 people and 20 wards to 26 sq.kms, 106320 people and 40 wards (NPP, 2017 and KII 1,2018). The equivalent floating population is considered as 12,344 (peyjal Nigam, 2016). The administrative boundary is shown in **Map No. i** of **Annexure-2.**

Rishikesh Septage Management Cell:

As per National Faecal Sludge and septage Management policy of MOUD, GOI - 2017, Government of Uttarakhand had notified “Protocol for septage management cell” by State Govt. vide G.O. No. 597/IV(2)UD2017-50 (Sa)/16 dated 22nd May 2017, a Septage Management Cell (SMC) has been constituted by Rishikesh Nagar Nigam.

Septage Management Cell of Nagar Nigam shall have the following 06 members:

S.No	Designation	Members
1	Municipal Commissioner, Rishikesh Nagar Nigam	Chairman
2	Representative from Uttarakhand Jal Sansthan not below E.E.	Member
3	Representative from Peyjal Nigam not below E.E.	Member
4	Representative from State Pollution Control Board	Member
5	Representative from Health Department	Member
6	Other persons who may be invited to provide technical advice to the SMC- GIZ Technical Expert	Member

1: Members Septage Management Cell

Role of Nagar Nigam

Nagar Nigam is responsible to ensure 100% of households should have sanitary latrines (as per Guidelines for Swachh Bharath Mission – Urban 2014) and to be connected with sewer lines. In case, absence of Sewer lines, it is the vital authority to ensure collection and transport of municipal septage to offsite septage management facility.

In accordance with the Septage Management Protocol notified by Urban Development Department, Govt. of Uttarakhand, Rishikesh Nagar Nigam has framed the regulatory framework for Emptying, Collection, Transportation and Disposal of Septage/Faecal sludge, being referred as "**Byelaws for Faecal Sludge & Septage Management**", Currently the septage management bye laws is under notification process by Rishikesh Nagar Nigam to be implemented within its jurisdiction. These bye laws include implementing the process of registration and provide license to private operators for desludging. It also warrants hotels and ashrams having more than 20 rooms are to be installed with onsite sewage management facility.

Nagar Nigam also implements "The prohibition of employment as manual scavenger and their rehabilitation Act, 2013 which defines to avoid the employment of manual scavengers, the manual cleaning of sewers and septic tanks without protective equipment and seeks to rehabilitate manual scavengers and provide for their substitute employment. It is accountable for surveying insanitary latrines within its jurisdiction and construct required number of sanitary community latrines. Nagar ensures each occupier of insanitary latrines shall be responsible for converting or demolishing the latrine at his own cost. If he fails to do so, the local authority shall convert the latrine and recover the cost from him. Nagar Nigam also undertakes the responsibility of efficient collection, transportation and disposal of municipal solid waste.

Role of Jal Nigam:

Jal Nigam is responsible for Planning, Design and Construction of Sewage Network lines, Sewerage pumping stations and Treatment Plants following CPHEEO Manual on Sewerage, 2013 and other technical guidelines. Currently Jal Nigam don't have any active role in Septage management of Rishikesh municipality, but in future it is responsible for design and construction of Infrastructure to ensure safe treatment and disposal of collected Septage/effluents using appropriate technology.

Role of Jal Sansthan:

Execute schemes and operate an efficient system of water supply, Operation and maintenance of sewerage system and storm water management. Safe conveyance, treatment and disposal of wastewater through sewage treatment plants, Operation and maintenance of STP's.

1.3 Objectives of the Assignment

- To design and conduct a household survey in Rishikesh Municipal Corporation areas to identify certain features of the household sanitation facilities.
- To create a database and geospatial maps to support the planning processes of concerned local authorities.

2. Methodology

The door-to-door survey was undertaken with the specific purpose to identify all unsewered households relying on onsite sanitation facilities in Rishikesh city. Survey questionnaire was developed in coordination with GIZ-SGR and the respective Nodal Officers of Urban Development Directorate (UDD) and State Program Management Group (SPMG), Namami Gange Uttarakhand. The survey involved capturing primary data by conducting face-to-face interviews with the inhabitants and users of all individual, commercial, institutional and communal structures with any onsite sanitation facility based upon the survey questionnaire. These included both existing and under-construction sites. Besides, the survey involved conducting physical verification of the nature of sanitation and septage management facilities in such properties. Additionally, in-depth interviews (IDIs) were conducted with the members of the Septage Management Cell (SMC) of Rishikesh including service providers involved in emptying, transportation and disposal of septage collected from the onsite sanitation facilities in the city.

To start with, the ward-wise maps along with the necessary secondary data were duly obtained and meetings done with the officiating in-charges of all concerned stakeholders (SMC), such as, Nagar Nigam, Jal Sansthan, Jal Nigam, etc.in coordination with GIZ-SGR Cell in Uttarakhand. In addition, active cooperation & support was sought from the frontline functionaries, such as, sanitation inspectors, in order to have greater understanding of the existing status of sewerage networks at grassroots level prior to embarking on the primary survey. Field verification of certain sample households were also done for cross-checks in coordination with GIZ Cell and ULB officers. The collected data was then analysed in detail in order to arrive at results and the properties with any on-site sanitation facility or those not connected to sewerage network were duly tagged on the GIS map. The detailed methodology adopted for carrying out the survey is presented in the following sections.

2.1 Data Collection Framework

2.1.1 Door-to-door Survey of Properties with On-site Sanitation Facility

A. Data Collection Tools Canvassed:	Face-to-face (F2F) Interview Schedule
B. Survey Respondents:	Owners / inhabitants / users of the following types of structures (both existing and under-construction sites) with any onsite sanitation facility:- a) Commercial Structures b) Institutional Structures c) Communal Structures (community toilets, etc.) The surveyed households were further divided into the following 4 categories: ▪ Toilets with Septic Tanks (Onsite Sanitation)— o Connected to sewerage network o Not Connected to sewerage network:- ➥ Connected with Soak Pits ➥ Not Connected to Soak Pits ▪ Toilets directly connected to sewerage network ▪ Community toilets / public toilets

C. Key Issues Probed:

I. Property Location:-

- Ward No. & Name
- Ward type (*Full sewer coverage; Partial sewer coverage; No sewer coverage*)
- Postal Address *(House No., Name of locality/street, etc.)*
- Locality type (*slum; non-slum*) – take picture
- Geospatial reference (*latitude; longitude; altitude*)
- Distance from the nearest vehicle approach road

II. Property Details:-

- Ownership (*owner occupied / tenant occupied / community use*)
- Availability (*open; locked; vacant*)
- No. of toilets in premises, and their age
- Source of help for designing & constructing toilet (if applicable)
- Whether available water is sufficient for usage / toilet use
- Public Toilets: Whether separate facility for men & women; availability of dustbin for disposal of sanitary napkin; manner of discharge of black-water and grey water; etc.
- Usage (*residential; commercial; mixed; institutional; communal*)
- Type if 'residential' (*bungalow; apartment; row house; chawl; hut; others-specify*)

- Type if 'commercial' (*factory; hotel/lodge; others-specify*)
- Type if 'institutional' (*hospital; dispensary; school / college; religious place; govt. office; others-specify*)
- Type in case of 'communal' (*public toilet; community toilet; others-specify*)

III. Details of Usage of On-site Sanitation Facility in the Property:-

- No. of users – *by gender, religion, caste, age, education, etc.*
- In case of 'no toilet', where do members go for defecation (*neighbours' toilet; public toilet; community toilet; others-specify*)
- In case of 'no toilet', nature of issues faced
- No. of users who had diarrhoea/ jaundice in last 3 months
- Whether aware of sewer connection laid down in area
- If yes, whether informed by authorities to take connection
- If yes, impediments in taking connection?

IV. On-site Sanitation Infrastructure:-

- No. of on-site sanitation structure within premises
- Orientation (*front side; back side; inside; outside property*)
- Type (*septic tank with/without soak pit; lined tank with/without soak pit; any other type- specify*)
- Nature (*Individual / shared*) → if shared, then with whom?
- Shape of onsite sanitation tank (*rectangular; circular*)
- Size (*Rectangular: length, breadth & height; Circular: diameter, height*)
- Capacity / volume of tank for holding faecal sludge (litre)
- Position of tank (*below the toilet; offset*)
- Nature of access (*covered; open*)
- Distance of septic tank from well (*if applicable*)
- No. of chambers in tank (*one; two; more*)
- Type of floor (*concrete- impervious ; kutcha-pervious*)
- Type of side walls (*concrete; kutcha*)
- Distance from nearest sewer line or manhole
- Distance from main entrance / road / lane
- Outfall from onsite sanitation tank connected to (*soak pit; open drain; covered drain; open land; others-specify*)
- Nature of disposal of grey-water from the property (*soak pit; open drain; covered drain; open land; others-specify*)

V. Faecal Sludge Management (FSM) :-

- Frequency of de-sludging
- When was tank emptied last time
- Why was tank emptied (*blocked toilet; overflow from access hole/manhole; bad smell; other reasons-specify*)
- Awareness of adverse environmental impacts of unsafe disposal
- Method of disposal (*manual; suction pipe with tank*)
- No. of trips required for disposal

- Amount paid per trip and preferred service provider
- Types of problems faced in de-sludging
- Place where sludge is disposed by service provider

2.1.2 Survey with Service Providers

A. Data Collection Tools Canvassed:	In-depth Interview (IDI) Schedule
B. Survey Respondents:	Service Providers engaged in emptying, transportation and disposal of septage collected from septic tanks & soak pits
C. Key Issues Probed:-	

I. Proprietary Details:-

- Name of service provider
- Registered address of service provider
- Operating status (*registered institution or individual service provider*)
- Total years of working experience in the city

II. Licensing Requirements & Protocols :-

- Nature of licensing requirements in place for collection, transportation and disposal of septage in the city
- Whether compliant with the existing licensing protocols
- Validity period of any licence obtained from ULB
- Manner of engagement with clients in case of no licensing requirements / compliance

III. Operational Details:-

- Manner in which the septic tanks / soak pits are emptied (*manual; suction pipe with tank*)
- Place of disposal of septage collected from the septic tanks / soak pits
- Source of payments against services rendered
- Level of control exerted over service provider by ULB staff for disposal of sludge
- Types of problems & constraints encountered while undertaking de-sludging of septic tanks / soak pits
- Suggestions for improvement in the existing system of septage disposal in Rishikesh.

2.1.3 Focussed Discussions with Official Stakeholders

A. Data Collection Tools Canvassed:	In-depth Interview (IDI) Schedule
B. Survey Respondents:	▪ Asst. Municipal Commissioner — Mr. Vinod Lal ▪ Project Manager – Jal Nigam — Mr. Sandeep Kashyap ▪ Asst. Engineer —Jal Sansthan — Mr. Harish Bansal
C. Key Issues Probed:	

- Role of ULB in septage management
- Types of septage management practises currently in vogue
- Type of agency / organisation / individuals designated for disposal of septage in city
- Place of disposal of septage collected from the septic tanks / soak pits
- Types and nature of operations of Sewage treatment plant (STP) facilities currently in place in the city
- Types of problems & constraints faced in septage management in the city

The Sanitation Flow Diagram (SFD) Report prepared by GIZ for Rishikesh city reported that out of the total **40 wards in the city**, 16 are 'fully covered', 3 are 'partially covered' and the rest 21 are 'not covered' by the sewerage system. Thus, using this information, the survey was carried out in the two types of wards (24 Nos.) that are yet to be fully covered by sewerage network.

Within these 24 wards, the survey was conducted by adopting census approach in which our survey teams visited all residential and non-residential properties. At the property level, our teams ascertained that whether or not the structure relies on the on-site sanitation. Further questions were canvassed only if its answer was 'yes', otherwise our surveyors moved on to next structure after putting a chalk-mark on its main gate to show it as covered. Using this modus operandi, our teams were able to cover and identify a total of 12,251 unsewered households relying on on-site sanitation facilities in the city.

Details of Ward Coverage in City		
Types of Wards (as per SFD Report)	**No. of Wards**	
	Existing	**Covered**
Fully Covered	16 Nos.	-
Partially Covered	3 Nos.	3 Nos.
Not Covered	21 Nos.	21 Nos.
Overall	**40 Nos.**	**24 Nos.**

2: Details of wards

2.3 Strategic Approach

For ensuring smooth execution of survey, the strategic approach adopted at various stages is presented sequentially hereunder.

2.3.1 Meetings with Official Stakeholders to Seek Updated Information and Cooperation of Grassroots level Staff

At the start, introductory meetings were conducted with the officiating in-charges of all concerned stakeholders, such as, Nagar Nigam, Jal Sansthan, Jal Nigam, etc., including the Mayor and the *Sahayak Nagar Ayukt* (Assistant Municipal Commissioner) of Nagar Nigam, Rishikesh. This was done in order to obtain their key insights into the nature of sanitation coverage in the city, as well as to seek active support of all the concerned official stakeholders in the city. Besides, this provided us the necessary secondary data, including a preliminary list of hotels, *ashrams*, *dharamshalas*, community toilets, etc., along with ward boundary maps and names & contact details of Corporators of all concerned wards.

Subsequently, two Sanitation Inspectors from Nagar Nigam were also designated for helping our field survey teams to coordinate with the grassroots level functionaries, including Corporators.

For publicizing the conduct of this survey as well as for seeking full cooperation of the households, the officials directed all garbage collection vehicles of Nagar Nigam to make announcements through their public address system throughout the city of Rishikesh. Further, formal letters were issued to the

Corporators of concerned wards to inform them regarding the survey and seek their full cooperation & support in this regard.

2.3.2 Orientation Training of Data Collection Professionals

Before embarking on the data collection exercise, the surveyors were provided 5-day orientation training on the developed tools. This was done with a view to acquainting the enumerators with the various operational modalities, including their roles & responsibilities and expectations from them, as well as with the type of questions to be asked through the questionnaires. This training was organised at AMS headquarters in Lucknow.

The training involved discussing and explaining all questions of the data collection tools. This was done to ensure that the surveyors are fully conversant with the tools and with the types of responses expected to be captured through them. Further, care was taken to ensure that the surveyors are thoroughly trained in canvassing the tools and in recording responses / observations through classroom sessions, individual and group exercises. During the process, the surveyors were made to complete at least 5 questionnaires in front of everybody else in the classroom. Besides, this training involved the use of vignettes (case scenarios based on typical responses) and the surveyors were required to complete the questionnaire as per the designed vignettes.

Keeping in mind the quality of information to be collected, a continuous appraisal of trainees was carried out throughout the course of training. At the end, a final appraisal was done to select only those demonstrating marked change in knowledge, attitude and skills following the training.

2.3.3 Primary Data Collection

The primary data collection exercise followed immediately after the conclusion of orientation training of field teams. However, before starting the work in any given ward, the deputed Sanitation Inspectors were extensively consulted for coordinating & communicating with the local Corporators. This was done with a view to motivate the Corporators to convince the households in case any member is averse to sharing his/her property's details.

During the survey exercise, our field teams, each comprising of one male and one female made door-to-door visits to all properties on their chalked-out routes and collected the details of all on-site sanitation systems in such properties. During the same, they conducted face-to-face interviews with the members residing in the property to assess their knowledge, attitude and practices to sanitation.

In addition, the surveyors conducted in-depth interviews with the service providers involved in disposal of septage from the septic tanks / soak pits.

- **Model Name & No.**	: Samsung Galaxy Tab A 7.0	- **Display**	: 7 inches
- **Network Connectivity**	: Wi-Fi + 4G	- **GPS**	: Yes
- **Operating System**	: Android 5.1 (*Lollipop*)	- **Supported Network**	: 4G LTE
- **RAM**	: 1.5 GB	- **Processor**	: 1.5 GHz Quad Core
- **ROM**	: 8 GB	- **User Interface**	: TouchWiz 2015
- **External Memory**	: Up to 32 GB supported	- **Battery Capacity**	: 4,000 mAh

IT Tools Used for Data Capture

The primary data collection under the survey was carried out by using the **computer-assisted personal interviewing (CAPI)** mode. For the same, we used hand-held **android tablets** that support both "off line" and "on line" modes of data collection. These tablets, along with other equipment's such as, chargers, backup batteries, etc., were earmarked from our own pool (480 Nos.) that we maintain regularly for undertaking data collection in near real time for similar large-scale field surveys. The specifications of tablets used for the survey are as hereunder –

2.3.4 Quality Control

To keep a tab on the quality of data collected by the field survey teams, Field Supervisors were appointed deployed in addition to the Enumerators. These Field supervisors extracted data from the investigators' tablets on a regular basis and conducted both spot checks and back-checks in the field. The spot-checks were conducted to check whether or not the investigator is interviewing only the stipulated types of respondents and is asking the questions and recording their responses in the appropriate manner. The back-checks ensured that no household has been left out and no critical information has been entered into the questionnaire incorrectly.

2.3.5 Data Validation and Uploading

The Supervisors accessed the data collected by field teams using their respective login Id and passwords on the **SurveyCTO** platform and conducted random back-checks of the data pertaining to 5% of the households covered during the survey. During the process, any inconsistency in data was duly rectified and uploaded / synced to the central CTO server so as to enhance its reliability.

At our back-end office, the output of the back-checked data was analysed using embedded Field Check Tables (FCTs) prepared by our software expert. This was done in order to correct all human errors that could not be detected even after the supervisory checks in the field. Based on its outcome, detailed feedback/instructions were given to the Field Supervisors and Investigators. Consequently, the Survey Coordinator did rigorous follow-up in the field to ensure non-recurrence of such omissions and errors.

A pictorial representation of the said verification protocol adopted for the survey is presented hereunder.

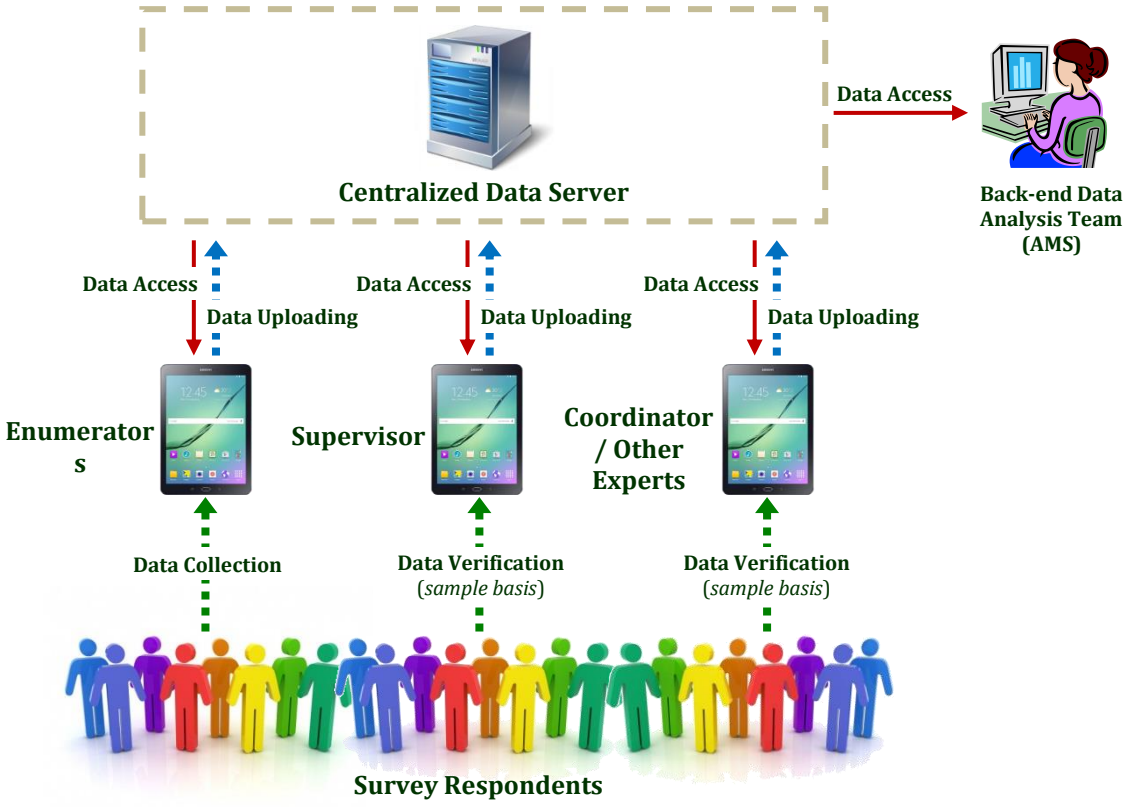


Figure 3: Verification Protocol

2.3.6 Data Analysis

The validated data was then analyzed by using SPSS software. Descriptive statistics (range, mean, standard deviation, etc.) was calculated for each variable. The summarized results of coverage data were represented graphically as and where required. Both point and interval estimates were generated. Cross-tabulation was done and suitable statistical analysis was performed to study the association/relationship between various variables. Statistical significance of these relationships was tested using appropriate statistical tests.

The spatial coordinates, along with the enumerated data, of households identified to be relying on onsite sanitation system were then plotted on the ward-wise map of Rishikesh city using Arc GIS software.

3. Physical & Demographic Profile

As aforementioned, Rishikesh city has a total of 40 wards, as per SFD Lite Report of GIZ, out of 40 wards, 16 were 'fully covered', 3 were 'partially covered' and the rest 21 were 'not covered' by the sewerage system. Thus, the present survey was initiated in only those wards which fall under either of the two categories - "partially covered" or "not covered". The detailed profile of all the 40 wards of Rishikesh as per the SFD Lite Report of GIZ is given at **Table i** of **Annexure-1** and shown in **Map No. ii** of **Annexure-2**. During the survey, it was revealed that situation has changed now. Out of 24 wards, 11 wards were "partially covered" and 13 wards were 'not covered'. As an outcome of survey, the detailed profile of these 24 wards in terms of their respective number of households, population, geographical area and population density is presented hereunder and shown in in **Map No. iii** of **Annexure-2** —

Table 3.1. Physical & Demographic Profile of Wards Covered under Survey

SN	Ward Name	Ward No.	No. of Households	Population	Area (km^2)	Population Density (No. of Persons per km^2)
1.	Triveni Colony	2	563	2,765	0.08	33,540
2.	Bhairav Mandir	4	756	3,231	0.21	15,584
3.	Pragati Vihar	12	286	1,116	0.33	3,351
4.	Ganga Vihar	17	521	2,455	0.57	4,290
5.	Someshwar Mandir	19	731	3,687	0.13	27,966
6.	Shastri Nagar	22	951	4,237	0.76	5,550
7.	Sarvahara Nagar	23	561	2,818	0.06	48,966
8.	Bharat Vihar	24	598	2,597	0.36	7,187
9.	Aavas Vikas	25	968	3,998	0.29	13,575
10.	Shivaji Nagar	26	745	3,363	0.97	3,471
11.	Barrage Ward	27	506	2,267	0.72	3,132
12.	Veerbhadra Mandir	28	401	1,855	0.64	2,891
13.	20 Bigha	29	1008	4,534	0.32	14,392
14.	Meera Nagar	30	880	4,199	0.30	14,075
15.	Bapugram	31	1072	4,959	0.27	18,609
16.	Suman Vihar	32	513	2,241	0.18	12,362
17.	Geeta Nagar	33	423	1,836	0.15	12,249
18.	Malviya Nagar	34	412	1,856	0.19	9,975
19.	Amit Gram (East)	35	742	3,416	0.16	20,920
20.	Amit Gram	36	746	3,348	0.30	11,092
21.	Mansha Devi	37	1439	6,801	0.94	7,201
22.	Indra Nagar	38	361	1,490	0.15	9,770
23.	Nehru Gram	39	594	2,639	0.28	9,459
24.	THDC	40	487*	2,435	0.66	3,704
Overall			**16,264**	**74,143**	**9.03**	**8,207**

** <u>Ward No. 40 (THDC)</u> mostly comprises of the THDC campus, which is an institutional residential colony that manages its own sanitation facilities, which includes their own STP. As such, the survey in this ward covered only 187 households situated outside the THDC campus.*

Note: On conclusion of the survey of above 24 wards, AMS team was informed by Asstt. Engineer, Jal Sansthan that some of the houses in sewered wards no.3, 5, 13 and 21 are not connected to sewer, accordingly, these houses (altogether 214) were visited and interview was taken of household, those were not connected to sewer. Since survey in these 4 wards was limited to households not connected to sewer, therefore, these wards were not included in above table of 24 wards, where all the houses of the ward were visited irrespective of whether connected to sewer or not.

