WARD SANITATION PLANS
for
Trilokpuri and Vishwas Nagar
Delhi

Learn from both the sky view of data and the ground view of reality. Don’t talk just to the powerful. And stay awhile.
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WaterAid

CENTRE FOR URBAN AND REGIONAL EXCELLENCE
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1. Introduction and Background

1.1 Background

Access to sanitation, together with toilets, is a basic human right and an essential component of a dignified living environment. Poor and marginalized communities who live in slum areas, especially women and children, are worst affected by the lack of access to sanitation services which includes toilets, sewerage, drains and solid waste disposal. Creating inclusive and equitable sanitation infrastructure and services is one of the most pervasive challenges facing urban India today. In 2008, the Government of India launched a National Urban Sanitation Policy (NUSP) encouraging cities to prepare City Sanitation Plans to create cleaner cities. The problem is a lack of base line information in order to not only conceive the problems but to intervene in a way that is sustainable which is why this report emphasizes localized information and planning in two wards. Sanitation is a key driver for positive development and so underpins the proposed interventions. The following section will outline the responsible agencies.

1.2 Delhi

Delhi, the National Capital Territory of India, had 835 slum settlements with an estimated population of more than 2 million (CUREs Community Based Information System – CBIS, 2011). DUSIB’s parallel count found 685 slums in the city. These settlements are characterized by a lack of sanitation services: toilets, sewerage, drainage and solid waste disposal.

1.3 East Delhi Municipal Corporation: Localizing the NUSP

The East Delhi Municipal Corporation (EDMC) is one of three local bodies in Delhi responsible for the provisioning of and management of infrastructure services in the east Delhi area; in particular the management of solid waste, surface drainage and community and public toilet facilities. This project is aimed at supporting the EDMC in localizing the NSUP to the ward level to enable more effective implementation of sanitation solutions in partnership with communities in Ward 211 (Trilokpuri) and 226 (Vishwas Nagar).

1.4 Delhi Urban Shelter Improvement Board (DUSIB)

The Delhi Urban Shelter Improvement Board has been set up by the Government of NCT of Delhi under the DUSIB Act, 2010 to address the issues of slums in a sustainable and inclusive manner. DUSIB is responsible for implementing the Rajiv AvasYojna (RAY) in Delhi, in particular preparing a citywide plan for slum development and the provisioning of basic urban services and housing in these communities.

1.5 Water Aid

WaterAid India is a donor organization that aims to improve access of poor people to appropriate and adequate sanitation services to sustainably improve their health and quality of life. In Delhi it is implementing the “Swachh Delhi Swastha Delhi” (SDSD) project with the objective of improving access of sanitation services in the city’s slums to increase availability, access and utilization of sanitation services, especially toilets. WAID works with partner organizations to implement the project in Delhi’s slums.
1.6 The Centre for Urban and Regional Excellence (CURE)

CURE is a development NGO with a vision to create an enabling environment for pro-poor urban and social policy development and advocacy through inclusive planning and governance processes, community government and private sector partnerships, institutional capacity building and reform. Its poverty alleviation agenda is pursued by way of grass root intervention projects, policy/evaluation research, technical capacity building and setting up of community based information systems. Its areas of work cut across all sectors of development including urban livelihoods, access to basic services of water supply and sanitation, housing, education, health and nutrition. It works at all levels of government national, state and local has created sustainable partnerships with state government agencies, donors and NGOs.

In association with EDMC and DUSIB, CURE has worked with the slum communities in the two selected wards of East Delhi, Ward 211 and Ward 226 with the objective of mobilizing and organized local groups, with a particular emphasis on women, for improved sanitation including the operation and maintenance of CTCs and other initiatives to improve the quality of life in their settlements. The major objective of the work was to prepare a ward level sanitation plan by identifying key problems and solutions, which can be implemented by EDMC.

Based on its work with the communities and information generated at the ward area level, CURE has prepared Ward(s) Sanitation Plans for the use of EDMC. Some of these are now in implementation stage.

1.7 Location Plan in Relation to wider Delhi context

The following map shows the location of the two new wards to be studied in relation to Delhi. A more detailed description of the sites will follow in ‘section 5’ which outlines both ward characteristics.
2. Ground Check: Predominant Issues

The issue of effective and inclusive development cannot be tackled in isolation and as such this report employs a holistic approach to sanitation looking at its entire value chain. A ground check informed by household surveys provides a summary of the predominant issues. 305 Households in the slum pockets were surveyed in Vishwas Nagar and 124 in Trilokpuri (see Appendix B for the full survey).

2.1 Sanitation and Toilets

In Vishwas Nagar, 25% of the 305 households have private toilets while in Trilokpuri it is 67.8% out of 124 households. Presently, the coverage of the sewer network remains inadequate. In Vishwas Nagar, out of the 77 households that have private toilets 65%; and in Trilokpuri, out of the 83 households that have private toilets 76% are connected to a septic tank which requires to be emptied. Only 2% of the private toilets are connected to formal municipal sewer lines.

Community Toilet Complexes (CTCs) have a lot of problems with reported complaints as inadequate water availability, dirty environment, overflowing tanks and that the CTCs are generally unsafe environments where women are especially subject to abuse. As a result open defecation is prevalent - 18% of the population of Vishwas Nagar defecates in the open while in Trilokpuri, it is 20%.

Sanitation can be loosely separated into (1) the individual or in-house provision of a toilet and its subsequent method for dealing with effluent and (2) community toilet complexes (including mobile toilet complexes). This plan focuses on both conditions affecting the urban poor who are not serviced by municipal sewerage. Sanitation services provided in these wards by DUSIB have largely been in the nature of large Community Toilet Complexes (CTCs), which are the default sanitation strategy for the urban poor. 33% of Vishwas Nagar households face problems at the CTC mainly because of abuse and fighting and anti-social activities at the CTC. In Trilokpuri, 44% of the households do not find the environment at the CTC adequate.

The problem with CTC’s are generally associated with a mixture of problems:

- They are smelly and dirty such that people prefer open defecation.
- Because of the number of available latrines (often 10 catering for 500 people at rush hour) people prefer to defecate in the open rather than wait in queue even if this means walking long distances.
- Most CTCs charge for use and residents have other spending priorities (open defecation is free).
- The temporary lifestyle of some slums and general lack of ownership encourages misuse of CTCs.
- Successful CTCs are usually owned by a small collection of families or communities with Community Based Organizations (CBO) who ensure that the complex is not misused.
- However communities are often fragmented along physical, social, cultural and economic lines which make the running of CBOs difficult.
- There are many social and cultural taboos surrounding the issue of sanitation in particular for women leaving them often open to abuse.
- There is a correlation between access to water adequate drainage and the cleanliness of community toilets.

As such the problem with CTC’s is not just about plumbing but a social problem. And a meaningful intervention requires the full participation of the users.
2.2 Drains

As a result of a deficient sanitation system a significant share of raw black wastewater is directly discharged into surface drains and naalas. All of the slums in both wards have no formal drainage with raw sewage running in open drains – these drains badly managed often blocked with trash and stagnant water. The flow is often not directed to an outfall and subject to frequent flooding and the spread of disease.

In principle there are three types of settlements and subsequent drains in both wards which are all interlinked.

**Bastis, Slums or JJs:**
These have no ‘pucca’ infrastructure. The movement of water is strictly limited to small surface water drains which are clogged and often over flow.

**Un-serviced Colonies:**
These colonies have ‘pucca’ houses and although the lanes have small surface water drains like those found in the slums these connect to large storm water drains which flow into either other larger drains and then to a naali or directly into a naala. Naala in this case is a term strictly reserved for large open water bodies which are part of a city wide network of flowing water bodies which are turn connect with the Yamuna, other river bodies and/or STP plants.

**Serviced Colonies:**
These colonies are all ‘pucca’ and have toilets and water connections to the houses. These are connected to municipal sewers. In both wards the sewers connect with a naala often without any form of primary treatment. Shallow surface water drains along the narrower lanes connect with storm water drains and/ or connect with the municipal sewer.

