

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
NATIONAL RIVER CONSERVATION DIRECTORATE (NRCD)
MINISTRY OF ENVIRONMENT AND FORESTS

**THE STUDY
ON
WATER QUALITY MANAGEMENT PLAN
FOR
GANGA RIVER
IN
THE REPUBLIC OF INDIA**

FINAL REPORT

VOLUME IV FEASIBILITY STUDY FOR PROJECT CITIES

VOLUME IV-2 FEASIBILITY STUDY FOR KANPUR CITY

PART II NON-SEWERAGE SCHEME

PART III PUBLIC PARTICIPATION AND AWARENESS PROGRAMME

PART IV INSTITUTIONAL DEVELOPMENT PROGRAMME

PART V ECONOMIC AND FINANCIAL EVALUATION

PART VI STAKEHOLDER MEETING

JULY 2005

**TOKYO ENGINEERING CONSULTANTS CO., LTD.
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MANIKARNIKA GHAT

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ABBREVIATIONS

CDS	Community Development Society
CTC	Community Toilet Complex
DG	Dhobighat
DUDA	District Urban Development Authority
FGD	Focus Group Discussion
IHL	Individual household Latrine
JICA	Japan International Cooperation Agency
LCS	Low Cost Sanitation
NGO	Non Government Organisation
NHC	Neighbourhood Group
NRCP	National River Conservation Plan
PP/PA	Public Participation and Awareness
RCV	Resident Community Volunteer
SPC	Sanitation Promotion Committee
SUDA	State Urban Development Authority
ULB	Urban Local Body
UPJN	Uttar Pradesh Jal Nigam
VJS	Varanasi Jal Sansthan
VNN	Varanasi Nagar Nigam
WC	Water Closet
WLC	World Literacy of Canada
WWG	Women Watching Group

CHAPTER 1
INTRODUCTION

PART II Non-Sewerage Scheme (CTC Program and Constructed Dhobighat Program)

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

River Ganga runs its course of over 2500 km from Gangotri in the Himalayas to Ganga Sagar in the Bay of Bengal through 29 cities with population over 1,50,000 ('class-I cities'), 23 cities with population between 75,000 and 1,25,000 ('class-II cities'), and about 48 towns. For ages, a belief that Ganga's "magical" powers that can "cleanse any thing" has remained strongly ingrained in the minds of people. This among other things has resulted in indiscriminate discharge/dumping of all kinds of waste and effluents into the river. Added to this, there are pollutants carried by its tributaries including Yamuna and Gomti. According to the estimates of the National River Conservation Directorate (NRCD), the sewage and wastewater that gets "loaded" to Ganga and its tributaries is in excess of 5000 MLD. Today, Ganga is "groaning" under such a colossal burden.

To achieve the objective of pollution abatement, the Ganga Action Plan (GAP) took up core and non-core schemes in phases. The core sector schemes comprised interception and diversion schemes and sewage treatment plants designed to tackle pollution from point sources, i.e. direct discharge into the river at specific points, from measurable sources, such as drains, sewage pumping stations and sewage systems. Non-core schemes comprised Low Cost Sanitation (LCS) schemes, river front development schemes, relocating Dhobighats and construction of Electric or Improved Wood Crematoria directed towards tackling non-measurable pollution (from "non-point" sources), such as dumping of solid waste and open defecation, dumping of un-burnt / half-burnt dead bodies etc.

Under the JICA-sponsored Project titled "**Ganga River Water Quality Management Plan for the cities of Lucknow, Kanpur, Allahabad and Varanasi**", a consortium (called the JICA Study Team) headed by Tokyo Engineering Consultants Company Limited, Japan (TEC), under the first phase of the project, carried out a detailed study involving identification and quantification of various pollution sources, mapping of the wastewater management infrastructure, water quality monitoring and modelling, impact of the existing river action plans in the first phase of this study. In the second phase, The JICA study team has prepared a Master Plan comprising sewerage and non-sewerage schemes, and evaluating the feasibility of implementing the master plan in one of the target cities. Whilst the sewerage scheme(s) focuses on sewage transmission system (main trunk sewers), storm water drainage¹, and sewage treatment plants, the non-sewerage schemes are directed towards improving existing facilities and/or creating additional facilities. These include Community Toilet Complexes (CTCs). In order to optimise the utilisation of existing facilities, create further facilities and realise the main underlying objective of "abating pollution in the River Ganga", JICA Study Team has awarded the study "**Feasibility Study of Non-Sewerage Schemes on Pollution Abatement of the Rivers Ganga and Gomti in the three cities of Lucknow, Kanpur and Allahabad in Uttar Pradesh, India**" to the consortium led by Haskoning India Private Limited, a Royal Haskoning Company.

¹ there is considerable disposal of waste water directly into storm water drains (or "nullahs"), which reaches the river untreated. The JICA Study Team, in its Master Plan, envisage that the ultimate solution for pollution abatement would require to bring all the wastewater to treatment plant(s) prior to disposal into the river

1.2 AIMS AND OBJECTIVES

Primary aim of the proposed study is to examine the feasibility of non-sewerage schemes in the three target cities. This is proposed to be met on the basis of the following broad objectives:

- Formulation of detailed programme(s) of development of LCS (CTCs) and Constructed Dhobighats; and
- Assessment of the technical, institutional, financial and economic viability, and environmental and social soundness of the programs and the facilities that will be proposed in the programme;

1.3 SCOPE OF THE STUDY

The work involves carrying out the following tasks:

- Literature survey, project appreciation and planning;
- Discussions with civic bodies and concerned Government agencies;
- Carrying out a brief baseline survey to determine the ground situation in slums;
- Carrying out a Community Needs Assessment (CNA) through Focus Group Discussions (FGDs) directed towards awareness generation and motivation in the target areas;
- Planning and Design (Preliminary Design) for the various facilities including typical layouts, costs etc.;
- Preparation of appropriate O&M Plan for the facilities;
- Evolving viable cost-recovery models;
- Conducting Workshops to facilitate the participation of the various stakeholders to assess the Need and Demand, and elicit their views on the proposed schemes;
- Examining and incorporating acceptable suggestions;
- Final report Preparation

1.3.1 Limitations of the Study

The following limitations of the study have been identified:

- Lack of adequate information of existing/planned sewage collection systems in specific localities or areas hampered accurate planning;
- It was difficult to assess the availability of land for all the CTCs. An assessment was done only for the pilot projects and several tens of slums for the rapid land availability survey;
- The slums of Kanpur have larger number of migrant population making them more complex, as compared to the slums in the other two cities i.e. Allahabad and Lucknow.

1.4 STUDY APPROACH AND METHODOLOGY

The approach adopted for the study was participatory in nature. The methodology included detailed consultations with the stakeholders in the city of Kanpur that included officials from the Urban Local Bodies (ULBs) – Kanpur Nagar Nigam; development authorities including State Urban Development Agency (SUDA), District Urban Development Agency (DUDA), Kanpur Development Authority (KDA; Kanpur Jal Sansthan (KJS); Uttar Pradesh Jal Nigam (UPJN); and various Community Development Societies (CDSs). The processes in the study included detailed sample surveys in the target areas, focused group discussions, individual interviews, workshops and review of available statistical/demographic information. This facilitated the Consultants to understand the needs and demand among slum dwellers for LCS, various socio-economic and environmental conditions, and the institutional aspects to develop an LCS based on appropriate technology, financial viability and sustainability. Similar exercise was carried out for the Dhobighats with the objective to understand the needs and demand of the Dhobis, the problems faced by them in their day-to-day activities of washing

clothes, and willingness of the Dhobis to move from traditional to constructed Dhobighats. The techniques were selected and suitably modified based on the local conditions, nature of topic, financial resources and availability of time.

The phases in the study are described below in brief:

Phase I: Problem Identification and Process Formulation

Identification of different stakeholders

The major objective of this task was to identify different stakeholders involved and to make an assessment of nature of involvement of each in order to have a "holistic" approach.

Stakeholders involved in LCS Programme

Mobilizing stakeholders, or bringing together all the key actors in the community, who have an interest in the outcome of the LCS programme is an important component of current assignment. Consultants began this process by first identifying all those groups who have a stake in the welfare of the city. These included the users, organized grassroots community organizations, non-government institutions, non-governmental organizations (NGOs) and the relevant government departments and civic body. The spectrum of the users and the community included Community Leaders, and/or persons actively involved in promoting good sanitary practices, Neighbourhood Groups, Community Based Organizations (CBOs), and the user groups, who were the main respondents in the primary survey.

Phase II: Data Collection and Analysis

Relevant primary and secondary information was collected using various study tools' as described in the following Table.

Table 1.1 Tools Used for Study

Data Collected	Data Collection Tools
Need Assessment	"Chapati" Diagram
Socio-economic data	Interview Schedule method Participatory Research Approach (PRA) tool - Social mapping
Facilities	Interviews with slum dwellers Interview with CDSs PRA tool - Social and resource mapping
Health and Awareness of Sanitation	Interview with slum dwellers, FGD Primary surveys, PRA
Housing and land	Interview Schedule Transect

Data Collected	Data Collection Tools
Water supply and sanitation situation	Interviews FGDs with target groups comprising men, women and children.
Resource and assets	Resource mapping
Gender	Interviews with women FGDs
Institutions and programmes	Interviews with slum dwellers; DUDA and Nagar Nigam officials and CDS workers
Issues and concerns	FGDs Workshop

The secondary and primary data collected along with the sources of information are respectively provided in Table 1.2

Table 1.2 List of Secondary Information collected and the corresponding sources

Information Collected	Source	Purpose
City level details Demography (population, population growth, density, settlement pattern, socio-economic structure of the town, Development plan	2001 Census Kanpur Nagar Nigam Available literature review SUDA DUDA, Kanpur	City Profile, comparison with primary survey and supplementation of data/details
Slum Details Slums in the city, slum population, slum location and other related details	Through discussion with DUDA and Kanpur Nagar Nigam officials	Selection of representative survey areas for baseline surveys and collection
Water supply scenario in slums O&M of CTCs	UPJN DUDA	Baseline scenario and need assessment Existing O&M System and their performance
Detail of Public toilets Sewerage system Sewered and Non Sewered areas Institutional Structures Other sanitation Issues	Nagar Nigams UPJS UPJN	Existing Scenario and Pilot Project formulation Existing institutional framework and plans for extension of new STPs
Prevailing norms for planning and delivery of services	Municipal Act The U.P. Water Supply and Sewerage Act, 1975 The U.P. Slum Areas (Improvement and Clearance), 1962 Centre and State Government Policies Discussions with officials of DUDA, Nagar Nigams, UPJS, and UPJN	Legal provisions for facilitating creation of facilities and sanitation/drainage facilities and schemes in operation
Case studies	Literature review JICA Study Report	

Phase III: Development of Standard Framework for Planning and Design

This phase involved preparation of design alternatives based on various socio economic, financial, technical and institutional factors, and make recommendations on the most suitable option(s) keeping in mind the technical soundness and sustainability. The Framework developed tried to identify the alternatives strategies for arranging the project capital cost, evaluate the strategies best responsive to community demand, and mechanism to ensure accountability, affordability and willingness to pay for the services, vital for a sustainable O&M model. It also stressed on promotion of gender equity, community participation and institutional structure to strengthen the local and community level institution.

1.4.1 Primary Survey

The selection of area was done on random bases using Stratified Random Sampling. Efforts have been made to select those areas, which have heterogeneous and representative samples, i.e. people

belonging to different economic and social strata in Kanpur city. In consultation with officials of DUDA, Nagar Nigam and CDSs. Kanpur was divided into five different zones for the purpose.

For the CTCs, the "zoning" was carried out on the basis of the following parameters:

- Density of population;
- Proximity to river;
- Socio-economic characteristics;
- Demographic structure of population;

The entire Kanpur city was divided to five zones(for studies related to CTCs):

Zone One (Kalayanpur) consist of the following areas

- Kalayanpur (Newly populated, away from river)
- Naramau (Village located on boundary of municipal limits, typical village)

Zone Two (Gowaltoli) consist of the following areas

- Gawaltoli Close to river, moderate density, CTC facility available to some extent)
- Golaghat Close to river, moderate density, CTC facility available to some extent)

Zone Three (Fazalganj) consist of the following areas

- Fazalganj (Old industrial labour colony converted to slums)
- Rajapurawa (Thickly populated, moderate distance to river)
- Loharanpurawa (Thickly populated, moderate distance to river)
- K.K.T (Thickly populated, moderate distance to river)
- Verma cell (Thickly populated, moderate distance to river)

Zone Four (Kidwai Nagar) consist of the following areas

- Kidwai nagar (Sparsely populated, away from river)
- Juhi (Moderately populated, away from river)
- Babu Purwa (Moderately populated, away from river)
- Naya purawa ((Moderately populated, away from river)

Zone Five (Lalbangla) consist of the following areas

- Ghau khera (Urban slum, vicinity to Air Force station)
- Manohar Nagar (Close to river)
- Vajpainagar (Close to river)

For Dhobighats, the project team carried out surveys in the following Dhobighats:

Constructed Dhobighats

- Bharaiwghat
- Juhi dhobi talab

Traditional River Side Dhobighats

- Golaghat

1.4.2 Study tools' design

Necessary Study Tools were designed based on the inputs received from different stakeholders. Study tools used in the project include:

Questionnaire for Primary Survey (QPS): Questionnaires for primary data collection was prepared in consultation with different stakeholders including the direct user groups (slum dwellers), Nagar Nigams and district/city development authorities/agencies;

- Participatory Methodologies

- Transect
- Mapping
- Primary Surveys
- FGDs
- Workshop

After collection of the relevant primary and secondary data analysis was carried out which include the following aspects:

- Socio-economic and demographic profile of the residents
- Resources
- Sanitation profile of the slums
- Availability of the other related facilities particularly sewerage, coverage of the area under existing/planned sewerage system etc.
- Satisfaction level of the community
- Area for development of facility and the type of facility to be developed for the community
- Community preferences and choices
- Awareness level

The objective of the Primary Survey was to obtain information on baseline conditions covering various aspects related to LCS and Dhobighats. 22 slums were surveyed which included 312 respondents and 27 respondents in Dhobighats in Kanpur. The details of respondents in Kanpur are given in Table 1.3.

Table 1.3 Number of Respondents for LCS and Dhobighats

Number of respondents	
LCS	Dhobighats
312	27

The interview schedule using QPS (refer Appendix A and B) in the form of a questionnaire included details about socio-economic aspects such as:

- Household profile - number of members, monthly income, occupation details, type of house, expenditure pattern, and household amenities and assets;
- Source of domestic water, distance from the source and payment details for water;
- Sanitation - bathing area, presence of IHL, area of defecation, health problems, type of IHL, response to pit toilet, reasons for satisfaction/dissatisfaction, CTC usage, distance from CTC, willingness to construct IHL, availability of space for IHL, natures of contribution for IHL, presence or absence of sewerage connection;
- Awareness about hygiene and safer sanitation practices;
- The data collected through the QPS was supplemented by notes made by surveyors in their notebooks on issues, which could not be covered in the standard format.

A **Transect** through the slum areas was done to gain an understanding of the habitat pattern spatially. **Mapping involved** spatial analysis of a wide range of issues culminating in the creation of Social Maps. These maps include details pertaining to houses, services, facilities, main roads, lanes and streets in the surveyed slum areas. The services and facilities identified on the maps reveal not only the location details, but also the issues that people perceive as important.

1.4.3 Focus Group Discussions (FGD)

FGDs were carried out with different sets of groups within the identified slums or target communities. Community issues, preferences and choices as well as the most suitable technological option for sanitation or management of waste water, and options for O&M were identified during the FGDs. The

FGDs comprised, besides key members of the Consultants' project team, the following different sets of people:

- Traditional and informal organization(s) that existed within the community (existing groups);
- Women in the community (ies) - this allowed the women to freely express their opinion on sanitation related issues.;
- Local Community Leaders;
- Group representing the younger generation; and
- Representatives from different caste, class and income levels;

Issues identified during various FGDs are provided in *FGD and Social Maps in Annexure C*.

1.4.4 Stakeholder Meeting

The Consultants (Project Team) held one workshop on 18 December, 2004 in Kanpur, which was chaired by the Kanpur District Magistrate Mr Prashant Trivedi, IAS along with Mr Arun Kumar, IAS (retd), Team Leader Study Team, Mr S. Vijaykrishnan, Director (Operations) Haskoning India Private Limited and Mr Ajay Kumar Singh, JICA Study Team. The workshop also included all the concerned government officials, stakeholders, various CDS and the Project Team. The workshop included an overview/ presentation of the ongoing assessment/study to the various stakeholders, policy makers, officials of ULBs and other government authorities/agencies. The agenda was to discuss the findings of the study through discussions on various aspects covered in the study. Owing to their own involvement in sanitation and hygiene aspects in slums, the participants at the workshop provided further insights and nuances on the areas covered in the study. The outcome of the workshop provided a "way forward" and laid ground for future course of action and approach for implementation and preparation of guidelines for replication of the programme proposed to be implemented through pilot project in Kanpur.

CHAPTER 2
EXISTING SCENARIO

CHAPTER 2 EXISTING SCENARIO

Chapter 2 presents the baseline environmental and socio-economic information for the city of Kanpur, its slums, state of sanitation and Community Toilet Complexes (CTC). The chapter also discusses institutional and legal aspects including existing programmes and activities of various agencies involved in Low Cost Sanitation.

2.1 STUDY AREA PROFILE

2.1.1 City Profile

The proposed feasibility study report covers the city of Kanpur, one is also, located at the banks of river Ganga. Kanpur is well-connected by rail and road to other parts of UP and The general elevation of the Kanpur city is 125 meters above mean sea level (msl). It lies between latitude 26° 10'30" and 26° 38'30" N and longitudes 80° 7'30" and 80° 34'00" E. River Ganga forms the eastern boundary of the district while the rest of the periphery is contiguous with that of Kanpur Dehat district. Kanpur city covers an area of 672 sq km of (Kanpur Municipal Area) and has a population of about 2.8 million (2001 census). Detailed demographic data of Kanpur has been provided in Appendix F.