During the field survey, interactions were made with all the stakeholders connected with city sanitation. In this context, Jal Nigam office of Rishikesh provided us a sewer map of city in 18 parts. These portions were assembled and plotted and superimposed on a ward map. The same is given as **Map iii A of Annexure-2.**

Besides undertaking survey in the aforementioned 24 wards, the physical dimensions, in terms of perimeter and area were also estimated of all 40 the wards in the city. The detailed ward-wise list of the same has been duly presented in **Table ii** of **Annexure-1**. The cumulative area of all the 40 wards in the city, as estimated by superimposing the peripheral boundaries of Nagar Nigam area from Google Maps on to the ArcGIS platform, comes out to 11.55 sq. km. Interestingly, this figure showing the total geographical expanse of city is even less than a half of that (26 sq. km) mentioned in the records of Rishikesh Nagar Nigam.

4. Distribution of Properties

Improved water, sanitation and hygiene (WASH) practices form the basic pre-requisites for achieving positive health outcomes in a society. They not only contain the spread of vector-borne diseases but also help in making healthcare services more accessible & effective by reducing their burden of disease-stricken patients. Besides, improved WASH practices have been reported to have significant social and economic benefits, with implications for environmental cleanliness, poverty reduction, and gender equity. Interventions to bring out improvements in WASH are therefore the epicentre of efforts for improving the quality of life worldwide, including India.

Here in India, acknowledging the significance of sanitation in nation-building, the Government started a mammoth exercise to improve its coverage of sanitary toilets in both rural and urban areas. The initiative has been highly successful in achieving open defecation free (ODF) status in almost all parts of the country. In the next step, the priority is to address the issue of groundwater contamination through insanitary practices for disposal of faecal sludge from the households, especially among those in urban areas who rely on on-site sanitation facilities. In this backdrop, the current survey

sought to assess the nature of sanitation facilities present in different types of properties existing in Haridwar city. The details of the same are presented sequentially ahead.

4.1 Types of Properties

Within the selected 24 wards, a total of 12,463 properties were surveyed. This was exclusive of 300 residential properties in THDC ward which could not be covered as they were within the THDC campus which manages its own sanitation facilities, including those for sewage disposal and treatment.

Among the abovementioned number of properties surveyed, the share of residential properties was found to be over nine-tenth (90%). The next highest share (5.7%) was that of the properties with mixed usage. The respective shares of commercial and fully institutional properties were much lower (see table-4.1).

Table 4.1. Break-up of Different Types of Properties

Particulars	No. of Properties	Proportion
Residential	11,279 Nos.	90.4%
Institutional	101 Nos.	0.8%
Commercial	381Nos.	3.1%
Mixed Usage	702 Nos.	5.7%
Overall	**12,463 Nos.**	**100.0%**

4.1.1 Details of Residential Properties

The residential properties comprised mostly of independent houses (99.6%) while the rest (41 Nos.) were apartments. Each of these apartments comprised of groups of flats constructed in single or multiple blocks within their respective campuses. The detailed distribution of Residential properties is presented in table 4.2.

Table 4.2 Distribution of Residential Properties

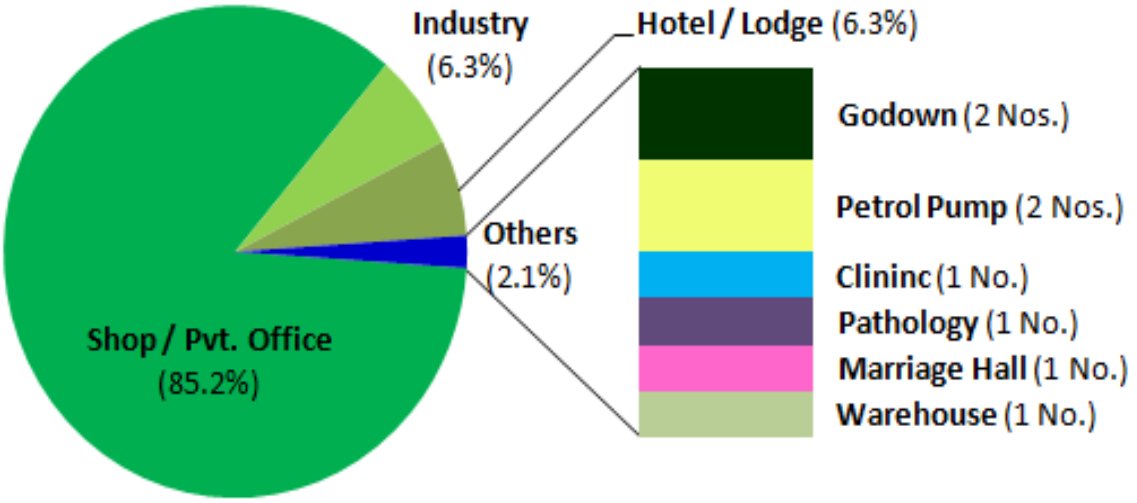
Particulars	No. of Properties	No. of HHs	No. of Toilets	No. of Users	No. of Tanks
Individual Houses	11,237	14863	19144	67857	8770
Apartments	42	273	494	1032	45
Overall	11,279	15,136	19,638	68,889	8,815

As may be seen from table 4.2, the individual properties (individual houses and apartment together) support 15136 households. These households use 19638 toilets indicating the availability of 1.3 toilets per household. These households comprised of 68889 users, which indicate that average load of users on each toilet is 3.5. The locations of residential properties have been shown in **Map iv of Annexure-2**.

4.1.2 Details of Commercial Properties

Among the 381 properties found to be commercial, a very high proportion (85%) was that of shops or private offices followed by those used for industry (6.3%) and hotel/lodges (6.3%) while the rest comprised of Godowns (2 Nos.), Petrol Pumps (2 Nos.), Clinic (1 No.), Pathology (1 No.), Marriage Hall (1 No.) and Warehouse (1 No.) (see chart 4.1).

Chart 4.1: Break-up of Commercial Properties (n=381)

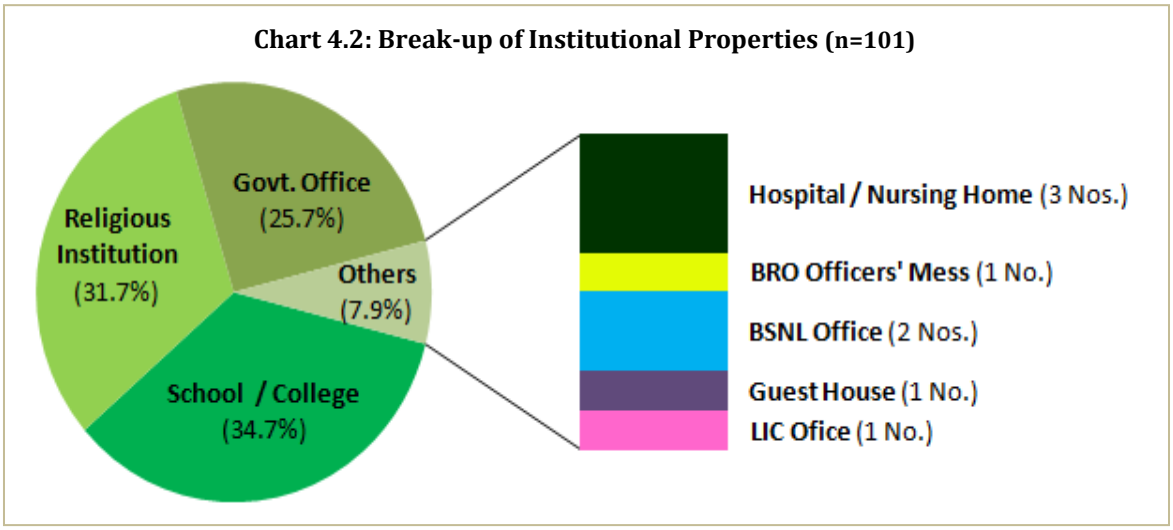


The locations of commercial properties have been shown in **Map v of Annexure-2.**

4.1.3 Details of Institutional Properties

The details of all institutional properties surveyed in the selected 24 wards of Rishikesh city have been presented in chart 4.2.

Chart 4.2: Break-up of Institutional Properties (n=101)



From the chart it may be seen that out of the total 101 properties surveyed, over one-third (35%) were schools/colleges and another one-third (32%) were religious institutions. The share of Government offices was one-fourth (26%) while the others included hospitals/nursing homes (3 Nos.), BSNL

offices (2 Nos.), Guest house (1 No.), BRO Officers' Mess (1 No.) and LIC Office (1 No.). The locations of institutional properties have been shown in **Map vi of Annexure-2.**

4.1.4 Details of Mixed Use Properties

Among the 693 properties found to have mixed usage, a very high majority (91%) was of those supporting commercial activities within the residential premises. Interestingly, it also included a few cases (11 Nos.) wherein commercial activities were being undertaken within the institutional properties. The locations of mexed properties have been shown in **Map vii of Annexur-2.**

Table 4.3. Break-up of Properties with Mixed Land Usage

Particulars	Number	Proportion
Residential + Commercial	640 Nos.	91.2%
Residential + Institutional	50 Nos.	7.2%
Institutional + Commercial	12 Nos.	1.6%
Total	**702 Nos.**	**100%**

5. Sanitation Infrastructure

5.1 Availability of Toilets

5.1.1 Level of Access to Individual Toilets

An in-depth analysis of survey data revealed that the proportion of residential properties that are without any individual toilet (3%) is very small as compared to that in the case of commercial properties (67%). Overall, the cumulative proportion of both these types of properties stands at around 5%.

Table 5.1 Level of Access to Individual Toilets in Residential and Commercial Properties

Property Type	Total No. of Properties	Properties with No Access to Individual Toilets	
		Number	Proportion
Residential	11,279 Nos.	297 Nos.	2.6%
Commercial	381 Nos.	255 Nos.	66.8%
Total	**11,660 Nos.**	**542 Nos.**	**4.7%**

Upon further analysis of this data, it emerged that "*Bharat Vihar"* and "*20 Bigha*" are the two wards where all the residential and commercial properties have their own individual toilets. Some of the worst performing wards in this regard are Ganga Vihar, Bhairav Mandir, Triveni Colony, Mansha Devi, etc. where the number of such properties with no individual toilet is the highest comparison to the other wards. The ward-wise break-up of each of these types of properties is presented in **Table iii** of **Annexure-1.** The locations of properties not having toilets have been shown in **Map viii of Annexure-2.**

5.1.2 Level of Access to Community/Public Toilets Among Inhabitants of Residential Properties with No Individual Toilets

Amongst the properties not having toilets, it was worthwhile to find out how many of them were residential and how many of them were commercial as the commercial properties comprising of small shop normally do not have toilet. It may be observed that out of 542 properties 255 were commercial properties. The result of this segregation is duly presented in chart 5.1 and in **Table iv of Annexure-1**.

Chart 5.1 clearly shows that about a half (47%) of all such properties with no individual toilet facility within their premises also do not have the facility of a community toilet in their close vicinity. The numbers of such properties with no individual toilet facility within the premises and also having no access to community / public toilet was found to be significantly higher in the two wards: Ganga Vihar and Barrage (see Table iv of Annexure-1).

Chart 5.1: Break-up of Residential Properties with No Individual Toilet

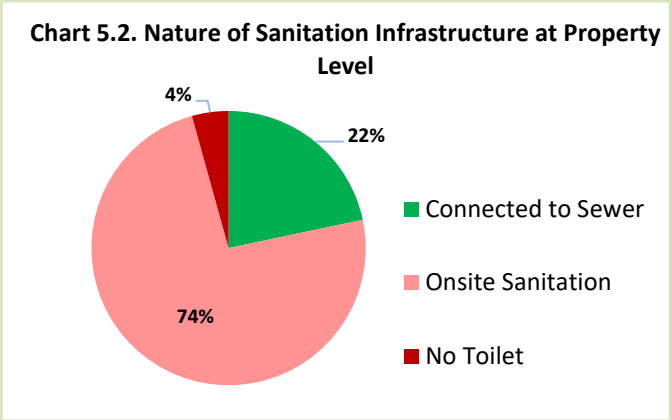
5.2 Status of Sanitation Infrastructure at Property Level

As aforementioned, a total of 12,463 properties were covered under the survey from across 24 wards. This was exclusive of the 300 residential properties that could not be covered inside the THDC campus, which otherwise were duly connected to their own sewer lines draining into an internal sewage treatment plant. Taking these connected residential properties also in account, the total number of properties sums up to 12,763. For these properties, the nature of sanitation infrastructure within the premises is presented in chart 5.2.

Chart 5.2 clearly shows that while over one-fifth properties are connected to sewer (properties connected to sewer system have been plotted in **Map-vii** under **Annexure-2**), another three-fourths are connected to the on-site sanitation facilities, while the rest 4% do not have individual toilets. The ward-wise breakup of these properties with the given types of sanitation infrastructure is presented in **Table-v** under **Annexure-1**.

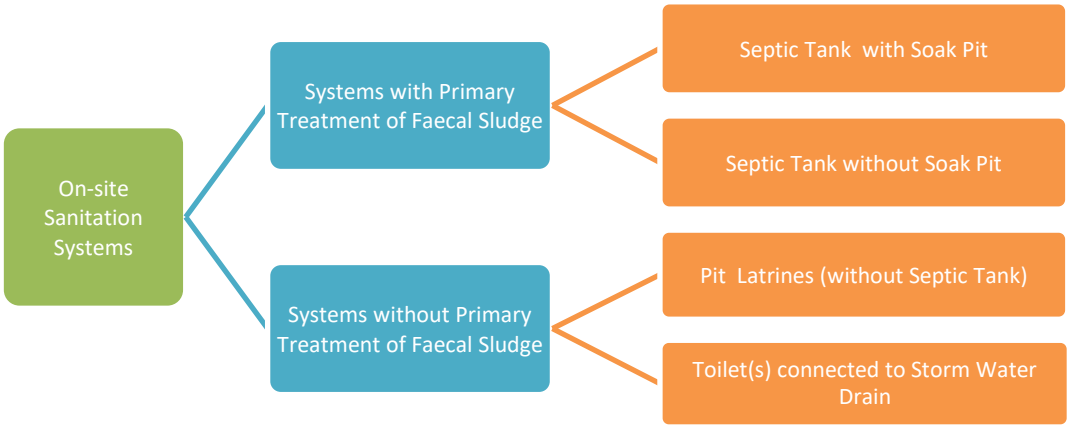
5.2.1 Nature of On-site Sanitation Facilities

Given that a whopping three-fourth of all toilet facilities have been found to be relying on on-site sanitation, it becomes imperative to discuss the nature and types of such on-site facilities currently in use at the property level.



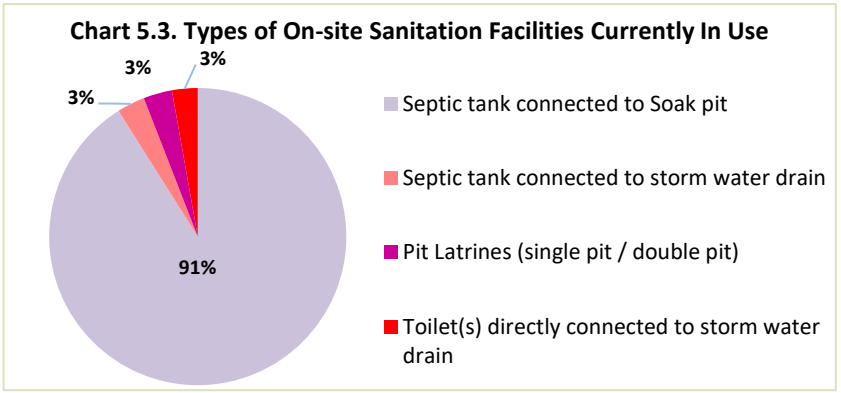
Overall, the following types of onsite sanitation facilities have been observed to be in practice in areas under Rishikesh Nagar Nigam.

Figure-5.3. Types of Onsite Sanitation Facilities in Vogue in Rishikesh Nagar Nigam Area



Among the given types of on-site sanitation facilities, those with "septic tank connected to soak pit" are the most common as reported in over nine-tenth (91%) of all such properties (see chart 5.3). The properties with different types of on-site sanitation facilities are depicted **in Maps-viii to xi** under **Annexure-2**.

The on-site sanitation infrastructure, comprising of septic tanks connected to soak pits, had several variations in their design, shape and dimensions as well as in their locations within the premises of such properties. The details of such factors of variation are discussed sequentially ahead.



5.2.2 Structural Design of On-site Sanitation Systems

There were several designs of on-site sanitation infrastructure in the city. These were broadly of two types – (a) those having facility for primary treatment of wastewater; and (b) those not having facility for primary treatment of wastewater. The primary treatment of wastewater in these properties is usually done through septic tanks.

The septic tanks come in multiple designs, ranging from single chambered to triple chambered ones. The multi chambered ones are usually constructed as a series of tanks separated by impervious partition walls. These partition walls have openings that allow passage of wastewater from one chamber to the next beyond a certain height above the bottom of tank.

In these tanks, the wastewater from toilet enters from one side and gets collected at the bottom. The tank is usually lined due to which this wastewater is not allowed to permeate into the soil. After staying in the tank for some time, the solids from this wastewater settle at the bottom while the scum floats on water surface.

When this wastewater swells beyond the level of whole /slit /opening at the other side of tank, its excess quantity drains out into the next chamber and subsequently into the soak pit. In extreme cases, this wastewater is drained out directly into the storm water drain. In this regard, the more is the number of chambers in septic tank, the greater is the quantity of faecal solids that are retained within the septic tank, thus reducing the detrimental impacts of environmental impact.

With time, the solids settled at the bottom of septic tank are digested anaerobically which reduces their volume. When the septic tank is filled up with this septage, it needs to be removed physically. If the septage is not removed, the tank loses its capacity to digest the faecal matter. In such a case, the faecal matter starts draining out directly into the soak pit / storm water drain.

The on-site sanitation systems that are devoid of septic tanks drain-off the wastewater directly into the soil through single or multiple “pits” or even into the storm water drain.

With regard to the abovementioned infrastructure, the survey has revealed the presence of the following 7 types of on-site sanitation structures in Rishikesh city:

1. Septic Tank (1-Chambered) Connected to Ideal Soak Pit

This type of on-site sanitation system was mostly observed in the affluent wards of Rishikesh. In this system, rectangular lined or Circular pre-casted concrete pipe septic tanks/pits were connected to soak pit padded with fine and coarse aggregates. This type of soak pit is considered to be fairly ideal considering its efficiency in adhering to ground water safety recommendations and protocols. The detailed structural design of this system is depicted in **Figure-i** under **Annexure-3**.

2. Septic Tank (1-Chambered) with Partition Wall between Soak Pit (with Gravel Base)

This type of on-site sanitation system is prevalent in most of the wards of Rishikesh. Under this system, the septic tanks are constructed rectangular or circular in shape. In the case of rectangular tanks, the walls are lined with bricks while in the case of circular ones pre-casted concrete rings are

mounted one over the other. These types of septic tanks are separated with the soak pit through a partition wall at one end. The soak pit is provided a thin layer of gravel (kutcha) at the base. This thin layer of gravel usually does not conform to the environmental safety protocols that require multi-layered filtering of faecal sludge from wastewater so as to prevent it from infiltrating the soil profile. The detailed structural design of this system is depicted in **Figure-ii** under **Annexure-3**.

3. Septic Tank (2-Chambered) Connected to Soak Pit (Honeycombed Lining and Gravelled Base)

This type of on-site sanitation system comprises of a two-chambered septic tank which is subsequently connected to a soak pit. The twin chambers of septic tank are usually rectangular in shape and lined with bricks or are even in the form of two interconnected cylinders embedded into the ground adjacent to each other. Each such cylinder is made of 2-3 pre-casted concrete rings mounted over each other. The second chamber in series is connected to a soak pit through a soak pit outlet. The soak pit is cylindrical in shape with permeable honeycomb structured walls and gravelled base. The detailed structural design of this system is depicted in **Figure-iii** under **Annexure-3**.

4. Septic Tank (3-Chambered) Connected to Soak Pit (Honeycombed Lining and Gravelled Base)

This type of on-site sanitation system comprises of a triple-chambered septic tank which is subsequently connected to a soak pit. The three chambers of septic tank are usually rectangular in shape and lined with bricks or are even in the form of three interconnected cylinders embedded into the ground adjacent to one other. Each such cylinder is made of 2-3 pre-casted concrete rings mounted over each other. The third chamber in series is connected to a soak pit through a soak pit outlet. The soak pit is cylindrical in shape with permeable honeycomb structured walls and gravelled base. The detailed structural design of this system is depicted in **Figure-iv** under **Annexure-3**.

5. Septic Tank Directly Connected to Sewer Network or Open/ Closed Drain

In this type of on-site sanitation system the septic tank is either connected to the sewerage network or drains out directly into the storm water drain. Often, this closed/open drain is connected to some *nulla* that drains out directly into the river Ganga. The septic tank in this case is usually rectangular or cylindrical in shape. In case of rectangular tanks, the walls are lined with bricks while in the case of cylindrical tanks, the walls are made of 2-3 pre-cast concrete rings mounted one over the other. In both the cases, the base of the tank in made impervious by a thick concrete layer. The detailed structural design of this system is depicted in **Figure-v** under **Annexure-3**.

6. Single Pit Onsite Sanitation System Without Septic Tank

This is a rudimentary form of on-site sanitation system which is found to exist mainly in the old settlements of city marked by lower socio-economic characteristics. In this system, the black-water from toilet directly enters into a pit without going through the primary treatment. The pit is rectangular or circular in cross-section. In the case of rectangular pit, the walls are lined with bricks in honeycomb like structure while in the case of circular one pre-casted concrete rings are mounted one over the other. At its bottom, the pit is provided a thin layer of gravel (kutcha). The detailed structural design of this system is depicted in **Figure-vi** under **Annexure-3**.

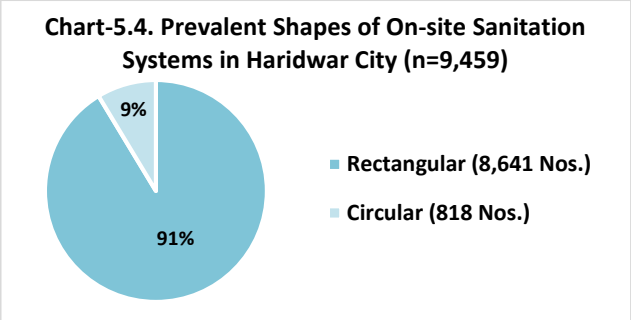
7. Twin Pit Onsite Sanitation System Without Septic Tank

This is another variation of the abovementioned type of on-site sanitation system which is found to exist in a few wards of the city. In this system, the black-water from toilet directly enters into one of the two unconnected pits without going through the primary treatment. For directing the black-water into either of these pits, a valve chamber is provided at the ground level.

The pits are rectangular or circular in cross-section. In the case of rectangular pits, the walls are lined with bricks in honeycomb like structure while in the case of circular ones pre-casted concrete rings are mounted one over the other. At its bottom, the pit is provided a thick layer of both coarse and fine gravel for filtering out the solids and semi-solids. The detailed structural design of this system is depicted in **Figure-vii** under **Annexure-3**.

5.2.3 Shape of Septic Tanks/Pits

Out of the total 9,459 on-site sanitation systems found to exist in and around the surveyed properties, over nine-tenth (91%) have rectangular cross-sectional design. The same is duly presented in chart 5.4.