2.3 Solid Waste Management

50% of the households in Vishwas Nagar use the dalaos for disposing their waste. EMCD have garbage collection vehicles for door-to-door (D2D) waste collection system. But the vehicles are collecting waste from collection points are often inaccessible due to the size of the roads. In the high-income areas residents and their welfare associations have set up D2D services using private cycle-carts or people pay to private waste collectors. In the low-income areas, residents usually dispose their own waste through privately paid waste collectors or by themselves. As a result large amounts of waste ends up inside open drains (surface, storm water or natural city drainage), on the streets or dispersed on the grounds around the dalaos. Solid waste from dalaos is collected through municipal solid waste collection vehicles. From these dalaos solid waste is sent to municipal landfill site through trucks.
3. Institutional Framework

3.1 Responsible Agencies

Access to sanitation, particularly toilets is a basic human right that needs to be addressed in order to provide inclusive and equitable solutions to Indian pervasive urban challenges. In 2008, the Government of India launched a National Urban Sanitation Policy encouraging cities to prepare City Sanitation Plans to create cleaner cities.

Water and sanitation services in Delhi are the responsibility of the Municipal Corporations of Delhi, the New Delhi Municipal Committee (CDMC) and the Delhi Jal Board (DJB). Some of the large drains are also managed by the Irrigation Department. These agencies are responsible for providing water and managing sanitation infrastructures in the 21 water zones of the city. Drainage and sewerage networks are built and maintained by the DJB, MCD and the Public Works Department. Solid waste is collected, transported and processed by the conservancy and sanitation departments of the three Municipal Corporations of Delhi and the Delhi Development Authority is responsible for providing sanitary land filling.

The Delhi Urban Shelter Improvement Board (DUSIB) is responsible for providing basic water and sanitation services to slums, unauthorized colonies and resettlement sites. Standards for slums used have been determined at the national level and set in the Environmental Improvement of Urban Slums Scheme (1970). However, with the introduction of the Rajiv AvasYojana (RAY), the norms for services to slums are also upgraded and propose equitable and in-house solutions. All these different institutions set up the standards and guidelines for service delivery.

3.2 Solid Waste Management

3.2.1. Sanitation including Toilets

Sanitation services to slums are mostly through community toilets. Norms for community toilets provide 1 seat for 50 users, or 1 seat per 10 households. Community toilets are to be linked to septic tanks or underground sewerage where networks are available. Community toilets are also to provide bathrooms as per 1 bathroom for 100 persons or 1 bathroom per 20 households.

There was no provision for household toilets in slums before RAY. Even in the resettlement sites developed by DUSIB prior to RAY, only community toilets have been provided. This is now changing. Resettlement in built housing mandates home toilets and bathrooms.

3.2.2. Drainage and Sewerage system

Only open and shallow street-side drains for household wastewater disposal are permitted. These have to be connected with community stand posts. Under RAY, for built housing there is covered drainage linked to city’s systems. For sites and services schemes, such as in SavdaGhevra, only storm water and shallow surface drains are provided.

3.2.3. Waste management

The Central Public Health and Environmental Engineer Organization manual prescribe 1 sweeping staff per 500 persons. In addition Corporations’ norms include:

- 1 dalao per 10,000 people
- 1 space (of 200sq/mtr) for segregation of non biodegradable wastes per 10,000 people
- 2cu.m. (2000 litres) container per 500kgs of waste
- In slums, community bins of suitable sizes ranging from 0.04 to 0.1 Cu.M. (40 to 100 litres) provided in suitable location and adequate quantities
- Enough vehicles or carts to transport to landfill sites the quantity of waste produced each day

As per the Corporation Act, waste is to be lifted from dalaos and dustbins. Every household is responsible for delivering their own waste to these sites. Local bodies do not undertake to collect waste from the doorstep, which can be done on the basis of private contracting. For waste collection (from dustbins to dalaos), the following vehicles are used\(^1\).

<table>
<thead>
<tr>
<th>Type of vehicle</th>
<th>Capacity</th>
<th>Total capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handcarts</td>
<td>4 to 6 detachable containers of capacity ranging from 0.03 to 0.04 cu.m. (30-40 litres) each</td>
<td>From 0.12 cu.m. (120 litres) to 0.24 cu.m (240 litres)</td>
</tr>
<tr>
<td>Tri-cycles (in areas which are spread out and distances are long)</td>
<td>8 containers of 0.04 cu.m capacity each</td>
<td>0.32 cu.m. (320 litres)</td>
</tr>
<tr>
<td>Community bin carriers with 2 member crew (when hand carts or tri-cycles are not suitable)</td>
<td>40 containers of about 0.04 cu.m each</td>
<td>1.6 cu.m. (1600 litres)</td>
</tr>
</tbody>
</table>

The informal economy, with its recycling-driven business model, is doing the national capital city a great service. The formalization of the waste economy underway has come through the Municipal Solid Wastes (Management and Handling) Rules, 2000, issued by the Union Ministry for Environment and Forests. As per the Rules, all urban waste must be segregated on the basis of waste sources (that is, industrial, biomedical, and household) and the nature of the waste (that is, biodegradable, non-biodegradable and recyclables) and disposed of accordingly. The implementation of these rules has required a marked departure from the existing practices, and many urban local bodies in cities such as Delhi, Mumbai and Chennai have handed over waste collection and segregation to private waste management companies. For more information on waste management see Appendix A on Solid Waste.

\(^1\)Manual on solid waste management, Ministry of Urban Development, 2000
4. Approach and Methodology

4.1 Objectives and Process: The Logical Flow

The following step guide outlines the approach taken to engage, participate and understand the existing problems in both wards as a basis for formulating the Ward Sanitation Plan.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Tools</th>
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</table>
| Introducing the project to communities and understanding their needs in terms of sanitation, waste management and hygiene | - Creation of a field team in charge of direct interaction with communities  
- Field visits  
- First planning work with the communities: mapping slum with the help of residents and sustainable effects |
| Analysing the current situation and identifying needs and priorities | - Encompassing the vision of the area by identifying key socio, cultural and economic elements  
- Household surveys  
- Community meetings  
- Creating "informative maps" |
| Identifying infrastructure gaps | - Research work to know what standards the MCD has to provide in terms of infrastructures  
- Field study and mapping work to be aware of the reality in the slums  
- Comparing the two and highlighting gaps |
| Preparing plans with the communities | - Slum level meetings to review the work that has been done and involve communities in the development of strategies  
- Creating groups composed of residents which will be in charge of the development of the project in their slum  
- Giving a legal legitimacy to groups by registering them as associations with the government |
| Convergence into ward level strategy | - Ward level meetings with members of the groups  
- Discussion between all the groups to compare, assess the evolution of the project, get inspired, learn, etc |
| Implementing the plan | - Door to door waste collection  
- Transfer of CTC management from the local body to the communities |
| Monitoring the plan for long term and sustainable effects | - Processing an evaluation of the improvements  
- Identifying indicators to help assessing the changes  
- Defining constraining factors at the community level about CTC and waste management for people in charge and for residents  
- Maintaining a high community participation: keeping the groups and organizing community meetings all along the implementation and after  
- Working toward legal land tenure/official recognition to make people more responsible and willing to invest more in their living environment |
Survey work is central to the approach. Over 400 households were surveyed in both wards (see Appendix B _ HH Survey Water and Sanitation Stats for Trilokpuri and Vishwaas Nagar), which were taken across a cross section of household types, income levels, and cultural factors. The participatory ethnographic method is required not simply because statistics and data don’t offer a sufficiently extensive explanation of the experiences encountered on the ground but also because the nuances of social interactions require a finer-grained approach. The method of direct observation or learning-from-context takes is a mode of planning that seeks to improve the existing fabric as opposed to initiating a process of tabula rasa which involves sweeping existing inhabitants off the map before constructing anew.

4.2 Preparing the Ward Sanitation Plan: A Bottom Up Planning Process

Both ward plans have been developed using participatory process based on community engagement described below.

4.2.1 Training of Field Facilitators

Field facilitators were identified for the project and trained at CURE. Besides being oriented to the broad goals and objective of the project, this first workshop was designed to focus the proposed participatory tools (PLA) to generate specific information on community sanitation concerns, needs and priorities. Facilitator skills were also strengthened for community engagement and organization.

4.2.2 Community Participation Process

Street meetings were organized in each settlement to discuss people’s concerns about sanitation conditions in their areas. Meetings were held in small groups so that all voices could be heard including the more vulnerable and marginalized. The issues addressed in these meetings were sanitation (including toilets), drains and solid waste. Below is a summary of key concerns which is further outlined in Section 5.