- One of the major urban, industrial and business centres of the Uttar Pradesh (UP);
- Geographical Location: Between latitude 26° 10'30" and 26° 38'30" N and longitudes 80° 7'30" and 80° 34'00" E;
- Area = 672 square kilometres (Municipal Area);
- General elevation ~ 125 m above mean sea level (MSL);
- Study area - Municipal limits of the city;
- Total Urban Population = 2.8 million (2001 census)
- Sub-tropical climate The climate of the Kanpur Nagar is sub-tropical. Hot and dry air with high wind velocity during peak summer and thick fog during chilly winter are the peculiar climatic features of the area.
- Kanpur area constitutes a part of Ganga sub-basin in the Central Indo Genetic plain. It exhibits more or less a flat topography with slight undulation and is having low relief except few ravines caused by stream erosion. The regional slope of the area is from NW to SE following the drainage lines of Ganga. The slope is very gentle. The elevation of land surface is about 125 m above msl.
- The drainage system of the area is controlled by river Ganga and its tributaries like Pandu and Rind. All these rivers are flowing in south-easterly direction. Pandu and Rind rivers and seasonal with little or no discharge the lean period.

2.1.2 Slum Profile

The city has 390 slums having a total population of 4,32,000 (DUDA Figures) covering almost 15.4% of population. The literacy level is approximately 35.8 % (census 2001). The decadal increase in slum population is given in Table 2.1. The slum map for Kanpur City has been provided in Appendix G.

Table 2.1 Slum Population of Kanpur (1991-2001)

Year	Slum Population
1991	417,000
2001	432,000

Source: Census of India , DUDA

The rapid growth and development of slums in the Kanpur city area has led to deterioration of its physical environment. Majority of slums have very poor water supply and sanitation facilities; most are either un-sewered or partially sewerred. With disposal of household waste water and solid wastes taking place directly into open nalas, which in turn adversely affects drainage in these areas, leading to water logging. The poor environmental conditions within the slum areas have adversely affected the health of the residents. Financial constraints on the part of civic authorities and un-authorized nature of the slums have also contributed to non-delivery or partial delivery of basic amenities. Most of the slums in Kanpur are well connected with roads but inside roads are kutcha and the sanitary conditions are unhygienic. The modes of disposal are either through sewer line or open nalas. The reasons for large population residing in slums in Kanpur can be attributed to the gap in the combination of factors (refer box below).

- Kanpur being one of the major industrial and trade centres attract migratory population who work as labour in industries
- Lack of family planning measures lead to a disproportionate growth of population in slums;
- Poor economic conditions – slum dwellers can neither pay rent for proper housing nor can afford to buy a house;
- Desire to live close to one's own community;
- Involvement of religious or political groups who have vested interests in developing slums;
- Inability on the part of the local administration to prevent encroachment of government-owned land;

Brief profiles of some of the major slums surveyed during the study in terms of their population, connectivity, socio-economic profile etc are presented below:

Brief Profiles of Some of the Major Slums Surveyed during the Study

Location	Population/ Number of Households	Infrastructure/ Accessibility	Jurisdiction	Drainage/ Sanitation Facilities	Socio-economic profile
Fazal Ganj	1050/180	On FazalGanj Road, Brick lined Pavement inside the slums developed by DUDA with huments and dinghies constructed haphazardly all through the pavement	NN	<ul style="list-style-type: none"> - Open drains; drainage to open low lying areas - No CTC - Preference for IHLs, but willing to opt for CTC due to space constraints 	<ul style="list-style-type: none"> - Mixed Hindu Muslim population with no dominant caste group; - The residents of the particular area were either employed with Cloth Mills - Presently the Daily wage workers
Loharan Bhatta and Settlements situated at the back of J K Temple	4100/640	Open Drainage as developed by DUDA and KNN. RCC lined Pavement inside the settlements was developed by DUDA, in coordination with NEDA	NN	<ul style="list-style-type: none"> - One CTC with biogas plant functional - Second CTC built by Sulabh not functional – in dilapidated condition - More CTC required - Deficient water supply 	<ul style="list-style-type: none"> - Mixed caste population, primarily Hindus - labourers
Nara Mau	NA	adjacent to Delhi -Kanpur Highway (GT Road) Open Drainage	NN	<ul style="list-style-type: none"> - The slum has open drainage connected to a closeby village pond - open defecation prevalent 	<ul style="list-style-type: none"> - Mixed population comprising various caste groups - Part of old area of the city with high population density
Kalayanpur (Panki Road)	1000/220	Close to GT Road Well-connected with accessibility to road transport; telephone lines; electrified slums with telephone lines	NN	<ul style="list-style-type: none"> - Sewer line present with disposes the waste water into a nala - One CTC disposing its wastewater into the sewer line - Well-maintained; predominantly used by labourers and local vendors - Inadequate capacity of the CTC - Preference for IHLs as space not a constraint 	<ul style="list-style-type: none"> - Area dominated by Muslims - Small scale businesses – Chikankari, Zardozi, small factories, shops - Comprises both the urban rich and poor
Vijay Nagar – Plot No: 12.	1800/300	no direct accessibility by road; electrified slums with telephone lines	NN	<ul style="list-style-type: none"> - No CTC in the area - Deficient water supply - Open defecation prevalent] - high need of CTC 	<ul style="list-style-type: none"> - Mixed caste and religions - Primarily daily wage workers in tanneries and industries
Daboli West.	2650/400	accessibility to road; electricity; small market within the slums land belongs to irrigation department	KDA	<ul style="list-style-type: none"> - Main drainage comprises open drains with final disposal into the canal nearby - Improper drainage leading to water logging - open defecation prevalent 	<ul style="list-style-type: none"> - consists of people from different caste and creed - a majority of population engaged as rag pickers or scrap dealers (Kabariwala) - women employed as maid servants in the neighbouring colonies of KDA
Govindpuri Kachhi Basti on Kanpur Jhansi Railway line	3300/ 540	slum is a recognised as per the NSDP directive and is has brick and Kutchha roads	NN	<ul style="list-style-type: none"> - No Sewer line and open drains; discharge into a nala - 2 existing CTCs, but inadequate; open defecation prevalent - Poor drainage resulting in water logging and problem of water-borne diseases 	<ul style="list-style-type: none"> - Mixed population with Muslims and Hindus - Maximum people employed with mills nearby or are rickshaw pullers - women are employed as maid servants in the neighbouring colonies and societies

Health Conditions and Risk

Lack of adequate sanitation facilities has led to severe health problems for the residents, contributing to spread of various serious ailments. The most prominent diseases include Dermatitis, Scabies, Bronchitis, Anaemia, Poliomyelitis, Encephalitis, Tuberculosis, Lung Cancer & Asthma, Amoebiasis, Gastroenteritis, Diarrhoea/ Dysentery, Worms Manifestation Disease (Ascariasis, Tape worm), Hook worm Disease (Ankylostomiasis), Conjunctivitis & Cataract, High Infant Mortality & Miscarriage, Typhoid, Filaria & Malaria, Dengue and Malnutrition. Open defecation and unhygienic disposal of night soil is a major cause of various diseases mentioned above.

Environmental Situation

During the survey it was seen that the condition of Ganga River at Kanpur is severely polluted. Location of this city on the river bank has made the river water more vulnerable to pollution making it gradually unfit for agriculture, industrial and domestic use and to future socio-economic imbalance and ill health. A major source of pollution includes lack of sanitation facilities leading to open defecation. Most of the slums without any sewerage system tend to make the rivers an open sewer.

2.1.3 Dhobighats

Kanpur has following 4 constructed Dhobighats and 4 river-bank ghats.

Sr. No.	Name of Existing Constructed Dhobighat
1	Gola Ghat
2	Bhairon Ghat
3	Juhi Bamhuria
4	Juhi Parampurwa

Health Condition and Risks

The protection of health of the washermen does not seem to have been a matter of concern to any one, compared to the way concern has been shown by the government and the non-government organisations to the health hazards faced by the scavengers. The washer men collect soiled clothes from households, hotels, hospitals and other establishments for cleaning. These clothes may be soiled with pathogenic bacteria and other hazardous stuff.

Chemicals used by dhobis .i.e. detergents, solvents, bleaching agents, dyes, cause various diseases including skin diseases. Common diseases prevalent among the dhobis include Dermatitis, Eczema, Throat Irritation, Dizziness, Chronic Bronchitis, Asthma, Amoebiasis, Gastroenteritis (Diarrhoea & Dysentery), Worm Disease (Ascariasis), Hook worm Disease (Ankylostomiasis), Anemia, Conjunctivitis, Cataract, Miscarriage, Typhoid, Malaria and dengue

Environmental Status

The waste water from the Dhobighats goes directly into the open drains without any treatment and the Dhobighats do not have adequate toilet facilities. Disposal of waste water without any preliminary treatment to the drains finally finds its way to the river, contributing to the river pollution. The lack of toilet facilities at the Dhobighats also leads to open defecation or urination. The general maintenance of the ghats was found to be poor, the Nagar Nigam is responsible for the overall management of these ghats, but the day to day maintenance is taken care of by their respective associations. Dhobighats do not have sheds for shelter, toilets, small drying space and resting place.

2.2 INSTITUTIONAL AND LEGAL ASPECTS

This section presents a review of the existing institutional and legal framework that exists at the National and State levels. In order to meet the ultimate objective of “Pollution Abatement in River Ganga”, the institutional and legal framework at the two levels essentially require close co-operation. For example, whilst the support from the National River Conservation Directorate (NRCD) under the Ministry of Environment and Forests (MoEF) to the Uttar Pradesh Government focuses on improving the collection and transmission of waste water through trunk sewers to waste water treatment plant(s), the various state level agencies have the mandate to develop/augment/strengthen sewerage networks (the “branches”) in different localities, directly influencing the water quality in the rivers, and their connection to the trunk sewers. For overall abatement of pollution in the rivers the two development processes should work in a coordinated manner.

The laws and regulations at National and State Levels are briefly presented in the subsequent sections:

▪ National Level

- Water (Prevention and Control of Pollution Act) 1974 (amended in 1988);
- Solid Waste Management: The Municipal Solid Wastes (Management and Handling) Rules, 2000;
- 74th Amendment to the Indian Constitution, 1992;
- The Employment Of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993

-

▪ State Level

- The U.P Slum Areas (Improvement and Clearance) Act, 1962 (amended in 1986);
- The U.P. Water Supply and Sewerage Act, 1975;
- Uttar Pradesh Municipal Corporation Act 1976

2.2.1 National and State Level Laws and Regulations

National Level Laws and Regulations

Water (Prevention and Control of Pollution Act) 1974 (amended in 1988) : *The Water (Prevention and Control of Pollution) Act 1974 resulted in the establishment of the Central and State level Pollution Control Boards whose responsibilities include managing water quality and effluent standards, monitoring water quality, prosecuting offenders and issuing licenses for construction and operation of certain facilities. Under this Act, the sewage must be treated before being discharged into the river. Hence for CTCs, treatment is obligatory before being discharged into river/land.*

Solid Waste Management: The Municipal Solid Wastes (Management and Handling) Rules, 2000 : *The Solid Waste Management and Handling Rules were notified by the Central Government by exercising its powers conferred under the sections 3, 6 and 25 of EPA. These rules are applicable to all municipal authorities responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes. According to these rules, every municipal authority, within its area of jurisdiction, shall be responsible for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes. The Rule stress upon the need for decentralization of solid waste management and hence more pro-active role of community based organizations (CBOs).*

74th Amendment to the Indian Constitution, 1992: *The Constitution of India was amended (74th Amendment Act) in 1992 to incorporate a separate Chapter on “Urban Local Bodies” (ULBs). Some of the salient features of this amendment are as hereunder:*

- ULBs, to be known as Municipal Corporations, Municipal Councils or Nagar “Panchayats”,

depending on the population of the urban area, shall be constituted through universal adult franchise in each notified urban area of the country;

- The Legislature of a State may, by law, entrust these bodies such powers and authority as may be necessary to enable them to carry out “functions”, including those listed in the Twelfth Schedule, as an Institution of Local Self Government; Slum improvement and upgradation is one of the important aspects listed in The Twelfth Schedule of the Constitution;

The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993: The Act was enacted by the Parliament on the authority of State Legislatures of Andhra Pradesh, Goa, Karnataka, Maharashtra, Tripura and West Bengal. Subsequently it was adopted by other States. The Act prohibits the construction and maintenance of dry latrines and employment of person for manual scavenging of human excreta.

Violation of the Act shall be a cognizable offence, with imprisonment for a term which may extend to one year.

Water Quality Standards: Central Pollution Control Board (CPCB) has categorised surface water into the following categories as follows:

- Class A: drinking water source without conventional treatment but after disinfection;
- Class B: outdoors bathing (organized);
- Class C: drinking water source with conventional treatment followed by disinfection;
- Class D: propagation of wildlife and fisheries;
- Class E: irrigation, industrial cooling and controlled waste disposal;

There should be no visible discharge of domestic and industrial wastes into Class A waters. In case of Class B and C waters, the discharge shall be regulated/treated to ensure maintenance of the stream standards.

Ground water quality is required to meet the standards for drinking water specified in IS: 10500: Specifications for drinking water.

State Level Laws and Regulations

The U.P. Slum Areas (Improvement And Clearance) Act, 1962 [U.P. Act No. 18 of 1962 as amended up to U.P. Act 23 of 1986] : This Act provides for the improvement and clearance of slum areas, rehabilitation of their residents and protection from eviction of tenants of such areas. The act also makes encroachment of government lands a cognizable offence.

The U.P. Water Supply and Sewerage Act, 1975 [U.P. Act No. 43 of 1975] : This act provides for the establishment of a corporation, authorities and/or organization for the development and regulation of water supply and sewerage services, and for all matters therewith. It also relates to establishment, conduct of business, functions and powers of the Nagar Nigam's and Jal Sansthans, all of which have a definite role in providing sanitation in the cities.

Uttar Pradesh Municipal Corporation Act, 1959 [UP Act No.11 of 1959 amended by UP Act No. 12 of 1994] : The UP Municipal Corporation Act governs the Municipal Corporation (MC) of the city and the Water Supply and Sewerage Act governs the Jal Sansthan. These two bodies perform their respective functions as defined in the acts but recently the 74th Constitutional Amendment has been put in place which makes it necessary for some changes to be made in existing structures that govern Kanpur. This Act was amended by UP Act No. 12 of 1994.

2.2.2 Institutional Framework

The water and sanitation services at city level are implemented by UPJS, UPJN and Kanpur Nagar Nigam, of these Nagar Nigam has the direct responsibility for all services and construction activities

related to water and sanitation. State Urban Development Authority (SUDA) is the apex, policy making and monitoring agency for the urban areas of the UP State. The field work is done by District Urban Development Authority (DUDA), Kanpur in their respective districts, which includes development of slum communities, construction of CTCs, assistance in construction of IHLs, creation of awareness etc. Figure 2.1, depicts the relationship of these organizations in connection with water and sanitation in the realm of community-based programmes.

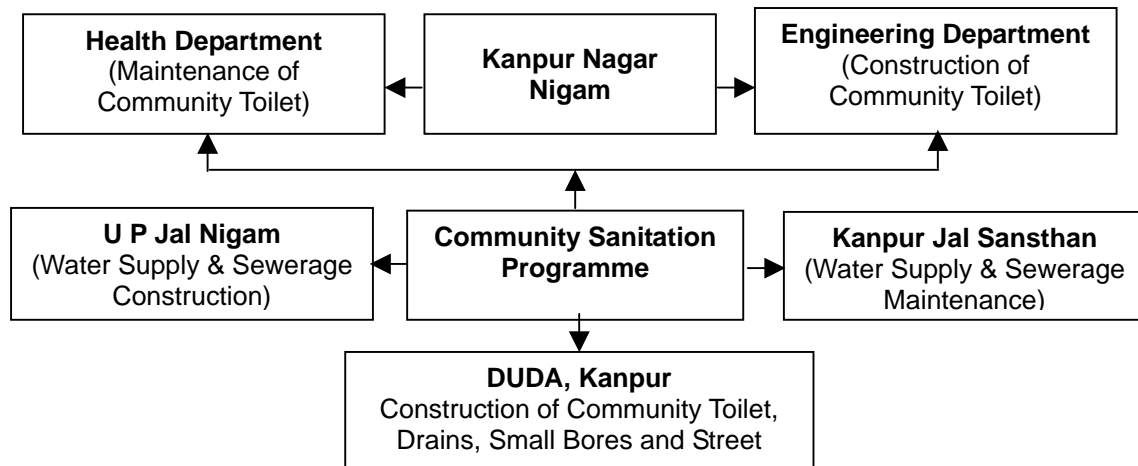


Figure 2.1 Role of Various Agencies in Relation to Water and Sanitation Services

State Urban Development Authority (SUDA)

SUDA is responsible for providing overall guidance to DUDA for implementation of community development programmes related to water and sanitation. State Urban Development Authority (SUDA) is the apex, policy making and monitoring agency for the urban areas of the UP State. SUDA provides overall guidance to DUDA for implementation of community development programmes related to water and sanitation. The implementation work in the field is done by District Urban Development Authority (DUDA) in their respective districts.

District Urban Development Authority (DUDA), Kanpur

The responsibilities of DUDA in terms of slum development activities include

- Development of slum communities
- Construction of community toilets in slums;
- Assistance in construction of IHLs.
- Construction of drains and small bore sewers in slums;
- Upgradation of streets and roads; and
- Coordination with Community Development Societies (CDSs) for awareness building and community participation.

Although there is overlap in the nature of works carried out by DUDA and Kanpur Nagar Nigam, the activities of the Nagar Nigam are limited to the areas over which their jurisdiction extends. DUDA takes a district level viewpoint, which includes new areas of development.