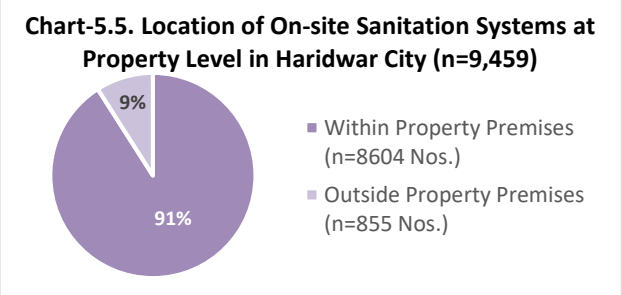
5.2.4 Volume of Septic Tank/Pit

The volume-wise distribution of septic tanks/pits was calculated (see Table 5.2). it may be seen from the table given alongside that more than four-fifth of the tanks are having capacities more than 80%. Septic tanks/pits less than 1 cum are only 0.2 %, whereas 1 cum to 5 cum are 13%.

Table 5.2 Volume-wise distribution of Septic Tanks/Pits			
S. N.	Volume of Septic Tank/Pit	No.	%
1	Less than equal to 1 cum	21	0.2%
2	> 1 cum & < = 2 cum	321	3.4%
3	> 2 cum & <= 5 cum	1043	11.0%
4	> 5 cum & <=10 cum	1922	20.3%
5	> 10 cum & <=20 cum	3446	36.5%
6	More than 20 cum	2194	23.2%
7	Don't know Can't say	512	5.4%
Total		9549	100.0%

5.2.5 Location of Septic Tanks

As expected, over nine-tenth (91%) of the total 9,459 on-site sanitation systems in the city were found to be located within the premises of properties surveyed. The rest 9% were located outside the premises of respective properties surveyed



5.3 Status of Properties directly connected to Open/Closed Drains

Overall, 268 properties, representing about 3% of the total 9,489 properties relying on on-site sanitation, were found to be discharging black-water directly into open or closed drains. The number of such properties was found to be the highest in Sarvahara Nagar ward (101 Nos.) followed by Bharat Vihar ward (84 Nos.). The geographical locations of such properties have been duly plotted in **Map-xiv** under **Annexure 2**.

Figure 5.2: A Snapshot of Property Discharging

5.4 Status & Ownership of Public and Community Toilets

The survey revealed that there are a total of 18 public/community toilets in surveyed areas. Of these, half (9 Nos.) were public toilets and half were community toilets. Among these, 14 were found to be functional, of which 8 were public toilets and 6 were community toilets. A snapshot of the same is depicted in table 5.3 as well as in **Map-xv** under **Annexure 2**.

Table 5.3: Status of Public and Community Toilets					
SN	**Type of Toilet**	**Operational Status**	**No. of Toilets**	**Toilets Connected to**	
				Sewer	**On-site Sanitation**
1.	Public Toilet (PT)	Functional	8 Nos.	7 Nos.	1 No.
		Non-Functional	1 No.	-	1 No.
		Sub-Total (PT)	**9 Nos.**	**7 Nos.**	**2 Nos.**
2.	Community Toilet (CT)	Functional	6 Nos.	6 Nos.	-
		Non-Functional	3 Nos.	3 Nos.	-
		Sub-Total (CT)	**9 Nos.**	**9 Nos.**	**-**
Overall		Functional	14 Nos.	13 Nos.	1 No.
		Non-Functional	4 Nos.	3 Nos.	1 No.
		Total	**18 Nos.**	**16 Nos.**	**2 Nos.**

Of all the 9 public toilets, 7 were connected to sewerage network while the rest 2 relied on on-site sanitation. In the case of community toilets, all 9 toilets were connected to the sewerage network.

When the status of these toilets was analyzed in terms of ownership, it emerged that except for 1 public toilet, all toilets across both categories (PT & CT) were constructed by the Nagar Nigam. Out of these, 14 were functional while the rest 3 were non-functional. Interestingly, of all the 17 toilets constructed by Nagar Nigam, only 1 relied on on-site sanitation while the rest were connected to sewerage network (see Table 5.3).

Further, out of the total 9 public toilets, 8 were constructed by the Nagar Nigam whereas 1 was constructed by a private agency - Pancha Tattva Waste and Energy. This lone public toilet relied on on-site sanitation while it was also non-functional (see Table 5.4).

Table 5.4: Current Status of Public and Community Toilets by Ownership					
SN	**Toilet Type**	**Status**	**Connected To**	**Constructed By**	**Operated By**
1.	Public Toilet (PT)	Functional	Sewer	Nagar Nigam (7 Nos.)	▪ Sulabh International (6 Nos.) ▪ Ganga Sabha (1 No.)
			Septic Tank	Nagar Nigam (1 No.)	▪ Sulabh International (1 No.)
		Non-Functional	Sewer	-	-
			Septic Tank	Pancha Tattva Waste & Energy (1 No.)	▪ Pancha Tattva Waste & Energy (1 No.)
2.	Community Toilet (CT)	Functional	Sewer	Nagar Nigam (6 Nos.)	▪ Shrishti Samajik Vikas Sanstha (5 Nos.) ▪ Sulabh International (1 No.)

Table 5.4: Current Status of Public and Community Toilets by Ownership					
SN	Toilet Type	Status	Connected To	Constructed By	Operated By
			Septic Tank	-	-
		Non-Functional	Sewer	Nagar Nigam (3 Nos.)	▪ Shrishti Samajik Vikas Sanstha (3 Nos.)
			Septic Tank	-	-

The toilet-wise details of public and community toilets are given in Table 5.5 and Table 5.6 —

Table 5.5 Details of Public Toilet by Locality						
Ward No	Locality	Status	No of Toilets	No of Users Per Day	Toilet Connected To	Maintained by
12	Shail vihar Dehradun road	Functional	6	40	Sewer	Sulabh International
17	chungi haridwar road	Functional	8	70	Sewer	Sulabh International
15	Triveni ghat	Functional	32	950	Sewer	Ganga Sabha
9	Railway road congress bhawan	Functional	10	50	Sewer	Sulabh International
6	ISBT Bus Stand No.3	Functional	25	180	Sewer	Sulabh International
6	ISBT Bus Stand NO.4	Functional	25	170	Sewer	Sulabh International
6	Garhwal bus stand	Functional	10	120	Sewer	Sulabh International
6	Garhwal bus stand	Non Functional*	10	150	Septic Tank	Pancha Tattva Waste and Energy*
40	Manari bhali	Functional	32	58	Septic Tank	Sulabh International

*It was informed that action has initiated for making this public toilet functional.

Table 5.6 : Details of Community Toilets by Locality					
Ward No	Locality	Status	No of Toilets	No of Users Per Day	Maintained by
7	Chandreshwar road mayakund	Functional	10	50	Shrishti Samajik Vikas Sanstha
2	Triveni colony nepali basti	Functional	13	145	Shrishti Samajik Vikas Sanstha
2	Trevni colony chandrabhaga pool main road	Functional	22	120	Shrishti Samajik Vikas Sanstha
2	Vishwakarma chauk	Functional	18	50	Shrishti Samajik Vikas Sanstha

Table 5.6 : Details of Community Toilets by Locality					
Ward No	**Locality**	**Status**	**No of Toilets**	**No of Users Per Day**	**Maintained by**
7	Chandreshwar Nagar road lal mandir ke paas	Functional	10	40	Shrishti Samajik Vikas Sanstha
9	Mukharji marg tiraha haridwar road	Functional	2	20	Sulabh International
1	New chandeshwar nagar	**Non Functional***	20	100	Shrishti Samajik Vikas Sanstha
2	Shamshan ghat	**Non Functional***	20	100	Shrishti Samajik Vikas Sanstha
7	Bangali basati maya kund	**Non Functional***	20	100	Shrishti Samajik Vikas Sanstha

*Later it was informed that 2 out of 3 non-functional toilets have been made functional

5.5 Awareness of Sewerage Network Among Households

The households with at least one toilet within their premises which was not connected to the sewerage network were asked whether or not they are aware of any sewer line been laid down in the vicinity of their property. It emerged that over nine-tenth (91%) were not aware of any such sewer line been laid out near to their property.

Table 5.7: Awareness of Households Regarding Sewerage Network Laid Near their Properties		
Particulars	**Households Who Affirmed**	
	Number	**Proportion**
Aware of Sewerage Network	895 Nos.	8.9%
Not Aware of Sewerage Network	8,595 Nos.	91%
Overall	**9,490 Nos.**	**100%**

Among the households who were aware (895 Nos.) of any sewerage network in the vicinity of their properties, near about a half (46%) affirmed to have been informed by the Nagar Nigam officials to get their properties connected to the sewerage network. All 100% of those who affirmed of having been informed by the Nagar Nigam staff regarding the laying of a sewerage network in their area reported that they have agreed to connect their toilets to the sewerage network.

In this regard, an attempt was made to assess the distances of their properties from the nearest manhole of the sewerage network laid out in the area. It emerged that the properties of all such households were within 100 metres from the newly laid sewer lines.

6. Desludging, Transportation & Disposal

Faecal Sludge and Septage Management is the process of safe collection, conveyance, treatment and disposal/ reuse of faecal sludge and septage from on-site sanitation systems such as pit latrines, septic tanks, etc., i.e. the management of the mixture of human waste (solid and liquid) that is not conveyed by a centralized sewerage system. A typical FSSM system involves mechanized desludging of a septic tank/pit latrine using a suction emptier machine, which then stores the collected waste in a sealed container and transports it to a treatment facility. In some cases it is a transfer station for temporary storage before being transported to a treatment facility by a different vehicle.

Efficient FSSM operation entails streamlining all processes and components along the 'sanitation value chain for on-site sanitation systems' during planning, design, implementation, operation and monitoring. Successful FSSM operations need active coordination and participation among relevant stakeholders – ULB, service providers, operators, residents/community groups, state government, etc.

"Most of the HHs empty and clean the septic tanks only when they get full. HHs do not have much knowledge on it and clean it only during emergencies. The septic tanks are cleaned by a single vehicle operated by a private service provider. In other cases it is cleaned manually." – **General Perception of householders**

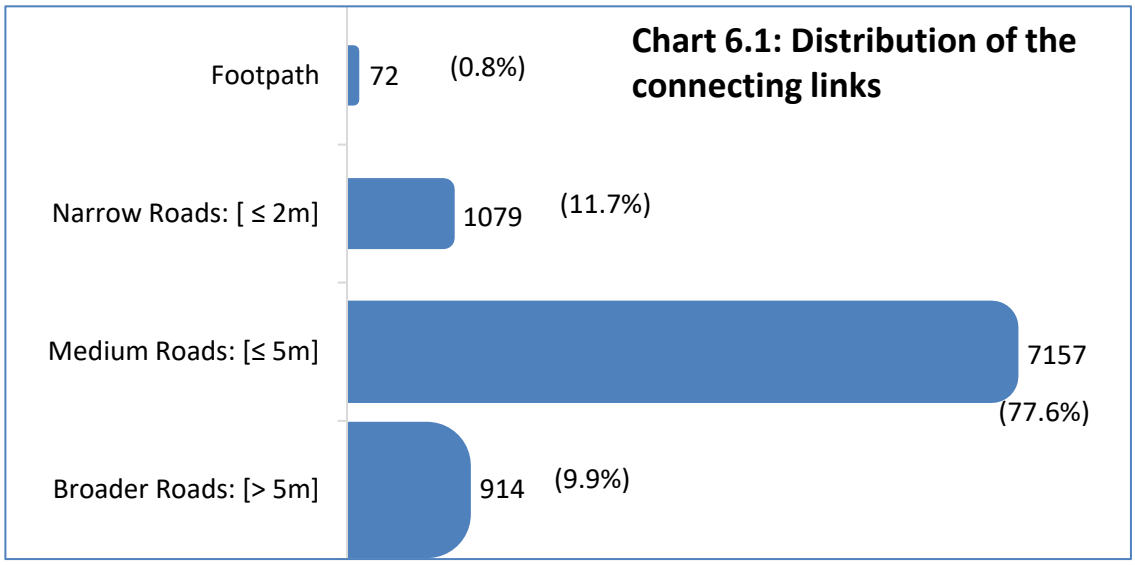
Smaller cesspool vehicles are required for Puri to increase accessibility – **EO, Puri Municipality**

6.1 Desludging

Before embarking on the desludging or emptying of septic tanks/pits, it would be imperative to assess a few facts related to main operation of desludging.

6.1.1 Accessibility of Septic Tank/Pit

The knowledge of road width will facilitate the type vehicle to be used for desludging. It was observed that the approach road to containing structures vary from footpath (0.8%) to broad roads (width exceeding 5 m) about one-tenth (9.7%) of total connecting roads. majority (77.8%) of connecting roads were found to be of medium width (width from 2 m to 5 m), followed by narrow roads (less than 2 m) occupying 11.7% of the connecting roads. The problem of narrow roads was found most in Shivaji Nagar, Barrage Ward and Sarvahara Nagar wards as shown in **Table vii of Annexure-1.** The distribution of the connecting links have been shown in Chart 6.1 ahead.



6.1.2 Distance between Septic Tank/Pit and Road

The distance between septic tank/pit and road is important for the purpose of e determining the length of the suction pipe required for emptying. There were instances where containing structure was constructed right on the road, whereas the maximum distance between septic tank/pit and road was observed as 100 feet. The distance-wise distribution of septic tank/pit is shown in Table 6.1. It may be observed that more than four-fifth of the tanks are within 30 feet.

Table 6.1 Distribution of septic Tank/Pit as per distance from road

Sl. No.	Distance from Road in Feet	Number	Proportion
1	On the road	353	3.7%
2	Up to 10 feet	6480	68.6%
3	> 10 feet & <= 30 feet	1791	18.9%
4	> 30 feet & <= 50 feet	566	6.0%
5	More than 50 feet	269	2.8%
Total		**9549**	**100.0%**

6.1.3 Level difference between Septic Tank/Pit and Road

The level difference between septic tank/pit and road is important for the purpose of determining the capacity of suction pump. There were instances where containing structure was constructed right on the road or in same level, whereas the maximum level difference between septic tank/pit and the road was observed as 6 feet. The level difference-wise distribution of septic tank/pit is shown in Table 6.2. It may be observed that more than 98% of the tanks are not higher than 4 feet.

Table 6.2 Distribution of septic Tank/Pit as per level difference from road			
Sl. No.	**Level Difference from Road in Feet**	**Number**	**Proportion**
1	On the road level	2271	24.0%
2	Up to 2 feet	5985	63.3%
3	> 2 feet & <=4 feet	1039	11.0%
4	More than 4 feet	163	1.7%
Total		**9549**	**100.0%**

6.1.4 Emptying Frequency

As per **Standard Operation Procedure of cleaning of Septic Tank** (Ministry of Housing and Urban Affairs 2018), the emptying frequency of septic tank/pit should preferably one to two years, but not more than 2 years in any case. However, the prevailing practice at Rishikesh was quite opposite to this, as depicted in the Table 6.3 ahead.

Table 6.3 Frequency of Septic Tank/Pit Emptying			
Sl. No.	**Status of Septic Tank/Pit Emptying**	**Number**	**Proportion**
1	Not yet emptied since construction	8575	90.8%
2	6 months	166	1.8%
3	6 – 12 months (6-12)	85	0.9%
4	12 – 24 months (12-24)	101	1.0%
5	24 – 36 months (24- 36)	69	0.7%
6	More than 36 months	463	4.8%
Total		9459	

A whooping more than nine-tenth (91%) of containing structures were reportedly not yet emptied from the date of construction. It necessitated determining the age of septic tank/pits to understand the maximum period for which septic tank/pit has not been emptied. The same is given in the Table 6.4 ahead.

Table 6.4 Age of septic Tank/Pit not yet emptied			
Sl. No.	**Age of Septic Tank/Pit**	**Number**	**Proportion**
1	Less than equal to 3 Years	1850	19.6%
2	> 3 Years & < 5 Years	1131	12.0%
3	> 5 Years & < 10 Years	2341	24.7%
4	> 10 Years & < 20 Years	2932	31.0%
5	More than 20 Years	1205	12.7%
Total		**9549**	**100.0%**

The table above clearly depicts that more than three-fourth (79%) of the tanks were not emptied since more than 3 years. It was interesting to note that more than two-fifth (40.4%) of the septic tank/pits have never emptied since more than 10 years.

Only 3.7% of the septic tanks/pits were emptied within two years. The scenario is quite contrary to the **Standard Operation Procedure of cleaning of Septic Tank 2018** (Ministry of Housing and Urban Affairs).

6.1.5 Method of Emptying

It was observed that only one service provider operates in Rishikesh for emptying the septic tanks/pits. He is an individual works as private service provider.

6.1.6 Amount paid for Emptying

Households were enquired regarding the amount paid for desludging of septic tank/pit. The amount varied from Rs. 2000/- to Rs. 6000/- depending upon the distance of house form suction vehicle garage and the size of septic tank. The same is shown in the Table 6.5 ahead.

Table 6.5 Amount Paid for emptying the Septic Tank/Pit

Sl. No.	Particular	Amount in Rupees
1	Minimum	Rs. 2000/-
2	Maximum	Rs. 6000

6.1.7 Service Provider for Emptying, Transportation & Disposal of Septage

Although FSSM is public sector responsibility, however, it is managed by a private service provider in Rishikesh. Incidentally, only one Truck Mounted Vacuum Tanker equipped with motorized pump and storage tank performs all the emptying work of Rishikesh Nagar Nigam area. The capacity of suction vehicle is 5000 liters. The private service provider Mr. Rajneesh Shetty presently works in individual capacity and is active in desludging activity since last 10 years in Rishikesh. He informed that he has applied for registration in Nagar Nigam recently as there was no requirement of registration earlier.

He further informed that Nagar Nigam has earmarked 2 Manholes for disposal of collected septage for treatment of the same. As per Mr. Shetty, sealed septic tanks/pits in many houses present the major challenge in emptying the septic tank/pit. To de-sludge these sealed containing devices, the surface of the septic tanks/pits needs to be broken first and only then de-sludging is possible. The second major problem that is the accessibility, as the road width doesn't allow the suction vehicle to reach every household in Rishikesh. It was reported that no proper safety gears were used by this Private desludging operator while emptying and disposal of faecal sludge.

Satisfaction with Service Provider

Households were probed regarding their satisfaction with the service provider. It was heartening to note that an overwhelming majority (88%) of households were reportedly satisfied with the emptying services provided by private service provider.

Transportation and Disposal of Collected Septage

Private Service Provider informed that Jal Sansthan has earmarked 2 Manholes for disposal of collected septage for treatment of the same. The septage collected from all Wards (Ward Nos. 5 to

40) situated on the south of Chandrabhaga River is disposed in the manhole located before Lakkarghat Sewage Treatment Plant as shown in **Map xvi of Annesure-2**. Whereas the septage collected form Ward No. 1 to Ward No. 4 (situated on the north of Chandrabhaga River) is disposed before Chorpani-Dhalwala Sewage Treatment Plant for treatment.

6.1.8 Presence of Sewer Line

Efforts were made to find out the distance of septic tank from existing sewer line through approximate measurement on ground as well as through map. While calculating the distance, the properties already connected to sewer or not having a toilet have been excluded from the calculation. The outcome of analysis is presented in Table 6.6—

Table 6.6 Distance of Septic Tank from nearest Sewer Line

Sl. No.	Distance in metres	Number	Proportion
1	Less than equal to 50 Metres	37	0.4%
2	> 50 Metres & <= 100 Metres	330	3.5%
3	> 100 Metres & < =500 Metres	1800	19.0%
4	> 500 Metres & < =1000 Metres	2407	25.5%
5	> 1000 Metres & < =2000 Metres	2005	21.2%
6	>2000 Metres & < =3000 Metres	2395	25.3%
7	More than 3000 Metres	485	5.1%
Total		**9549**	**100.0%**

It may be observed that more than half (52%) of septic tanks are more than 1 km away.

Awareness of Sewer Line in the vicinity

The respondents having a toilet and not connected to sewer line were inquired about existence of a sewer line in the vicinity of their property, less than one-tenth (8.9%) of the respondent were aware of a sewer line in their vicinity (see Table 6.7). Those respondents who were aware, were further inquired whether they received any notice from Rsihikesh Nagar Nigam regarding connection of their toilet to the sewer line. In all, 409 (45.7%) respondents affirmed to have received notice for connection. It was encouraging to note that all such respondents were willing to connect their toilets to sewer line.

Table 6.7: Awareness regarding Sewer Line being laid down in the vicinity

Sl. No.	Particular	Number	Percentage
1	Aware	895	8.9%
2	Not Aware	8594	91.1%
Total		**9489**	

7. Under – Construction Properties

For the purpose of effective future planning for Faecal Sludge and Septage Management (FSSM) of an urban area all the under-construction properties need to be taken in account. Accordingly, all the under-construction properties were visited, and various issues were inquired from the available respondents.

7.1 Types of under-construction properties

The field survey enumerated a total of 270 under-construction properties within Rishikesh Nagar Nigam area. The details of which are shown ahead in Table 7.1 —

Table 7.1 Types of Under-construction Properties			
Sl. No.	**Type of Property**	**Number**	**Percentage**
1	Residential	259	95.9%
2	Commercial	2	0.8%
3	Residential cum Commercial	9	3.3%
Total		**270**	**100%**

The Table 7.1 depicts that majority (96%) of the under-construction properties were residential followed by 3% mixed properties (Residential and Commercial). A miniscule (1%) proportion was found as commercial properties. The locations of under-construction properties are shown in **Map xvii of Annexure-2**.

7.2 Status of Sanitation in Under-construction Properties

The status of sanitation in the under-construction properties was inquired from the available respondents. The same is presented in the Table 7.2 given ahead —

Table 7.2 Status of Sanitation in Under-construction Properties			
Sl. No.	**Type of Property**	**Number**	**Percentage**
1	Sewer Network	29	10.7%
2	Septic Tank Connected to Soak Pit	231	85.2%
3	Single Pit	6	2.2%
4	Twin Pit	3	1.1%
5	Connected to open/close drain	1	0.4%
Total		**270**	**100%**

The Table 7.2 above depicts that more than one-tenth (11%) of the under-construction properties were connected to sewer network. A miniscule proportion (0.4%) of properties were reported not having toilets. Remaining about 89% have on-site sanitation. The majority (85%) of the properties were having septic tank connected to a soak pit. In one of the residential property, it was found that toilet is directly connected to open/close drain.

7.2.1 Shape of Septic Tank/Pit

The shape of under-construction septic /pit tank was inquired from available respondent. The majority (93%) of these were rectangular as shown in Table 7.3 given ahead —

Table 7.3 Shape of Septic Tank/Pit of Under-construction Properties			
Sl. No.	**Type of Shape**	**Number**	**Percentage**
1	Rectangular	223	92.9%
2	Circular	17	7.1%
Total		240	

7.2.2 Dimensions of Septic Tank/Pit

The dimensions of under-construction septic /pit tank were also inquired from available respondent. The details of which are presented in the Table 7.4 given ahead —

Table 7.4 Dimension of Septic Tank/Pit of Under-construction Properties			
Sl. No.	**Type of Property**	**Minimum**	**Maximum**
1	Length	4	24
2	Width	3	12
3	Depth	4	12

It may be observed form above table that the length varies for 4 feet to 24 feet and width varies from 3 feet to 12 feet. In case of depth, it was observed that the minimum depth was 4 feet, whereas the maximum depth was reported as deep as 12 feet, which may not be desirable in place like Rishikesh, where ground water is available at about 20 feet as observed in Ward No. 24 Shivaji Nagar and Ward No. 37 Mansha Devi. The volume of containing device was also calculated as depicted in the Table 7.5 ahead —

Table 7.5 Volume of Septic Tank/Pit of Under-construction Properties			
Sl. No.	**Volume Range**	**Number**	**Percentage**
1	Less than 1 cum	1	0.4%
2	More than 1 cum and less than 2 cum	12	5.1%
3	More than 2 cum and less than 5 cum	13	5.5%
4	More than 5 cum and less than 10 cum	44	18.6%
5	More than 10 cum and less than 20 cum	99	41.9%
6	More than 20 cum and less than 30 cum	46	19.6%
7	More than 30 cum	21	8.9%

The table 7.5 above depicts that the septic tanks/pits less than equal to 5 cum are only 11% whereas, the tanks/pits above 10 cum are more than two-third (70%).