- The CTCs in general are run down due to bad construction and a lack of maintenance. The lack of adequate water supply is a major issue. In-house toilets need to be served as there are no sewer connections.
- The drains, particularly, in the bastis get clogged causing flooding.
- The accumulation of waste in non-designated areas particularly parks results in stench

Consultation was held with groups of special needs such as disabled and those with long term health problems who are particularly affected by the lack of sanitation. The following images sample some of the consultation processes:
4.2.3 Information Generation

Members of the community were trained to record and prepare a total sanitation map of both wards highlighting the following issues:

1. Toilets
   a. Location, condition (cleanliness, structural) of CTCs
   b. Outflow mechanism – septic tank/ connected to sewage network (CTCs)
   c. Urinals (similar)

2. Drains
   a. Location, condition of drains (broken, clogged)
   b. Type of drain (covered/uncovered)
   c. Size (hierarchy)
   d. Areas that get waterlogged during rains (location and duration of waterlogging)

3. Sewerage
   a. Find out where the network does not extend

4. Solid waste
   a. Location of waste dumps (find out the frequency of cleaning up)
   b. Type of waste (location-wise) – talk to kabadiwalas + observation
   c. Location, condition of Dhalaos and dustbins (cleanliness, structural)
   d. Makhi and badboo mapping
   e. Existing Waste collection system
      i. Process
      ii. Coverage (area/location)
      iii. Reasons for non-coverage wherever applicable

The maps helped identify hotspots in the community where interventions were most needed and seek out opportunities for interventions.

CURE also undertook a household survey to generate quantitative information for each household on sanitation issues, practices and challenges. The household survey provides the demographic and socio economic profile of the area, essential for developing the frame work for Community Management structures (key summary points were outlined in Section: ‘2. Ground Check: predominant Issues’).

4.2.4 Preparation of the Ward Sanitation Plans

The objective of the mapping exercise was to enable the preparation of sanitation plans for both areas using ground level information. The data generated by and from the community in addition became a talking point to understand the problems. The slum sanitation plans prepared were aimed at addressing the full range of sanitation issues; access to toilets, solid waste management systems, wastewater drainage and sanitation behavior. Below are image the maps produced for ward 226 and 211 respectively in their raw state:
4.3 Limitations

The first limitation is the availability of data. Since most of the data on the ward was not available, the data in many instances had to be estimated. This creates uncertainty and can put doubt in the proposals. However, this is complemented by ground-level experience based on community mobilization and participatory processes engaged with in both wards but also previous work in other wards under the purview of EDMC and other work in marginalized communities throughout northern Indian cities.

The methodologies described above provided a comprehensive dataset of both qualitative and quantitative nature, which has allowed the team to document a proliferation of complex and interweaving institutions, small-scale designs, community associations and day-to-day nuances sufficient to reveal new insights regarding the incremental improvement of the two wards. The interventions provided an opportunity to witness the small changes through which local actors can make and participate in the creation of their built environment.
5. The Ward(s) Sanitation Plan

The ward sanitation plan is to provide solutions to design, build and sustain a healthier living environment. This section presents a typology of existing problems which sets the foundations for a series of recommendations. In terms of the ‘scope of works’ and particulars presented by the site for upgrading there are loosely three ‘infrastructural’ elements which have been highlighted:

- Toilets including Sanitation Infrastructure
- Drains
- Solid Waste

The following diagram illustrates these interweaving issues:

The plan is prepared keeping in mind the existing scenario and the future demands of population.

The Two wards - Trilokpuri (ward no. 211) and Vishwas Nagar (ward no. 226) are located in Trans Yamuna Area in Zone E of Delhi. Both the wards are under the jurisdiction of East Delhi Municipal Corporation (South Shahdra Zone). The following section gives a brief outline of both wards and is then followed by the physical maps which were produced.5.1 Location
Vishwas Nagar 226

Ward 226 is bordered by the Shahdara drain to the east which is part of a network of open drains called naalas which are sewage laden storm water networks. The ward is predominantly residential however there are various businesses and a couple of large market streets. The total area of the ward is approx. 58500 square meters.

New Sanjay Amar Colony (Vishwas Nagar) was created by the Sanjay Gandhi Government back in 1970. Gradually, people hailing from all states began arriving and settling here. Today, the colony consists predominantly of Muslims, Gujratis, Punjabis, and Bengalis. Originally there was less of a mix of people however following drives by the Sanjay Government the colony became more populated. Later, the V. P. Singh government granted tokens to the colony’s residents.

Residents of A-Block in Sanjay Amar Colony (Basti) primarily sell utensils and kitchenware. About 20% of them work in the Sabji Mandi. 15% run stalls in the weekly market. 10% are vendors/hawkers, 15% are rickshaw-pullers, 5% hold govt. Jobs, 5% are shopkeepers, 15% women work as maids, 20% work in toy-making industries. Residents come from all states, including U.P., Bihar, Punjab, Bengal, Murshidabad, Kolkata, Jharkhand and other places.

Existing institutional structures:

All Blocks of Sanjay Amar Colony- Blocks A, B, C and D elected its representatives to form a Resident’s Welfare Association or an RWA. This RWA consists of both men and women. D-Block has formed an RWA Valmiki Sudhaar Samiti (Valmiki Upliftment Group).

15 women from A-Block took the initiative to form a self-help group, wherein they manage to collect Rs. 200-225 every month.

Another institution that has been formed is Manav Kalyan Samiti (Registered)/ Human Welfare Group)
Ward 211 is bordered by the Hindon Cut canal – which flows between the Hindon and Yamuna – to the South and the Sanjay Lake to the North. The ward is predominantly residential in nature having been established as a resettlement colony in the 1970s. Trilokpuri is famous for the massacre of over 350 Sikhs in 1984 following the assassination of Indira Ghandi. Within the ward are a handful of squatter colonies. There is a Muslim basti (slum or JJ) which is mainly inhabited by embroiderers who do freelancing in various boutiques in east Delhi and a lot of the houses have embroidery addas. The site in general has few public amenities; squatter residents use Community Toilet Complexes which are functional only during the day time till 8pm. The total area of the ward is approx. 165000 square meters. There are various level community and development centers.

The No. 26 Block is a 32-years old settlement, its residents used to rent houses in the resettlement colonies close by. Most of the residents are laborers and as such they couldn’t afford escalating rental costs, often resorting to sleeping road side. A couple of families established themselves living in jhuggis initially, bringing along their relatives later, and slowly upgrading their homes. Some, who worked as laborers in the neighborhood, also set up their jhuggis with the help of the pradhan. The community that lives in No.26 block is very diverse, with people hailing from different places of UP and Bihar. Most of the male residents are engaged in pulling rickshaws, running small shops and tailoring. Women work as maids in large houses and as seamstresses, sourcing cloth from export companies.

Block No. 27 is a 35 year old settlement, planned by the Sanjay Gandhi government. The people who live here lived on rent in resettlement colonies in the vicinity. After they set up their jhuggis here their relatives joined them. Many of the residents were looking to escape having to pay rents and on spotting this empty, unused piece of land, set up their jhuggis here. Gradually, relatives arrived and set up their jhuggis as well. Three fires have broken out in these jhuggis. In 1985, when the jhuggis caught fire, Mr. T.P. Singh and Mr. S.K Bhagat converted these into 12.5 ganj size plots. Most of the residents engage in labor activities, in tailoring, in running small businesses and working at factories.