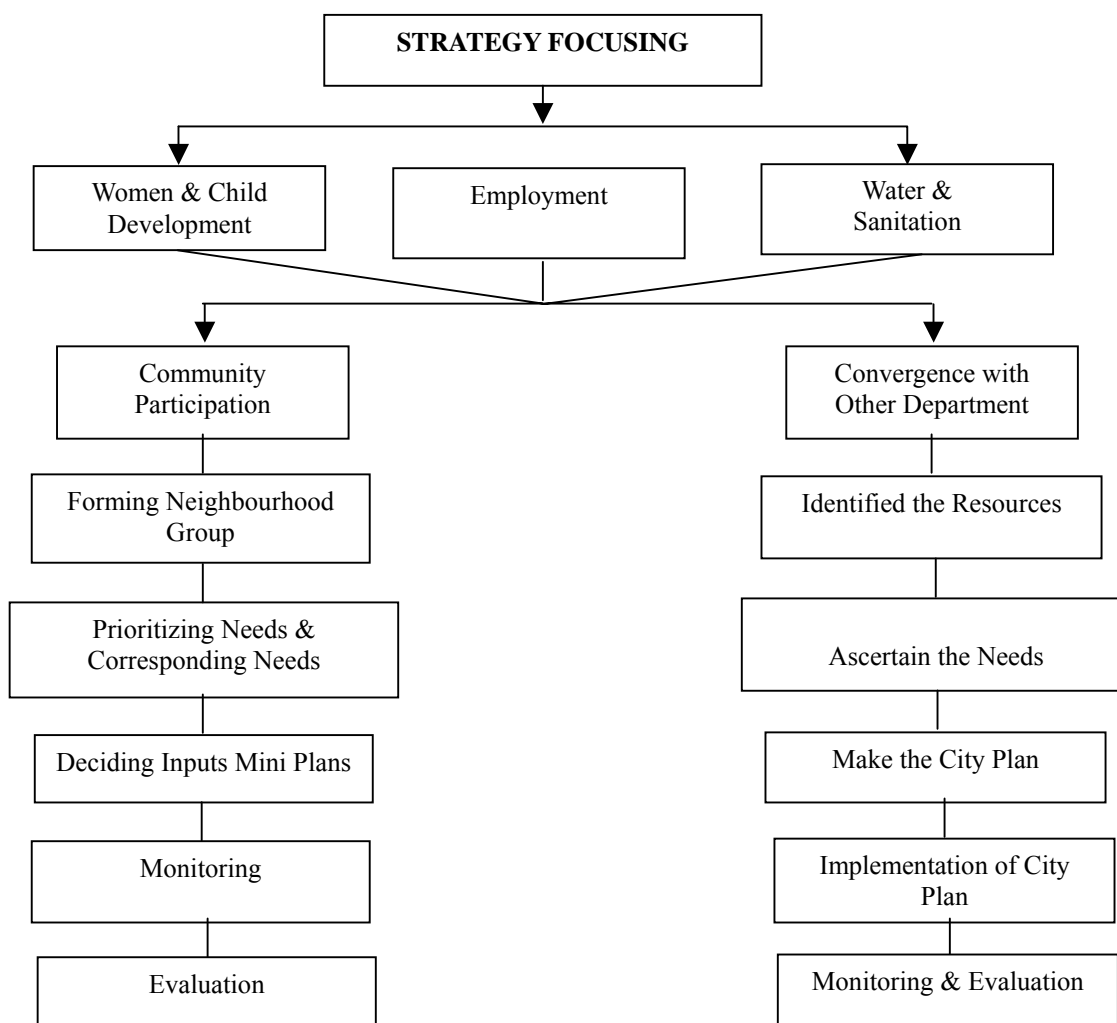


Figure 2.2 Focus Areas of SUDA

Kanpur Nagar Nigam

Figure 2.3 depicts the organizational structure of Kanpur Nagar Nigam. In Table 2.2, the responsibilities in relation to water and sanitation services under Nagar Nigams are listed in terms of the responsible departments within the Nagar Nigam.

Table 2.2 Responsibilities of Different Departments within the Kanpur Nagar Nigam

Activity	Responsibility
Construction of community toilet facilities in the slum areas	Engineering Department
Operations and Maintenance of community toilets	Health Department
PP/PA programmes related to public health	Health Department
Women and Child Development	Welfare Department

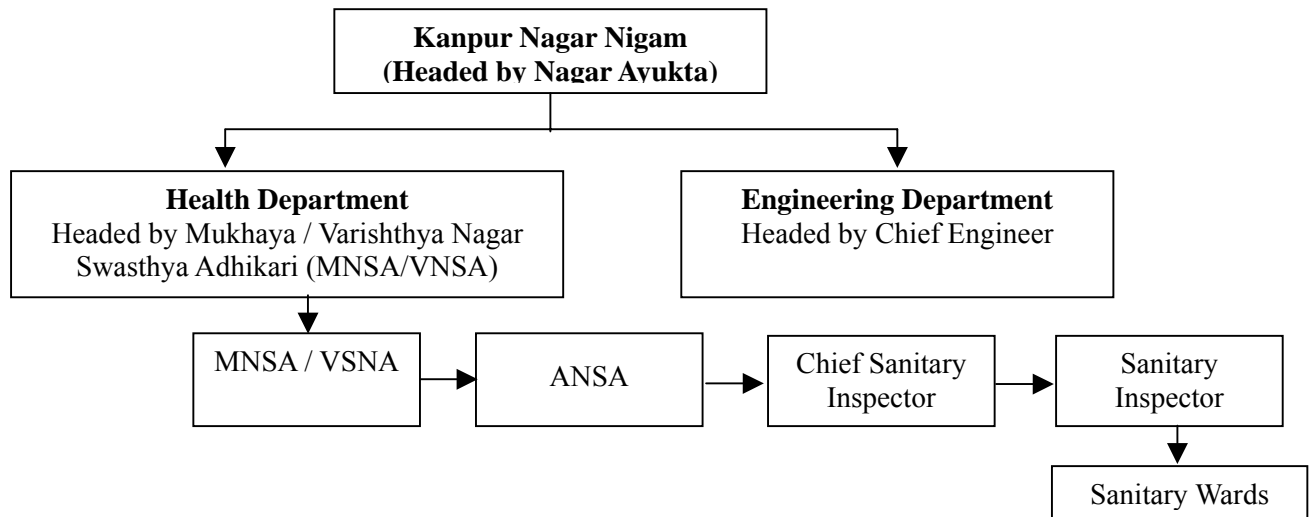


Figure 2.3 Organisational Structure of Kanpur Nagar Nigam

The other agencies/departments/authorities who are directly related to urban development activities at State/district/city levels are presented in Table 2.3.

Table 2.3 Other Key Organizations related to Urban Development and their Responsibilities

Organization	Responsibility(ies)
Uttar Pradesh Jal Nigam (UPJN)	Construction of water supply and sewerage network for the cities and rural areas
Kanpur Jal Sansthan (KJS)	<ul style="list-style-type: none"> ▪ Provision of supply of potable water ▪ O&M of water supply and sewerage networks
Kanpur Development Authority (KDA)	Development of new areas and provision for housing for Kanpur city
Non-Conventional Energy Development Agency (NEDA)	<ul style="list-style-type: none"> ▪ Nodal agency for promotion and development of non-conventional energy sources in Uttar Pradesh ▪ Development of a new set of energy alternatives to supplement the growing energy needs

2.2.3 Relevant CBOs, NGOs and Local Associations

Community-Based Organizations

The various community-based organizations form the last, but probably the most critical link between the authorities and programme implementing agencies. These organizations are involved in community development activities and therefore, play the role of “catalyst”. Their position is vital to the success of future low cost sanitation programmes in the target cities. These organizations typically have a four tiered structure:

- Community Development Societies (CDSs) – comprising of 2000-2500 families
- Neighbourhood Committees (NHCs) – comprising of 200-250 families
- Resident Community Volunteers (RCV)– comprising of 20-25 families
- Neighbourhood Groups (NHGs) – comprising of 20-25 families

Community Development Societies

CDSs or Samudai Vikas Samitis comprises of 10 NHCs representing a total of 2000-2500 families. These societies or samitis are created among communities to empower women in the decision-making process and enable them to put forward their needs and demands. The number of registered CDS or samitis in Kanpur is 26. Typically, each “samiti” has 20 members, all women, and is headed also by a woman. Meetings are held every month and proposals for funding are presented to the “Nagar Ayukta” for possible financial support. These “samitis” also network with the Health Department of the Nagar Nigam Kanpur and other urban development organizations. The duties attributable to the “samitis” include:

- Identification of beneficiaries;
- Preparation of community plans and mobilizing resources;
- Monitoring of repayment and recovery;
- Liaise with Governmental and non- governmental agencies; and
- Creation of community assets and maintenance of the same.

Neighbourhood Committees

NHCs comprise about 10 Resident Community Volunteers (RCVs). They are responsible for identifying the local “problems”, motivating the NHGs and developing community-based credit thrift societies. They also facilitate the process of identifying the training needs and capacity building programmes.

Neighbourhood Groups

NHGs comprise women from 20-25 households with a RCV as its head. They facilitate the processes related to:

- Planning, implementation and monitoring of activities at the cluster level;
- Formation of credit and thrift society; and
- Collection of household data

2.3 EXISTING PROGRAMMES / PLAN AND ACTIVITIES (DUDA, NN, HUDCO)

2.3.1 Low Cost Sanitation Programmes & Plan

National Slum Development Programme (NSDP)

Under National Slum Development Programme, Additional Central Assistance (ACA) is being released to the States/UTs for the development of urban slums. The objectives of this programme is upgradation of urban slums by providing physical amenities like water supply, storm water drains, community bath, widening and paving of existing lanes, sewers, community latrines, street lights etc. Besides the funds under NSDP can be used for provision of community infrastructure and social amenities like pre school education, non formal education, adult education, maternity, child health and primary health care including immunization etc. The programme also has a component of shelter upgradation or construction of new houses. An amount of almost 400 million INR was released under this program for the state of Uttar Pradesh.

Major Constraints

Field survey identified a number of constraints for the project. Constraints were technical, institutional, community related constraints, constrains of facilities etc. For successful implementation of the project following constraints need to be dealt with effectively.

Pre-Construction and Construction Stage Constraints

Technical constraints: Non-availability of sewerage in affected areas, and where available, inadequacy of capacity because of which designs could not be integrated with the most preferred option of final disposal.

Availability of Space: Availability of space is major constraint despite large open spaces lying unused in several parts. Series of discussions with Nagar Nigam, Government departments and Developmental Authorities would be necessary to finalise sites for project especially if it include resumption or acquisition of land. This will however involve resettlement of evicted residents

Support Services: For sanitation programme to be successful sufficient water supply is a must, without which well-designed CTCs would be ineffective very soon. Irregular electric supply is another constraint which hinders people from using the constructed facility at night, specially the women and children. It also hinders pumping of water for cleaning purpose.

Operation and Maintenance Constraints

Operation and maintenance of CTCs existing in slum areas causes serious problems. The amount collected through user-charges are not sufficient to sustain the operation.

Apart from these constraints, there is no proper institutional mechanism for supervising day to day maintenance and also absence of periodical monitoring by concerned agencies. The related institutional and community constraints are discussed below:

Institutional Constraints

No effective interaction between two government agencies working for slums i.e DUDA Kanpur and Kanpur Nagar Nigam.

No coordination between government and community. There is no mechanism by which either DUDA or Nagar Nigam gets feedback relating to satisfaction of community

Community Constraints

Communities have less belief in organisation like Nagar Nigam despite of the fact that its Council is an elected body, as they have failed to provide adequate sanitation facilities.

Difficult to change social habits like open defecation

Mobilising community is a tedious process which becomes complicated due to heterogeneous mix of city slums.

2.3.2 Dhobighats

Facility Constraints

The followings explain constrains of existing constructed Dhobighat in Kanpur.

Existing Constructed Dhobighat	No. of unit	O&M organization	Problems
Gola Ghat	15	Dhobi	Two platform is available, in each platform are five tanks installed, but out of all tanks only two tank are in good condition and other tanks having leakage problems. Only first tank is working condition but water pressure is very low. Electricity, toilet room etc. is not available, so people are going to Ganga River for washing cloth. No arrangement for cleaning the ghat. Electricity & water supply is not available.
Bhairon Ghat	110	All India Dhobi Association	Out of 110 units 25-30 are working condition and surrounding area is very dirty. Toilet is broken, no arrangement for electricity. Maximum tank/unit is not working. In the rainy season people cannot use the platform because the no roof. Nobody is coming to clean the ghat. Wastewater is disposed in nala.
Juhi Bamhuria	10	Nil	Dhobighat was constructed in the middle of the city near the pond. The condition is very bad. No arrangement for water in the tank. Surrounding of the ghat area is very dirty. Only washing tanks are available but no any arrangement in electricity, water, toilet and no arrangement for rainy season are available. If required facilities are given dhobis will use the ghat more.
Juhi Parampurwa	10	Nil	Dhobi ghat was constructed before 2 years by KNN but not in use, because the all ten tanks were found leakage.

O&M Constraints

Dhobis have their own O&M through their associations for which each member makes contribution. One of the important constraints relating to O&M in Dhobighats is the lack of funds. Water for washing clothes is another constraint. No assistance or guidance is provided by the Nagar Nigam. The wastewater generated is also directly discharged into the nearby open nala or pond.

CHAPTER 3
SITUATION ANALYSIS

CHAPTER 3 SITUATION ANALYSIS

3.1 ANALYSIS OF SANITATION IN SLUM

3.1.1 Baseline Environmental Status

As per the Environmental Management Plan for the water quality of Ganga in Kanpur was very poor with most of the water parameters exceeding the prescribed limits. The total load discharge of BOD load is of 59163.4 kg/d and SS load of 281863 kg/d. The CPCB Annual Report 2000 – 2001 also mentions that the BOD value was found highest at *Kanpur D/S* followed by *Varanasi D/S* and *Allahabad D/S*. The BOD values at *Kanpur D/S* increased from 6.2 mg/l to 10.4 mg/l during 1990 to 1999.

Ground Water Level and Quality : The depth of ground water varies from 10 m to 30 m in different areas. The analysis of ground water quality is given in Table in Appendix I. In most of the areas the water quality parameters including nitrates, total hardness and Fluorides is close to or exceeding the desirable limit in most of the cases compared to the permissible limits defined in per IS: 10500 (BIS 1991).

Geology and Hydrogeology: Kanpur Nagar district forms a part of Central Ganga plains and occupies the alluvial tract on the Western bank of river Ganga. The area is underlain by thick succession of unconsolidated sediments of Quaternary age, comprising silt, clay, sand of various grades, gravel and kankar in varying proportions, deposited over the undulating surface of basement rock (Granite).

3.1.2 Lessons from Existing Facilities and O&M Issues

An overview of LCS facilities in Kanpur

As per the DUDA figures there a total of 390 slums in Kanpur having a total population of 4.32 lakhs. There are total 366 CTCs situated in Kanpur out of which 139 CTCs are managed by Sulabh International, 137 by Nagar Nigam, 81 by NEDA and 12 by other agencies; 353 CTCs are in working condition and 13 are not working; 342 CTCs have adequate water supply and 14 do not have any source of water; 328 are electrified and 38 are not electrified; and 84 CTCs have septic tank, 215 are joined with sewer line, 45 have biogas plant and 9 have other disposal system.

The major constraints that affect the existing institutional framework are:

- Lack of availability of space for construction of CTCs and/or IHLs;
- Limited disposal options for the waste water as majority of areas are not covered by the existing sewerage system;
- Lack of sense of ownership among the residents - facilities are looked upon as something that has been provided by the government, and it is the government's responsibility to "run" the CTCs;
- Almost no involvement of the residents in design, location or O&M of the CTCs;
- Difficulty in maintaining facilities that are affected by poor quality of construction resulting in frequent breakdowns, and eventual non-functioning of the CTCs;
- Erratic power supply leading to non-functioning of pumps and thereby inadequate water supply affecting the cleaning of CTCs;
- Resistance to payment of user charges in certain pockets leading to inadequate financial resources for O&M - "why pay for poor facilities?"
- Lack of cohesiveness or coordination between different agencies in implementation of the LCS programmes;
- No mechanism for obtaining feedback from the users for any improvements;

The existing institutional mechanism for construction and O&M of CTCs is graphically presented in Figure 3.1.

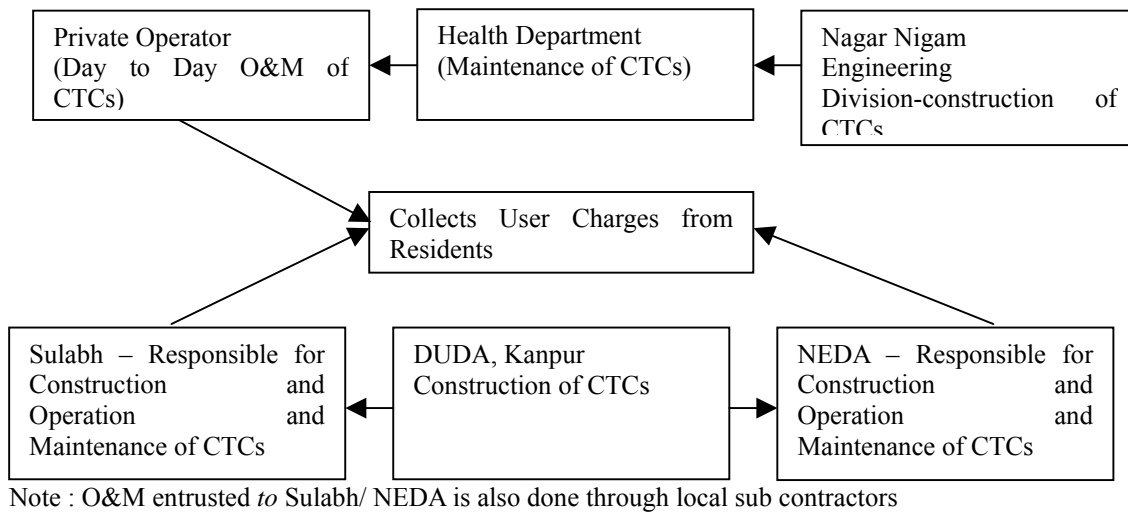


Figure 3.1 Existing Institutional Mechanism for CTC

3.1.3 Survey Details and Findings

Primary survey was carried out based on scientifically designed questionnaire covering 23 slums and 312 respondents i.e., almost 15 percent of the total slums in Kanpur. The slums for primary surveys were decided by the project team in close consultation with Nagar Nigam and District Urban Development Authority, Kanpur List of slums surveyed is given in Table 3.1 below.

Table 3.1 List of slums surveyed in Kanpur

Sr. No	Name of the Slum	Sr. No	Name of the Slum
1	Juhi Narayan Purva	2	Babu Purva
3	Baghi Bhatta	4	Bajpai Nagar
5	Bhairon Ghat	6	Deviganj
7	Fazalganj	8	Ghaukheda
9	Gola Ghat	10	Gwal Toli
11	J.K. Tample	12	Jajmau
13	Juhi Narayan purva	14	Juhi Param Purva
15	Kalyanpur Kala	16	Lohran Bhatta
17	Manohar Nagar	18	Mohan Lal Park
19	Nai Chungi	20	Naramau
21	Naya Purva	22	Sahab Nagar
23	Sundar Nagar		

(1) Analysis and Outcome of Sample Survey of LCS

In order to assess the need and demand for LCS facilities in the slums, and to identify various issues and concerns of the slum dwellers pertaining to LCS, a combination of quantitative and qualitative assessment techniques were used. The techniques used for the current study include different participatory methodologies, focus group discussions (FGDs), workshops with different stakeholders, and structured interview schedule.