7.2.3 Accessibility to Septic Tank/Pit

The width of connecting road to the septic tank\pit was observed during field survey and the outcome is presented in Table 7.5 given ahead —

Table 7.6 Accessibility to Septic Tank/Pit of Under-construction Properties			
Sl. No.	**Width of connecting Road**	**Number**	**Percentage**
1	Footpath	1	0.4%
2	Narrow — less than 2m	15	6.3%
3	Medium — less than 5m	198	82.5%
4	Broad — more than 5m	26	10.8%
Total		**240**	

The Table 7.5 depicts that one of the containing structure is connected by footpath. However, a huge majority (93%) of the properties are connected by medium or broad roads. About 6 % of the properties are connected with narrow roads.

8. Areas of Concern and Recommendations

The current survey of on-site sanitation within Rishikesh Nagar Nigam area, brought to light some pertinent findings, which need to be considered while charting future course of action. The study offers strategic insights into various issues related to on-site sanitation and highlighting its efficacy and effectiveness in managing the faecal sludge and Septage handling. The results of the survey have led us to highlight certain areas needing immediate attention of concern authorities. In addition, there are suggestions for improving the overall on-site sanitation strategy. There are a few concerns, which may be needing the immediate attention of Septage Management Cell in Rishikesh Nagar Nigam.

8.1 Barrage Colony – A typical case

There was a curious case of Barrage Colony, where it was reported that some of the houses instead of septic tank/pit were having 1mX1mX1m chambers in front of their houses. These chambers were connected through closed drains to a large Septic Tank, which was built for the whole colony. On the visit to the big septic tank in the ward, it was found completely dry. The immediate question came forth in front of the senior members of the field survey team that where did the septage from these

chambers go? Subsequently, walking along these chambers it was revealed that these chambers get frequently filled. At times emptied sludge was found right next to the chambers in the open. The greater cause of concern was that some of these households were situated on the bank of river and the sludge emptied from the chambers was kept overlooking the storm water drains, ultimately connected to river. Post a heavy rainfall, the sludge kept outside the chambers gets mixed with rain water and flows through the storm water drains and finally flows into the river. The survey team also informed about an old sewer line at the entrance of the ward. However, the septage was unable to flow through old sewer line mainly because the main sewer line, to which the old sewer line was joined, was on a higher elevation, which resulted in backflow of septage. A suitable pump is immediately required to be installed for transferring the septage from old sewer line to main sewer line besides cleaning the blockages in the old sewer line.

8.2 Toilets Directly Connected to Open Drains

It was revealed that 268 properties (2.8% of total properties) were directly connected to open drains. Incidentally, close to four-fifth (79%) or 213 such properties were found in Ward Nos. 23, 24, 26 and 31. As a matter of fact, Ward No. 23 Sarvahara Nagar (101 properties) and Ward No. 24 Bharat Vihar (84 properties) had the maximum concentration of such properties as shown in **Map xiv of Annexure-2**. All these 213 properties were found to be overlooking an open drain flowing through these wards. Therefore, this issue needs immediate attention of Nagar Nigam authorities.

8.3 Other concerns and Recommendations

Besides the above, there were a few more concerns observed during the field survey, the same are shared for consideration and for taking remedial measures as follows:

- Considering the high ground water level, an attempt was made to list-out those houses, which are having on-site sanitation and a hand-pump within their premises. The ward-wise details of such properties are given in **Table x Annexure-1**. Drinking water source in all such properties is vulnerable for contamination. Therefore, it is suggested that drinking water quality (including analysis of biological parameters) of these hand pumps should be periodically monitored.
- The storm water needs to be separated by constructing appropriate storm water drains and bypassing these drains from STP to reduce the load of treatment. Currently, Storm water mixes with Sewerage system resulting excess inflow to STP thus reducing the Hydraulic Retention period from 21 days to 6 days during monsoons in Lakkar Ghat STP.
- Most of the pits are constructed by local masons according to financial status and space available to the user. It was observed that masons have a tendency of making bigger/deeper pits than required. Consequently, taking a long period for filling resulting in difficult desludging operation.

- The deeper pits have a greater threat to contamination of ground water quality owing to the high level of water table in Rishikesh.
- Action is required to impose a restriction that construction of septic tank/pit should be done based on National Building Code – Bureau of Indian Standard.

Annex

Annexure 1- Tables

Tables:

Table i — Annexure-1

Water supply and Sewerage network coverage in Rishikesh as per SFD Lite Report				
Ward No.	**Ward Name**	**Population**	**Piped water status (YES/NO)**	**Sewerage status (YES/NO)**
1	Chandreshwar Nagar	3011	Yes	Yes
2	Triveni Colony	3024	Yes	No
3	Durga Mandir	3054	Yes	Yes
4	Bhairav Mandir	2912	Yes	No
5	Pushkar Mandir	2764	Yes	Yes
6	Aadarsh Gram	2498	Yes	Yes
7	Mayakund	2696	Yes	Yes
8	Bharat Mandir	2983	Yes	Yes
9	Mukherjee Marg	2532	Yes	Yes
10	Sadanand Marg	2635	Yes	Yes
11	Ashutosh Nagar	2628	Yes	Yes
12	Pragati Vihar	2345	Yes	No
13	Valmiki Nagar	2710	Yes	Yes
14	Subhash Nagar	2840	Yes	Yes
15	Maniram Ward	2634	Yes	Yes
16	Tilak Marg	2668	Yes	Yes
17	Ganga Vihar	2334	Yes	Yes (approx. 70 % sewered)
18	Shanti Nagar	2844	Yes	Yes
19	Someshwar Mandir	2760	Yes	No
20	Ganga Nagar	2740	Yes	Yes
21	Upper Ganga Nagar	2677	Yes	Yes
22	Shastri Nagar	2720	Yes	No
23	Sarvahara Nagar	2566	Yes	No
24	Bharat Vihar	2927	No	No
25	Aavas Vikas	3086	Yes	Yes (approx. 90 % sewered)
26	Shivaji Nagar	2488	No	No
27	Barrage Ward	2377	Yes	No

Water supply and Sewerage network coverage in Rishikesh as per SFD Lite Report				
Ward No.	**Ward Name**	**Population**	**Piped water status (YES/NO)**	**Sewerage status (YES/NO)**
28	Veerbhadra Mandir	2385	Yes	Yes (approx. 50 % sewered)
29	20 Bigha	2545	Yes	No
30	Meera Nagar	2499	Yes	No
31	Bapugram	2455	Yes	No
32	Suman Vihar	2631	Yes	No
33	Geeta Nagar	2488	Yes	No
34	Malviya Nagar	2485	Yes	No
35	Amit Gram (East)	2545	Yes	No
36	Amit Gram (West)	2602	Yes	No
37	Mansa Devi	2657	No	No
38	Indra Nagar	2595	Yes	No
39	Nehru Gram	2545	Yes	No
40	THDC	2435	THDC's own water supply	No

Table ii — Annexure-1

Physical Dimensions of All 40 Wards in Rishikesh City			
Ward No.	**Ward Name**	**Perimeter (km)**	**Area (sq. km)**
1.	Chandreshwar Nagar	1.00	0.05
2.	Triveni Colony	2.01	0.08
3.	Durga Mandir	2.74	0.12
4.	Bhairav Mandir	2.04	0.21
5.	Pushkar Mandir	1.37	0.11
6.	Aadarsh Gram	4.59	0.35
7.	Mayakund	1.39	0.08
8.	Bharat Mandir	1.67	0.09
9.	Mukherjee Marg	2.85	0.23
10.	Sadanand Marg	2.02	0.17
11.	Ashutosh Nagar	1.89	0.19
12.	Pragati Vihar	2.98	0.33
13.	Valmiki Nagar	1.15	0.06
14.	Subhash Nagar	1.87	0.11
15.	Maniram Ward	1.85	0.14
16.	Tilak Marg	1.94	0.13
17.	Ganga Vihar	6.46	0.57
18.	Shanti Nagar	1.26	0.05
19.	Someshwar Mandir	2.01	0.13
20.	Ganga Nagar	4.20	0.52
21.	Upper Ganga Nagar	2.61	0.12
22.	Shastri Nagar	4.21	0.76
23.	Sarvahara Nagar	1.00	0.06
24.	Bharat Vihar	3.59	0.36
25.	Aavas Vikas	4.99	0.29
26.	Shivaji Nagar	5.09	0.97
27.	Barrage Ward	4.52	0.72
28.	Veerbhadra Mandir	5.30	0.64
29.	20 Bigha	2.60	0.32
30.	Meera Nagar	2.51	0.30

Physical Dimensions of All 40 Wards in Rishikesh City			
Ward No.	**Ward Name**	**Perimeter (km)**	**Area (sq. km)**
31.	Bapugram	3.22	0.27
32.	Suman Vihar	1.77	0.18
33.	Geeta Nagar	2.43	0.15
34.	Malviya Nagar	2.45	0.19
35.	Amit Gram (East)	1.78	0.16
36.	Amit Gram	2.13	0.30
37.	Mansha Devi	4.23	0.94
38.	Indra Nagar	2.27	0.15
39.	Nehru Gram	2.91	0.28
40.	THDC	4.78	0.66
Overall (Rishikesh City)		**28.40**	**11.55**

Table iii — Annexure-1

Ward-wise Distribution of Residential & Commercial Properties with No Access to Individual Toilet							
SN	Ward Name	Ward No.	No of Properties with No Access to Individual Toilet	Residential		Commercial	
				Number	Proportion	Number	Proportion
1.	Ganga Vihar	17	193 Nos.	116 Nos.	60.1%	77 Nos.	39.9%
2.	Bhairav Mandir	4	79 Nos.	36 Nos.	45.6%	43 Nos.	54.4%
3.	Triveni Colony	2	65 Nos.	59 Nos.	90.8%	6 Nos.	9.2%
4.	Mansha Devi	37	32 Nos.	18 Nos.	56.3%	14 Nos.	43.8%
5.	Nehru Gram	39	19 Nos.	3 Nos.	15.8%	16 Nos.	84.2%
6.	Geeta Nagar	33	18 Nos.	1 No.	5.6%	17 Nos.	94.4%
7.	Pragati Vihar	12	17 Nos.	-	-	17 Nos.	100.0%
8.	Amit Gram (East)	35	16 Nos.	-	-	16 Nos.	100.0%
9.	Barrage Ward	27	15 Nos.	15 Nos.	100.0%	-	-
10.	Aavas Vikas	25	13 Nos.	8 Nos.	61.5%	5 Nos.	38.5%
11.	Amit Gram	36	13 Nos.	1 No.	7.7%	12 Nos.	92.3%
12.	Shastri Nagar	22	12 Nos.	6 Nos.	50.0%	6 Nos.	50.0%
13.	Someshwar Mandir	19	10 Nos.	1 No.	10.0%	9 Nos.	90.0%
14.	THDC	40	9 Nos.	6 Nos.	66.7%	3 Nos.	33.3%
15.	Bapugram	31	6 Nos.	6 Nos.	100.0%	-	-
16.	Veerbhadra Mandir	28	5 Nos.	3 Nos.	60.0%	2 Nos.	40.0%
17.	Indra Nagar	38	5 Nos.	1 No.	20.0%	4 Nos.	80.0%
18.	Sarvahara Nagar	23	4 Nos.	4 Nos.	100.0%	-	-
19.	Suman Vihar	32	4 Nos.	-	-	4 Nos.	100.0%
20.	Malviya Nagar	34	4 Nos.	1 No.	25.0%	3 Nos.	75.0%
21.	Shivaji Nagar	26	1 No.	1 No.	100.0%	-	-
22.	Meera Nagar	30	1 No.	1 No.	100.0%	-	-
23.	Bharat Vihar	24	-	-	-	-	-
24.	20 Bigha	29	-	-	-	-	-
25.	Durga Mandir	3					
26.	Valmiki Nagar	13					
27.	Upper Ganga Nagar	21					
Overall			**541 Nos.**	**287 Nos.**	**53%**	**254 Nos.**	**47%**

Table iv — Annexure-1

Ward-wise Break-up of Residential Properties with No Individual Toilet - By Level of Proximity to Community Toilet							
SN	Ward Name	Ward No.	Residential Properties with No Individual Toilet				
			Total Nos.	Have Access to CT (Located Nearby)		Have No Access to CT (Located Far-off)	
				Number	Proportion	Number	Proportion
1.	Triveni Colony	2	59 Nos.	59 Nos.	100%	-	-
2.	Bhairav Mandir	4	36 Nos.	36 Nos.	100%	-	-
3.	Pragati Vihar	12	-	-	-	-	-
4.	Ganga Vihar	17	116 Nos.	50 Nos.	43%	66 Nos.	57%
5.	Someshwar Mandir	19	1 No.	1 No.	100%	-	-
6.	Shastri Nagar	22	6 Nos.	-	-	6 Nos.	100%
7.	Sarvahara Nagar	23	4 Nos.	-	-	4 Nos.	100%
8.	Bharat Vihar	24	-	-	-	-	-
9.	Aavas Vikas	25	8 Nos.	-	-	8 Nos.	100%
10.	Shivaji Nagar	26	1 No.	-	-	1 No.	100%
11.	Barrage Ward	27	15 Nos.	-	-	15 Nos.	100%
12.	Veerbhadra Mandir	28	3 Nos.	-	-	3 Nos.	100%
13.	20 Bigha	29	-	-	-	-	-
14.	Meera Nagar	30	1 Nos.	-	-	1 No.	100%
15.	Bapugram	31	6 Nos.	-	-	6 Nos.	100%
16.	Suman Vihar	32	-	-	-	-	-
17.	Geeta Nagar	33	1 No.	-	-	1 No.	100%
18.	Malviya Nagar	34	1 No.	-	-	1 No.	100%
19.	Amit Gram (East)	35	-	-	-	-	-
20.	Amit Gram	36	1 No.	-	-	1 No.	100%
21.	Mansha Devi	37	18 Nos.	-	-	18 Nos.	100%
22.	Indra Nagar	38	1 No.	-	-	1 No.	100%
23.	Nehru Gram	39	3 Nos.	-	-	3 Nos.	100%
24.	THDC	40	6 Nos.	6 Nos.	100%	-	-
25	Durga Mandir	3					
26	Valmiki Nagar	13					
27	Upper Ganga Nagar	21					
Total			**287 Nos.**	**152 Nos.**	**53.0%**	**135 Nos.**	**47%**

Table v — Annexure-1

Status of Sanitation

Ward No.	Ward Name	No of Properties	Toilets Connected to Sewer		On Site Sanitation		No Toilet	
			No.	%	No.	%	No.	%
2	Triveni Colony	324	223	68.8%	36	11.1%	65	20.1%
4	Bhairav Mandir	469	305	65.0%	85	18.1%	79	16.8%
12	Pragati Vihar	205	49	23.9%	139	67.8%	17	8.3%
17	Ganga Vihar	540	296	54.8%	51	9.4%	193	35.7%
19	Someshwar Mandir	539	509	94.4%	20	3.7%	10	1.9%
22	Shastri Nagar	683	0	0.0%	671	98.2%	12	1.8%
23	Sarvahara Nagar	399	0	0.0%	395	99.0%	4	1.0%
24	Bharat Vihar	434	0	0.0%	434	100.0%	0	0.0%
25	Aavas Vikas	693	635	91.6%	45	6.5%	13	1.9%
26	Shivaji Nagar	588	0	0.0%	587	99.8%	1	0.2%
27	Barrage Ward	460	78	17.0%	367	79.8%	15	3.3%
28	Veerbhadra Mandir	308	248	80.5%	55	17.9%	5	1.6%
29	20 Bigha	849	0	0.0%	849	100.0%	0	0.0%
30	Meera Nagar	747	0	0.0%	746	99.9%	1	0.1%
31	Bapugram	805	0	0.0%	799	99.3%	6	0.7%
32	Suman Vihar	416	0	0.0%	412	99.0%	4	1.0%
33	Geeta Nagar	330	0	0.0%	312	94.5%	18	5.5%
34	Malviya Nagar	321	0	0.0%	317	98.8%	4	1.2%
35	Amit Gram (East)	607	0	0.0%	591	97.4%	16	2.6%
36	Amit Gram	661	0	0.0%	648	98.0%	13	2.0%
37	Mansha Devi	1216	0	0.0%	1184	97.4%	32	2.6%
38	Indra Nagar	212	21	9.9%	186	87.7%	5	2.4%
39	Nehru Gram	356	37	10.4%	300	84.3%	19	5.3%
40	THDC	387	321	82.9%	57	14.7%	9	2.3%
3	Durga Mandir	72	0	0.0%	70	97.2%	2	2.8%
13	Valmiki Nagar	4	0	0.0%	1	25.0%	3	75.0%
21	Upper Ganga Nagar	138	0	0.0%	132	95.7%	6	4.3%
Total		**12763**	**2722**	**21.3%**	**9489**	**74.3%**	**552**	**4.3%**

Table vi — Annexure-1

Status of On-site Sanitation

Ward No.	Ward Name	No of Properties with On-site Sanitation	Septic tank connected to Soak pit		Septic tank connected to Open/closed drain		Single Pit		Twin Pit		Directly connected to Open/closed drain	
			No.	%	No.	%	No.	%	No.	%	No.	%
2	Triveni Colony	36	32	88.89%	0	0.00%	3	8.33%	0	0.00%	1	2.78%
4	Bhairav Mandir	85	75	88.24%	4	4.71%	2	2.35%	1	1.18%	3	3.53%
12	Pragati Vihar	139	129	92.81%	0	0.00%	10	7.19%	0	0.00%	0	0.00%
17	Ganga Vihar	51	40	78.43%	0	0.00%	2	3.92%	2	3.92%	7	13.73%
19	Someshwar Mandir	20	4	20.00%	0	0.00%	1	5.00%	1	5.00%	14	70.00%
22	Shastri Nagar	671	646	96.27%	1	0.15%	12	1.79%	11	1.64%	1	0.15%
23	Sarvahara Nagar	395	207	52.41%	55	13.92%	31	7.85%	1	0.25%	101	25.57%
24	Bharat Vihar	434	271	62.44%	25	5.76%	44	10.14%	10	2.30%	84	19.35%
25	Aavas Vikas	45	40	88.89%	0	0.00%	1	2.22%	1	2.22%	3	6.67%
26	Shivaji Nagar	587	565	96.25%	4	0.68%	6	1.02%	0	0.00%	12	2.04%
27	Barrage Ward	367	185	50.41%	176	47.96%	1	0.27%	0	0.00%	5	1.36%
28	Veerbhadra Mandir	55	55	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
29	20 Bigha	849	838	98.70%	4	0.47%	3	0.35%	3	0.35%	1	0.12%
30	Meera Nagar	746	657	88.07%	2	0.27%	82	10.99%	4	0.54%	1	0.13%
31	Bapugram	799	778	97.37%	3	0.38%	2	0.25%	0	0.00%	16	2.00%
32	Suman Vihar	412	403	97.82%	0	0.00%	7	1.70%	2	0.49%	0	0.00%
33	Geeta Nagar	312	309	99.04%	0	0.00%	2	0.64%	0	0.00%	1	0.32%
34	Malviya Nagar	317	314	99.05%	1	0.32%	1	0.32%	1	0.32%	0	0.00%
35	Amit Gram (East)	591	587	99.32%	1	0.17%	1	0.17%	1	0.17%	1	0.17%
36	Amit Gram	648	639	98.61%	0	0.00%	7	1.08%	2	0.31%	0	0.00%
37	Mansha Devi	1184	1168	98.65%	3	0.25%	2	0.17%	11	0.93%	0	0.00%
38	Indra Nagar	186	184	98.92%	0	0.00%	2	1.08%	0	0.00%	0	0.00%
39	Nehru Gram	300	284	94.67%	0	0.00%	1	0.33%	15	5.00%	0	0.00%
40	THDC	57	45	78.95%	3	5.26%	1	1.75%	0	0.00%	8	14.04%
3	Durga Mandir	70	61	87.14%	0	0.00%	0	0.00%	1	1.43%	8	11.43%
13	Valmiki Nagar	1	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	100.00%
21	Upper Ganga Nagar	132	132	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total		**9489**	**8648**	**91.14%**	**282**	**2.97%**	**224**	**2.36%**	**67**	**0.71%**	**268**	**2.82%**

Table vii – Annexure-1

Access road to Septic tank/ Pit

Ward No.	Ward Name	Narrow road (less than 2 meter)	Medium Road (less than 5 meter)	Wide road (more than 5 meter)	Footpath
2	Triveni Colony	18	14	3	0
3	Durga Mandir	15	47	0	0
4	Bhairav Mandir	14	48	19	0
12	Pragati Vihar	0	58	81	0
13	Valmiki Nagar	0	0	0	0
17	Ganga Vihar	9	14	21	0
19	Someshwar Mandir	1	3	2	0
21	Upper Ganga Nagar	10	82	40	0
22	Shastri Nagar	34	456	179	1
23	Sarvahara Nagar	133	123	10	28
24	Bharat Vihar	72	195	70	13
25	Aavas Vikas	14	23	5	0
26	Shivaji Nagar	238	299	27	11
27	Barrage Ward	135	225	1	1
28	Veerbhadra Mandir	7	47	1	0
29	20 Bigha	68	748	32	0
30	Meera Nagar	55	611	73	6
31	Bapugram	39	674	69	1
32	Suman Vihar	0	334	78	0
33	Geeta Nagar	10	250	51	0
34	Malviya Nagar	21	266	30	0
35	Amit Gram (East)	11	567	12	0
36	Amit Gram	14	600	33	1
37	Mansha Devi	111	1056	8	10
38	Indra Nagar	1	165	20	0
39	Nehru Gram	49	204	48	0
40	THDC	0	48	1	0
Total		**1079**	**7157**	**914**	**72**

Table viii – Annexure-1

Problems during emptying of septic tank/ Pit

Wrd No.	Ward Name	No. of HHs Emptied septic tank/pit	No problem		Difficult access		Long distance from suction machine		Breakable structure near septic tank/ Pit		Difficult to locate the septic tank / Pit	
			No.	%	No.	%	No.	%	No.	%	No.	%
2	Triveni Colony	1	0	0.00%	1	100.00%	1	100.00%	1	100.00%	0	0.00%
3	Durga Mandir	13	11	84.62%	2	15.38%	0	0.00%	0	0.00%	0	0.00%
4	Bhairav Mandir	10	3	30.00%	4	40.00%	3	30.00%	5	50.00%	0	0.00%
12	Pragati Vihar	21	20	95.24%	0	0.00%	0	0.00%	1	4.76%	0	0.00%
13	Valmiki Nagar	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
17	Ganga Vihar	2	2	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
19	Someshwar Mandir	1	1	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
21	Upper Ganga Nagar	22	17	77.27%	4	18.18%	3	13.64%	0	0.00%	1	4.55%
22	Shastri Nagar	90	79	87.78%	8	8.89%	1	1.11%	2	2.22%	2	2.22%
23	Sarvahara Nagar	62	36	58.06%	18	29.03%	10	16.13%	10	16.13%	3	4.84%
24	Bharat Vihar	65	59	90.77%	2	3.08%	1	1.54%	3	4.62%	1	1.54%
25	Aavas Vikas	7	3	42.86%	3	42.86%	1	14.29%	1	14.29%	0	0.00%
26	Shivaji Nagar	44	34	77.27%	5	11.36%	8	18.18%	5	11.36%	1	2.27%
27	Barrage Ward	129	56	43.41%	65	50.39%	35	27.13%	26	20.16%	49	37.98%
28	Veerbhadra Mandir	5	5	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
29	20 Bigha	33	23	69.70%	5	15.15%	2	6.06%	9	27.27%	3	9.09%
30	Meera Nagar	44	32	72.73%	7	15.91%	5	11.36%	2	4.55%	1	2.27%
31	Bapugram	34	26	76.47%	2	5.88%	2	5.88%	5	14.71%	0	0.00%
32	Suman Vihar	35	32	91.43%	3	8.57%	0	0.00%	0	0.00%	0	0.00%
33	Geeta Nagar	50	48	96.00%	1	2.00%	0	0.00%	0	0.00%	1	2.00%
34	Malviya Nagar	31	24	77.42%	2	6.45%	2	6.45%	6	19.35%	0	0.00%
35	Amit Gram (East)	40	33	82.50%	3	7.50%	2	5.00%	5	12.50%	0	0.00%
36	Amit Gram	26	21	80.77%	1	3.85%	1	3.85%	3	11.54%	1	3.85%
37	Mansha Devi	21	16	76.19%	1	4.76%	2	9.52%	3	14.29%	0	0.00%
38	Indra Nagar	27	27	100.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
39	Nehru Gram	48	40	83.33%	8	16.67%	2	4.17%	1	2.08%	0	0.00%
40	THDC	6	5	83.33%	1	16.67%	0	0.00%	0	0.00%	0	0.00%
Total		**867**	**651**	**75.09%**	**146**	**16.84%**	**81**	**9.34%**	**88**	**10.15%**	**63**	**7.27%**