Block No. 28 is a 37 year old settlement. The residents who live here mainly subsist on rent in the local resettlement colonies around or are relatives of those owning homes in the colonies. Historically spotting empty, unused land to avoid having to pay rent, they set up their jhuggis in Block 28 and 37. Gradually as part of the upgrading process relatives arrived and set up their jhuggis as well expanding the population size. Most of the resident in these blocks engage in labor activities, run stalls in the local market or small shops, hold private jobs, own meat shops, and 10% of them have government jobs as well. Women mostly work as maids in bigger local houses.
**Existing institutional structures:**

There are three existing formal institutions in Trilokpuri that CURE is working with:
- RWA’s Name in Block. No 27: Men-led RWA – Jan Vikas Samiti
- Women’s groups: Mahila Basti Vikaas Samiti 27. No. Block
- RWA’s Name in Block. No 28: Women’s groups –Mahila Basti Vikaas Samiti 8 No. Block

**Basic demographic profile of both wards:**

<table>
<thead>
<tr>
<th>Ward Name</th>
<th>Number of Households</th>
<th>Total Population</th>
<th>SC Population</th>
<th>0-6 population</th>
<th>age Literate</th>
<th>SEX RATIO</th>
<th>Literacy rate</th>
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<td>Trilokpuri</td>
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<td>1650</td>
<td>8708</td>
<td>4642</td>
<td>4065</td>
<td>1660</td>
<td>8773</td>
<td>7836</td>
</tr>
</tbody>
</table>
5. 2 Physical Map for Ward 226

The following map is a digitized version of the community mapping (see Appendix F_ Maps for higher resolution versions):

VISHWAS NAGAR
PHYSICAL MAPPING
### 5.3 Area Brief for Ward 226

**Current Problem / Solution Highlights:**

<table>
<thead>
<tr>
<th>Basti</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| New Sanjay Amar Colony-Block A| As two lanes of A-Block are situated at relatively higher elevations, they face problems of inadequate water pressure in the water pipelines. | RWA should write to DJB regarding this.  
RWA should write to the MLA regarding this in order to hasten action towards increasing the water pressure. |
| Block B                       | The community toilet’s cleanliness is not up to the standards.  
The toilets remain clogged and dirty because the toilet seats have sunk into the ground. | RWA should write to the MCD regarding the state of cleanliness in the CTC.  
The toilet seats in the CTC require urgent repair. |
| Block C                       | CTC remains dirty as cleanliness standards are not maintained.  
Toilet seats in Community toilets are sunken and hence remain clogged and dirty | RWA should file a complaint letter with the MCD regarding the need for cleanliness and repair in the CTC.  
Strictly monitor the caretaker’s responsibilities of maintaining cleanliness.  
Strictly monitor the caretaker’s responsibilities in maintaining cleanliness.  
As the women’s premises are highly unclean, make women aware of the need to use dustbins and maintain hygiene.  
The CTC should have a female caretaker as well. |
| Block D                       | The slope of the drains is not inadequate.  
Lack of cleanliness.  
Dirt lying about everywhere | RWA should write to the MCD as well as the MLA for setting the slope of the drains right.  
Create awareness amongst the basti residents to not to strew rubbish around. |
| New Sanjay Amar Colony A Block | 1. The outlet of the main Naali in Lane no. 2 is clogged.  
2. Inadequate taps in Gujrati Gali | RAW should write to the MCD  
The institution CURE’s advise to the people was for them to pool money for getting the naali unclogged. People followed this and got the drain unclogged.  
Residents of Gujrati Gali sought permission from the DJB and installed a new water pipeline in their lane.  
RWA created banners for educating people to throw their daily rubbish into the Dhalao instead of onto the streets. Now, people strictly throw their rubbish into the Dhalao and use dustbins.  
The residents now get the drains cleaned by MCD workers and monitor this by themselves. They also ensure that insecticide (?) is sprinkled in the drains. |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Rubbish is strewn right onto the streets and has led to build-up of filthy garbage piles.</td>
<td>4. Cleanliness of the naalis is not up to the standards</td>
<td></td>
</tr>
</tbody>
</table>
| B-Block | • 5-6 community taps have broken handles  
• Cement concrete broken in both the roads and lanes  
• Lack of cleanliness in CTCs | The residents of the Basti pooled in their own money to get the tap handles installed. They also took up the responsibility of preventing water wastage.  
RWA wrote to MLA and MLA got the CC work done for the roads and lanes.  
Awareness created amongst people for maintaining cleanliness.  
Strict monitoring of the caretaker’s responsibilities  
The CTC is cleaner than before. |
| C-Block | • 3 Lanes have not been paved with CC  
• 3 Lanes do not have Water pipelines laid out through them | A meeting was held amongst the residents, RWA and Pradhan.  
RWA wrote to the MLA regarding this  
MLA got the CC work done in the 3 lanes  
A water pipeline was laid out in each of the lanes after the residents wrote to both the DJB and the MLA.  
After the meeting and after writing |
- 2 Lanes do not have naalis to the MLA and the MCD, the naalis have been constructed.

<table>
<thead>
<tr>
<th>D-Block</th>
<th></th>
</tr>
</thead>
</table>
| - CTC dismantled and torn down since all the toilet seats had sunk into the ground  
- Water Cooler near Valmiki Mandir out of order  
- No Water pipeline in D-Block, towards the park  
- Park is not maintained properly; rubbish lying around | - More people were included within the RWA and a letter was written to the MLA  
- Construction of the toilet is underway; half the toilet already constructed  
- RWA’s efforts led to the repair of the water cooler  
- Residents staying around the park pooled in money to get a handpump installed  
- The residents of the lane cleaned and planted over the park. CURE institution encouraged them not to dirty the park. |
5.3.1 Toilets and Sanitation of Ward 226

Ward 226 has 8 community toilet complexes, 3 mobile toilet complexes and 5 additional urinal spots. The following images outline the conditions of these complexes.

The complexes are mostly built badly so they do not maintain easily.

In ward 226 there are 3 Mobile Toilet Complexes which don’t get maintained properly and are sited in vacant land that is used as a dumping ground. This results in a large unhygienic environment used for open defecation and as a public space posing a particular health hazard to children who can be seen in this image to be playing next to the dump.
In the absence of adequate sanitation the predominant systems (aside from open defecation) commonly used by the urban poor are cesspools which are emptied, toilets connecting directly into open drains and or septic tanks with soak pits, and septic tanks overflowing into open drains. This is an image from ward 226 where families have built toilets over drains outside their homes. The effluent runs through open drains which eventually connect with larger drains and the *naala*.

### 5.3.2 Drains of Ward 226

All drains and sewers in the ward end up in the large open *naala* (1). The area around the *Naala* is used as a dumping ground and a place for open defecation.

Parts of the *Naala* are lined with concrete embankments but at the junction (marked by a blue circle above) the embankment is untouched offering an opportunity here to improve this condition.
The photo below was taken from the South side of the *naala*—most of the embankment is used as a dumping ground and open defecation spot.

The *naala* is fed by a series of principal drains that run along the main roads. The road highlighted to the left has no open storm water drains along the side of this road. All water runs along a covered sewer which runs underneath the middle of the road.
There is a sewer line but because the sewer is closed and has no manholes this causes a lot of problems highlighted in the image below:

Below (left) is a view looking down the ‘market’ road towards the large naala. There is large storm water drain to the right and a smaller storm water drain to the left. The one to the right is predominantly covered whilst the one to the left is not. Both flow towards the naala although the one to the left is often blocked with rubbish and so requires regular cleaning to maintain flow. There is a sewer line that runs through this main road – indicate by the manhole - but the drains do not connected with this sewer which services houses in Bikham Colony. However before the naala the sewer lines and the storm water drains merge and flow into the naala.
The bastis and informal settlements have small drains intended to move surface water which connect with the secondary rainwater drains.

These are often clogged requiring regular maintenance usually done by the MCD.