While the Participatory methodologies were used to get a qualitative insight of the issues and concerns

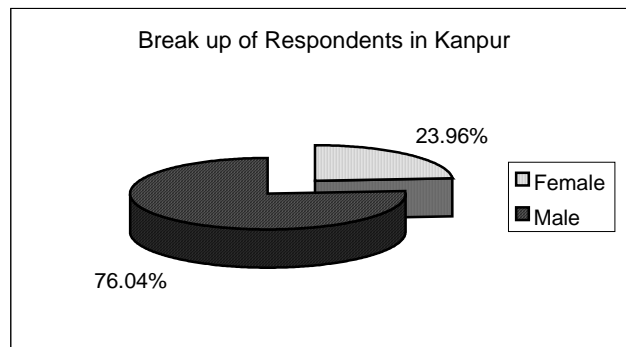
of the inhabitants, and their preferences and priorities for the LCS programme, the interview schedule was used to get in-depth quantitative information about the inhabitants, their socio economic profile, availability of infrastructure, sanitation details, and their capacity and willingness to pay for the preferred service. The results of the assessment were used to derive the most appropriate and sustainable solution for the community.

The primary surveys exhibits that in Kanpur approximately 40 % of the respondents use CTC. Our primary survey also reveals that Kanpur city has maximum number of user of CTC as compared to the cities of Allahabad and Lucknow. At several locations such as J.K. Temple and Bhairon Ghat, 100% of the respondents use CTCs and in some areas such as Bajpayee nagar, Kalayanpur and Sunder Nagar where 100% of respondents do not use CTCs for any of the purposes.

(2) Quantitative Assessment

1) Respondent's Profile

The percentage of male and female respondents was 76% and 24% respectively.



2) Literacy Level

Survey indicates that the literacy level in slums in Kanpur is almost 50% as compared to city's average of 74%. This is mainly due low literacy due to poor economic status of people residing in slums.

Table 3.2 Level of Education among the Respondents

Educational status	
10th pass	13.11%
11th pass	0.32%
12th pass	0.00%
8th Pass	10.87%
Below Pri Status	14.69%
Graduate	3.50%
Inter mediate	0.32%
Literate	3.50%
NA	0.95%
Other	0.95%
Post graduate	2.24%
Literate	50.43%
Illiterate	49.51%

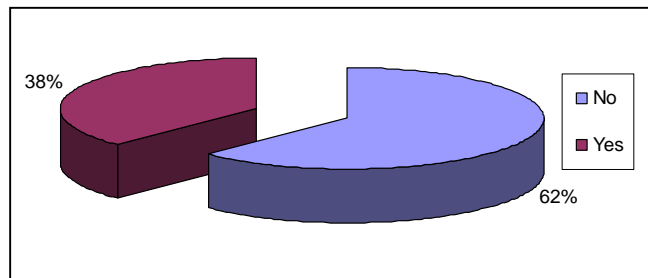
Source: Primary Survey, October 2004

3) Monthly Income

Monthly income of the family is an indicator of ability to pay for the services. However it was observed during the survey that most of the respondents were hesitant to disclose correct information about their household income. Survey results showed that the respondents in slums of Kanpur the average household income was about Rs 1891.

4) Use of Community Toilet Complexes

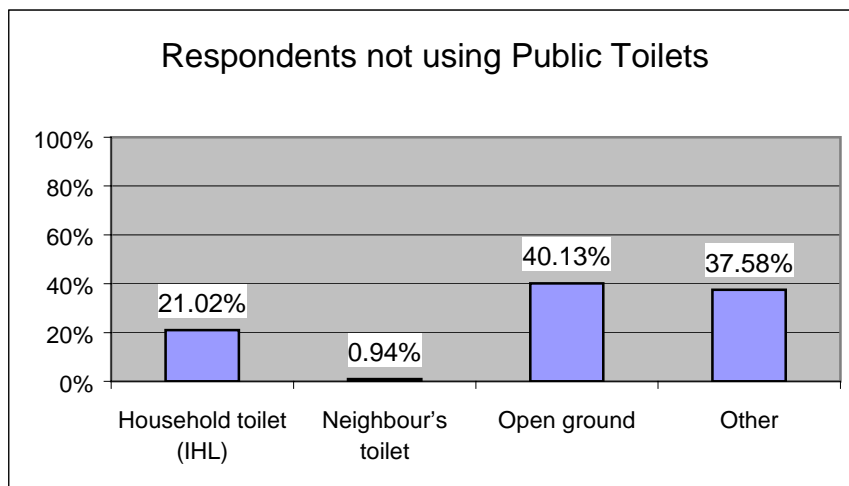
Number of respondents using CTC is one of the indicators for determining the need for construction of CTCs. Kanpur has the maximum number of respondents using CTCs (37.70%) out of the three cities studied.



Source: Primary Survey, October 2004

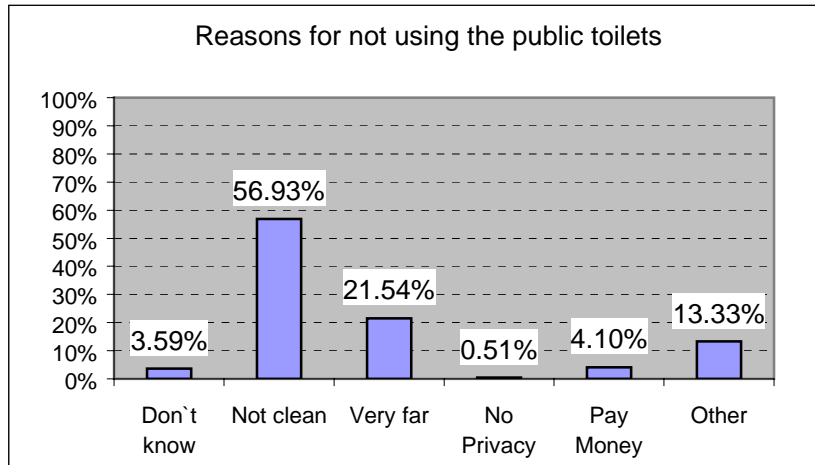
5) Respondents not using Public Toilets

From the following graph it can be concluded that about 24.8 % (62 % x 40 %) of the slum dwellers carry out open defecation, as it can be assumed that half of the respondents giving “other” answer actually carry out open defecation and did not admit in surveys



In JK Temple, Bhairon Ghat maximum people use CTCs (100%) and Juhi Narayan Purva has a utilisation of about 75%. Bajpai, Kalyanpur Kala, Nai Chungi and Sunder Nagar have almost no usage of CTCs among the slum dwellers.

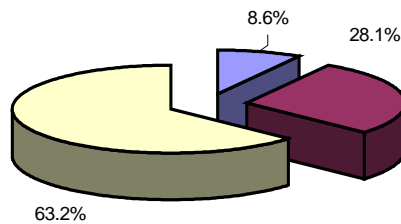
Various reasons alongwith the percentage for non usage of existing CTCs are given the following graph.



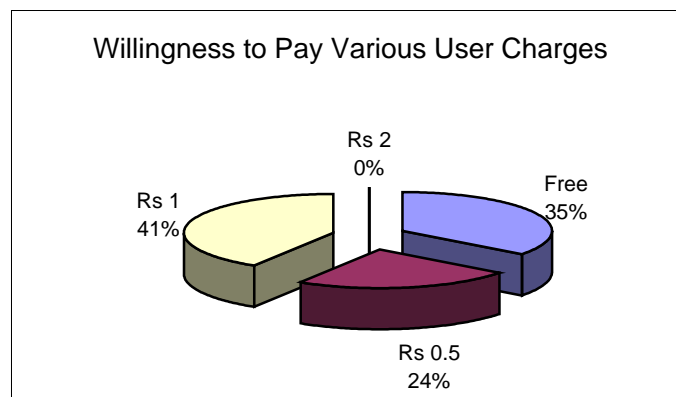
Source: Primary Survey, October 2004

CTCs not being clean are the main reason for not usage of toilets, residents of Lohran Bhatta and Deviganj cleanliness as the main reason for not using CTCs. About 63 percent of respondents in the slums are willing to participate in the Operation and Maintenance Activities of the CTCs as shown in following graph.

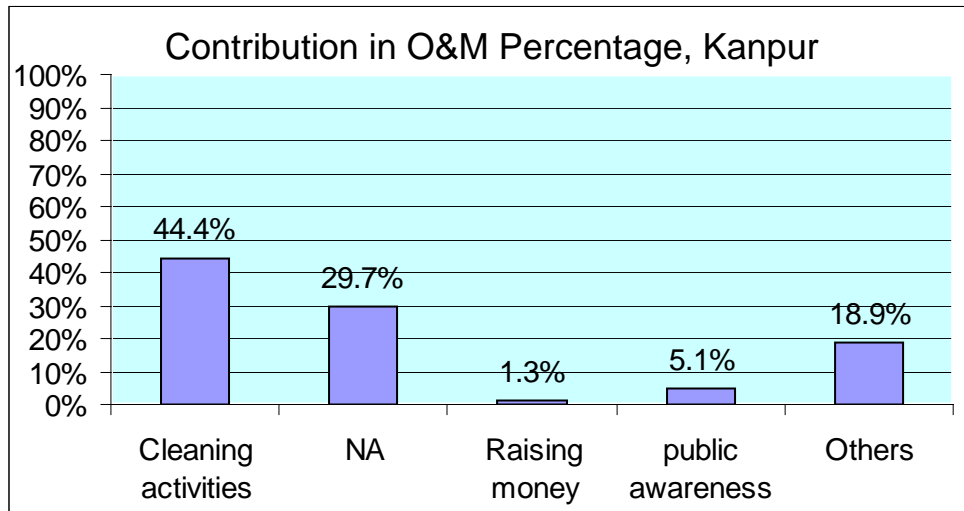
Willingness to Participate in O&M



About 35 percent of users want the CTC services to be free of cost and about 65 percent are ready to pay user charges. About percent of the non users are willing to pay more than Re 1, as seen in the following graph:



The various ways in which the respondents are willing to participate in O&M activities with about 44 percent are willing to contribute in cleaning activities, all the residents of Juhi Narayan Purva, Bajpai Nagar, Manohar Nagar, Nai Chungi and Sundar Nagar want to contribute in cleanliness.



6) Community Health

The most prominent disease being Dermatitis, Scabies, Bronchitis, Anemia, Poliomyelitis, Encephalitis, Tuberculosis, Lung Cancer & Asthma, Amoebiasis, Gastroenteritis, Diarrhoea, Dysentery, Worms Manifestation Disease (Ascariasis, Tape worm), Hook worm Disease (Ankylostomiasis), Conjunctivitis & Cataract, Typhoid, Filariasis & Malaria, Dengue etc. There is also high Infant Mortality, Miscarriage and Malnutrition

Therefore preparation of action plans for sustainable development, abatement of pollution and restoration of the purity of natural resources for cleaner and healthy environment. Therefore health education and awareness has to be incorporated with any development plan if we want to derive success from it.

Health Planning at every level to minimize deficiency in preventive measures and providing safe water supply, clean surroundings, and environment will help in reducing the problems.

(3) Observations

- Kanpur has the maximum number of respondents using CTCs (37.70%) of all the three studied cities.
- Out of the total 312 respondents, the split between male and female respondents is 3:1;
- The average literacy rate in the slums surveyed is only 50 per cent as against the city average of 74 per cent, as per Census 2001. The main contributing factors are poor economic conditions and lack of access to educational facilities. In case of slums at Bajpai Nagar and Sunder Nagar literacy is the highest;
- Monthly income of a household is an indicator of ability to pay for the services. During the survey, majority of the respondents were unwilling to disclose correct information about their household income; the average monthly income is estimated at Rs. 2018 approximately;
- The present usage level of public toilets is one of the indicators for determining the need for construction of CTCs. In case of Kanpur, most of the respondents (> 62 per cent) do not use public toilets. They have their own toilet (IHL), or use their neighbour's toilet, or simply go for open defecation. When asked the reason for not using the existing public toilets, majority of the residents felt inhibited in giving a clear answer. The usage level in localities such as JK Temple, Bhairon Ghat the usage of public toilet is almost 100 per cent. In case of localities such as Bajpai, Kalyanpu Kala, Nai Chungi and Sunder Nagar all the residents use open grounds for defecation.
- Almost all residents in slums, when asked to choose between IHL and CTC preferred the former as, in their perception, the O&M of CTCs was difficult, a view point probably borne out of the existing situation in terms of lack of cleanliness. However, almost 56 per cent of the

present non-users are willing to pay for use of public toilets provided the quality of service delivery (e.g. cleanliness) meets their expectations. 63 per cent of the respondents are willing to participate in the O&M of CTCs. Besides the willingness to pay user charges, there are a variety of ways in which the respondents are willing to participate in O&M activities. This includes cleaning, mobilizing collection of funds and initiating public awareness.

- Majority of the respondents (62 per cent) were aware of the environmental pollution caused by open defecation. Very few slum residents were aware of the direct linkage between the open defecation and health hazards.

3.1.4 Summary of Findings

Need for toilets required in the slums can be calculated by assessing the number of households practicing open defecation. The analysis of primary data revealed that of all the people not using CTCs almost 61% of respondents use open ground for defecation that must be prevented to improve slum sanitation and consequently control river pollution. Even allowing for sub-optimal use of CTCs, there is substantial need for LCS either through IHLs or CTCs.

Need for upgradation can be quantified by knowing the percentage of respondents who are not satisfied with the existing level of service and expressed a need for better operation and maintenance through various means. Maximum respondents do not use existing CTCs due to the distance factor followed by cleanliness. A vast majority of respondents (~50%) preferred not to answer the question. This is due to their reluctance to say anything, which possibly suggest consciousness of impropriety of the practice. Hence it can be concluded that distance of CTC and cleanliness i.e. proper operation and maintenance is must for ensuring optimal utilisation and sustainability of assets created.

Demand for the service is linked to individuals or households preference for the service. In order to sustain operation and carry out necessary maintenance, willingness to pay for the service or participate in some other way such as shramdan or community service is most crucial. It can be inferred from primary survey that majority of the respondents are willing to participate in operation and maintenance. This is also in consonance with reported willingness to pay for operation and maintenance which is about 70% for Kanpur. But since the sustainability of operation can only be achieved if the user charge is Rs. 1.0 or more which is only 27%.

The demand for CTCs is also substantiated as maximum percentage of respondents are willing to contribute in different ways like cleaning activities, raising money, creating public awareness for operation and maintenance.

Availability of space in their houses for construction of IHLs is a major constraint for slum residents. This clearly underscores the need for CTCs. Various participatory techniques need to be applied in further increasing willingness to pay for service.

3.2 ANALYSIS OF DHOBIGHATS IN KANPUR

Kanpur city has total 8 Dhobighats, 4 constructed and 4 traditional which include the following:

Constructed Dhobighat

- 1 Gola Ghat (not in use)
- 2 Bhairon Ghat
- 3 Juhi Bamhuria
- 4 Juhi Parampurwa

Traditional Dhobighat

- 5 Gola Ghat
- 6 Bhairon Ghat
- 7 Maskat Ghat
- 8 Koyala Ghat

Source : JICA Data

3.2.1 Baseline Environmental Status

The baseline environmental condition of the Dhobighats in Kanpur is similar to the ones in the slums as described earlier in this chapter. The environmental considerations specific to Dhobighat are related to the use of water, consumption and discharge of chemicals contained in soap, detergent and other materials used in the process, and the impact of the activities on the health, especially the skin of the washer men.

In case of constructed Dhobighats the wastewater is discharged into an adjoining drain which discharges untreated water into Ganga River, whereas traditional riverside Dhobighats all the washing activities are carried out on the river bank.

3.2.2 Survey Details and Findings

Generally, the washer men carry out preliminary activities at their homes. The earlier practice was to add some reh (alkaline soil) and put the clothes in a Bhatti (steam vessel). This practice, although being still used, is giving way to the use of detergents for soaking the dirty linen. The cubicles of the existing constructed dhobi ghats are only partially utilised. Reasons stated for under-utilization of the cubicles range from inadequate or uncertain supply of water to availability of more convenient alternative of temporary ghats along the river.

(1) Selection of Study Area

The approach adopted for the study was participatory in nature. The methodology included detailed consultation with the stakeholders including officials from Nagar Nigam and DUDA Kanpur, Nagar Nigam, etc. Three out of total eight Dhobighats have been surveyed covering 27 Dhobis. The respondents were selected on the basis of purposive random sampling. The selected Ghats for sample survey are stated below:

Constructed Dhobighats

- Bhairon ghat
- Juhi ghat

Traditional Dhobighats

- Gola ghat

(2) Tools of the Study

The data was collected from primary and secondary sources. The primary data was collected by interview schedule (format used is annexed in Appendix B), observation guidelines and 'focus group discussions' (one of PRA methods). This helped the team in the collection of qualitative and quantitative data. In 'focus group discussions' the stakeholders, opinion leaders and other formal elected members of their Panchayat had participated in the discussions to explain their perceptions on different issues for formulating and articulating the alternative strategies to solve their problems. Secondary data were collected from Nagar Nigam, Jal Nigam, census 2001, DUDA and Kanpur Development Authority.