Table ix Annexure-1

Properties with on-site Sanitation and Hand pump

Ward No.	Ward Name	No of Properties	Properties with on-site Sanitation and handpump in their Premises		Piped water status (YES/NO)
			No.	%	
2	Triveni Colony	324	30	9.26%	Yes
3	Durga Mandir	72	70	97.22%	Yes
4	Bhairav Mandir	469	71	15.14%	Yes
12	Pragati Vihar	205	3	1.46%	Yes
13	Valmiki Nagar	4	1	25.00%	Yes
17	Ganga Vihar	540	7	1.30%	Yes
19	Someshwar Mandir	539	0	0.00%	Yes
21	Upper Ganga Nagar	138	2	1.45%	Yes
22	Shastri Nagar	683	28	4.10%	Yes
23	Sarvahara Nagar	399	335	83.96%	Yes
24	Bharat Vihar	434	366	84.33%	No
25	Aavas Vikas	693	9	1.30%	Yes
26	Shivaji Nagar	588	575	97.79%	No
27	Barrage Ward	460	136	29.57%	Yes
28	Veerbhadra Mandir	308	12	3.90%	Yes
29	20 Bigha	849	145	17.08%	Yes
30	Meera Nagar	747	112	14.99%	Yes
31	Bapugram	805	328	40.75%	Yes
32	Suman Vihar	416	10	2.40%	Yes
33	Geeta Nagar	330	26	7.88%	Yes
34	Malviya Nagar	321	4	1.25%	Yes
35	Amit Gram (East)	607	14	2.31%	Yes
36	Amit Gram	661	167	25.26%	Yes
37	Mansha Devi	1216	849	69.82%	No
38	Indra Nagar	212	8	3.77%	Yes
39	Nehru Gram	356	5	1.40%	Yes
40	THDC	387	3	0.78%	Yes
Total		**12763**	**3316**	**25.98%**	

Annexure 2 - Maps

Maps

Map-i. Administrative Boundary of Rishikesh Nagar Nigam

Map-ii. Rishikesh sewer coverage map (As per GIZ's SFD Report)

Map-iii. Rishikesh sewer coverage map (Updated as per AMS Survey)

Map-iiiA. Rishikesh sewer network layout map

Map-iv. Residential Properties of Unsewered/ Partially Sewered wards

Map-v. Commercial Properties of Unsewered/ Partially sewered wards

Map-vi. Institutional Properties of Unsewered/ Partially Sewered wards

Map-vii. Mixed Land use Properties of Unsewered/Partially sewered wards

Map-viii. Properties without toilet

Map-ix. Properties connected to Sewer

Map-x. Properties with Septic tanks connected to Soak pit

Map-xi. Properties with Septic tanks without soak pit connected to open/closed drain

Map-xii. Properties connected to Single Pit

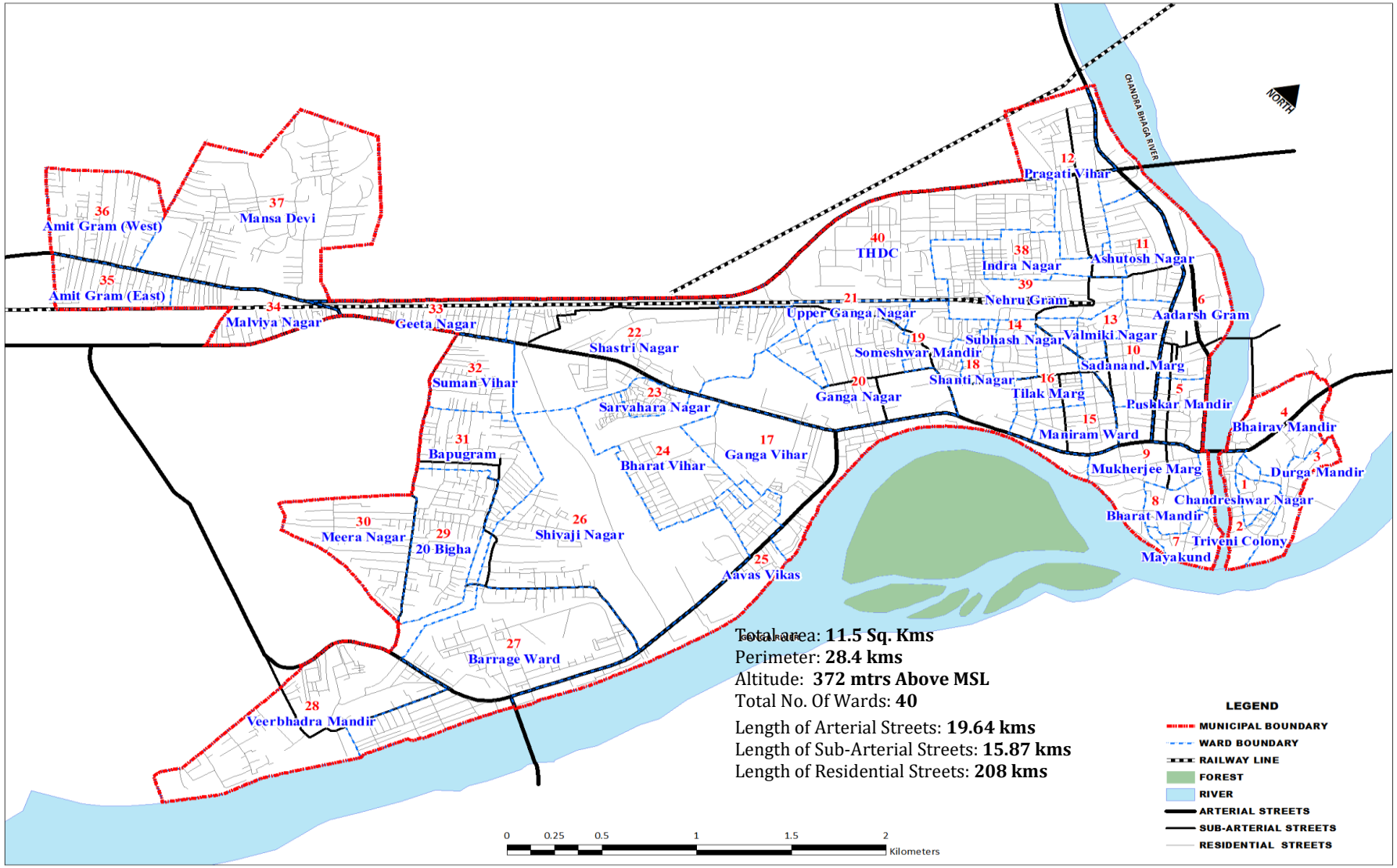
Map-xiii. Properties connected to Twin pits

Map-xiv. Toilets directly connected to Open/closed drain

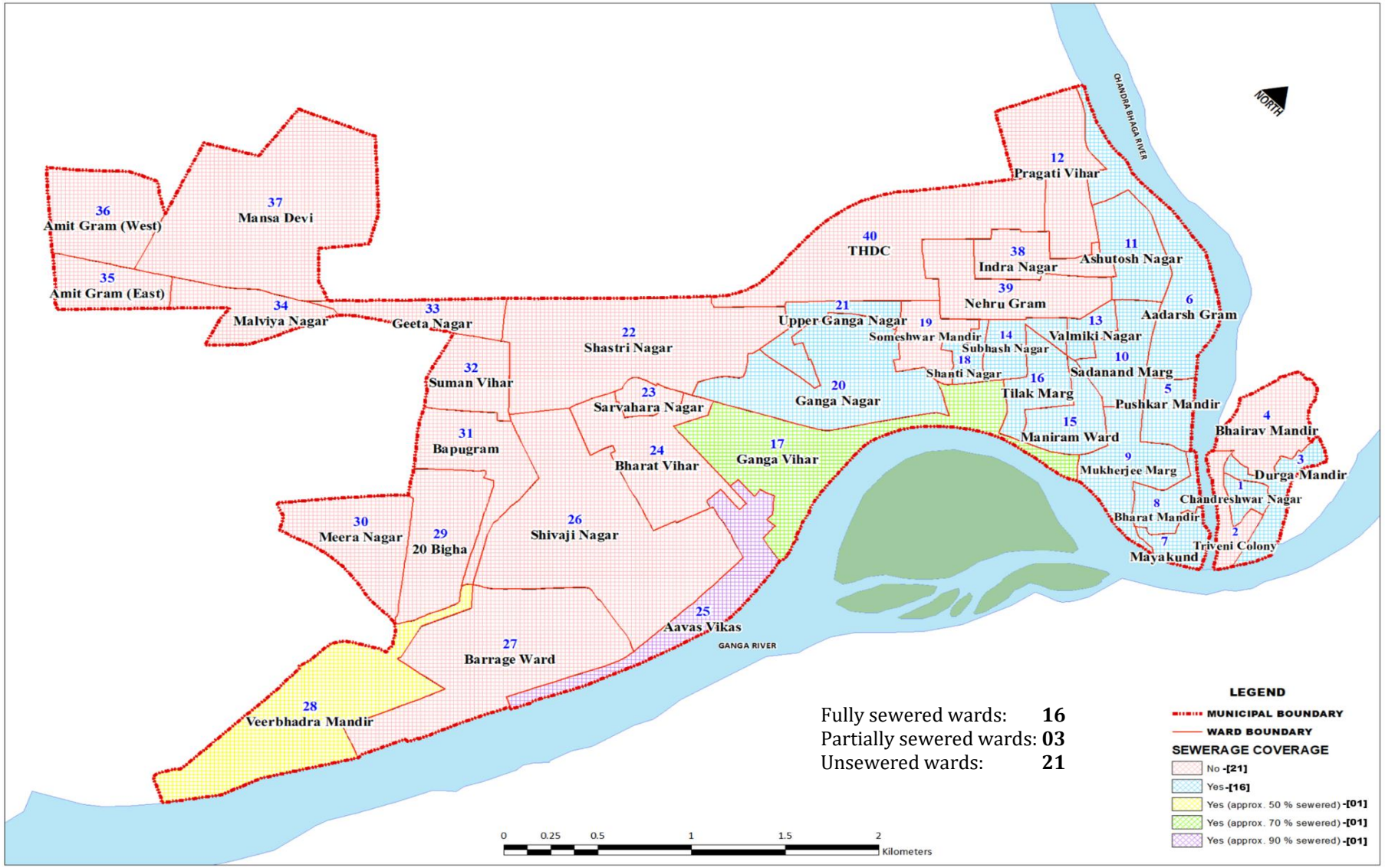
Map-xv. Locations of Community/Public toilets

Map-xvi. Locations of Sewage Treatment Plants of Rishikesh

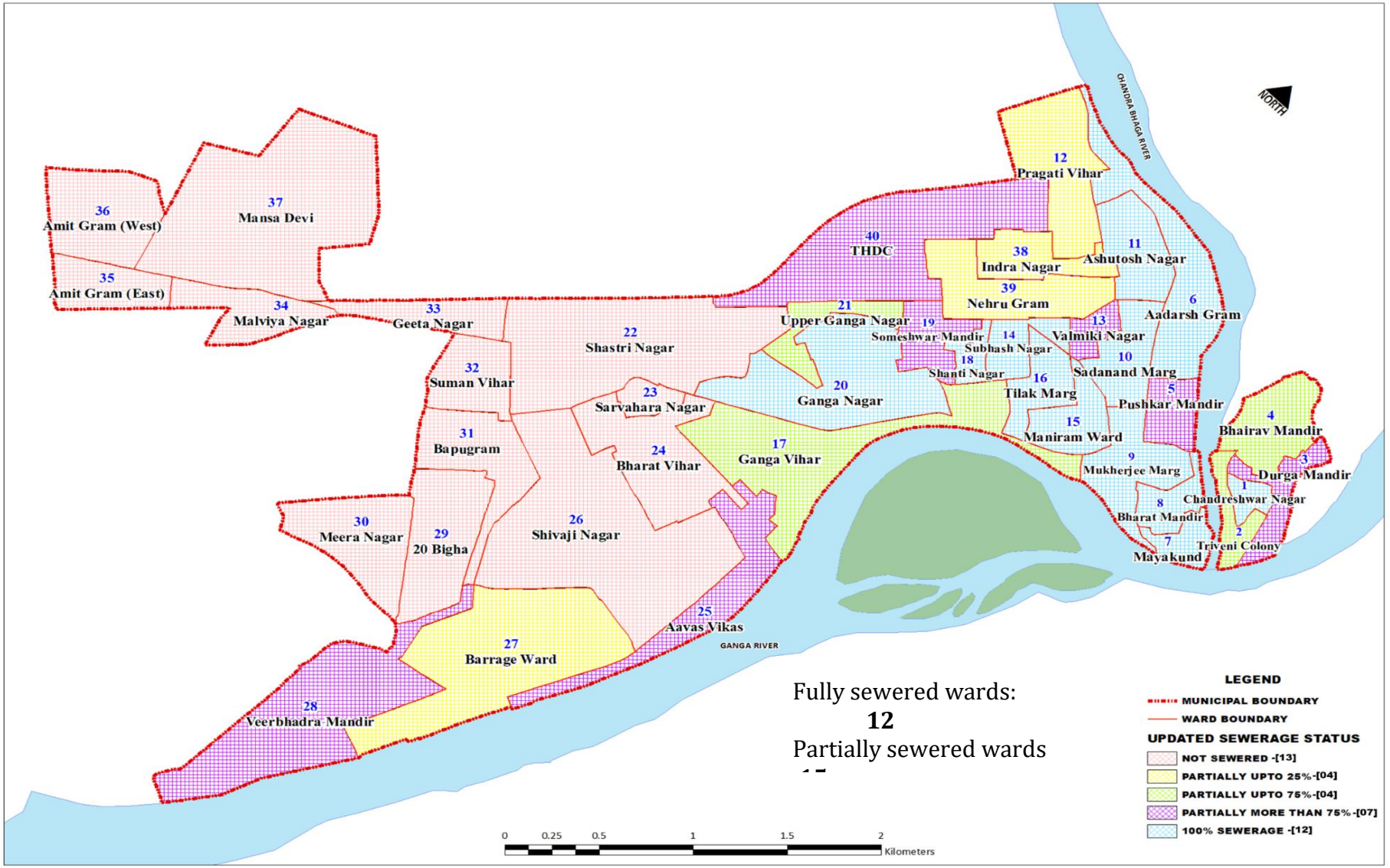
Map-xvii. Locations of Under-Construction Properties



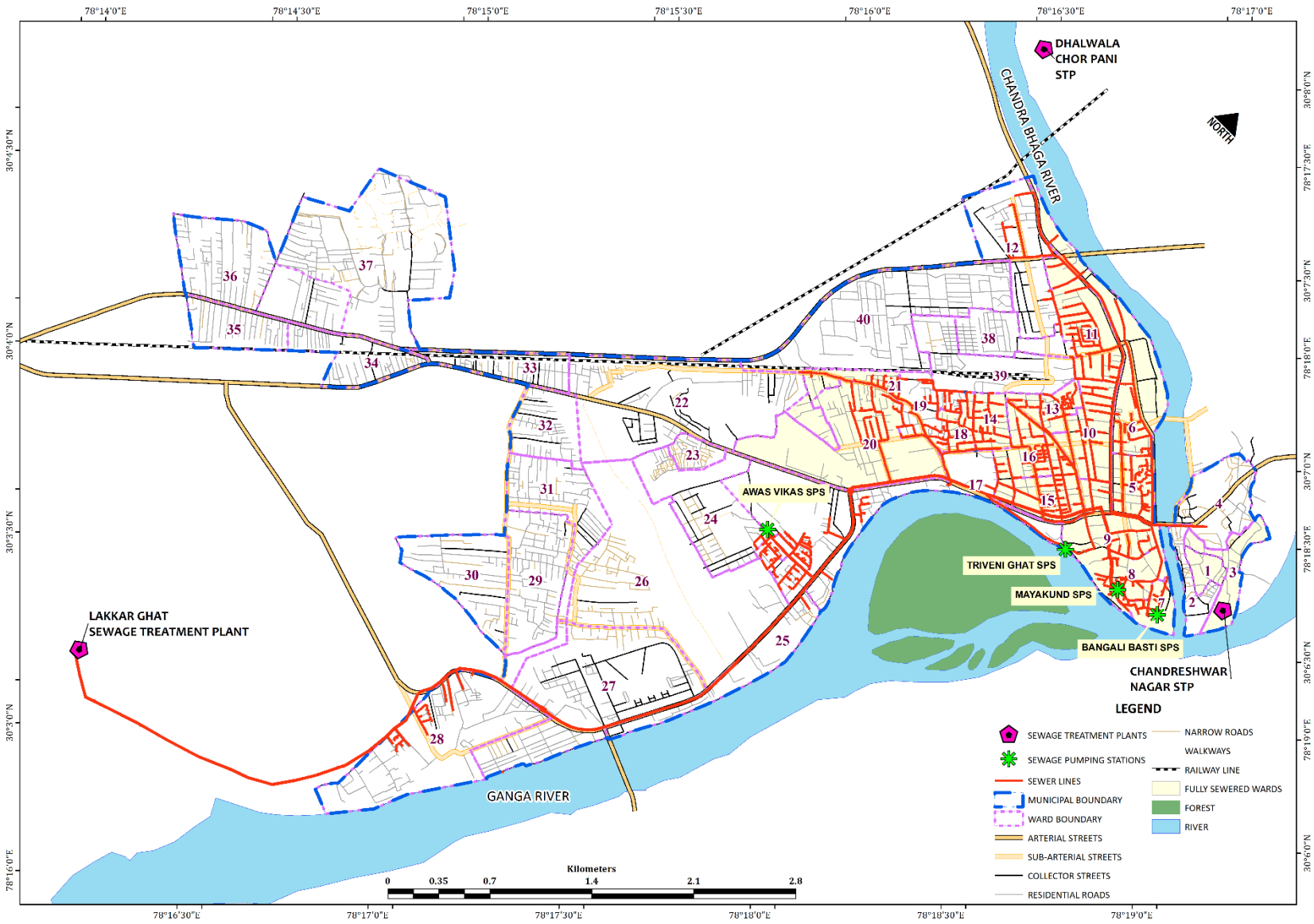
Map-i. Administrative Boundary of Rishikesh Nagar Nigam



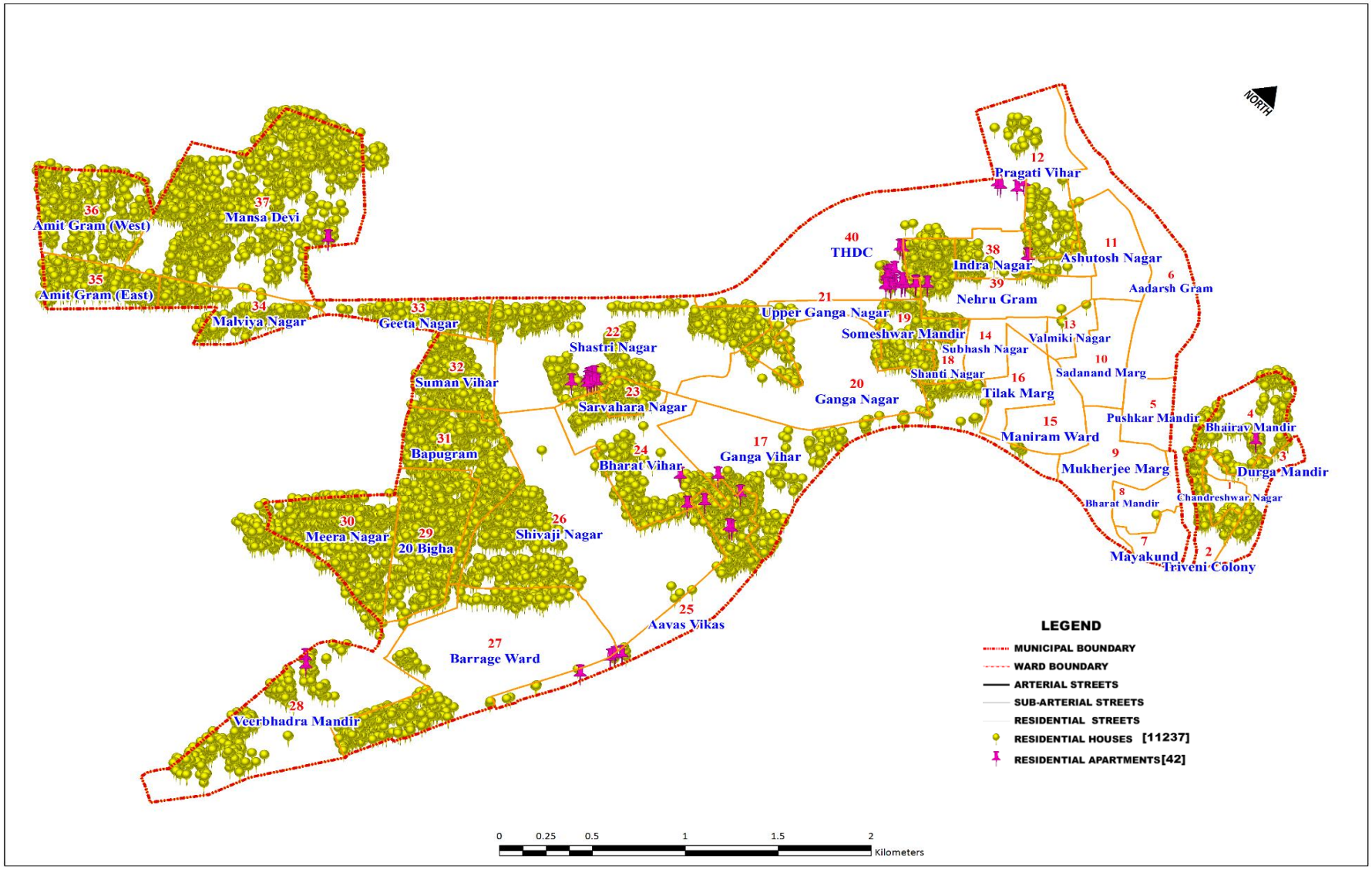
Map-ii. Rishikesh sewer coverage map (As per GIZ's SFD Report)