The survey identified a handful of areas that are hotspots for flooding (more can be seen on the map). The area circled in the image to the left is often subject to flooding caused because the area is low lying land which naturally accumulates run-off compounded when multiple drains converge in one point.
In summary ward 226 has three hierarchies of drains each with their own features. The Basti lanes with their internal and informal logic flow to larger storm water drains. The storm water drains converge with the naala and at time with formal drainage and sewage. The storm water drains are divided into two types depending on the settlement that flanks it. i.e. whether it is adjacent to formal or informal infrastructure. All drains end up in the naala which also includes raw untreated sewage.
5.3.3 Solid Waste Management of Ward 226

Table 1: EDMC has the following Dalao in ward 226 – Vishwas nagar, Karkadooma

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Dalao No.</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D1</td>
<td>Near Open large drain in Vishwasnagar</td>
</tr>
<tr>
<td>2</td>
<td>D2</td>
<td>Near CTC between Factory Area and Cemetery</td>
</tr>
<tr>
<td>3</td>
<td>D3</td>
<td>Kasturba Nagar near Wedding Hall</td>
</tr>
<tr>
<td>4</td>
<td>D4</td>
<td>New Vishwas Nagar (near open dump of factory paper waste)</td>
</tr>
<tr>
<td>5</td>
<td>D5</td>
<td>Near CTC close to Samudayik Bhavan</td>
</tr>
</tbody>
</table>

Table 2: As per the survey, the following are the Open dumps/ garbage piles in ward 226 where garbage accumulates

<table>
<thead>
<tr>
<th>S.No</th>
<th>Open Dump No.</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OD 1</td>
<td>Paper waste from factory at Vishwasnagar</td>
</tr>
<tr>
<td>2</td>
<td>OD 2</td>
<td>Mixed HH waste next to road near School</td>
</tr>
<tr>
<td>3</td>
<td>OD 3</td>
<td>Factory waste near road near 18 number quarters colony</td>
</tr>
<tr>
<td>4</td>
<td>OD 4</td>
<td>Cardboard, PVC, E-waste at New Vishwas Nagar</td>
</tr>
<tr>
<td>5</td>
<td>OD 5</td>
<td>Green waste by the road at New Vishwas Nagar</td>
</tr>
<tr>
<td>6</td>
<td>OD 6</td>
<td>Near Dalao D4 on other side of clogged drain</td>
</tr>
<tr>
<td>7</td>
<td>OD 7</td>
<td>Green waste near empty space near temple</td>
</tr>
<tr>
<td>8</td>
<td>OD 8</td>
<td>Opposite side of Sabji Mandi near road</td>
</tr>
<tr>
<td>9</td>
<td>OD 9</td>
<td>HH waste near Masjid and school</td>
</tr>
<tr>
<td>10</td>
<td>OD 10</td>
<td>Near Empty space near D Block MTC</td>
</tr>
<tr>
<td>11</td>
<td>OD 11</td>
<td>Near employment centre</td>
</tr>
<tr>
<td>12</td>
<td>OD 12</td>
<td>Opposite Park, near clogged drain near Lehri colony</td>
</tr>
<tr>
<td>13</td>
<td>OD13</td>
<td>Dumpyard for plastic and HH waste outside Gurudwara</td>
</tr>
</tbody>
</table>
Fig: Map showing status of Dalaos and garbage piles in Ward 226

Current status of Ward 226:

It is evident from the map and the tables that there are 5 Dalaos and 13 spots where garbage regularly piles up and rots. This is because the EDMC collection is not coordinated with the generation and deposition of solid waste in the Dalaos. Furthermore, the private waste retriever who has been employed by the House Holds (HH) for daily door to door collection of garbage has not been mandated to collect and deposit the waste only in the Dalaos. Hence he/she is probably collecting mixed garbage from inside labyrinthine streets in bastis, colonies and settlements, but is leaving it as garbage piles at various locations where malba (construction and demolition waste) or garbage has accumulated earlier. It is also evident that Sabjimandi/ vegetable markets, who are
bulk consumers, are not being mandated or penalized for not depositing their waste in the *Dalaos*. They leave it as it is and the sweeper sweeps it out of the market. He/ she leaves it in a pile just outside the market for the EDMC truck to pick it up and transport it to landfill site at Ghazipur.

Ward 226 is by and large a fairly developed locality with regularized resettlement colonies except for a certain number of *bastis*. Vishwas Nagar is an industrial area and hence it could be seen that along with municipal solid waste, paper, polythene and other types of factory waste were piled and left in many locations as indicated in the map. Although most of the cardboard waste etc., went for recycling, it is suspected that a lot of the hazardous chemical waste and their containers such as chlorinated paraffin wax, used in the manufacture of Polyvinyl Chloride (PVC) and other such chemicals were found in several *bastis*, posing grave danger to the residents especially mothers and infants.

Since the Delhi’s master plan 2021 does not allow any kind of hazardous industrial activity in land classified as Category C/ Annexure II industrial area, it is recommended that through community involvement and consensus, such industrial activities are disallowed inside Ward 226 and are moved out of Delhi to industrial areas in states where they would be allowed.

We also noticed that although the colonies are well laid out, the streets are narrow and open drains are overflowing with garbage. We also found that after removing the garbage clogging the drains (some partially covered), it is left outside the drain very close to its opening. One anticipates that during rains, the waste would slip back into the drain and clog it again. There is also a lot of plastic material in the garbage which is bound to swell and clog the drains. Organic matter too will rot and give a very bad stench, which is what is happening in all parts of the ward.

However, it was seen that there are large open spaces in the locality, which can be used for some of the waste management purposes especially for the one time cleaning, sorting and even composting before the planned management through the method described below using the intermediate parking locations and *Dalaos*, are developed and established.
TRILOKPURI
WARD 211
5.4 Physical Map for Ward 211

The following map is a digitized version of the community mapping (see Appendix F_ Maps for higher resolution versions):
## 5. 4 Area Brief for Ward 211

### Current Problem / Solution Highlights:

<table>
<thead>
<tr>
<th>Basti</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| 26 No. Block Trilokpuri | • The basti’s naali runs below the CTC before reaching the Naala. Lack of maintenance causes frequent clogging and often causes the water in the naala to retract into the basti | • The RWA should file a complaint regarding the state of cleanliness with the MCD.  
• The RWA should file this complaint with the Nigam Parishad as well to ensure proper maintenance of the drain. |
| 27 No. Block Trilokpuri | • The lanes have potholes, RCC is broken  
• The lanes are dirty all over  
• 40% of the Basti has a sewer line connection. However since the sewer line doesn’t connect to the main sewer line, it remains dirty and clogged most of the time.  
• The CTC floor has caved in and the toilet seats have sunk below the ground. The toilet seats remain dirty because of this. | • The RWA should file a complaint with the MLA for repair of roads and laying down of CTC.  
• A cleanliness awareness drive should be carried out in the basti |
| 28 No. Block Trilokpuri | • RCC of road broken in 2 lanes  
• The CTCs are dirty | • The RWA should write to the MLA  
• Strictly monitor the caretaker’s responsibilities in maintaining cleanliness |

<table>
<thead>
<tr>
<th>Basti</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| 27 Number Block Trilokpuri | • Several plans were made to call a Basti level meeting in 27 Block for getting a new water pipe laid | • A new water pipeline was laid down  
• The residents themselves started ensuring the cleanliness |
and for getting the RCC work done in roads.
- The CTC doors were broken and plans were made for a meeting to address cleaning of the area.
- At the RWA, plans were made for a meeting for greater inclusion of women.
- The RWA’s efforts led to filling of RCC in the lanes
- The RWA and the residents’ efforts led to installation of new doors in the CTC
- After the RWA became rigorous about the caretaker’s responsibilities, better cleanliness was maintained in the CTCs.
- Once the RWA increased participation of women in its activities, the women of the Basti became proactive in raising issues of electricity problems, issuing of identity cards and cleanliness before the MLA.

<table>
<thead>
<tr>
<th>Basti</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 No. Block Trilokpuri</td>
<td>A meeting was organized to address issues of water, RCC repair and electricity problems.</td>
<td>The RWA’s efforts led to the laying down of a new water pipeline in the Basti.</td>
</tr>
<tr>
<td></td>
<td>A meeting was planned with the RWA for creating awareness amongst the residents for maintaining cleanliness in the Basti.</td>
<td>In one of the lanes, the residents pooled in their own money for installing a private pipeline.</td>
</tr>
<tr>
<td></td>
<td>A meeting was organized for ensuring greater inclusion of women.</td>
<td>The Basti residents have become aware about the need to maintain cleanliness. All of them have dustbins at their homes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The RWA’s efforts led to laying down of RCC in the roads.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The group now included 5 women. These women work on development of the basti. Each woman collects Rs. 10 for helping the poor?</td>
</tr>
<tr>
<td>Basti</td>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>26 No. Block Trilokpuri</td>
<td>• Meetings were held repeatedly for discussing the laying down of new water pipeline, community toilet, cleanliness of drains, greater inclusion of women etc.</td>
<td>• Repeated meetings regarding the toilet led to the repair of the CTC, whose septic tank had stopped working. The Nigam Parishad now has provided a sewer line in the CTC that connects to the Naala. <em>The residents of the basti repeatedly demanded a new pipeline from the MLA until it was installed.</em> <em>The residents themselves installed a ‘toti’ and pooled in money to get the tap repaired and thus prevent wastage of water,</em></td>
</tr>
</tbody>
</table>
5.4.1 Toilets and Sanitation of Ward 211

Ward 211 has five community toilet complexes and 17 additional urinal spots.