(3) Analysis of Data in Qualitative Frame of Reference

The findings of the structured interview schedule have been substantiated with the information gathered through focused group discussions (FGDs) conducted with the members of local population in the target areas. During FGDs the people were encouraged to air their point of view about the requirement and use of Dhobighat. Almost all the FGDs had more than 50 respondents. It was observed during the discussions that most of them are not satisfied with existing condition of Dhobighats. They are willing to contribute towards the construction of dhobighats. Most of them are of opinion that ghats should be managed by their associations only. Majority of respondents were male

who operated at Dhobighat with women participating in the activities like pressing the clothes at home. The literacy rate among the male (53.3 per cent) is higher than that of female (39.2 per cent). The literacy percentage in the study area is given in Table 3.3:

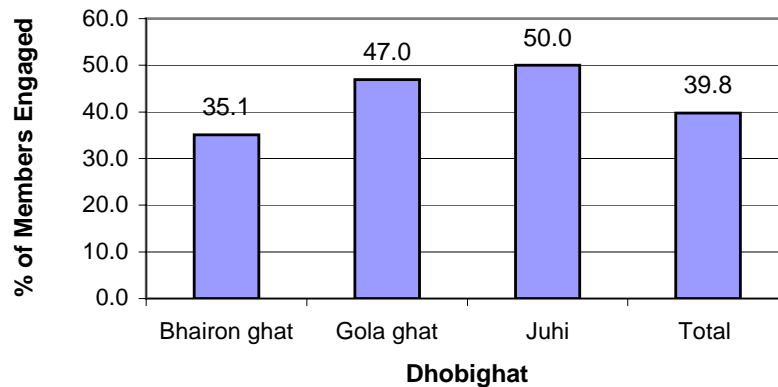
Table 3.3 Literacy Rate among the respondents

Sex	Percentage Literates
Male	53.3
Female	39.2

Source : Primary Survey, October 2004

The following graph indicates that the almost 39.8 per cent of the total family members of the respondents are engaged in washing clothes. Field survey revealed that average number of family members engaged in washing activity is largest in Juhi, followed by Gola Ghat and least in Bhairon Ghat.

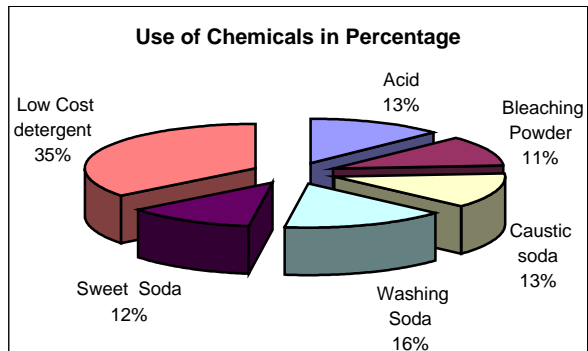
Percentage of Family Members Engaged in Washing



Source : Primary Survey, October 2004

1) Use of Detergents and other material in washing clothes

Washing material used by the Dhobis includes diluted acids, bleaching powder, caustic soda, soap, detergents and soda. The following pie chart presents break up of various chemicals in washing..



Source : Primary Survey, October 2004

2) Sources of water and Disposal

The source of water for the three ghats surveyed is either from a bore-well, water pumped from river Ganga and river Ganga. The wastewater in case of constructed Dhobighats is disposed in open drains/nalas in the vicinity or into river Ganga.

Area	Source of water		
	Bore well	River	Directly Pumping from river Ganga
Bhairon ghat			▲
Gola ghat		▲	
Juhi	▲		

Source : Primary Survey, October 2004

3) Membership of Association

The Dhobis are not as much organised in case of Kanpur as compared to other two cities – only about 37% are members of any Dhobi association. An Association plays a significant role in the integration of the community. An association is a forum for Dhobis to collectively address or raise their issues through dialogue with the concerned local body. It also plays a significant role in solving intra-community disputes.

Table 3.4 Membership of Association, Kanpur

Area	No	Yes
Bhairon ghat	1	4
Gola ghat	12	6
Juhi	4	
Total	15	10

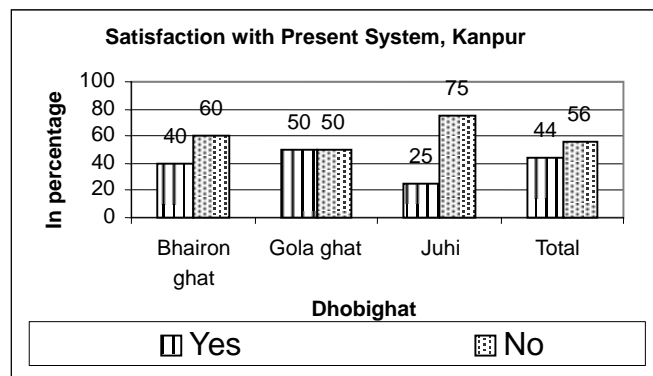
Source : Primary Survey, October 2004

4) Amount Charged per Item of Clothing

There is no uniform pattern in the amount charged per item of clothing, varying from Rs. 1.5 to Rs. 12. The higher charges per item can be related to the beddings, curtains etc from hospitals and hotels. According to the Dhobis, they find it difficult to increase the charges per piece of cloth washed due to the resistance from their customers.

5) Satisfaction with the Present System

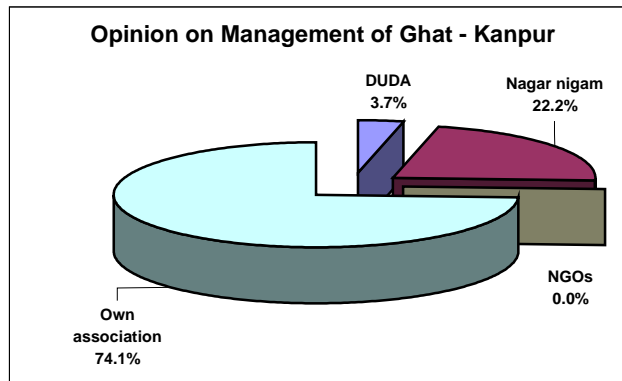
Satisfaction with the level of facilities at the Ghats is more in case of constructed Dhobighats (61.6 per cent) than the Traditional or Riverside Ghats (55.1 per cent). Majority of the respondents are not satisfied with the present level of facilities provided at the ghats (~56%), except Gola Ghat (~50%).



Source : Primary Survey, October 2004

6) Management of Ghats

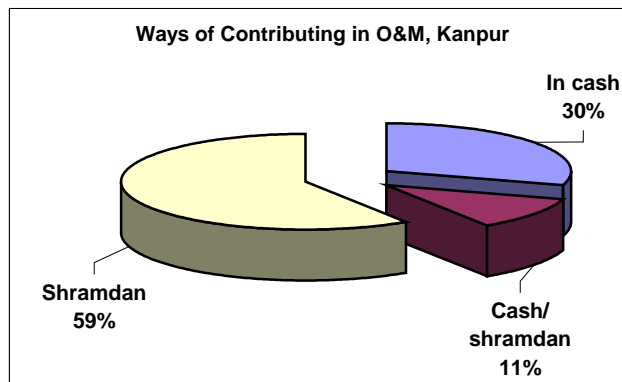
Majority of Dhobis (74 per cent) want their own association to manage the Ghat, whereas none would prefer NGOs managing the Ghats in Kanpur.



Source : Primary Survey, October 2004

7) Willingness to Contribute in Improvement of Dhobighats

All the respondents are ready to contribute in improvement of the Ghats, out of which about 59 per cent of Dhobis are willing to contribute by Shramdan and about 30 per cent in cash.



Source : Primary Survey, October 2004

3.2.3 Lessons from Existing Facilities and O&M Issues

Nagar Nigam is responsible for the overall management of the Ghats but the Operation and Maintenance is actually taken care of by the respective associations. The maintenance of the Ghats was found to be very poor in case of Kanpur. Majority (~73.1 per cent) of the respondents are of opinion that the Ghats should be managed by their own association i.e. continuation of the present practice.

In general, the existing constructed Dhobighat suffer from the lack or inadequacy of the following services or facilities:

- Insufficient water supply; absence of potable drinking water
- Absence of any roof cover for protection during the hot summer months, or any other shelter to take rest or eat food
- No arrangement for drying clothes
- No toilet facilities; absence of sanitation has made the general working environment unhealthy
- Absence of any safety arrangement for their clothes
- Effect on water supply when either the tube-well fails or there is no electricity
- Direct disposal of waste water directly into open drains or river without any treatment
- The arrangement of washing area necessitates washing of clothes while standing in water
- Lack of proper drainage with two of the three surveyed ghats were nearly submerged in waters and the Dhobis were found to be working in very poor conditions

Observations

The Dhobis do not take any specific health protection measures either while collecting soiled clothes from households, hotels, hospitals and other establishments, or in their use of detergents and/or other chemicals.

Generally, the Dhobis carry out preliminary activities at their homes. Although the traditional practice of washing clothes by adding "ret" (alkaline soil) and putting them in a Bhatti (steam vessel) has given way to use of detergents, the formal practice is still prevalent.

The cubicles of the existing constructed Dhobighats are only partially utilized. Reasons expressed for under-utilization of the cubicles range from inadequate or uncertain supply of water to availability of more convenient alternative temporary Ghats along the river, e.g. constructed Gola Ghat is not operational.

No attention is paid to the aspect of conservation of water is followed; as such, the Dhobis are unaware of the environmental impact of washing clothes in the river.

Majority of Dhobis are men; women are actively involved in ironing of clothes;.

Among the Dhobis surveyed, 40 per cent of their family members are engaged in washing clothes.

The Dhobis use low cost detergents, diluted acids and/or soda for washing clothes, continuous use of which with bare hands is the prime reason for associated skin diseases prevalent among the Dhobis.

In Kanpur only about 37 per cent of the respondents are members of Dhobi Associations, which play a significant role in the integration of the community. It acts as the forum where Dhobis collectively address issues through a process of dialogue with the concerned local government body. It also plays a significant role in solving intra-community disputes.

There is no uniform pattern in the amount charged by the Dhobis per item of clothing washed. It varies in the range of Rs. 1.5 to 12. The Dhobis contend that they are unable to increase the rates beyond the present level due to resistance faced from the customers and competition from washing machines - most middle class or upper class households either use domestic washing machines or hire an individual to wash clothes at their homes.

Availability of space for drying clothes is inadequate. Dhobis preferred the construction of Dhobighats on the basis of settlements of dhobis.

3.2.4 Summary of Findings

The need and demand assessment of dhobis relating to new construction/improvement to existing Dhobighats are summarized hereunder:

Constructed Dhobighats

- Sufficient quantity of water not available
- Lack of any shed
- Lack of arrangement for drying clothes
- Lack of shelter for taking rest and food
- Lack of toilet & urinals
- No facility of drinking water
- Lack of safety arrangement
- No water is available when tube well fails or electricity is not available
- Lack of arrangement for 'Bhatti'
- No arrangement for processing washed clothes with "Neel" & bleaching agents
- No arrangement for proper disposal and treatment of waste water
- Dhobies have to stand in water of cubicles, which affects adversely their health due to presence of chemicals.
- Insanitary conditions within campus

Traditional Dhobighats

- Washing of clothes not possible many times due to turbid and polluted river waters
- Washing platforms need to be shifted according to levels of water in rivers
- Lack of proper space for drying clothes
- Long distances from residences of Dhobis
- Lack of toilet facilities
- Unhygienic conditions around working place due to open defecation by other people, wallowing of cattle and solids waste being dumped in rivers
- Lack of suitable space for taking rest and eating
- Lack of safety for clothes
- Lack of safe drinking water

CHAPTER 4

LOW COST SANITATION PROGRAMME

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4.1 INTRODUCTION

4.1.1 Low Cost Sanitation (LCS)

A large population in the city is living in sub-minimal conditions in slums lacking basic amenities and services leading to the practice of open defecation on a fairly large scale. This aspect has been discussed in the earlier chapters. Houses in the slums are too small and often built on encroached lands. The highly congested localities leave no scope for construction of IHLs in most slums. Given the conditions and the poor financial status, it becomes imperative to provide LCS alternatives for the slums. In the absence of space, the only alternative left is the CTCs, which again should be cost effective and sustainable with available funds for serving the large population in the slums.

4.1.2 Constraints and Requirements

Based on findings of the preliminary survey and lessons learnt from the current scenario, many constraints have been identified in O&M of existing CTCs discussed in the previous chapter. These primarily include those pertaining to assessing the need for CTC, technical needs, O&M requirements and community aspects.

The following table presents the key factors that have to be considered and/or the necessary actions required to be taken to overcome the constraints and meet the needs of the community through the implementation of a LCS programme involving construction of CTCs, and should be considered at the planning and designing stage of the proposed programme.

Need and Location	<ul style="list-style-type: none"> • Demand and Need Assessment • Priority to locations/areas with greater demand for CTCs • Locating CTCs near or in a portion of the existing major open defecation ground • Average distance of the CTC from dwelling units (recommended to be ≤ 500 m)
Technical requirements	<ul style="list-style-type: none"> • Appropriate design in terms of number of water closets (seats) and wastewater disposal • Adequate and consistent water supply for flushing and cleaning a must • Regular electricity supply essential especially for night-time usage, and where the source of water supply is a tube-well • Feasible cost recovery of O&M costs partly or wholly through user charges – a key to long-term financial viability • Appropriate institutional framework • Balance between a financial viable larger CTC (say, a 2-seater) and multiple smaller CTCs depending on the number of residents to be served and the coverage area – single CTC located too far away will probably make the users unwilling to use the CTC.
O&M requirements	<ul style="list-style-type: none"> • Regular cleaning • Mobilization of required resources • Training to the caretaker(s) in managing, operating and maintaining a CTC
Community or user requirements	<ul style="list-style-type: none"> • Building a sense of ownership amongst the community members through an effective PP/PA programme • Participation of the community at all stages of programme implementation • Willingness to pay for using the facility • Education on use of toilets • Encouragement to women to participate in the O&M activities, which will also facilitate the PP/PA processes as women are generally responsible for managing their households

4.2 PLANNING AND DESIGNING

4.2.1 Facility Required

The design of a CTC should ensure comfortable access to all individuals in order to meet their personal needs irrespective of their background or physical condition in an easy and efficient manner. The design should maximize comfort and safety, and cleanliness, which in turn will encourage people to use them.

The essential requirements in a CTC are:

- Separate sections for male and female users
- A separate WC for physically-challenged persons and children
- Separate bathing cubicles in the male and female sections
- Arrangement for water, preferably independent tube-well with over head storage tank
- Urinals
- Basin for hand wash with mirror and towel stand.
- A caretaker room
- Store room for keeping cleaning materials
- Entrance lobby
- If space is not a constraint, then development of green areas around the CTC

4.2.2 Key Planning Factors

The key planning parameters for a typical CTC are:

- Proximity to a sewer line in case of sewered areas; in case of un-sewered areas, disposal of waste water would either be to a septic tank/soak pit or into an open drain after treatment;
- Adequate power supply;
- Sufficient space for the CTC with facilities of water closets in separate sections for male and female users; power back-up; provision for physically challenged persons and children; urinals and bathing cubicles;
- The design of the facility should be able to cater to peak usage levels (2-3 hours) in the morning and evening;
- Number of WCs (seats) on the basis of not more than 30 users per WC;
- Location of CTC in such a way that the maximum distance between the CTC and the farthest dwelling unit does not exceed 500 metres;
- Well designed brick and RCC Structure with adequate drainage system;
- Good ventilation and illumination of the premises.
- Presentable and pleasing reception and lobby area.
- Round the clock water supply system for cleaning and washing essential for offering hygienic toilets facilities with overhead storage tanks.
- Caretaker room to facilitate proper and round the clock cleaning and security of the premises.
- Use of high performance interiors and exterior material and fitments for regular and rugged use of modern public toilets on the streets corners and public places.

4.2.3 Number of Users

In slum areas or residential colonies, the CTCs should preferably not have more than 20 seats, which can cater to a population of 600 persons using the facility daily. According to the primary survey results, 58.9 per cent² of the population in the slums surveyed are estimated to carry out open

² Figure arrived at by including 50 % of the respondents who did not provide an answer during the questionnaire survey.

defecation. The percentage of respondents willing to pay Re. 1 or more is 41. Based on these results, it can be estimated that actual population that will use the CTC would be 24.1 per cent. This would imply that a 20-seater CTC can be located in a slum area having a population of almost 2500. It is proposed that CTCs with 5, 10 and 20 seats with standard designs are provided in slum areas.

4.2.4 Location of CTC

Prior to site selection for construction of CTC, the following assessment should be carried out.

- Existing facilities - IHLs and CTCs
- Number of households, who do not have IHLs, and the floating population that may either be temporarily residing or visiting the area
- Population that would need the facility based on the estimated number carrying out open defecation and the percentage of persons willing to pay a user charge of at least Re. 1
- Number of water closets based 30 users per seat considered to be a practical parameter as usage levels are higher in the morning hours and in late evening

The number of CTCs, one or more in a particular slum area, would depend on the concentration of the households and the average distance from the dwelling units. A distance greater than 500 metres is considered to be impractical especially in the case of women, children and physically-challenged persons.

Once number of seats and complexes are worked out, the selection of site(s) would have to consider the following factors:

- Availability of sufficient space
- Availability of water and electricity
- Availability of sewer line
- Hydrological conditions
- Acceptability of the community in consideration to different groups and their social habits
- Environmental aspects

4.2.5 Design Criteria

Based on the above factors that need to be considered for designing a CTC, Design Criteria for CTCs with 5, 10 and 20 WCs is presented in Table 4.1.

Table 4.1 Design Criteria for a Community Toilet Complex (CTC)

Design Factor		No. of Water Closets (WCs) in the CTC		
		5 WCs	10 WCs	20 WCs
No. of users	No. of users per WC per day	30	30	30
	Total users per day	150	300	600
	Total families	25	50	100
No. of bath		1	2	4
No. of urinal		0	2	4
Water Supply Requirement	Total water supply per day (45 lpcd) in kilolitres incl. bathing use	9	18	36
	Capacity of Storage tanks on the basis of 50 per cent of daily requirement in kilolitres	4.5	9	18
Electricity	Pumps (KWH per day)	2.5	5	10
	General Lighting, fans etc. (KWH per day)	5	10	20
Area requirement for the CTC with septic tank and soak pit	Single-storied structure (sq.m)	120	250	470
	Double-storied structure (sq.m)	-	200	390
Distance criterion – location of the CTC from the furthest dwelling unit		≤500	≤500	≤500

Notes: 1. If sewer connection is available the area requirement will be reduced.
2. Average family size is assumed as 6.

4.2.6 Design Alternatives for Disposal

Following three alternatives for wastewater water disposal options are discussed in Table 4.2 in terms of advantage and disadvantage. The proposed layout for CTCs are attached at Appendix K.