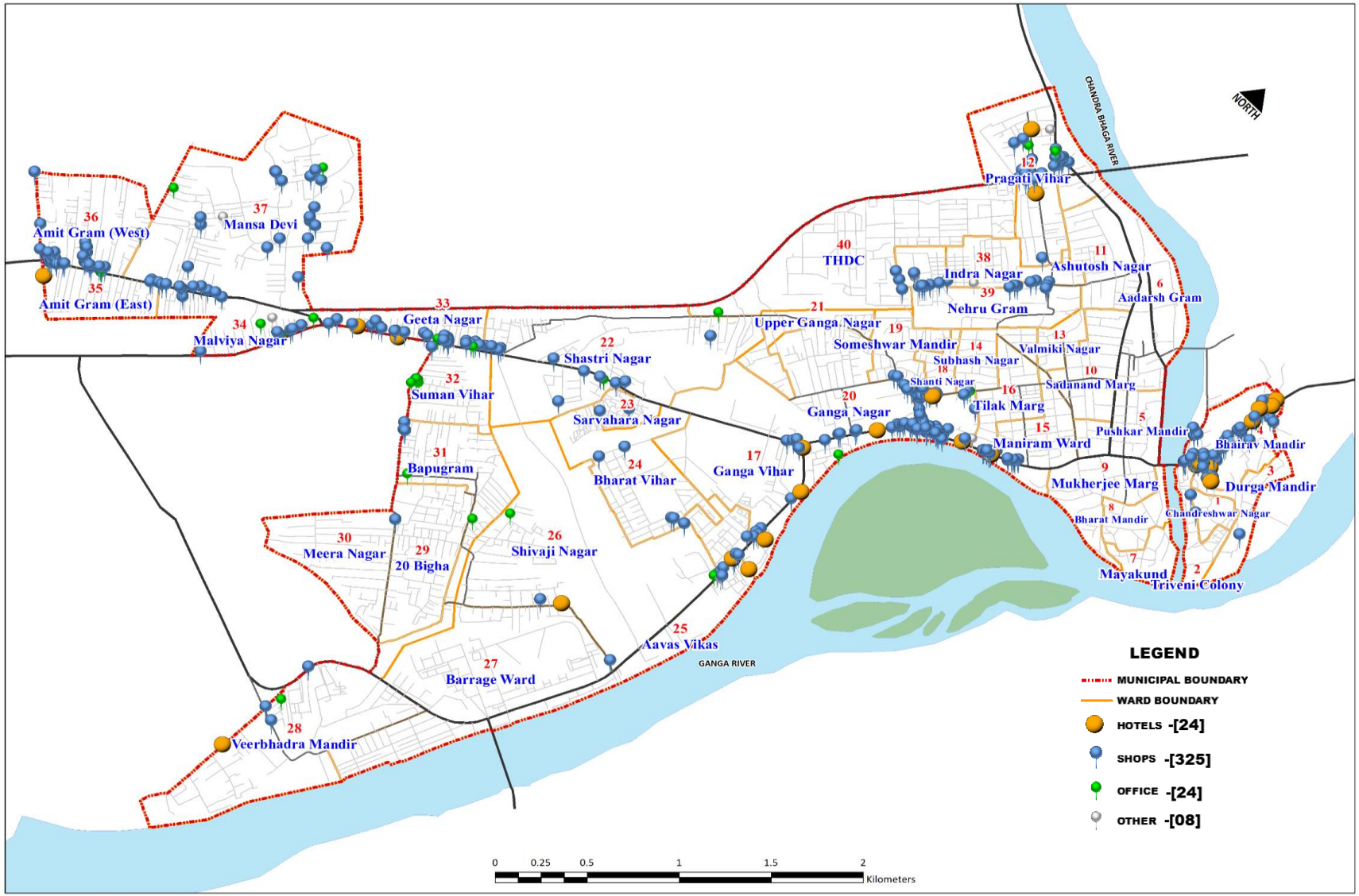
Map-iii. Rishikesh sewer coverage map (Updated as per AMS Survey)



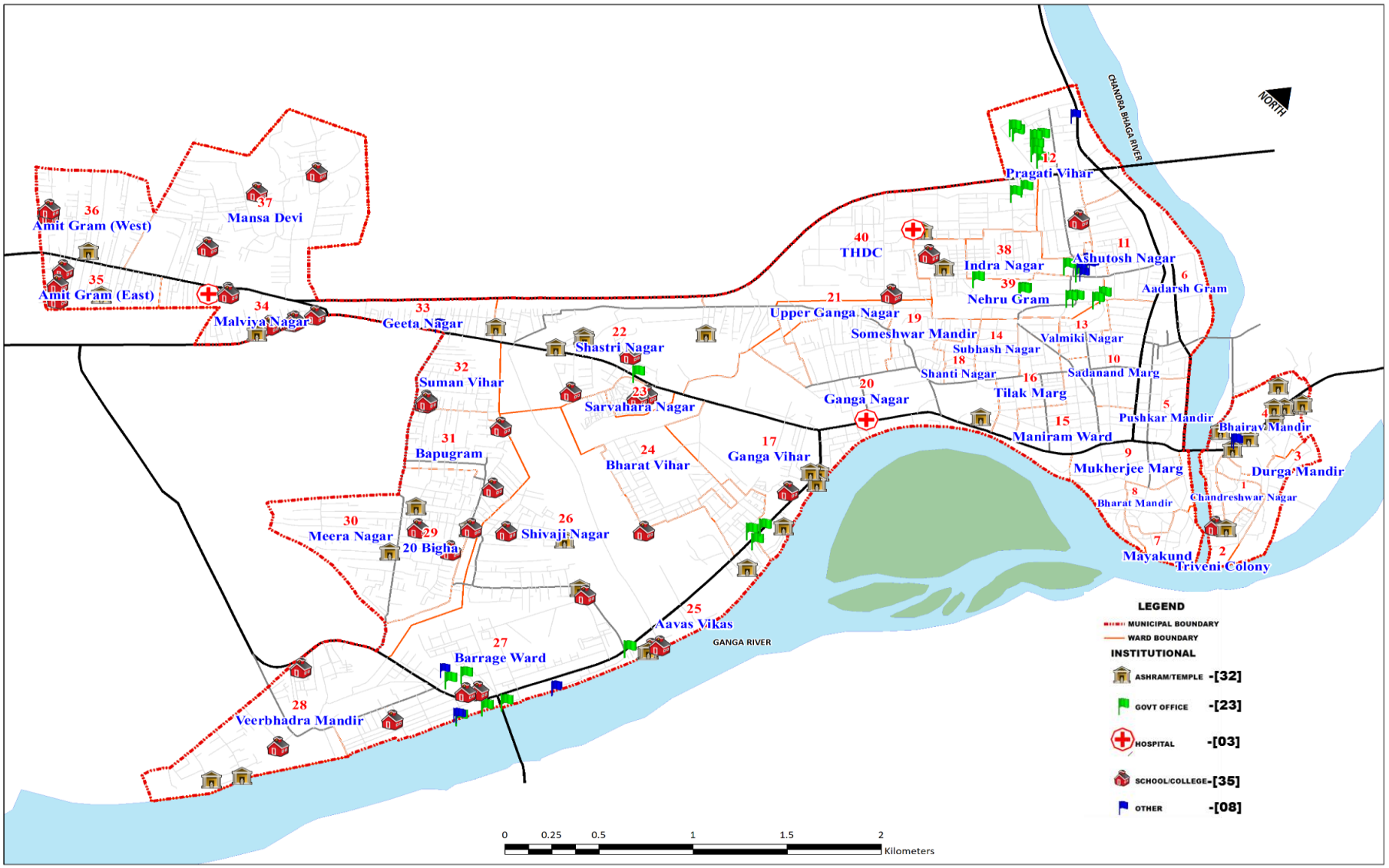
Map-iiiA Existing Sewer Network of Rishikesh Nagar Nigam (Source: JAL NIGAM)



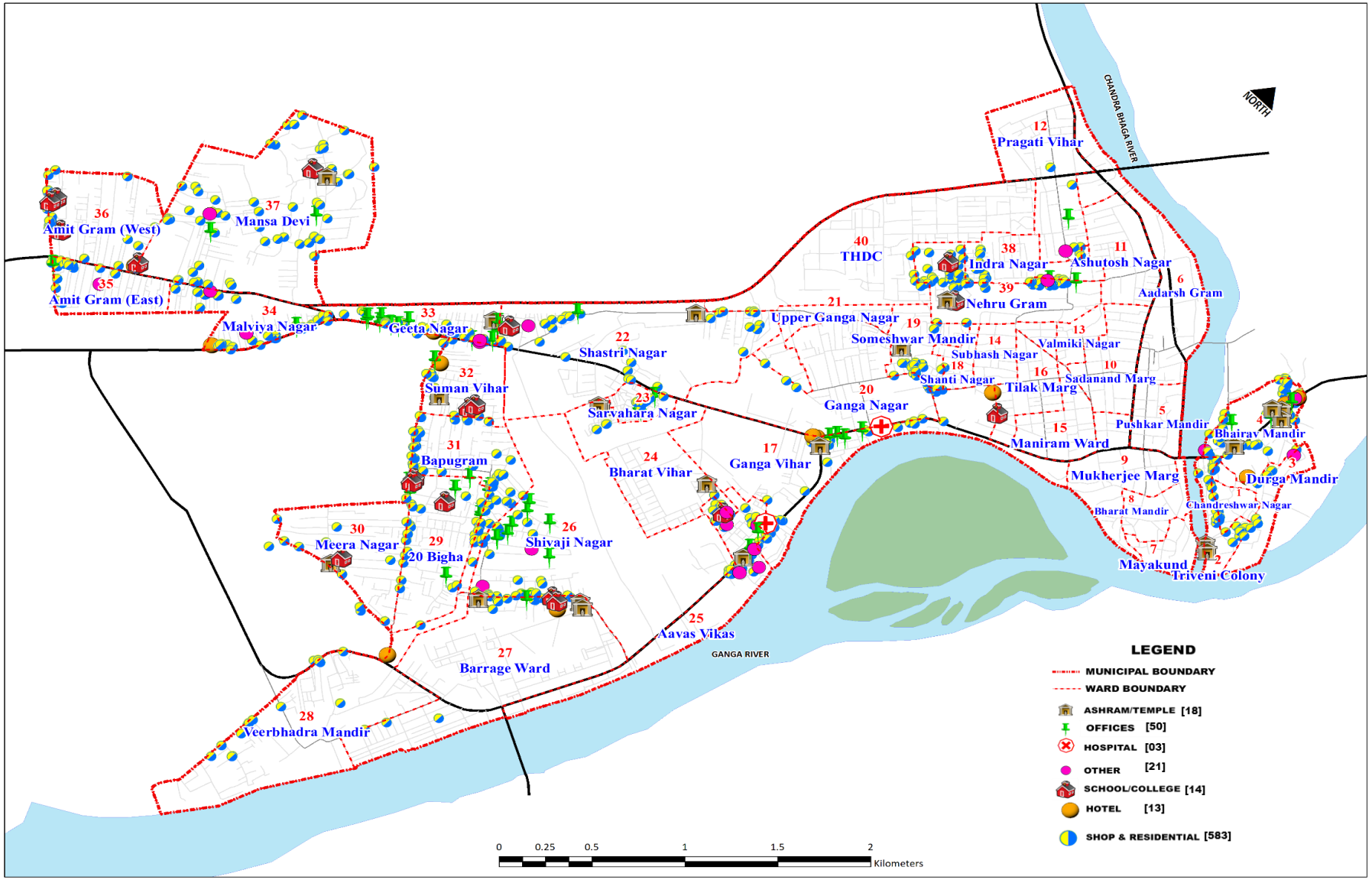
Map-iv. Residential Properties of Unsewered/ Partially Sewered wards



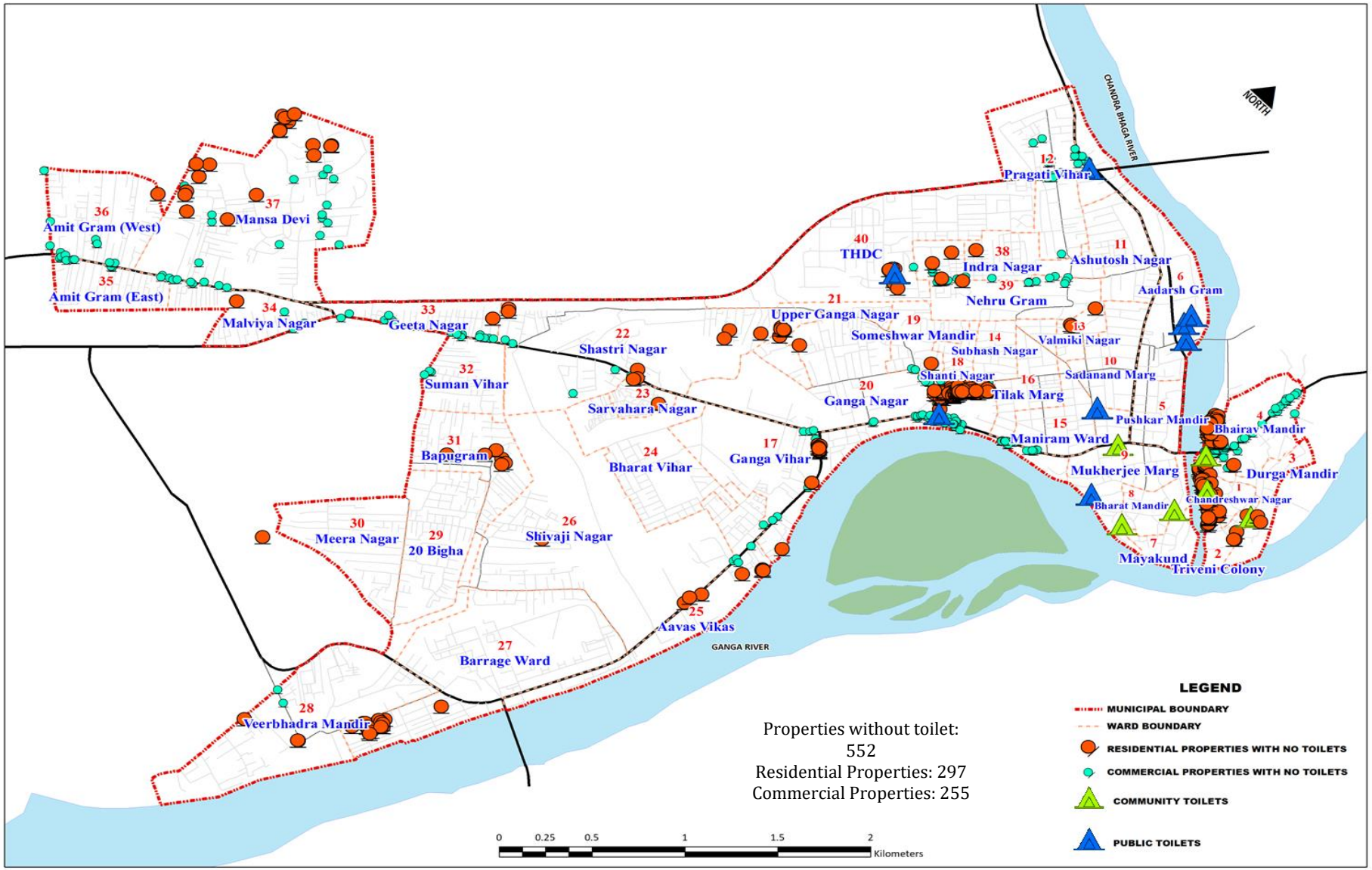
Map-v. Commercial Properties of Unsewered/ Partially sewered wards



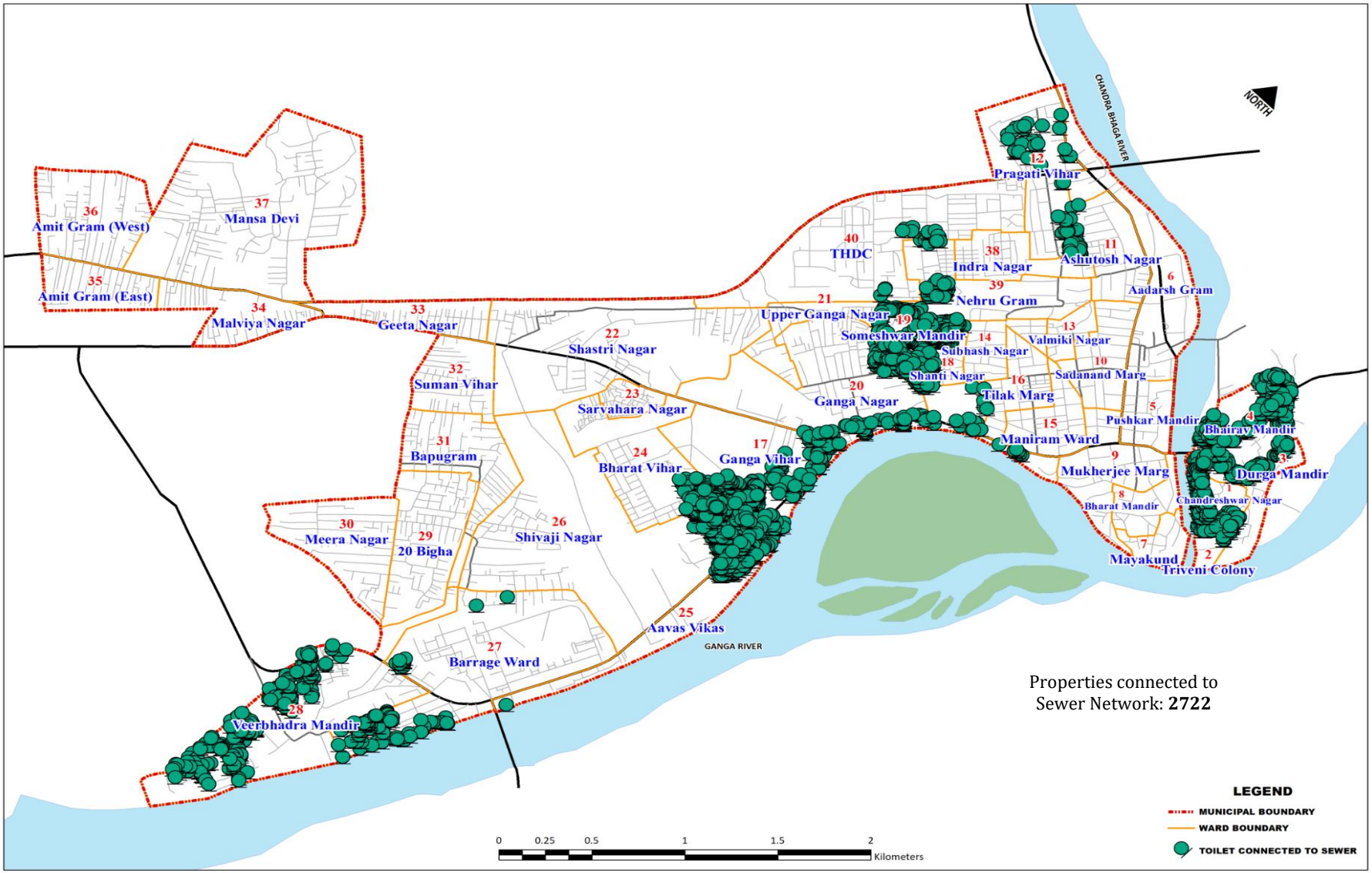
Map-vi. Institutional Properties of Unsewered/ Partially Sewered wards



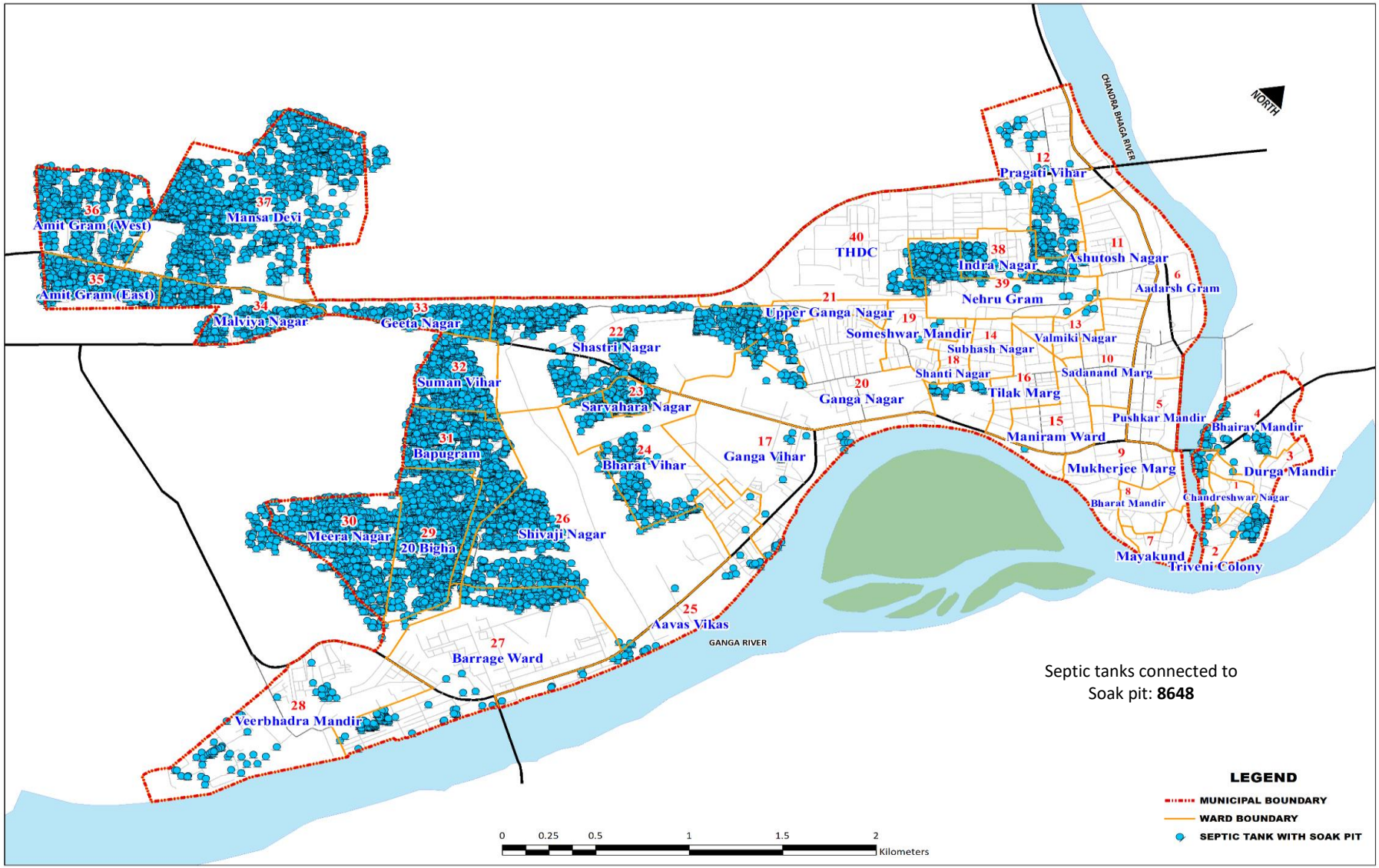
Map-vii. Mixed Land use Properties of Unsewered/Partially sewered wards