The complexes are mostly built badly so they do not maintain easily. In this case the toilet seat can be seen to be ‘sinking’ into the ground as the floor has not been set properly.
The complexes have been built such that there is no system for water surface management which contributes to creating a dirty environment.

The general lack of maintenance in all the complexes creates an environment where the complex is not seen as a resource but rather as a dumping ground.
5.4.2 Drains of Ward 211

Like 226, the drains in 211 follow a similar logic. There are three main types of drains which all eventually converge into a large open naala which runs to the south of the site.

The main road though the colony is flanked on both sides by very large storm water drains. These are in places covered but not uniformly or consistently.
The drains are in many places clogged with solid waste. Solid waste accumulates until it becomes a problem at which point locals have to petition to the MCD to come and clean it. The photograph to the right shows MCD cleaners removing rubbish.

Unlike ward 226, the storm water drains to the north (that line the main road) of the colony do not enter directly into the naala but connect via smaller tributary naalas. The drains of the southern half of the colony connect, like 226, directly into the naala.

The main road drains through the colony to the north connect to a small tributary naala which runs parallel to the main naala. These drains connect to a small tributary naala (image on next page) which runs parallel to the main naala.
The small tributary naala runs parallel to the main naala. Despite the large amounts of rubbish the naala does flow.
These large drains to the south despite being clogged with rubbish also move freely and connect with the principal naala under the highway.

Like 226 all the Bastis have informal small shallow drains which connect with ‘formal’ infrastructure.

We have identified hotspots such as the image to the right where drains from 25 Block Basti run around the CTC connecting with the main road drain. This channel, due to solid waste dumping, is often clogged (see image to the right).
5.4.3 Solid Waste Management of Ward 221

Status of Waste Management in Ward 211:

Table 3: EDMC has the following Dalaos in Ward 211 – Trilokpuri

<table>
<thead>
<tr>
<th>S.No</th>
<th>Dalao No.</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D1</td>
<td>Near Community Development Centre</td>
</tr>
<tr>
<td>2</td>
<td>D2</td>
<td>Near Dhobi Ghat</td>
</tr>
<tr>
<td>3</td>
<td>D3</td>
<td>At 31 Block Basti</td>
</tr>
<tr>
<td>4</td>
<td>D4</td>
<td>31 Block, Near HP Gas and Bharat Gas centres</td>
</tr>
<tr>
<td>5</td>
<td>D5</td>
<td>In 32 Block</td>
</tr>
<tr>
<td>6</td>
<td>D6</td>
<td>At 32 Block Basti near urinal</td>
</tr>
<tr>
<td>7</td>
<td>D7</td>
<td>At 33 Block</td>
</tr>
<tr>
<td>8</td>
<td>D8</td>
<td>At 34 Block</td>
</tr>
<tr>
<td>9</td>
<td>D9</td>
<td>At 36 Block near urinal</td>
</tr>
<tr>
<td>10</td>
<td>D10</td>
<td>At 28 Block</td>
</tr>
</tbody>
</table>

Table 4: Following are the Open dump/ garbage piles in Ward 211 – Trilokpuri where garbage accumulates:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Open Dump No.</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OD 1</td>
<td>Near Sabji Mandi</td>
</tr>
<tr>
<td>2</td>
<td>OD 2</td>
<td>Opposite Sabji Mandi in an open space</td>
</tr>
<tr>
<td>3</td>
<td>OD 3</td>
<td>In an open space near Govt. hospital</td>
</tr>
<tr>
<td>4</td>
<td>OD 4</td>
<td>In an open space in 31 Block Basti</td>
</tr>
<tr>
<td>5</td>
<td>OD 5</td>
<td>Near D3 Dalao overflow from Sabji Mandi</td>
</tr>
<tr>
<td>6</td>
<td>OD 6</td>
<td>On the other side of HP Gas</td>
</tr>
<tr>
<td>7</td>
<td>OD 7</td>
<td>Edge of 32 Block near Urinal</td>
</tr>
<tr>
<td>8</td>
<td>OD 8</td>
<td>Edge of 32 Block basti</td>
</tr>
<tr>
<td>9</td>
<td>OD 9</td>
<td>In 28 Block</td>
</tr>
</tbody>
</table>

It is evident from the tables and maps that neither the solid waste collection nor its transportation and management is currently in good shape since there are several spots in the two wards where waste is piling up and is rotting besides being eyesores. There are currently 10 Dalaos and 9 open dumps or garbage/ waste piles where garbage has accumulated. Besides these, all the drains and their edges are filled with garbage which is a hindrance to achieving cleanliness and obstructs flow of the drains.

This ward has many regular colonies and many bastis. The streets in the bastis are very narrow and just sufficient for a human being to pass. The houses are accessed through ladders which go up from the street. The open drains by the sides of these labyrinthine lanes are often filled with garbage since door to door collection is not regular and systematic.

This is mainly a residential ward and does not have many industries although many trades like TV and mobile repair shops and small shops are common within the colonies and bastis.
Fig: Map showing status of *Dalaos* and garbage piles in Ward 211
6. Proposals

The following sections which propose a series of projects specifically with the following objectives:

- Provide an improved drainage plan and maintenance strategy
- Proposed a revised and improved solid waste collection and management including proposals for localized waste water treatment systems
- Propose plans for slum networking in JJ's
- Options for rain water harvesting and ground water recharging

6.1 Solid Waste Management Plan

One of the major problems of both wards is a solid waste management issue. Despite regular pickup collection from the MCD) solid waste accumulating in public spaces contributes to not only an unhealthy environment but clogs drains causing flooding and stench.

Basic Assumptions and Calculations

The solid waste management plan is based on a series of basic calculations relevant for both wards 226 and 211:

Dimensions of Dhalao= 16 * 32* 25 cube feet

Proposal to install biogas plant next to the Dhalao, in which case the slurry is sent to the composting bins. Slurry requires about 10-15 days to compost and 8 composting bins are installed within the Dhalao.

Dimensions of Composting Bins= 4 * 3*3 cube feet (36 cube feet) or 1.2* 0.9 * 0.9 cube metres (0.972 cube metres)

Waste per household= 0.5 kg
Each Dhalao services 2000 households OR 10, 000 people
Total Waste serviced by Dhalao= 1 Tonne
Total Green Waste that comes to the Dhalao= 0.5 Tonne (allowing for consumption of some of the green waste as animal fodder etc.)
Assuming the density of the green waste as 2000 kg/m^3
Its volume is 2.5 cube metres per day
So that total bins needed are 8 (if we include a biogas & composting facility) and 12 (if the green waste enters straight into the composting bins)
So we need ~ 24 ft. of wall length to place eight bins with the 3ft side flush with the Dhalao wall and ~32 ft. with the 4ft side flush with the Dhalao wall.
The remaining 4 composting bins take up 12 or 16 ft. of the adjacent wall.

Assuming that every block consists of 1000 households, a total of 2.5 cube metre of waste has to be collected from it every day
Estimating that each tricycle carries 0.6 cube meter waste at a time, we need 4 tricycles for every block/ 1000 households that is 8 tricycles for every Dhalao since one Dhalao services 10,000 persons or 2000 Households.
Each handcart holds 0.2 cube metre of waste at a time. If each ragpicker makes 3 trips with his/her handcart, he/she can collect a total of 0.6 cube metres of waste with it and after primary segregation at the 3-walled depot, can transport the 0.6 cube metres waste thus collected with the tricycle to the Dhalao.
The following section outlines a solid waste management plan for Ward 226 and 211:

A. Preliminary basic interventions

To begin, a general cleanup is required to initially clean the entire ward. This should be done at the same time as conducting a campaign about solid waste with nukkad-nataks and meetings, talking and explaining to the residents as to why cleanliness is important and what we can do towards making and keeping our area clean (A successful precedent is stated in Appendix to this report as Item C). This campaign should form the processes by which residents along with women and children through activities like photography and painting competition as to how they want their locality to be. Residents should be involved in the plan making and how it can be achieved. They should be asked as individuals, what would they be willing to do and what can they contribute - financially or through their labour? There should be engagement in terms of the key issues such as segregation of waste and find out whether they would be willing to separate their waste into wet and dry and give it to the waste picker who would come to their house to pick up the waste every day?