- Disposal into a sewer line of the existing/proposed sewerage network
- Twin-pit system (see appendix)
- Septic tank with a soak pit
- Mini-STP

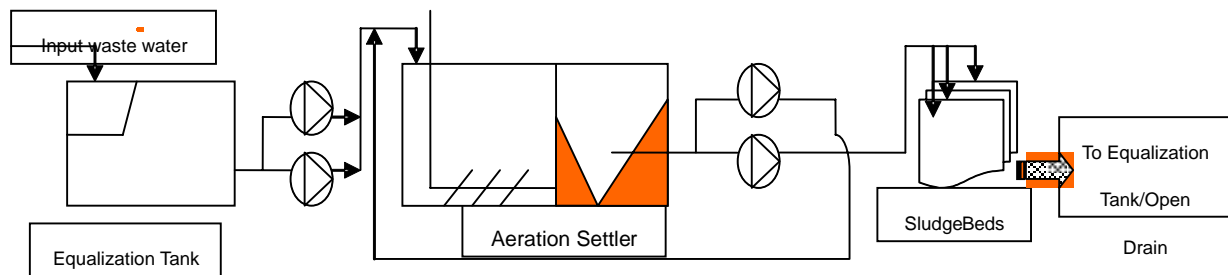


Figure 4.1 Mini-STP Treatments Scheme

Table 4.2 Comparison of Alternative for Disposal

Option	Advantages	Disadvantages
Disposal into a sewer line of the existing/proposed sewerage network	<ul style="list-style-type: none"> - Off-site disposal with no necessity for any on-site treatment - Best option from the environmental aspect - Reduces the burden on O&M by obviating the need for on-site disposal - No additional land requirement at the CTC location - Almost no impact on ground water pollution - Best option if sewer is available 	<ul style="list-style-type: none"> - Flow generated necessitates greater slopes than normally required to ensure self-cleansing velocity - Periodic de-siltation necessary to prevent blockages - Needs a well-developed sewerage network • Low coverage of present sewerage network, and long time period required for its expansion leads to delays in meeting the sanitation requirements of the local population • Locating CTCs to provide convenient access to slum-dwellers becomes difficult
Twin-pit system	<ul style="list-style-type: none"> - On-site disposal - Need for emptying the pits (one pit) in 1½-2 years only - Low requirement of water (1½-2 litres) for flushing out the excreta 	<ul style="list-style-type: none"> - more suited for IHLs - not suitable in soil conditions where the maximum ground water level from the bottom of the pit is less than 2 metres in case of soils with effective size greater than 2 mm – preferable to have an impervious bottom in such a situation
Septic tank with a soak pit	<ul style="list-style-type: none"> - on-site disposal - can be conveniently used up to 300 users per day 	<ul style="list-style-type: none"> - de-sludging necessary at least once a year (therefore, close monitoring by ULB necessary) - chances of over-septicization if de-sludging not carried out at the required time intervals - need for multiple septic tanks for 10-seater and 20-seater CTCs - BOD levels higher than permissible levels
Mini-STP	<ul style="list-style-type: none"> - Re-use of treated wastewater possible for non-human contact purposes - Reduces potable water consumption - Effluent characteristics meet discharge standards - Can be effectively applied in areas where the time horizon for implementation of new sewerage network is large 	<ul style="list-style-type: none"> - Greater requirement of electricity and therefore, susceptible to failures due to the power cuts - Greater requirement of both capital and O&M costs - More suited for local area application wherein a group of CTCs can be connected to one STP - More skilled manpower required to carry out O&M; also, O&M costs higher

Table 4.3 shows the costs of disposal options. Significantly higher capital and O&M costs are required for mini-STP, which is financially not feasible. Anticipated environmental impact and proposed mitigation measures have been outlined in Appendix L. Besides, there is a requirement of skilled manpower for O&M and the electricity consumption is higher warranting the need for stable power supply although the environmental advantage is noteworthy as highlighted in table 4.2

Table 4.3 Costs for Disposal Options

	5 WCs	10 WCs	20 WCs
1. Capital Cost			
(1) Main building	325,250	553,500	1,011,000
(2) Disposal options			
a) Sewer line	25,000	25,000	25,000
b) Septic tank/soak pit	105,000	175,000	315,000
c) Mini-STP	360,000	530,000	785,000
2. O&M Cost			
(1) Main building	4,910	5,525	7,735
(2) Disposal options			
a) Sewer connection	nil	nil	nil
b) Septic tank/soak pit (de-sludging)	350	450	600
c) Mini-STP	6,800	7,400	9,100

4.2.7 Recommendations for Wastewater Disposal

The following wastewater disposal option is recommended based on the comparison for various alternatives outlined in the previous section.

- (1) CTCs should be connected to existing/proposed sewer line if nearby sewer is available; and
- (2) If not available, then Septic tank/soak pit system is recommended.

4.3 OPERATION AND MAINTENANCE

4.3.1 Alternative institutional arrangements for sustainable O & M

It is important to motivate the affected communities to use the CTCs on consistent and regular basis. For this, it is imperative that the project beneficiaries perceive as well as are convinced about the crucial link between the health of their families and their other problems with the practice of open defecation, and how it can be mitigated by using CTCs.

Since the ULBs are reluctant to undertake responsibilities of O&M of new/refurbished CTCs, the other institutional alternatives for O&M are through/by:

- Private contractors
- NGOs
- CBOs/SHGs

The various options available for O&M of CTCs have been presented in a matrix form in table 4.4 with an analysis of the pros and cons for each option.

Table 4.4 Evaluation of Alternatives for Institutional Mechanism

O&M by	Pros	Cons
Private contractors	<ul style="list-style-type: none"> ▪ Services offered as a commercial venture; ▪ Private contractors shall ensure that the facilities are well-maintained otherwise the prospective users will not be attracted; ▪ Reduction of financial burden on the Nagar Nigam; ▪ Private contractors have the drive to make profits, which shall result in maximum utilization of resources and harnessing of opportunities to generate higher revenue 	<ul style="list-style-type: none"> ▪ Providing sanitation facilities may not be a very attractive business proposition for private contractors; may not generate adequate profits in some cases; ▪ May demand minimum usage guarantees in terms of number of users; ▪ May not be willing to take up the responsibility of O&M for long-time horizons (e.g. greater than 10 years); ▪ If venture fails, the CTC will suffer, and the situation will return to "square one"
NGOs	<ul style="list-style-type: none"> ▪ Dedicated to focused community development activities; with profit not being their motive, the NGOs are likely to be more committed than private contractors in situations where there is huge deficit in O & M of CTCs; ▪ Can also be responsible for IEC Programme for increasing awareness on the direct link between open defecation and personal health and hygiene 	<ul style="list-style-type: none"> ▪ NGOS may not be able to carry on O & M in case there is a consistent and growing deficit in operation of CTC since most of NGOs do not have surplus income and unfunded activities; ▪ NGOs may see O & M of CTC as commercial activities, though some NGOs, specially Friends of Vrindavan, Vrindavan see this activity as furthering their environmental interventions.
CBOs or SHGs	<ul style="list-style-type: none"> ▪ Sense of ownership; will ensure optimal utilization; ▪ Self- drive for surplus/ income generation by SHGs shall result in well maintained and working CTCs encouraging maximum usage ▪ Willingness of residents to contribute towards various activities as part of O&M can help build the ownership spirit. ▪ The availability of such ready infrastructure for revenue generation against usages shall attract several SHGs involved in income –generating urban services activities. 	<ul style="list-style-type: none"> ▪ Acceptance level low; Resistance to being associated with cleaning activities in some pockets ▪ Need "hand-holding" over initial year in respect of technical matters such as repair and maintenance works ▪ Lack of homogeneity among the slum dwellers can lead to many members resisting payment of same user charges.

Each of the options has its pros and cons. The former two are already in place for the existing CTCs although in general, the performance is unsatisfactory. The option of creating a CBO or SHG has not been attempted before. However, with CDSs already involved in activities such as savings and loan societies, minor infrastructure works etc., this option can be successfully experimented provided that there is legal and institutional support from all angles - technical and financial. Also, NGOs can be involved in the training and PP/PA activities. The role of women will be vital as they are more susceptible to diseases caused by poor sanitation. Some noteworthy examples of this approach of management of basic urban services in the economically weaker sections of the society by the community themselves are highlighted in the following paragraph.

In the rapidly-growing city of Pune in Maharashtra, the municipality's commitment to ensure that the poor have access to sanitation has produced a major example of community-driven provision of services. The municipality involved a number of NGOs in reconstructing dilapidated toilet blocks, and work contracts for maintenance of these toilets were given to members of the community. Women play a key role in these activities. This experience is being taken forward in the cities of Bangalore and Mumbai. In Mumbai, the community work of the National Slum Dwellers' Federation, and the Society for Promotion of Area Resource Centres (SPARC) has been recognised as path-breaking by the UN Centre for Housing and Services (Habitat). Working jointly, the two Mumbai organisations have been instrumental in designing and construction of low-cost housing, developing waste disposal systems capable of reducing waste output from slums by up to 70 per cent, designing, constructing and maintaining toilets at very low costs, and sharing their best practices with other countries.

Although no single model of O&M can be applicable to all areas, the above examples demonstrate that community-driven approaches led by women have a far more positive track record than top-down ones.

4.3.2 CBO/SHG setting up

A non-conventional institutional mechanism is sought to be used for realizing the objective of the proposed project. It is suggested that O&M is handled by women-centric SHGs, who also provide urban services as a partner of ULBs. SHGs can handle urban services as an income-generating activity in addition to the usual financial services activities (savings, loan and insurance). The SHGs handle O&M of these facilities and collect levies as mutually agreed by them. Institutional measures are to be assessed based upon their expected contribution to O&M activities.

The mission of the CBO/SHG earmarked for O&M of CTC should be clearly agreed by members. For example, one such suggested mission is "Improvement of quality of lives of Members of Specific area". The goals and objectives of each such CBO/ SHG should be clearly delineated. These should include the following:

- Regular and consistent use of CTCs by all its members
- Maintenance of the hygiene conditions and cleanliness in and around CTC.
- Maintenance of CTCs in good and usable condition all the time;
- Generation of Income from CTCs through user charges and other sources to exceed the projected O&M costs of CTCs; and
- Strive to generate surplus through use of CTC

For the finalization of the CBO structure and its institutional set-up, the byelaws shall be prepared along with consultation with stakeholders. The CBO/SHG should select a President, Secretary and a Treasurer. The role of each position should be defined so as to avoid ambiguity and achievement of its objectives.

4.3.3 Capacity Building and Training

The CBOs/SHGs face serious constraints, which are to be identified, and actions taken to overcome them. Careful analysis of constraints is becoming a hallmark of successful community development programmes. The categories of constraints are:

- Poor management skills
- Lack of technical skills related to O & M of CTCs.
- Lack of access to financial resources

The interventions are to be targeted to overcome these constraints. Following table is an indicative list of activities, which may be required for institutional strengthening of the CBOs/SHGs;

Capacity Building Activity List

Definition: Capacity-building activities are undertaken to strengthen the institutional capacity of CBOs/SHGs

- Leadership training for board members e.g. conduct of meetings, conflict resolution etc.
- Develop business plans for profitable operation of economic activities like O & M of CTCs.
- Developing linkages with local, state and central government social welfare schemes
- Improving internal administrative and financial procedures (accounting, personnel etc.)
- Role definition and its monitoring
- Determination of user charges and periodic financial reviews
- Defining operating policies (i.e disbursement approvals, use of equipment, collection of user charges etc.)
- Technical capacity-building for O & M and its supervision
- Determination of benchmarks for O & M for periodic review
- Sharing /dissemination of best practices

The capacity building and training for CBOs/SHGs should be organized by NGOs/Consultants. It is recommended that a Training Centre under the auspices of Nagar Nigam in consultation with DUDA or SUDA is planned with the objective of capacity-building of members of CBOs/SHGs as well as all stakeholders. This training centre can also be equipped with a full-scale working model of a CTC (also for daily use at the proposed training centre) to facilitate hands-on training to key members of the CBO responsible for O&M.

4.3.4 Responsible Organization

Currently, several organizations, i.e., Nagar Nigam, SUDA, DUDA, NEDA etc. are implementing LCS schemes. Ideally, one single agency should be made responsible for all aspects of public sanitation to have proper control, integrated planning, implementation and monitoring.

4.3.5 Suggested Institutional Mechanism for Sustainable O & M of CTCs

The implementing agency transfers the responsibility and accountability for sustainable O & M of CTCs / Dhobighats to PMUs in each city. The PMU shall be responsible, inter alia, for the following:

- Construction and completion of the pilot as well as the main components of the project;

- Involvement of and ownership by communities during implementation of the project;
- Create a community apex institution which shall be responsible for sustainable O & M as well as capacity building institution for the CBOs/SHGs during and after the project is completed;
- Perform necessary monitoring and evaluation functions for successful implementation of the project with full accountability to IAs and funding agencies.
- Responsible for funds allocation and management to Training/Capacity Building Centres/ Apex body for CBOs/SHGs
- Dissemination of information about the project
- Accountable for the specific and measurable project deliverables.

In each city, the PMU shall be headed by Project coordinator with accountability to the concerned Implementing Agency in the city, State department and donor agency. The PMU shall have representation from IA, elected representatives involving affected communities, a representative each from DUDA & SUDA, apex body of CBOs and prominent NGOs known for their contributions for promotion of health and hygiene and environmental work in affected communities.

Initially, A Training /Capacity-building Centre in each city shall be set up through concerted efforts, which shall be responsible for capacity building of CBOs/SHGs during implementation and after completion of the project on self-sustainable basis. This unit shall be headed by a competent and experienced Training Officer with capability to manage capacity-building initiatives. This unit shall also have a community mobilization specialist who shall guide and assist in creation and strengthening the CBOs/ SHGs. During implementation of the project as well as after the project is completed, this unit shall be responsible for continued awareness building, technical and managerial capacity-building as per attached institutional framework.

As the project proceeds towards completion, the management of the Training Centre shall be handed over to a newly created apex body representing CBOs / SHGs. The general body members of this apex body should have representative from each CBO. The resources created under the project shall also be handed over to the Apex body of CBOs/ SHGs.

It is recommended that this apex body is registered under Society Registration Act. This representative body shall be undertaking the responsibility for sustainable O & M after the project is completed. This unit should be able to sustain itself through mutually agreed contributions from individual CBOs, IAs and other relevant departments responsible for health, hygiene, urban development and poverty alleviations.

4.4 OPERATION AND MAINTENANCE COST RECOVERY

A sustainable O&M cost recovery model is the key to the success of any LCS Programme as capital costs (refer next section) are proposed to be from grant funds in this project.

4.4.1 Cost Estimation

(1) Capital Cost

The capital cost for the Community Toilet Complex with 5, 10 and 20 water closets with alternative design options with regard to water supply and disposal of waste water are summarized in table 4.5.

Table 4.5 Summary of Capital Costs (Indian Rupees)

	5 WCs	10 WCs	20 WCs
Main building			
(I) Civil works	289,000	481,000	866,000
(II) Electrical works	18,250	36,500	73,000
(III) Storage tank	18,000	36,000	72,000
Total	325,250	553,500	1,011,000
Water supply options			
(a) Jal Sansthan	25,000	25,000	25,000
(b) Bore well with pump	60,000	60,000	60,000
Disposal options			
(a) Sewer line	25,000	25,000	25,000
(b) Septic tank/soak pit	105,000	175,000	315,000
Capital cost summary by disposal option			
(A) JS Water			
(I) Sewer connection	353,000	583,500	1,037,000
(II) Open drain with septic tank/soak pit	458,000	758,500	1,352,000
(B) Bore Well			
(I) Sewer connection	413,000	683,500	1,217,000
(II) Open drain with septic tank/soak pit	518,000	858,500	1,532,000
Average Capital Costs	445,250	708,500	1,236,000

(2) Operation and Maintenance Cost

The O&M costs for a CTC comprise costs related to electricity charges, cost of cleaning chemicals, salary and wages for the supervisors, attendants and sweepers, repairs/replacements due to normal wear-and-tear etc. Among all the cost heads, the main components are wages and electricity. The O&M cost for the Community Toilet Complex with 5, 10 and 20 water costs with septic tank and soak pit are summarized in table 4.6. In table 4.6, cost recovery from users is also estimated. Users of 5, 10, and 20-seater CTC have to pay Rs.276, Rs.161 and Rs.102 per family per month respectively. These amounts do not consider any subsidization such as exemption from paying electricity charges or de-sludging of septic tank.

Table 4.6 Operation & Maintenance Cost Estimate (INR per month)

Description	5 WCs	10 WCs	20 WCs
Manpower	5,000	5,000	5,000
Chemicals	300	500	900
General Maintenance	300	500	900
Electricity	945	1,575	2,835
Desludging for septic tank	350	450	600
Total	6,895	8,025	10,235
*Cost per family per month	276	161	102
*Cost per person per month	46	27	17
*Cost per person per day	1.53	0.89	0.57

*As can be observed from the above table that the cost per family/ person is on much higher side without any subsidization. The amount has been derived assuming utilization of CTCs at the rate of 30 persons per seat. The average household size has been taken as 6.

4.4.2 O & M Cost Recovery

(1) Affordability

According to the preliminary survey, the average family monthly income is estimated at around Rs.1891. Generally, 2 to 4 per cent of the income (5 per cent maximum) can be spent for sanitation. Assuming 3 per cent of income can be spent for sanitation, affordable monthly charge for CTC would be around Rs.60 per household.

(2) Number of users

While working out the design, it is assumed that one seat will not be able to serve more than 30 persons as most of the users in slum areas use CTCs during two to three hours in morning and/or late evening. It is needless to say that CTCs in slum areas cannot be compared with those in public places where the users turn up during all hours of the day. The average household size has been taken as 6.

(3) Cost Recovery Measures

Sustainability of the project will depend on the cost recovery models. In this project, the facilities are provided by the government and O&M costs should be recovered by users and local bodies. To recover the costs the following alternatives are studied.

- Alternative 1: All the costs are recovered through user fee
- Alternative 2: Electricity charge and sludge disposal are covered by the Nagar Nigam
- Alternative 3: Alternative 2 plus 50 per cent of the cost of caretakers is provided through community labour

The following cases of user fee are studied.

- Case 1: Rs.30 per family (1 adult in a family pays Re. 1 per day and children are free)
- Case 2: Rs.60 per family (2 adults in a family pay Re. 1 each per day and children are free)
- Case 3: Rs.90 per family (3 adults in a family pay Re. 1 each per day or 2 adults in a family pay Rs.1.50 each per day and children are free)

The results of financial analysis are presented in Table 4.7.