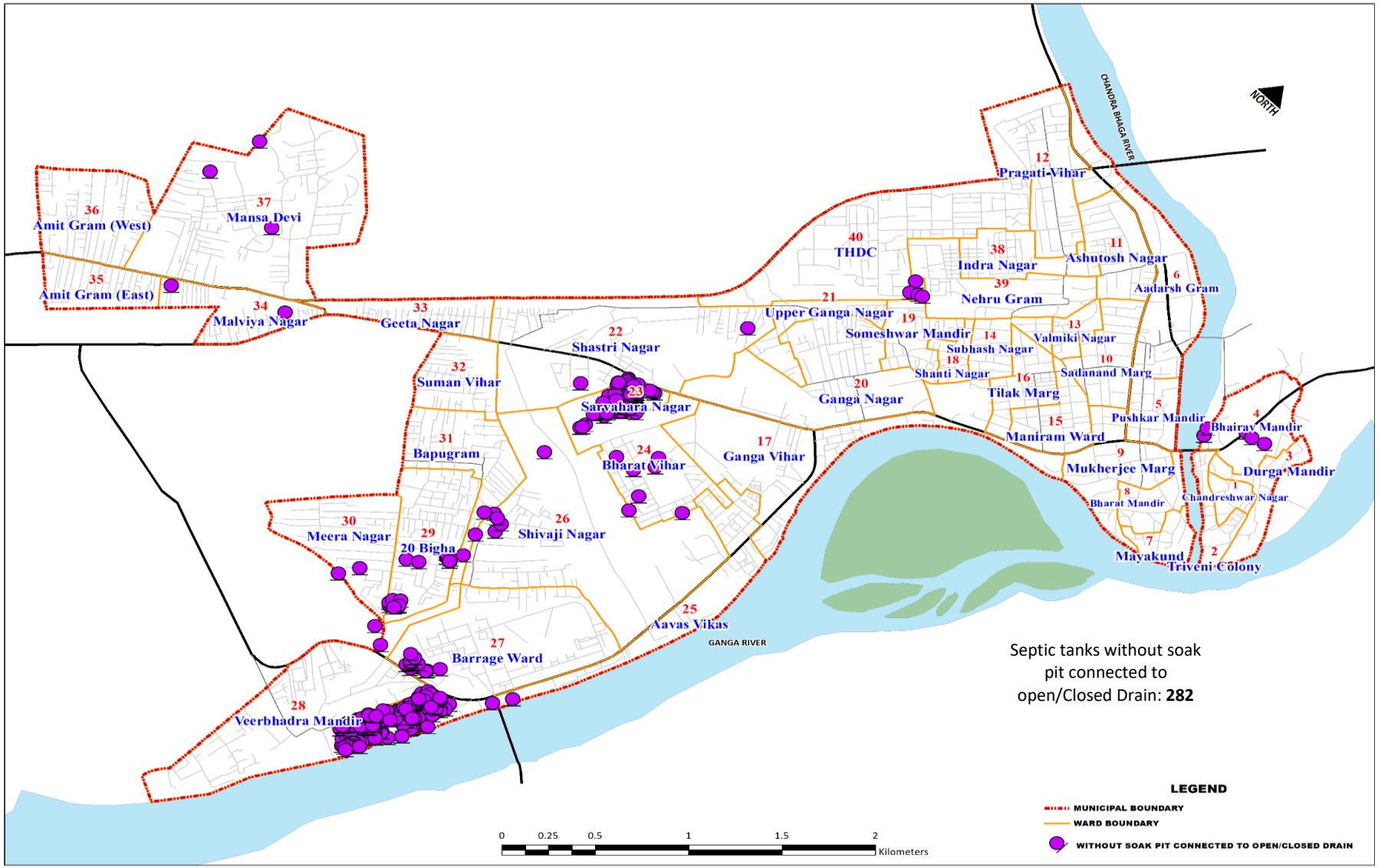
Map-viii. Properties without toilet



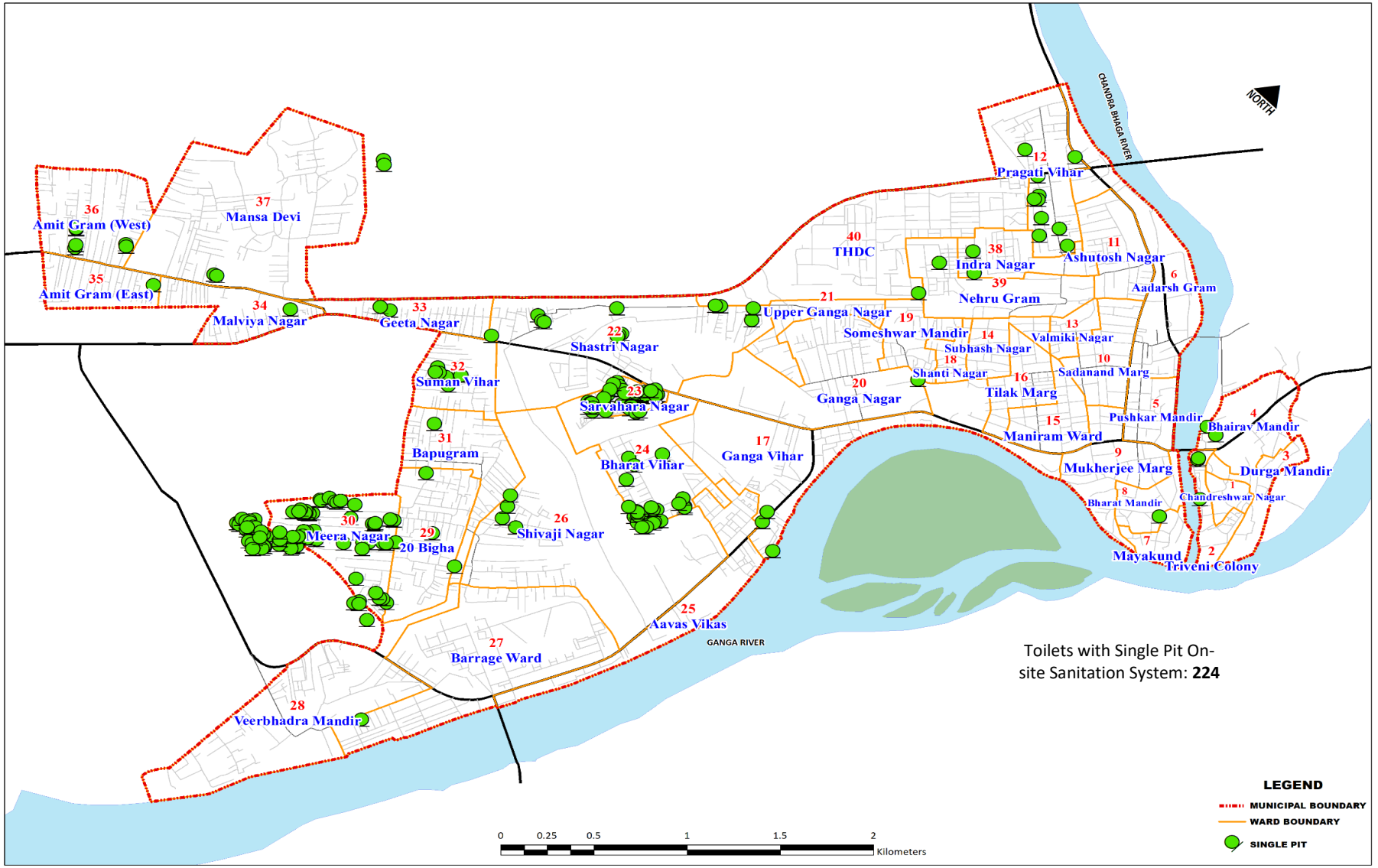
Map-ix. Properties connected to Sewer



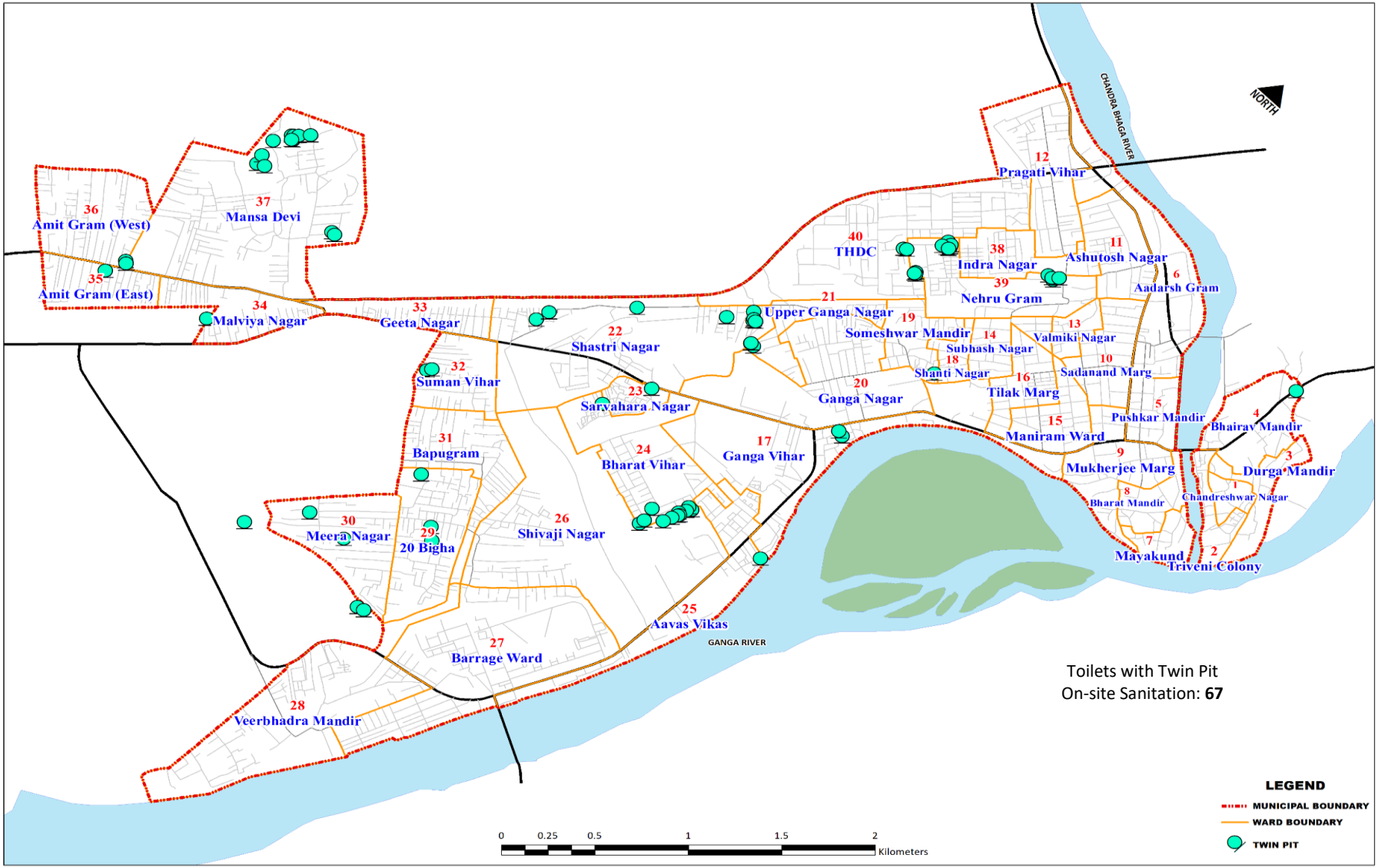
Map-x. Properties with Septic tanks connected to Soak pit



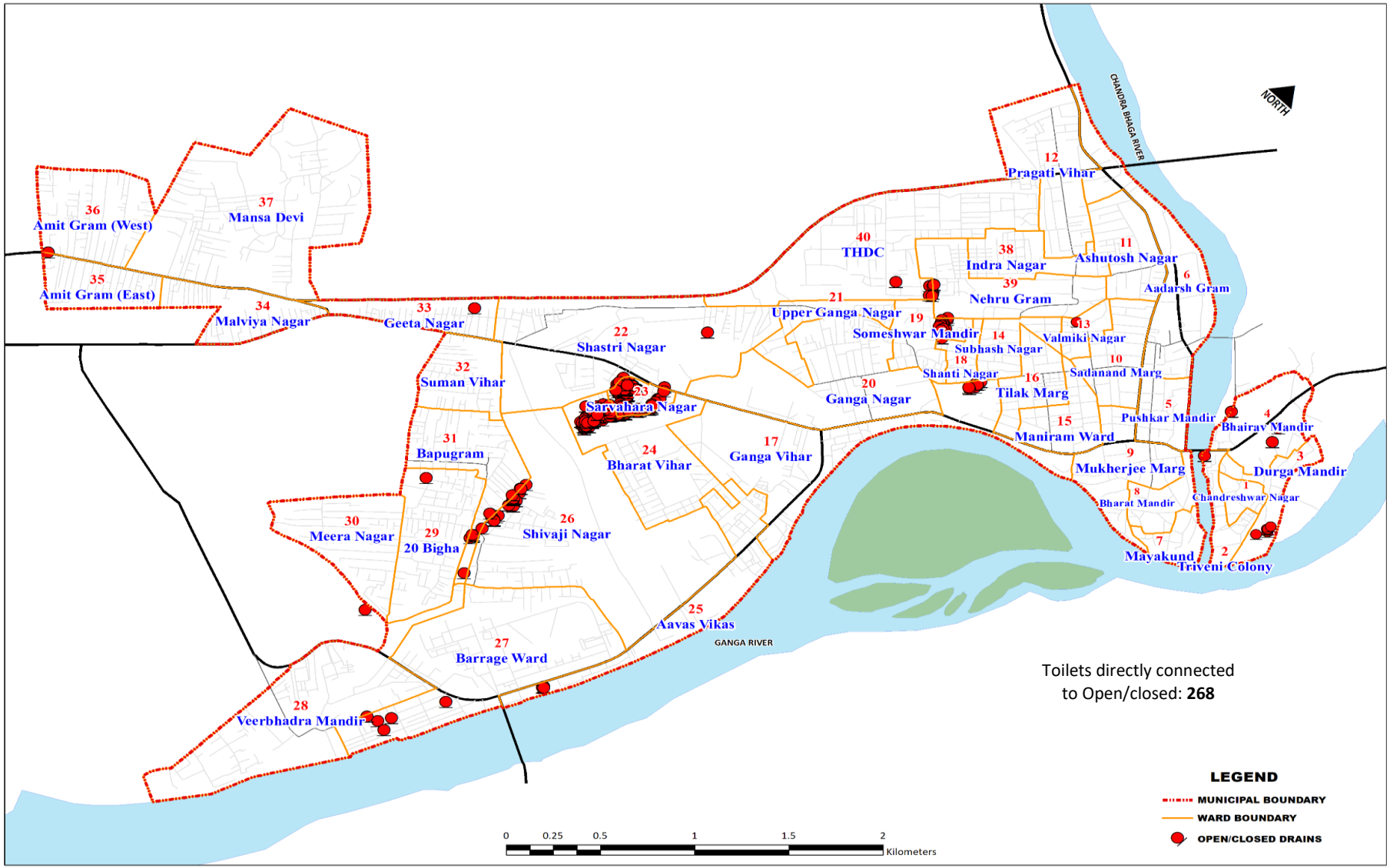
Map-xi. Properties with Septic tanks without soak pit connected to open/closed drain



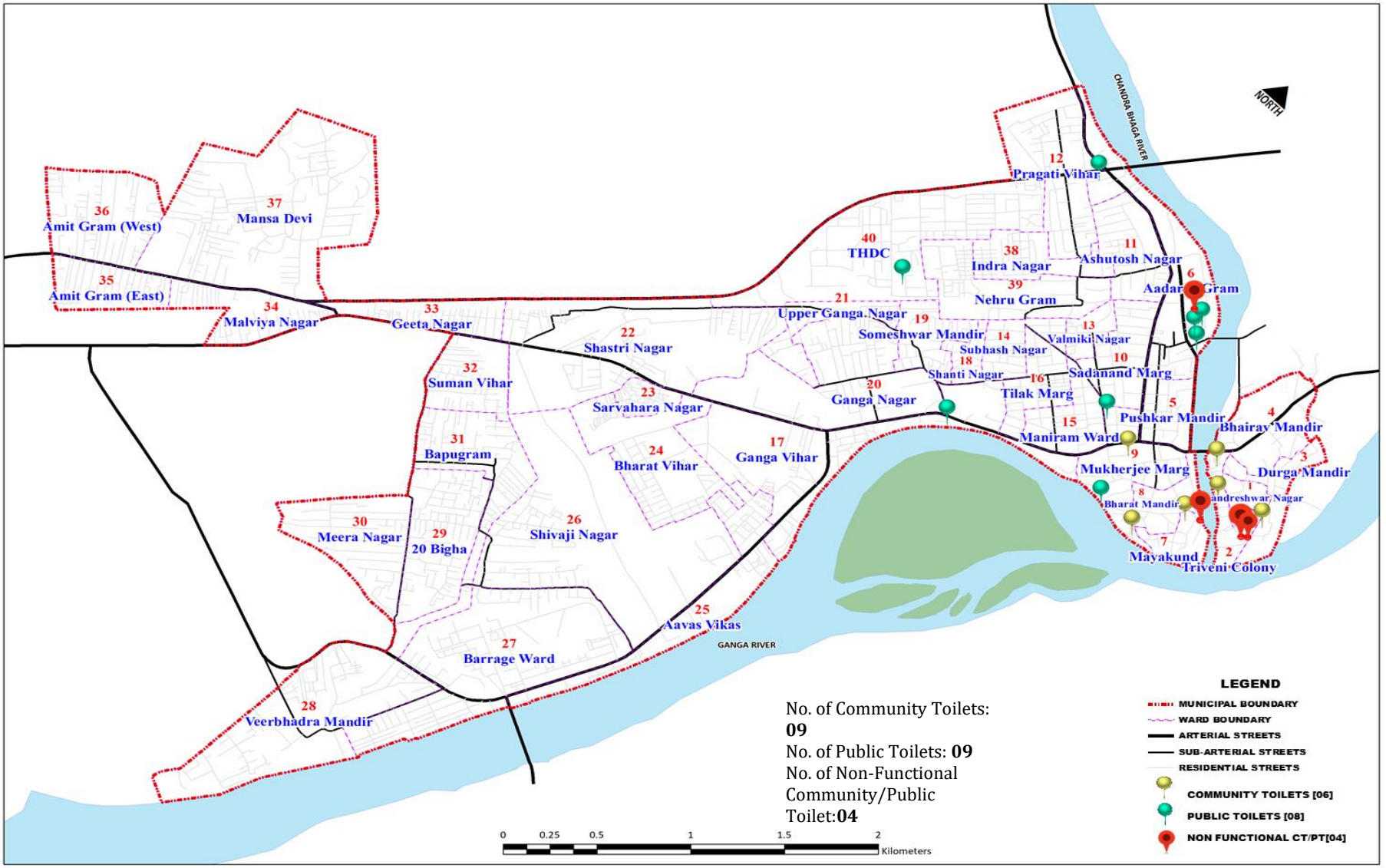
Map-xii. Properties connected to Single Pit



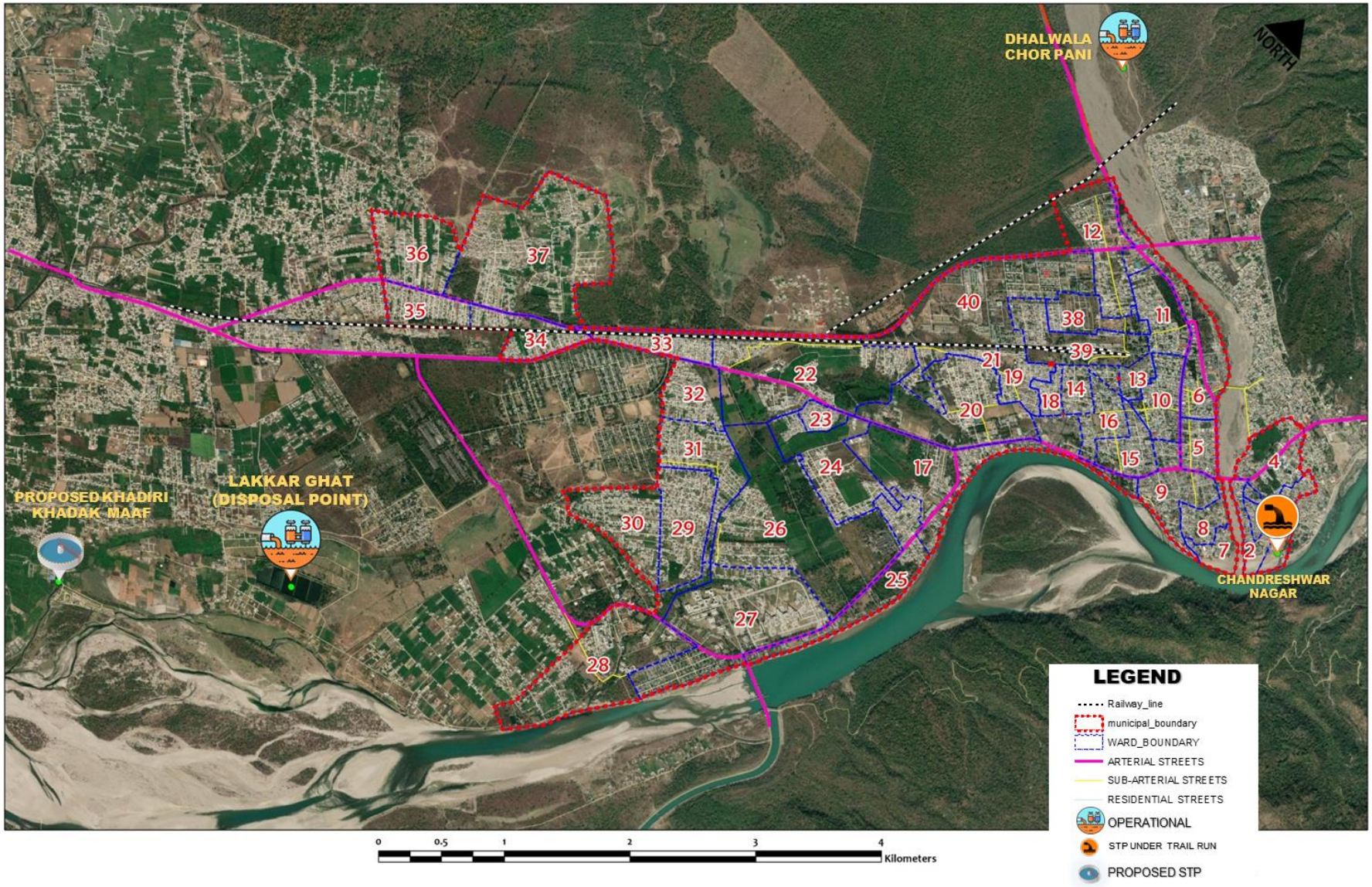
Map-xiii. Properties connected to Twin pits



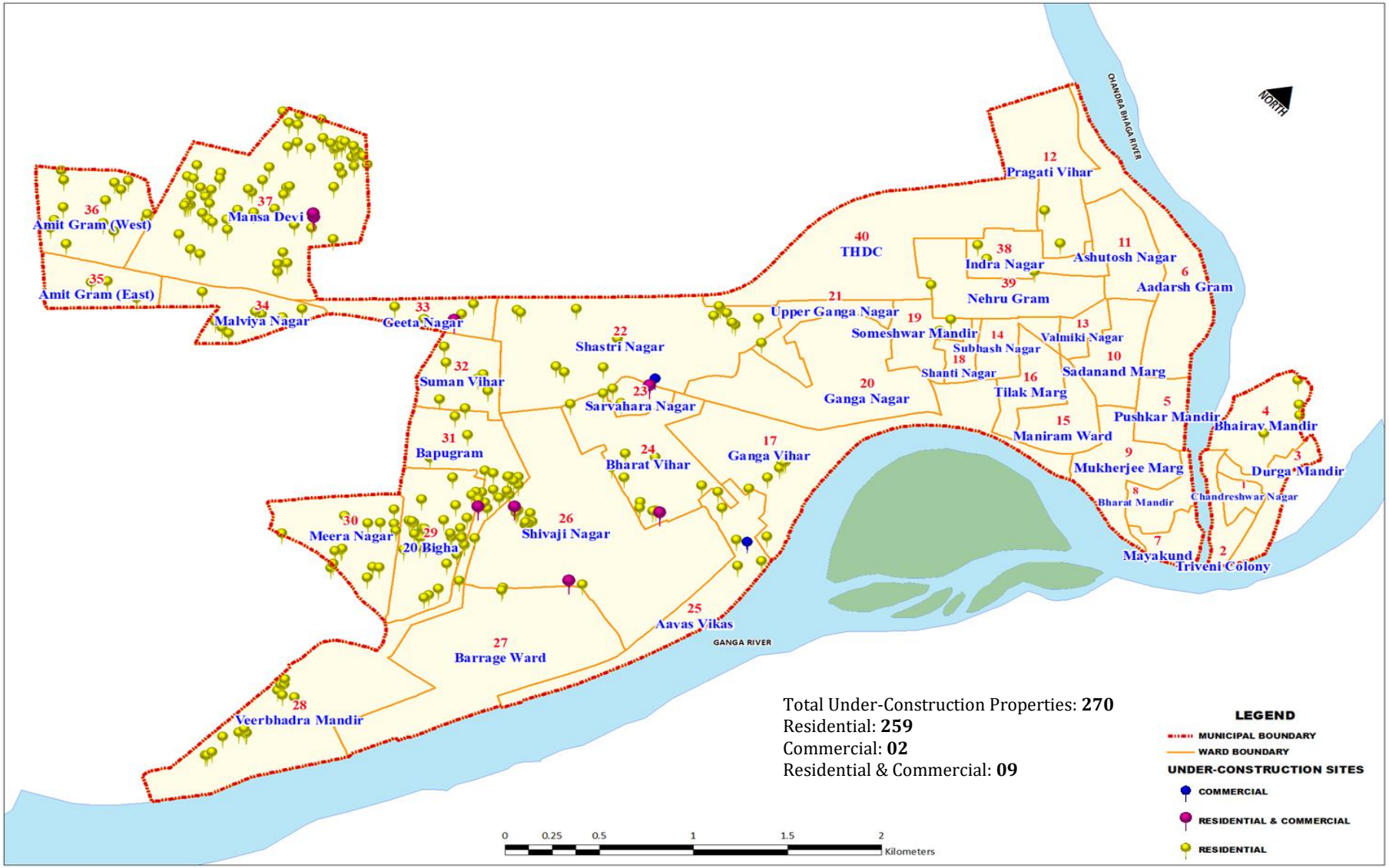
Map-xiv. Toilets directly connected to Open/closed



Map-xv. Locations of Community/Public toilets



Map-xvi. Locations of Sewage Treatment Plants of Rishikesh



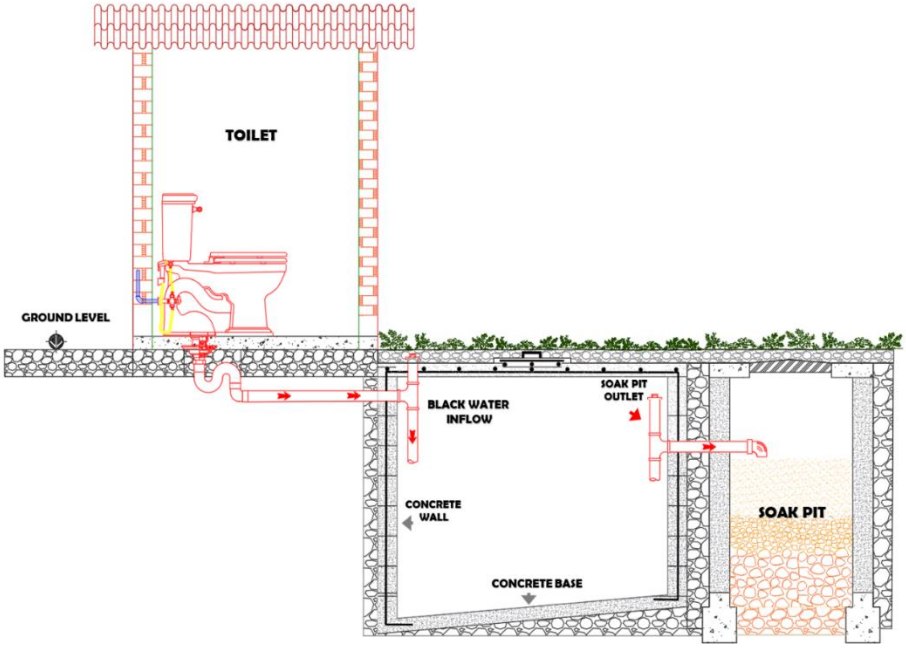
Map-xvii. Locations of Under-Construction Properties

Annexure 3 (i)- Figures

Figures

DESIGN OF TYPICAL ON-SITE SANITATION SYSTEMS IN RISHIKESH NAGAR NIGAM AREA

Figure-i. Septic Tank (*1-Chambered*) Connected to Ideal Soak Pit



Scenario: On-site sanitation system observed in affluent wards of Rishikesh in which rectangular lined or Circular pre-casted concrete pipe septic tanks/pits connected to Ideal soak pit padded with fine and coarse aggregates.