B. Establish sites for intervention

The first stage to implement a revised solid waste management plan starts with the EDMC. The ambition is to convert the 13 OD spots in Ward 226 and nine spots in Ward 211 into 3-walled tricycle cum secondary segregation sheds where the waste picker for each group of 200-300 HH can bring the waste in handcarts or bags and separate it further into wet and dry for transporting it to the allocated Dalao.

In parallel the residents need to be engaged and financially willing to give Rs.10/20 per HH per month to the waste retriever so that the waste retriever has an incentive to separate the waste at source and again at the tricycle shed to transport the segregated waste to the designated Dalao.

C. Operation and Maintenance Structures

Regular clean-up programmes every three to six months should be conducted with shramdaan so that whatever waste keeps getting left behind and accumulates in piles, is collected and treated in the Dalao.

D. Implementation

With the help of EDMC and some corporate sponsors, the proposal is to convert each Dalao into a waste sorting and treatment centre. The diagram for the same is given below. This will help in separating 50% of the waste (wet waste), giving food waste to piggeries and treating the rest in the location to stop it from rotting unhygienically. Since the EDMC truck comes once in three to four days, it will utilize the time lag between every EDMC collection for not only treating wet waste but also sorting and accumulating the dry waste. The wet waste to be composted at the Dhalao is estimated to be between half to one ton per day. If adequate land is provided, biomethanation of wet waste before composting can be carried out generating gas which can be used for cooking, heating, lighting etc.

Waste retrievers at the modified Dhalao should be allowed to sell/ utilize the separated and sorted dry waste to the extent possible and deposit only the hazardous waste and rejects in the Schiff/ container provided by EDMC so that when the truck comes, this Schiff/ container is taken and deposited at the landfill site. Soiled and Biomedical waste can have separate containers and their pick-up tied up with Biomedical waste transporter/service provider.

The treated wet waste is converted to compost and used for developing parks and green spaces within the ward wherever there is land and where the residents want it. Whenever there is Construction and Demolition (C&D) debris, EDMC’s C&D plant should be requested to send a vehicle for collecting the same from the locality. This should not be mixed with other waste.
Other non-utilizable waste is deposited in the EDMC Schiff/ container and transported outside the ward to the landfill site. The timing of the waste pick-up from HHs and of the material recovery process at the Dalao would be according to the convenience of the residents and waste pickers.

The following set of figures illustrates the proposal:

**Fig. 3**: Door to Door Collection in narrow lanes where waste pickers collect the House Hold waste in bins

**Fig. 4**: Garbage collection in lanes where hand carts can be taken. The hand cart has two bins, one for wet waste and one for dry waste.

**Fig. 5**: Garbage collected from narrow lanes is brought to the intermediate depot in the Block to transfer the segregated wet and dry waste into the cart and bag in tricycle respectively

**Fig. 6**: Three walled tricycle parking cum secondary segregation depot where garbage is collected is segregated further into wet and dry waste to be taken to the Dalao

**Fig. 7**: Using tricycles in wider roads for door to door collection
Fig 8: Modified *Dalao* with loft made of wood and bamboo for sorting plastic, paper wrappers and other light weighted dry waste

Figures 9 and 10: SWM Planning maps of the wards 211 and 226 have been attached as Appendix E. SWM Planning Maps.

Details of the Modified Dhalao and its functions:

**Fig. 11**

Tricycle arrives at the Dalao.

**Fig. 12**

Bag holding dry waste gets taken towards the ramp that goes to the loft. The bins holding wet waste are placed onto a trolley and wheeled into the dhalao.

Fig 11: The tricycle from the HH blocks arrive with the waste at the *Dalao*. It brings partially mixed and pure wet waste in bins and dry waste in woven sacks/bags

Fig 12: At the *Dalao*, from the bag with dry waste, the heavy items like glass and metal are sorted and the lighter dry waste is sent for further sorting in the loft in the *Dalao*. Wet waste in bins is wheeled into the Dalao on trolleys as shown.
The wet waste system is taken into the Dalao: the bin holding purely wet waste is wheeled directly towards the composting bins and emptied there.

Mixed wet waste is taken towards the sorting table for sorting.
Rejects collected at the sorting table are deposited in the schiffs kept outside the Dalao.

Fig 13: This illustration shows sorting of different categories of wet, dry and mixed waste in different sections of the Dalao and the rejects are collected for depositing in schiffs outside the Dalao.

Fig 13A: This is a zoomed in illustration showing activities at the sorting table where the dry waste is separated from the wet waste but also the dry waste separated as heavy and light so that only the lightweight dry waste is sent to the loft for further sorting.

The loft is used for sorting lightweight dry waste. The picture shows a bag carrying lightweight dry waste being pulled up the loft. Workers sitting on the loft segregate the waste and place into different heaps. The sorted waste is placed into sacks and then dropped from above to the ground floor, where a worker places it into the appropriate bin.

Fig 14: This shows a distant view of the dry waste sorting activity in the loft and segregation of the sorted dry waste into dry waste bins below the loft at the far end. The mixed waste sorting table in the middle and the composting pits at the near end can also be seen.
Fig 15: This shows how the sorted dry waste which is received from the tricycle and the loft are segregated and stored in bins meant for separate categories and for sale.

Fig 16: This shows the view of the Dhalao and its exterior that has a compound for curing the compost and parking tricycles and the schiffs placed outside the Dhalao for rejects.
Thus the Modified Dhalo serves the purpose of providing the space for receiving, sorting and materials recovery, which is mandatory for sustainable waste management especially when the local citizens have constraints of space for segregation and storage in their homes and the Municipal Corporation is able to provide services only once in three to four days. It also helps in providing employment to those who have the need, skills and willingness to handle the domestic waste and recover materials from it like ragpickers/ waste retrievers. However, providing them with requisite Personal Protective Equipment (PPE) is a must because however innocuous domestic waste may be considered to be, it can lead to contaminants affecting those who are in constant contact with it. Hence providing occupational health education, PPE, immunization, first aid and facilities for hand washing and use of disinfectants for those handling HH waste would go a long way in making this a successful model. Furthermore, integration of waste pick up such as biomedical waste (BMW) from hospitals, nursing homes, clinics and laboratories in the locality by the service provider/ transporter for BMW, C&D waste by the C&D transporter and the rejects by the EDMC for landfilling would be required if the model is to succeed and cleanliness achieved.

6.2 Slum Networking

Slum Networking comes from the understanding of the basic link between access to sanitation and positive development both in terms of investment in housing but also in terms of increase health. The strategy for networking includes laying down of shallow bore sewerage which follows the natural drains paths of the site. The potential for such a project is to transform the sanitation and environment of the entire slum matrix of cities – CURE already have a successfully implemented this is Sadva Ghevra resettlement colony and are in the process of buildings such infrastructure in Geeta Colony also under the remit of EDMC.

Community consultation process has consistently demonstrated that they are keen to change their living conditions and make the financial investments necessary to do so. We propose to pilot a slum networking project in Trilokpuri Block 27. However this could be replicated throughout both wards.

The following plan indicates the proposed networking infrastructure of drains, which would connect with the city level existing drainage on the site. The red dotted line shows where the shallow sewer would run and the square dots are essential manholes.
This section is indicative of the proposed technology. The section shows the upgrade required for house with an existing toilet (left) and a full house plus toilet upgrade. Simplified sewerage, also called small-bore sewerage, is a sewer system that collects all household wastewater (WC wastes and sullage) in small-diameter pipes laid at fairly flat gradients. It is suitable for existing unplanned low-income areas due to its ability to be able to adapt to tight and non-linear configurations and affordability. With simplified sewerage it is crucial to have management arrangements in place to remove blockages, which are more frequent than with conventional sewers which is why participatory methods and community engagement is crucial. It has been estimated that simplified sewerage reduces investment costs by up to 50% compared to conventional sewerage.
The concept of simplified sewerage emerged in parallel in Natal, Brazil and Karachi, Pakistan in the early 1980s. In both cases particular emphasis was given to community mobilization, an essential element for the success of simplified sewerage.