Table 4.7 Cost Recovery Financial Analysis -CTCs

User Charge Cases		Alternative A			Alternative B			Alternative C		
	Number of WCs (seats)	5	10	20	5	10	20	5	10	20
	Monthly O & M Costs	6,895	8,025	10,235	5,600	6,000	6,800	3,100	3,500	4,300
Case 1	Cost Recovery @ Rs. 30 per family per month	750	1,500	3,000	750	1,500	3,000	750	1,500	3,000
	Surplus/ (Deficit) required from other sources	(6,145)	(6,525)	(7,235)	(4,850)	(4,500)	(3,800)	(2,350)	(2,000)	(1,300)
	% Surplus/(Deficit)	(89)	(81)	(71)	(87)	(75)	(56)	(76)	(57)	(30)
Case 2	Cost Recovery @ Rs. 60 per family per month	1,500	3,000	6,000	1,500	3,000	6,000	1,500	3,000	6,000
	Surplus/ (Deficit) required from other sources	(5,395)	(5,025)	(4,235)	(4,100)	(3,000)	(800)	(1,600)	(500)	1,700
	% Surplus/(Deficit)	(78)	(63)	(41)	(73)	(50)	(12)	(52)	(14)	40
Case 3	Cost Recovery @ Rs.90 per family per month	2,250	4,500	9,000	2,250	4,500	9,000	2,250	4,500	9,000
	Surplus/ (Deficit) required from other sources	(4,645)	(3,525)	(1,235)	(3,350)	(1,500)	2,200	(850)	1,000	4,700
	% Surplus/(Deficit)	(67)	(44)	(12)	(60)	(25)	32	(27)	29	109

Notes:

1. Revenue alternatives

Alternative A: All the costs are recovered through user fees

Alternative B: Electricity charges and sludge disposal are covered by Nagar Nigam

Alternative C: Alternative 2 and 50 per cent of the cost of care takers is provided by community labour

2. User charge cases

Case 1: Rs. 30 per family (1 adult in a family pays Re. 1 per day and children are free)

Case 2: Rs. 60 per family (2 adults in a family pay Re. 1 each per day and children are free)

Case 3: Rs. 90 per family (3 adults in a family pay Re. 1 each per day or 2 adults in a family pay Rs.1.50 each per day and children are free)

3. Financially feasible option

The following alternatives and cases are financially feasible.

(1) 20 WCs CTC

- Cost Recovery @ **Rs. 60** per family per month;
- Electricity charges and sludge disposal are covered by Nagar Nigam; and
- 50 per cent of manpower costs (caretaker) is covered through community labour.

Or

- Cost Recovery @ **Rs. 90** per family per month; and
- Electricity charges and sludge disposal are covered by Nagar Nigam.

(2) 10 WCs CTC

- Cost Recovery @ **Rs. 90** per family per month;
- Electricity charges, and sludge disposal are covered by Nagar Nigam; and
- 50 per cent of manpower costs (caretaker) is covered through community labour.

(3) 5 WCs CTC

- No alternatives and cases are feasible.

4.4.3 Conclusions and Recommendations

- Cost recovery at prevailing monthly rates of Rs. 30 per family are totally un-remunerative as they do not even cover subsidized costs for all types of CTCs.
- A minimum charge of Rs. 60 per household per household (20-seater CTC) is required to be levied for sustainability.
- 5-seater CTCs are not viable from the point of sustainability of O&M, and therefore not recommended.
- Part of the costs - electricity costs and sludge disposal costs should be borne by the Government considering the social and environmental importance of this project.
- Part of the manpower costs for caretakers should be shared through community involvement such as contribution in carrying out regular O&M works.
- Manpower costs should be minimized by sharing of O&M activities through allocation of duties amongst the members (of the CBO) on voluntary basis.

It is further recommended that full cost recovery of O&M can be facilitated through the following policy interventions:

- Strict and disciplined enforcement of regulations by ULBs against defaulters in respect of defecation at places other than CTCs; and
- Imposition of market induced user charges and generation of income from other sources by the CBOs/ SHGs as part of their income-generation urban services activities such as
 - User charges per visit from non-community members;
 - Income from hoardings/ advertisements from private parties;
 - Community mobilization charges from local, state and central development agencies

4.5 SOCIAL AND ECONOMIC BENEFITS

This section deals with the social and economic benefits of community toilet complexes.

According to the World Health Organisation (WHO) and the United Nations Children's Fund's (UNICEF) Global Water Supply and Sanitation Assessment 2000 Report, 2.4 billion people did not have access to any sanitary means of human waste disposal. The consequences are devastating. This is a major cause of diarrhea and disease, which claims 2.2 million deaths annually, many of them young children as per Gender and Water Development Report 2003.

Providing access to sanitation facilities, though relatively inexpensive, could halve the death toll among those who do not currently enjoy this fundamental human right. The incidence of infectious diseases is four times higher in India than in China, despite India's higher per capita expenditure on health. In India, millions of people live in slums and squatter settlements that are latticed by ditches clogged with faeces, rubbish and fetid water.

This project shall generate intangible benefits that are more difficult to express in monetary terms. These benefits can be conveniently classified in the following groups:

(1) Environmental benefits:

The construction of all CTCs envisaged under the project is expected to reduce the pollution indirectly caused by open defecation. The project shall generate important health benefits and positive environmental externalities. This project also targets poverty reduction through raising the living standards of the poor and environmental protection and improvement. The surrounding areas for the local communities are likely to improve with the absence of incidence of open defecation.

(2) Economic Benefits:

Economic benefits include productivity gains, secondary economic benefits and developmental impact due to improved health and lower incidence of water-borne diseases. This project shall ensure access to quality services for the urban poor and the affected communities at affordable prices. Besides, the project shall provide self-employment and income-generating opportunities to several community members especially women members of Self-help Groups.

(3) Health-related benefits:

Experience shows that inadequate water and poor sanitation aggravates poverty in urban areas, as the poor are forced into a vicious cycle where they have to spend their limited resources on health-care to treat water-borne diseases, a major cause of mortality and morbidity throughout India. This project is expected to reduce the incidence of diarrhoea resulting from poor sanitation and hygiene and responsible for the death of impoverished children each year in the communities;

(4) Social or equity benefits:

These include gender, regional and income-related equity. Where there are no toilets, girls commonly avoid school; without access to toilets women and girls must wait until it is dark to defecate, exposing themselves to harassment and sexual assault. In an era of increasingly competing demands for water and other resources and services, the key is de-centralized management, especially by women's groups. This project shall empower the women's groups and assist in improved earnings for the communities.

(5) Institutional benefits:

The project is expected to strengthen the CBOs/SHGs through capacity-building in areas like financial management and contract management, and lead to empowered community organizations;

4.6 IMPLEMENTATION OF PROPOSED PROGRAMME

4.6.1 Estimation of number of Community Toilets Complexes required

(1) Estimation of number of Community Toilets Complexes required

Need assessment for toilets in slums in Kanpur has been carried out on the basis of findings of the primary survey and data from JICA Study Reports, DUDA and Nagar Nigam. The requirement for CTC has been calculated for the population practicing open defecation combined with willingness to pay for the usage of CTC facility. As per the analysis of primary surveys, 24.8 per cent of the respondents practice open defecation in Kanpur, which is the target group for which CTCs have to be proposed for restricting open defecation.

One Rupee per usage has been considered as a benchmark for calculating the willingness to pay for a sustainable O&M model for CTCs. It has been found from the primary surveys that about 41 per cent of the target is willing to pay Re. 1 or more per usage. Total slum-wise population for Kanpur has been updated based on information from various secondary sources including Nagar Nigam and DUDA data. One seat for every thirty persons has been considered as norm for calculating the number of seats required for the target group. The proposed CTCs have been categorized into two categories - 10 seater and 20 seater, which for Kanpur has been calculated as 92 and 3 respectively adding up to a total of 95 CTCs. The slum-wise CTC requirement for Kanpur city has been provided in Appendix J.

(2) Rapid Survey for Availability of Land and Utilities for CTCs

To confirm land availability and existing utilities (water supply, electricity and wastewater disposal) near the proposed site for CTC, a rapid sample survey to collect the following information was conducted. The questionnaire is attached in the appendix.

- Approximate population
- Existence of CTC
- Proposed sites for CTC (250 Sq mtr in case of 10 seats)
- Current status of the land
- Current source of water supply in the slum
- Electricity supply
- Wastewater disposal
- Site map

23 slums were selected for the rapid survey in the slums that preliminary survey was done. The results of the survey confirmed that adequate lands are available in 10 slums and some of the remaining of slums have no land available or some slums are combined with other slums for one proposed CTC. In 3 slums demand for CTC were not confirmed. The results of the survey are attached in the appendix.

4.6.2 Programme Implementation Strategy

(1) Project Implementation Concepts

As highlighted earlier, the foremost constraint with regard to CTCs is O&M activities. The O&M by private contractors and NGOs are already in place for the existing CTCs although in general, the performance is unsatisfactory.

The proposed LCS programme to improve slum sanitation adopts a needs-driven and community-driven approach in planning, implementing, operating and maintaining CTCs and it is proposed that the O&M of CTCs is facilitated through local CBOs/SHGs. However, the creation of a CBO/SHG for O&M of CTCs has not been attempted before. Therefore, the JICA Study Team recommends that a pilot project to manage CTC through CBO be implemented and a good example or model for O&M of CTC be created before implementing full-scale project. This model project can then be extended to full-scale projects.

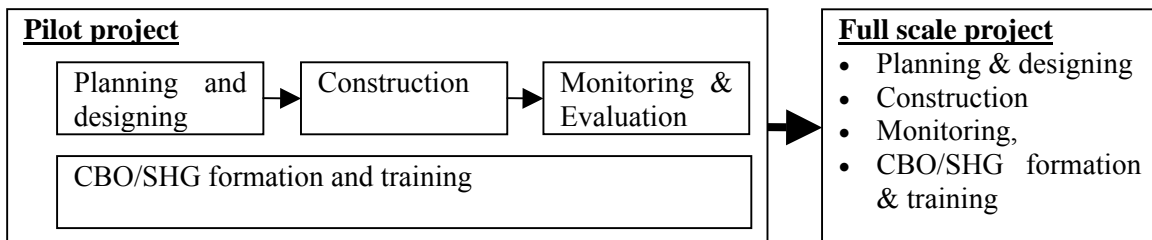


Figure 4.2 Programme Implementation Strategy

(2) Institutional Setting Up for Monitoring

The proposed institutional set-up is graphically presented in Figure 4.2. Nagar Nigam being the main body responsible for health and hygiene should regularly monitor the functioning of the CTCs within Municipal limits. It should interact with the coordination committee, which should consist of elected members of the community and representatives of the Health Officer of the Nagar Nigam. This committee will discuss the problems of the community in respect of the CTC(s) in an area and try to solve them. This will also provide an opportunity to the Nagar Nigam to obtain feedback on the experience of the community supervisors of the respective CTCs. Each CTC will be supervised by the community itself, while the O&M will be done by members/volunteers from the community.

Supervision and monitoring can be also be carried out through Women Watching Groups (WWGs). These monitoring activities will have to be carried out in coordination with the proposed activities of Public Participation and Awareness for non-sewerage schemes, which is discussed in the separate chapter of this report.

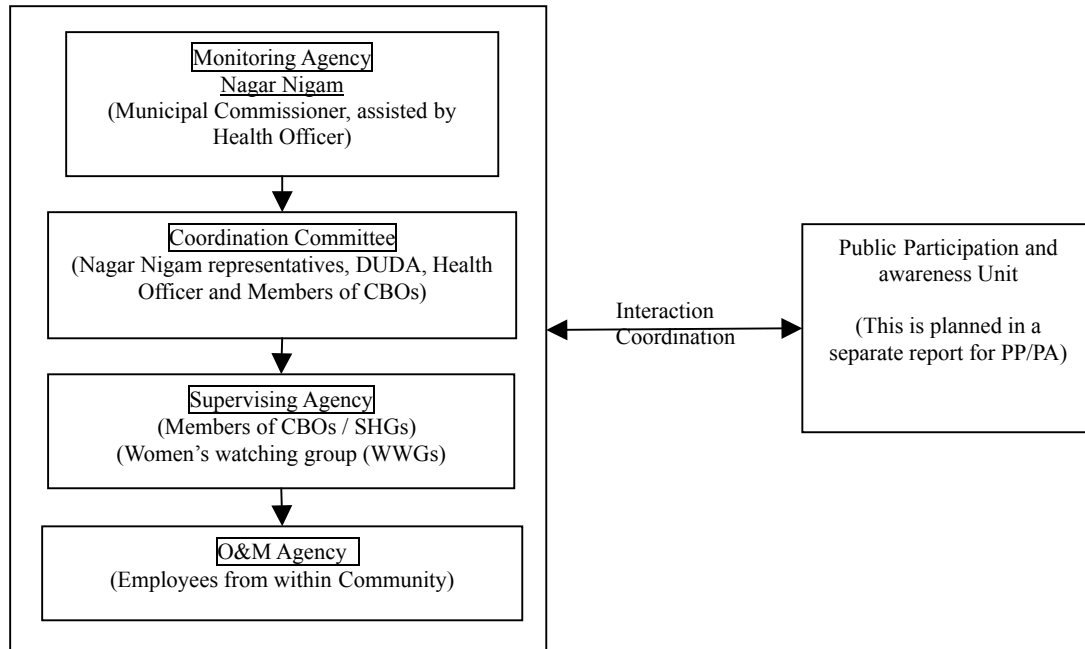


Figure 4.3 Proposed Institutional Set Up for CTC Monitoring

(3) Programme Monitoring

After completion of construction of the CTC and setting up the required institutional framework, the pilot has to be monitored regularly to test the efficacy of the proposed system, the community response etc. It must be allowed some time to enable the assessment of its full impact and PP/PA exercise must continue in full vigor. Any meaningful evaluation would be available only after a few months. The monitoring and evaluation of the pilots will provide the basis for judging the suitability for replication. The evaluation of performance should be done against a checklist and anticipated responses. The deviations will need to be carefully recorded and appraisal carried out. It is quite possible that the feedback received from the two pilots will be different. This will provide a sound basis for assessment. The common short comings noticed can be kept in view for corrective actions in full scale projects. Variations in the findings of the two pilots will need to be examined with reference to their specific locations, which in turn will provide insight into the kind of expectations the different communities might have. This would form the starting point for making changes for specific locations.

(4) Programme Implementation Procedure

The proposed Programme will be implemented through following steps.

- Step 1: Slum Survey
- Step 2: Creation of CBOs/SHGs
- Step 3: Planning and designing
- Step 4: Selection of location of CTC including land acquisition clearance
- Step 5: Construction
- Step 6: Training of CBOs/SHGs

- Step 7: Operation & Maintenance
- Step 8: Monitoring, Evaluation and Learning
- Step 9: Feed back

Following information in slums will be required for detailed planning of CTC facility and O&M:

- Socio-economic situation (population, number of household, average wage, etc)
- Existing infrastructure
- Existing water supply mode and its status
- Existing sanitation mode and its status
- Need for CTC, willingness to pay, willingness to participate
- Health standards
- Housing and availability of land
- Characteristics of the community
- Awareness level

Following information collection tools are proposed for surveys:

- Secondary data collection
- Questionnaire survey
- Focus group discussion (FGD)
- Mapping
- Transect walk
- Workshops

(5) Operation and Maintenance Plan

Considering the O&M costs in light of the poor capacity of the users to pay for the services, the ULB and the CBO/SHG should jointly share the responsibility to “run” the CTC. The local body should subscribe to the deficit amount after accounting for the resources that can be generated through contributions from the beneficiaries.

The day to day O&M can be entrusted to CBO. In any case, the local community should be involved in O&M as a monitoring and evaluation body.

Guidelines for the following are annexed at A.15:

- Supervision of construction
- O&M
- Users of the CTC
- Monitoring and Evaluation of O&M by ULB

(6) Public Participation and Awareness for LCS Programme³

The Consultants recommend that the proposed IEC programme is carried out by CDSs/"Samudai Vikas Samitis" with the close assistance of Nagar Nigam in three phases as a process running parallel to the proposed pilot projects. The involvement of voluntary groups and school children will also be vital. The particulars mentioned in the following sections refer primarily to LCS programmes, although the basic structure of PP/PA framework can be used, with certain modifications for the constructed Dhobighats.

Inculcating the sense of ownership and ensuring proper operation and maintenance are key to meeting

³ PP/PA programme for Non-sewerage scheme and its project cost estimation are also discussed in Part III, Public Participation and Awareness.

the stated objective of cleaning Ganga and her tributaries; The ultimate objective of the PP/PA programme should be to raise the consciousness to a level where inhabitants begin to demand their rights and carry out their duties without external impetus and move towards a regime of self-help.

With more and more migration of the rural poor expected to take place in the future in search of a livelihood, the habit of open defecation may continue even after adequate toilet facilities are created in different areas. Therefore, there is a need for propagating the hygiene virtues, making PP/PA a continuous process and it should begin with young children - best way to educate is to catch them young - and women.

Phase I – Awareness for needs and design (Pre-Construction Phase)

Inception Workshops should be organized at the community level to explain the objective and benefits of the LCS programme. Workshops should clarify roles and responsibilities of different stakeholders, and the key elements of the LCS programme such as the lay-outs, construction material, and importance of treatment of waste water before disposal, and O&M issues, akin to an "orientation" programme. Topics should be designed in a manner that they encourage participation of all sections of the stakeholders. The target group would include persons of all age groups, women and children; vulnerable sections must be given special attention. The programme should cover the following aspects:

- Problems of arising from "un-sanitary" conditions, such as adverse impact on health and the vicious cycle of poverty, pollution and ill-health.
- Initiatives that would help in improving the living conditions through improved sanitation i.e. long term benefits of health , better earnings and living standard;
- The need to keep one's environment clean.
- Rationale behind the proposed action plan must be explained and their objections and fears looked after. The inputs received from the community can form the basis of initiation and content of PP/PA programme.
- After the initiation, different groups may be formed to enable special job-oriented training being imparted to the persons selected for various tasks such as manager, operator and office bearers of the CBO.

Community-Based Organizations (CBOs) would need representation of both the elders/community leaders, who are looked up to as well as the youth for guiding them to the path of better living. CBOs are expected to not only function as managers of CTCs, but also as multipurpose societies. One of the major objectives may be to act as credit societies, which can help setting up small business as avenue for income generation. CBOs can involve some of the semi-trained/trained residents, and pay them service charges for routine management and maintenance work. Those at lower rung of ability and education can be appointed for cleaning, gardening and other simple activities and earn a reasonable income.