Figure-ii. Septic Tank (*1-Chambered*) with Partition Wall between Soak Pit (*Gravelled Base*)

Scenario: Alternate On-site sanitation system prevalent in most of the wards of Rishikesh in which rectangular lined or circular pre-casted concrete pipe septic tanks having a partition wall separating soak pit of a thin layer of gravel (kutcha) base.

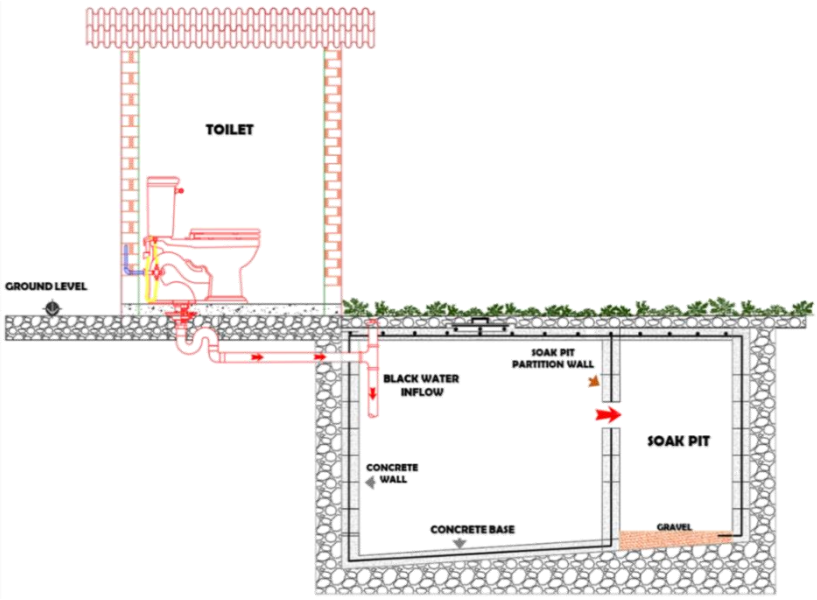
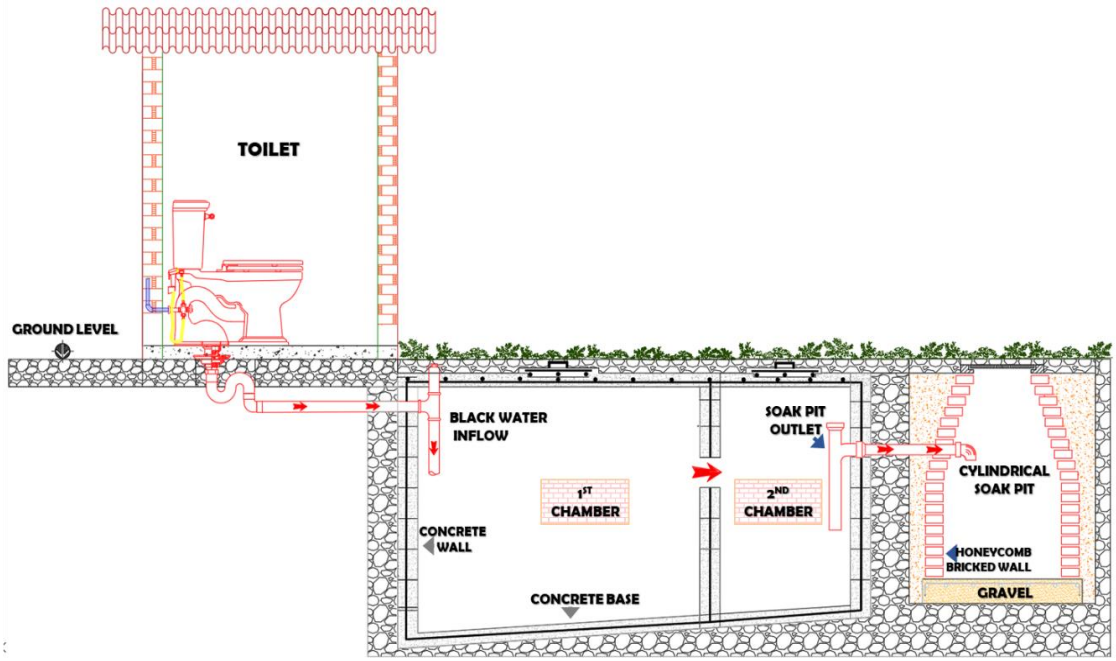
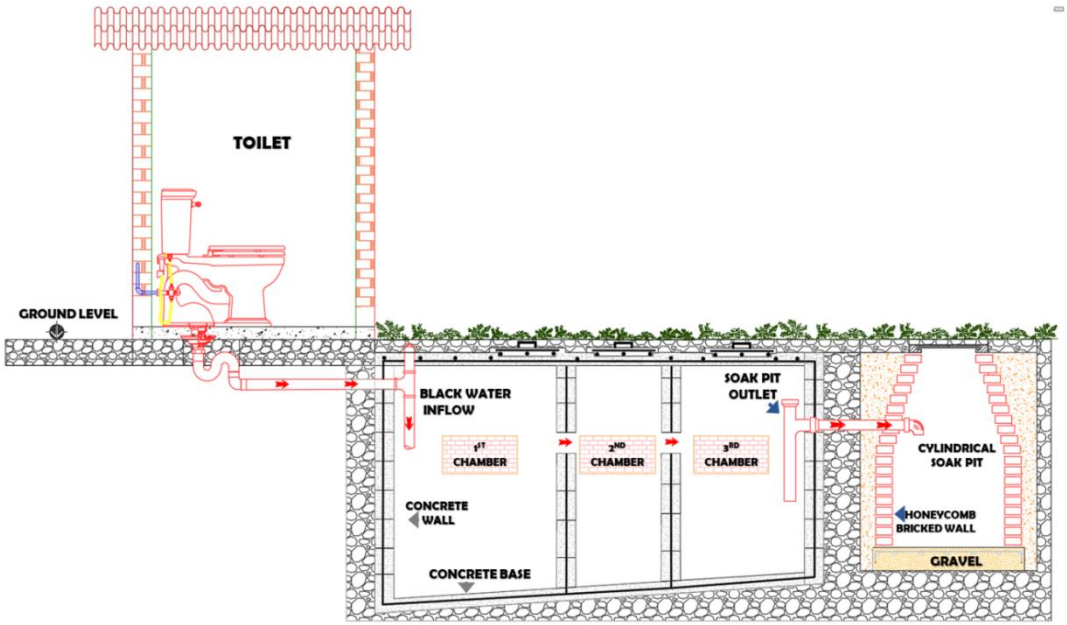


Figure-iii. Septic Tank (*2-Chambered*) Connected to Soak Pit (*Honeycombed Lining and Gravelled Base*)



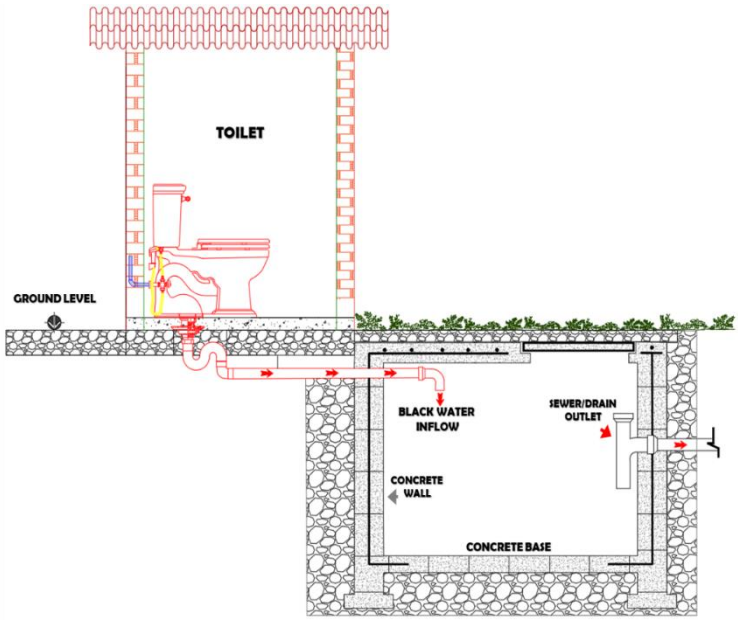
Scenario: On-site sanitation system with two chambered rectangular lined septic tank or double circular pre-casted concrete pipe septic tanks connected to a permeable honey comb wall structured cylindrical soak pit.

Figure-iv. Septic Tank (*3-Chambered*) Connected to Soak Pit (*Honeycombed Lining and Gravelled Base*)



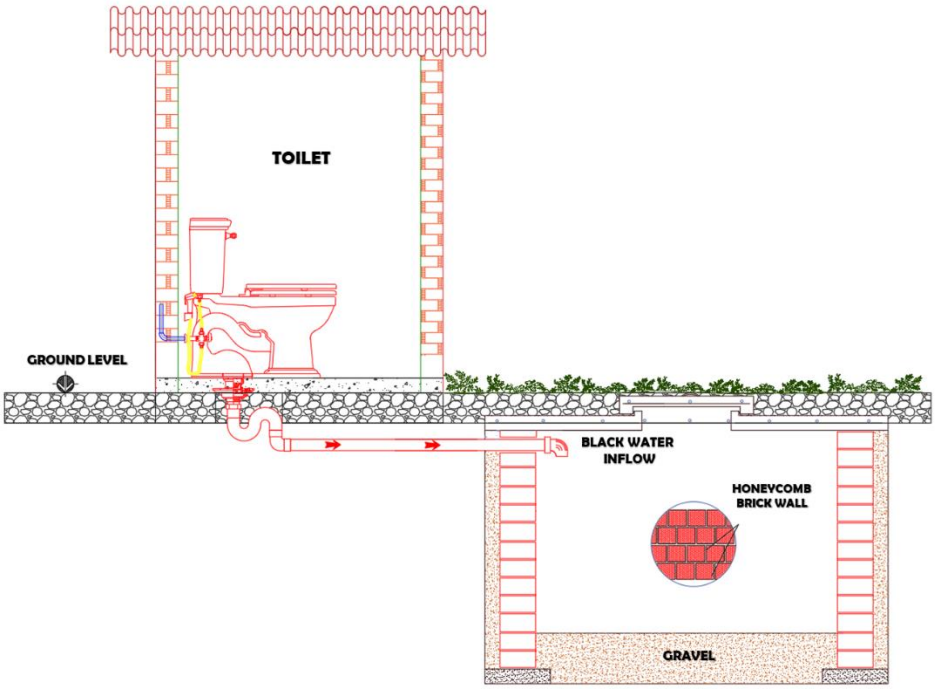
Scenario: On-site sanitation system barely observed in affluent wards of Rishikesh with three chamber rectangular lined septic tank connected to permeable honey comb bricked cylindrical soak pit.

Figure-v. Septic Tank Directly Connected to Sewer Network or Open/ Closed Drain



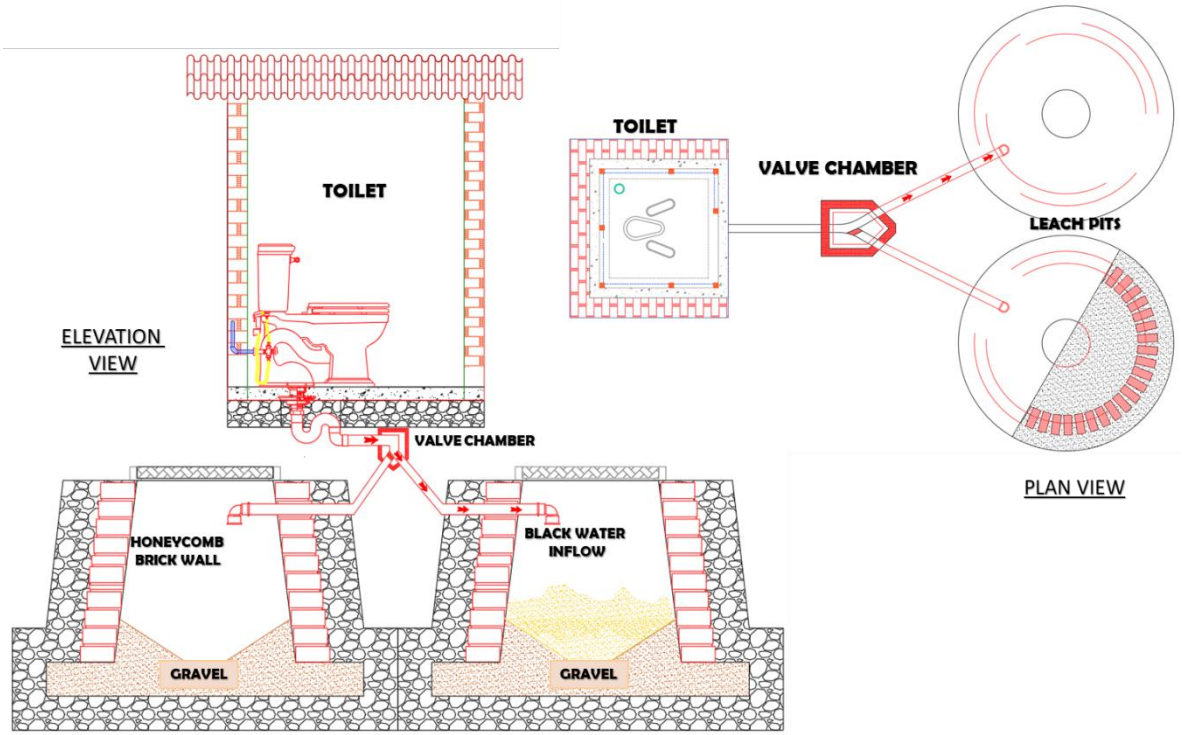
Scenario: On-site sanitation system generally observed in wards of Rishikesh in which Rectangular lined or circular pre-casted concrete pipe septic tanks/pits with a concrete base are connected to Underground Sewer lines, Open or closed storm water drains.

Figure-vi. Single Pit Onsite Sanitation System (Without Septic Tank)



Scenario: Rudimentary single pit on-site sanitation system with rectangular or circular shaped permeable honey comb bricked walls with a gravel base pits are observed in indigent wards & old settlements of Rishikesh.

Figure-vii. Twin Pit Onsite Sanitation System (Without Septic Tank)



Scenario: Twin pit on-site toilet system with two cylindrical shaped alternating pits with permeable honey comb bricked walls and gravel base connected to valve chamber of a pour-flush toilets can also been observed in few wards of Rishikesh Nagar Nigam.

Annexure 3 (ii)- Letter from UDD

E-mail/Speed Post/By hand

शहरी विकास निदेशालय, उत्तराखण्ड।

31/62 राजपुर रोड, देहरादून–248001
Email –sbmurbaninfo@gmail.com, दूरभाष एवं फैक्स– 0135–2742885

पत्रांकः–५०५० / 36/SBM/2016–17 देहरादून :दिनांकः– 07-12-19

सेवा में,

नगर आयुक्त,
नगर निगम, ऋषिकेश।

विषय :– **Regarding Household Sanitation Survey in Rishikesh for implementation of Septage Management Protocol.**

महोदय,

कृपया उपरोक्त विषयक नमामि गंगे के पत्र संख्या 806/एस0पी0एम0जी0/नमामि गंगे/ई0सी0 दिनांक 04–10–2019 तथा 823/एस0पी0एम0जी0/नमामि गंगे/एस0 सी0 दिनांक 11–10–2019, एक्जुक्यूटिव कमेटी तथा सुपरवाइजरी कमेटी की बैठक के कार्यवृत्त के प्रस्तर 2 का संदर्भ ग्रहण करने का कष्ट करें, **(संलग्न–1)**, जिसके द्वारा निर्णय लिया गया है कि ऋषिकेश नगर में Septage Management हेतु Household Sanitation Survey का कार्य GIZ-SGR के द्वारा कराया जाना है।

उक्त के सम्बन्ध में तकनीकी विशेषज्ञ GIZ-SGR के ई–मेल दिनांक 5 दिसम्बर, 2019 **(संलग्न–2)** के माध्यम से अवगत कराया गया है कि नगर निकाय अन्तर्गत जिन क्षेत्रों में घरों में सेप्टिक टैंक/पिट हैं, उन में सेप्टेज मैनेजमेंट प्रोटोकॉल के क्रियान्वयन हेतु Household Sanitation Survey का कार्य GIZ द्वारा Academy of Managment Services (AMS) एजेंसी के माध्यम से दिनांक 09 दिसम्बर, 2019 से प्रारम्भ किया जाना है।

अतः उक्तानुसार Septage Management Household Sanitation Survey हेतु सम्बन्धित एजेंसी Academy of Managment Services (AMS) को नगर निगम ऋषिकेश क्षेत्रान्तर्गत संदर्भित सर्वेक्षण हेतु आवश्यक सहयोग प्रदान करने कष्ट करें।

भवदीय,
07/12/19
(अशेक कुमार पाण्डेय)
अपर निदेशक।

संख्या एवं दिनांकः– तदैव।
प्रतिलिपिः– निम्नलिखित को सूचनार्थ एवं अवश्यक कार्यवाही हेतु प्रेषित।

1– सचिव, शहरी विकास विभाग, उत्तराखण्ड शासन।
2– कार्यक्रम निदेशक, एस0पी0एम0जी0 नमामि गंगे, देहरादून।
3– जिलाधिकारी जनपद देहरादून।
4– प्रबन्धक निदेशक, उत्तराखण्ड पेयजल निगम देहरादून तथा Septage Management Cell (SMC) के सदस्य को इस आशय से प्रेषित कि अपने विभाग के ऋषिकेश सिटी यूनिट को आवश्यक सहयोग हेतु निर्देशित करने का कष्ट करें।
5– महा प्रबन्धक, उत्तराखण्ड जल संस्थान देहरादून तथा Septage Management Cell (SMC) के सदस्यको इस आशय से प्रेषित कि अपने विभाग के सम्बन्धित सिटी यूनिट को आवश्यक सहयोग हेतु निर्देशित करने का कष्ट करें।
6– तकनीकी विशेषज्ञ GIZ-SGR देहरादून।

07/12/19
(अशेक कुमार पाण्डेय)
अपर निदेशक।

Annexure 3 (iii) Letter from Rishikesh Nagar Nigam regarding survey Dissemination meeting

कार्यालय–: नगर निगम ऋषिकेश।

पत्रांकः2178/11/ स्वा0अनु0/2020 दिनांकः– 20.02. 2020

सेवा में,

1. मुख्य चिकित्सा अधीक्षक,ऋषिकेश।
2. सी0ई0ओ0राज्य प्रदुषण नियंत्रण बोर्ड, देहरादून।
3. परियोजना प्रबन्धक पेयजल निगम ऋषिकेश।
4. अधिशासी अभियन्ता उत्तराखण्ड, जल संस्थान देहरादून।
5. श्री रजनीश सेठी डिस्लजिंग वाहन ऑपरेटर।

विषय– प्राटोकॉल फॉर मेनेजमेन्ट के अनुपालन में आहुत बैठक के सम्बन्ध में।

महोदय,

उपरोक्त विषकय के क्रम में आपको अवगत कराना है कि मिराज अहमद जी0आई0जेड0 सेल एस0जी0आर0 के पत्र दिनांक 20.02.2020 के द्वारा अवगत कराया गया है, कि सैप्टेज प्रोटोकॉल मेंनेजमेंन्ट के कियावन्यन हेतु हाउस होल्ड का कार्य जी0आई0जेड0 के समन्वय से (ए0एम0एस0) ऐजेन्सी के माध्यम से जो सर्वे किया गया है, जिसका प्रस्तुति करण (ए0एम0एस0) द्वारा किया जाना है। इस क्रम में नगर आयुक्त महोदय की अध्यक्षता में दिनांक 22.02.2020 को बैठक आहुत की गई है।

अतः आप से अनुरोध है कि अपने विभाग से नामित सदस्यों को दिनांक 22.02.2020 को प्रातः 11:00 बजे बैठक में प्रतिभाग करने हेतु आदेशित करने का कष्ट करें।

सहायक नगर आयुक्त,
नगर निगम ऋषिकेश।

प्रतिलिपि– निम्न को सूचनार्थ।

1. निदेशक शहरी विकास निदेशालय उत्तराखण्ड।
2. नगर आयुक्त महोदय नगर निगम ऋषिकेश।
3. श्री मिराज अहमद तकनीकि विशेषज्ञ जी0आई0जेड0सेल उत्तराखण्ड।

सहायक नगर आयुक्त,
नगर निगम ऋषिकेश।

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Sitz der Gesellschaft
Bonn und Eschborn

Friedrich-Ebert-Allee 36 + 40
53113 Bonn, Deutschland
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