6.3 Reviving the Community Toilet Complexes

For the existing Community Toilet Complexes it is proposed to create Community Based Organizations in the operation and management of these complexes. Some investment should be done in line with the community and their expectations to create a sense of ownership and to bring the complexes up in terms of basic functional requirements. Based on community consultation there is willingness across both wards to form such structures.

Although most of the complexes did connect with sewers they all require some basic rehabilitation. Access to water, missing fixtures, general cleanliness and privacy issues need to be addressed. The proposed strategy is to begin with the creation of community groups and begins to highlight the required infrastructural problems prior to making any kind of investment.

There are successful examples of how community participation helped revive defunct CTCs in settlements like Indra Nehru Camp, Sunlight Colony, Aradhak Nagar, to name a few projects. In these places, community exercises in designing CTCs helped generate ideas and solutions towards the problems that people faced regarding community toilets. The community identified problems like improper laying of floor and sunken toilet seats, missing doors, poor management of the CTC and other issues and consequently, these could be addressed. It was seen in these cases that community engagement indeed helped instill a sense of ownership within the people and led to better management of the facilities in the longer run.

Designs for CTCs prepared by residents of Bastis, as part of community engagement participatory exercises led by CURE.

Community-led intervention led to replacement of broken toilet pans at Sunlight Colony, New Delhi.
6.4 Drain Covers

The primary problem of surface drains is the issue of clogging due to rubbish which is why there has been much emphasis of improved door-to-door waste collection as part of the Modified Dalao (Section 6.1). Such intervention aims to target what is a behavioral problem at source. Regardless there is much benefit in also covering the drains as a method for improved hygiene and cleanliness.

The issue with covering drains is that EDMC is reluctant to cover the drains with anything (materially) substantial – such as concrete - as this might encourage encroachment; while on the other hand light weight materials may be easily stolen. In light of this the proposal is to create a series of localized ferrocement drain covers, which have no use otherwise. The following images illustrate the design; the drains are built at an angle so as not to encourage encroachment but to allow water to fall and percolate through perforations in the surface.

In addition to localized ferrocement covers another proposal seeks to address grey-water, which often overflows during peak hours during the day. This design proposes a series of clay pots which at the same time increase the volume of water capable of being held but also perform small localized treatment of grey water with a gravel medium. The plants could also be potted as part of a drive to improve the overall ambience.

In the CTC in Indra Nehru camp, all stalls had missing doors. These were installed and the vital issue of privacy and dignity was reinstated within the CTC, making it much more preferable than open defecation.
Both 211 and 226 are bordered by naalas which form part of Delhi’s Sewage Network. Untreated sewage enters the open rains produces harmful gases like sulfur dioxide. Environmental activist say drains should not be covered so as to enable aeration². Waste water should be treated before entering eh drains. The many embankments offer a unique and emergent possibility for localized treatment to ease the pressure on the city’s environmental resources by cleaning the drainage system of Delhi. By treating sewage on site rather than at the river, waste water can be reused rather than discarded into the river. If this happens, potentially 80% of the pollution in the Yamuna River could disappear, further allowing wildlife to thrive again³. Native plants can be used to slow the surface runoff and allow storm water to infiltrate back into the ground to recharge the water table rather than into the storm sewers. The improved drainage system will help prevent flooding of urban areas and reduce the risk of waterborne diseases.

There are various challenges with such an initiative: the various land owning agencies and their willingness is a massive institutional barrier. More so there is a knowledge barrier in that low technology systems are not well understood and so difficult for stakeholder agencies to engage with these ideas. There are a few existing projects which can help overcome this knowledge gap:

**Indian Institute of Technology, Bombay**

The first pilot-scale sub-surface constructed wetland research facility is built on half an acre area adjoining sewage receiving-cum-pumping sump on IIT-B campus. It treats wastewater generated by about 250 students. The plant treats nearly 100 litres sewage per person per day.

**Rajendra Agricultural University, Pusa, Bihar**

The bio-methanation facility uses waste water effluent generated during distillation of alcohol to provide nutrients to the soil. It provides a safe Bio-methanated distillery effluent treated pots at the sugarcane research institute provide a safe alternative to industrial waste. At the Pusa University, the distillery effluent is used to treat sugarcane plants.

³http://www.delhinullahs.org/
Cheonggyecheon, Seoul
In July 2003, then-Seoul mayor, current President Lee Myung-bak initiated a project to remove an elevated highway and restore a historic stream which ran below it. Also it was important to bring the nature to the city again and to restore history and culture which had been lost for about 30 years and to revitalize the economy of metropolis, Seoul.

Fuzhou, China
A 600-meter canal, considered one of the worst in the city, had extreme problems with odor and floating solids created by the influx of 750,000 gallons per day of untreated domestic sewage. Using 12,000 plants composed of 20 native species with a walkway down the center, the project has met water quality goals and created a desired recreation area for the residents of the neighborhood.

Both wards offer a perfect opportunity to pilot micro treatment of sewage from drains before entering the naa la. The following images outline a proposal for eat site of micro treatment for the drains. The challenges involved will be predominantly land issues and the multiple stakeholders involved; however implementation of such a project would set a genuine precedent for low cost, high impact treatments tacking one of Delhi’s primary urban problems: sewage.

There are various water quality improvement measures that can be implemented as illustrated above. (From left to right) Floating ‘Restorers’ Technology which utilizes plats as a nature water filtration; Bank Stabilization which reduces erosion; Upland Erosion Control; Constructed Wetlands which duplicate natural wetland ecosystems which has the ability to extract nutrients and heave metals from storm water runoff and can increase biodiversity; Storm Water Management which uses retention basins of plants which extract pollutants; Rainwater Harvesting; and Soil Phytoremediation which is the use of plants to extract heavy metals and contaminated soils. All these process are significantly cheaper than conventional methods.
6.5.1 Proposal for Vishwas Nagar
Working at the junction highlighted in Section 5.3.2 where all the drains (including the municipal sewer) converge and meet the *naala*.

The proposal is create a new connection with the *naala* with the waste water running through a micro Decentralized Wastewater Treatment Systems (DEWAT) and wetland planting.
The images above show a before and after of a micro DEWAT embankment planting.

The above image shows an indicative section of the embankment.

The technology deployed is a simple trickle filter which discharges the waste water and through a process of bioremediation will get partially treated, illustrated by the diagram below.
6.5.2 Proposal for Trilokpuri
This proposal is set in the area highlighted in Section 5 which showed a smaller tributary drain which connected the main drains with the principal naala.

The proposal is a series of DEWATS which take the water from the tributary naala and clean that water before it discharges into the main naala to the south of the site.
The embankment of the naala would form part of a constructed wetland and bank stabilization which would also perform localized treatment to the waste water. The above images show a before and after of shot of the proposed wetland planting for the tributary naala. The proposal includes the creation of planting leading to a series of DEWATs as illustrated below.

### 6.6 Groundwater Trenches

For hotspot areas which are prone to flooding it is proposed to build a series of trenches. The hotspot identified in 226 provides a suitable pilot for ameliorating flood prone areas. There are various kinds of recharge structures which can surface water percolates in the ground instead of accumulating on the surface. Recharging through recharge trenches, recharge pits and soakaways is simpler compared to recharge through wells. Fewer precautions have to be taken to maintain the quality of the rainfall runoff. For these types of structures, there is no restriction on the type of catchment from which water is to be harvested, i.e., both paved and unpaved catchments can be tapped. A recharge trench is simply a continuous trench excavated in the ground and refilled with porous media like pebbles, boulders or brickbats. A recharge trench can be 0.5m to 1m wide and 0.5 to 1.5 m deep. The following section is an example:
The above images show a before and after of shot of proposed trenches in combination with the existing drains covers to ameliorate the hotspot indicated in section 5.3.2 Drains.

Below is plan indicated all the hotspots in both wards where trenches could be used (Vishwas Nagar 226, left and Trilokpuri 211, right):
7. Report Summary

This report contains a set of key proposals which address toilets, sanitation, solid waste and drainage in both wards. The proposals are replicable and scalable. The emphasis has been on pilot projects which are feasible as entry points to engage with the EDMC.

Much of the information contained within the report is base-line information on what exists which is the foundation for the project ideas and proposals. The projects would all require a high level of community and key stakeholder involvement to ensure not only that they are sustainable both financially but also culturally.

This information should also been seen as part of the wider work CURE, WAID and EDMC are engaged with in East Delhi.