Phase II - Training - a participatory approach (Construction Phase)- 2 months

This phase runs parallel to the construction phase, and continues after the construction activities are completed, wherein people's participation in the entire process is further encouraged or strengthened by stressing on issues related to hygiene, "right" sanitation practices etc. This will focus on training of trainers -mostly community workers. They should be given special orientation in PR work and behavioural aspects of communities and hands on training for use of various training tools. This training should ideally be imparted by experts in group psychology and organisational behaviour. It will involve:

- Formation and training of women's groups - recent success stories have shown that women play an important role in the creation of Self Help Groups (SHG);

- Audit of CTC construction;
- Developing CTC not merely a place for public "conveniences", but as a centre of community activities with various allied facilities such as a community centre with some basic recreation facilities, landscaping etc.;
- Environmental education for school children;
- Hygiene assessment and "collective" action.

This phase could also be utilised for selection of managers, operators from among the literate/educated members and formation of formal CBO.

Phase III - Final Phase (Operation and Maintenance)- 5 months

This phase should have a separate module for prospective managers, operators and supervisors etc. training would include lessons in running repairs, trouble shooting, efficient O&M practices, simple account keeping , handling of chemicals and cleaning agents and approach to improving ambience. They should also be given insight into topics like water /hydrological cycle and need to conserve water, water borne diseases, causes and their prevention, cost benefit aspects of sanitation, environmental issues and ambience of neighbourhood.

It is expected that by the time the third phase begins, the construction process of CTCs would either be near completion or would have been completed in certain areas. For the community as a whole, Phase III should be treated as a continuation of PP/PA programme and cover, inter alia, formal and informal education, , vocational training to help setting SMEs, or jobs in them; issues like housing and development, drainage, electricity, water, rights and duties leading to empowerment and welfare possibilities and gender bias. The emphasis of this phase would be on the following aspects:

- Maintaining cleanliness of CTC;
- Prudent usage and conservation of water;
- "Dos and Don'ts" of using the sanitation facilities;
- Need to assist O&M regime;
- Be role model for other communities.

This section relates to mechanisms in assessing the various components of the ongoing programme to ensure effectiveness and efficiency.

(7) Monitoring, Evaluation and Learning (MEL)

LCS Programme

Based on the guidelines suggested in this report, the implementing agency should develop a mechanism for MEL considering the following aspects:

- It has to be an ongoing process – assess the situation, analyze it, take corrective measures where necessary and record the same as part of the lessons learnt;
- Follow-up on the above to ensure that the members of the CBO are learning from successes and mistakes;
- Implementation plans should be prepared on an annual basis; the process should incorporate quarterly, half-yearly and annual assessments besides regular fortnightly visits to enable trouble-shooting; the intermediate assessments will also facilitate revisions to the implementation plan wherever necessary;
- The reports should be delivered to the responsible departments/agencies at city/district/state government/central government levels as well as the funding agency; this process will facilitate any initiatives that may become necessary at legal or policy levels;

Table 4.8 Items to be Monitored

Data requirement	Frequency of data collection	Data collectors
Increase/decrease of number of households using CTCs	Quarterly report	CBO/SHG
Power supply	Monthly report	CBO/SHG
Water usage	Monthly report	CBO/SHG
Presence of caretaker any time of the day	Monthly Women's watch group report (WWG)	CBO/SHG
Regular presence of cleaner	Monthly Women's watch group report	CBO/SHG
Odor	Monthly Women's watch group report	CBO/SHG
Willingness to pay for use	Payment register	CBO/SHG
Recurring Monthly maintenance expense	Stock register	CBO/SHG
Maintenance of stock register for cleaning material	Random cross-checking	Implementation Agency (CBO/SHG)
Monthly internal review meetings to assess the situation of operation and maintenance		Implementation Agency (CBO/SHG)
Quarterly review meetings to assess the situation of operation and maintenance		Local body, Community representatives
Corrective actions taken	Monthly reporting internal and external as appropriate	CBO/SHG

Public Participation and Awareness

The implementing agency should develop a monitoring and review system in order to make an ongoing assessment of the programme and take action where necessary. Stepping back from time to time will allow the facilitators to ask questions and ensure that they are learning from successes and mistakes. In this context, annual planning, regular monitoring and reporting, assessment, annual and mid-term reviews, and programme revision, if appropriate, are important management tools.

The project activities – PP/PA which are for a fixed period of one year should be evaluated mid term and end term. The programme should be evaluation as per the objectives of the project. Table given below provides an indicative list of indicators for evaluation of PP/ PA programme :

Table 4.9 Items to be Monitored and Evaluated for PP/PA programme

Effect	Indicators
Improvement in general health	<ul style="list-style-type: none"> • Money spent on medications/ physicians for health problems related to vector and water borne disease.
Higher level of awareness on health and hygiene in comparison to the situation before the PP/PA	<ul style="list-style-type: none"> • Increased demand for CTCs • Increased demand of IHLs • Decrease in open defecation • Increase in water consumption for personal hygiene. • Demand for bathing facilities • Concern over general hygiene conditions among family members
Increased awareness, knowledge about environmental conservation.	<ul style="list-style-type: none"> • Decrease in littering • Decrease in burning leaves and garbage • Increase in burial of biodegradable waste • Decrease in wastage of water • Decrease in cutting of trees
Improvement in general cleanliness of habitat	<ul style="list-style-type: none"> • Decrease in disposal of garbage in drains • Alternate garbage disposal mechanisms. • Cleaner pavement • Decrease in use of open drains as urinals and toilets • Restricted movement of cattle (if any) • Decrease in littering of food waste
Higher demand of Municipal support	<ul style="list-style-type: none"> • Spraying of insect repellent • Regular lifting of garbage • Sweeping of lanes • Clean water supply • Cleaning of Septic tanks and sewer (if any) • Reporting municipal irregularities to higher authorities
Reflection of higher self esteem among women	<ul style="list-style-type: none"> • Increased demand for IHLs/CTCs • Demand for adequate bathing facilities resulting in privacy
School children as agents of change	<ul style="list-style-type: none"> • Averse to open defecation • Propagation of ill effects of the same at home • Developing of hygienic habits • Trying to inculcate the same among family members and peer group • Sensitive to apathy towards health and hygiene issues
Elderly as guardian of society	<ul style="list-style-type: none"> • Active participation in awareness campaign. • Act as opinion leaders during social functions • Influence children to develop hygienic habits

(8) Requirements for Feasibility of CTC Programme

The evaluation of feasibility of setting up a CTC at a particular location is proposed on the basis of a feasibility matrix that will consider the following factors:

- Availability of land
- Sewage (waste-water) disposal system
- Water supply
- Electricity supply

To identify and evaluate the above factors, and promote planning and training, consultants/ NGOs should be hired for the following purposes:

- To assist finding needs and demands
- To plan and design facility
- To assist forming CBO/SHG

- To train CBO/SHG
- To assist monitoring and evaluating CTC Programme

(9) Feasibility Matrix

The feasibility matrix evaluates the feasibility of setting up a community toilet complex (CTC) at a particular location on the basis of the factors mentioned hereinabove. By allotting a maximum feasibility score of 5 to each of four factors (as underlined), a scale from 0 to 20 evaluates the feasibility of the proposal to determine whether the project is immediately feasible (high priority), feasible after taking certain specific actions (medium/low priority depending on the length of time required to take the suggested actions), and un-feasible. The following examples illustrate this categorization:

- A clear space without any encumbrances and belonging to the project implementation agency satisfying the area and distance criteria (see table) is allotted a maximum feasibility evaluation score (FES) of 5. Wastewater disposal into the existing underground sewerage or open storm water drainage system will respectively contribute 5 and 4 points to the FES. Provision of bore-well for water supply and back-up generator facility will contribute 3 points each to the maximum feasibility score. This leads to a total score of 16/15 points out of 20.
- If the land identified is in the realm of private ownership and is not free from encumbrances, then the practical difficulties involved in acquiring such a piece of land render the location un-feasible, and obviate the need to evaluate the other feasibility factors. In fact, the key factor is availability of land while the other hindrances can be tackled by making suitable investment decisions.

The immediate feasibility (high priority) of the proposed CTC can be considered if the minimum contribution of each feasibility factor to the FES is as follows subject to a total minimum score of 13:

- Availability of land = 4
- Sewage disposal system = 3
- Water supply = 3
- Electricity supply = 3

The medium/low priority projects will require a minimum score of 8 and can be considered as feasible if the minimum contribution of each feasibility factor to the FES is as follows:

- Availability of land = 1
- Sewage disposal system = 2
- Water supply = 3
- Electricity supply = 2

The matrix outlined in Appendix O is primarily a decision making tool, and is expected to be applied once the need-and-demand assessment has been completed. It is recommended that those areas, wherein residents demonstrate a greater desire to self-manage the CTCs, and willing to pay user charges should be accorded high priority.

4.6.3 Total Programme Cost of Proposed Community Toilets Complexes

The total capital costs for proposed CTC for Kanpur has been calculated as Rs. 170 million, the details of the same are given in the following table.

Table 4.10 Cost Details of CTCs Required for Kanpur City

Type of CTCs	Cost per CTC(In Rs)	No of Proposed CTCs	Total Cost(In Rs)
10 Seater	708,500	92	65,182,000
20 Seater	1,236,000	3	3,708,000
Total Capita Cost			68,890,000

4.6.4 Implementation Schedule for CTCs

The estimated total project duration, including planning/design and construction phases is six months. However, it is expected that the MEL activities will span a longer period of time. The details of the implementation schedule are given in the following table:

Table 4.11 Proposed Implementation Schedule

Activity	Month							
	1	2	3	4	5	6	7	8
1. Need survey								
2. Identification of location for CTC								
3. Detailed Design & Engg Studies								
4. Construction								
5. Evaluation								
6. CBO formation and PPPA activities								

Note: PPPA activities are planned in the different volume of report.

4.6.5 Preliminary Implementation Cost for CTCs

Based on following assumption, the total project costs with a yearly break-up (2007-2011) is presented in table below. Total project implementation cost will be Rs.212 million.

- The project duration is 5 year starting in 2007;
- Physical contingency is 5 per cent of the capital cost;
- Consulting and engineering costs is 10 per cent of the capital cost;
- Project Administration costs is 10 per cent of the capital cost;

Table 4.12 Total Implementation Cost with Yearly Break-up

Kanpur	2007	2008	2009	2010	2011
	Pilot Project	Full Scale Projects			
10 Seater	1	23	23	23	22
20 Seater	1	1	1	0	0
Capital Costs	1,944,500	17,531,500	17,531,500	16,295,500	15,587,000
Physical contingency (5%)	97,225	876,575	876,575	814,775	779,350
Consulting & Engg Costing (10%)	194,450	1,753,150	1,753,150	1,629,550	1,558,700
Project Administration Costs (10%)	194,450	1,753,150	1,753,150	1,629,550	1,558,700
Total	2,430,625	21,914,375	21,914,375	20,369,375	19,483,750
Grand Total					86,112,500

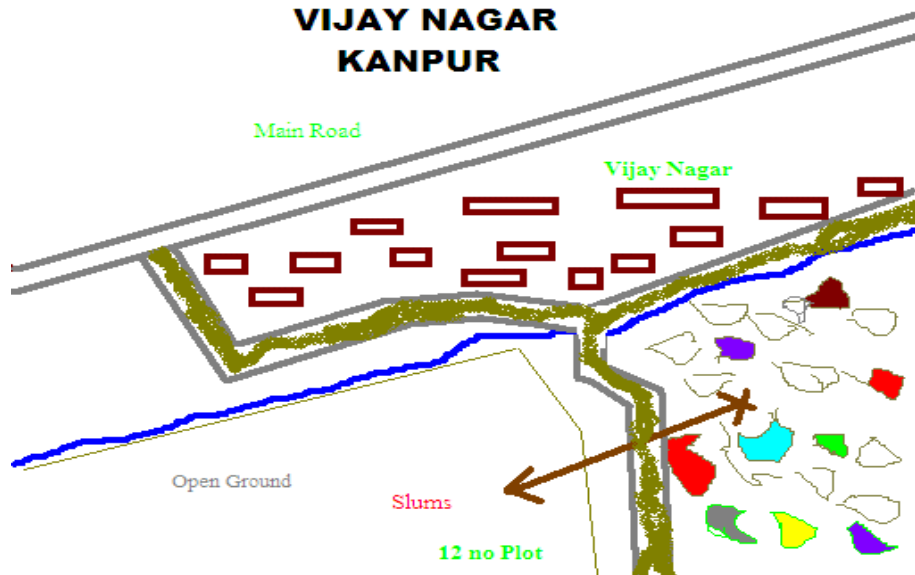
4.6.6 Pilot Project

Based on the baseline surveys and need assessment, Consultants have identified two possible locations where pilots can be considered. These locations are:

- a Vijay Nagar Plot No 12.
- b Daboli West on Canal Banks.

These locations have been short listed according to the need assessment and willingness to pay discussed in earlier Chapters of the report.

- (1) Pilot Study Site: Vijay Nagar – Plot No: 12.



Social Profile: This ward mainly consists of people from different caste and creed and basically has the majority of Daily wage earners. The women are basically employed as household servants in the nearby neighboring colonies of KDA. The total Demographic area covered by this particular Slum is of around 2.7 Sq Km and consist of Kutcha Pucca structures.

Current Facilities Present in the Locality: The major Problem of this area is none of the hutments has got latrines or pits in with them and the total Population is Defecating in the Open ground or into the adjacent Drain which ultimately meets the Canal and subsequently flows in the river. There is no sewerage network available in the adjoining area and only solution to the problem is soak pits. Some people whose houses are near to the semi covered drain have directly connected their sewer pipelines to the same.

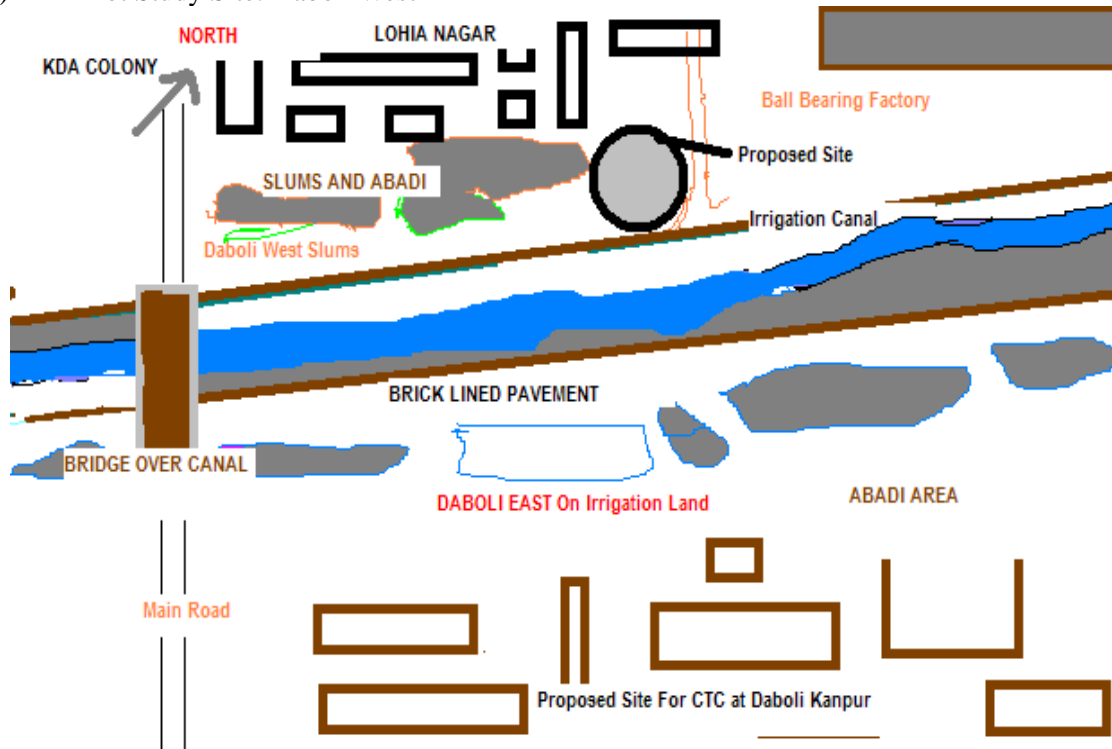
Urgent Requirements: An urgent need for a Community Toilet Complex was felt as per the FGD held on 02 December 2004. 75% of the Participants expressed their willingness to contribute to the said proposal of making a Facility out there and were ready to take part in with O&M of the complex if constructed.

Table 4.13 Feasibility Matrix for Vijay Nagar Pilot Project

Feasibility Factor	Maximum Feasibility Evaluation Score (FES)	Check List	Existing Status	Proposed Action
Availability of Land	5	<ul style="list-style-type: none"> ✓ Ownership of the space or area identified ✓ Land free from all encumbrances ✓ Adequacy-of-area criterion – adequacy of space for the construction of a community toilet complex (CTC) comprising the number of toilet seats determined on the basis of demand-and-need analysis ✓ Farthest-distance criterion – the distance between the farthest dwelling unit in the area covered by proposed CTC does not exceed 500 metres 	<ul style="list-style-type: none"> • Land belongs to DUDA/Nagar Nigam • CTC proposed at the location of the existing Community Centre; Build a two-storied structure with a CTC at the ground floor level and the community centre at the first floor level, or at the present open ground used for defecation • The two criteria of adequacy-of-area, and farthest-distance are satisfied 	<ul style="list-style-type: none"> • Allot 5 points to the FES • Proceed to evaluate the next feasibility factor
Sewage (waste-water) disposal	5	<ul style="list-style-type: none"> ✓ Location of the closest point on the existing sewerage system ✓ Location of the closest point on the existing open storm water drainage system ✓ Soil conditions and ground water status 	<ul style="list-style-type: none"> • The cost of construction of an on-site waste-water disposal system is lower than the cost of laying a sewer line as no sewerage system exists within the area 	<ul style="list-style-type: none"> • Evaluate the feasibility of setting-up an on-site waste-water treatment and disposal system considering the existing soil and ground water conditions
			<ul style="list-style-type: none"> • Existing soil and ground water conditions considered suitable for setting-up an on-site waste-water treatment and disposal system comprising a septic tank and a soak pit 	<ul style="list-style-type: none"> • Choose the option of on-site waste-water treatment and disposal system comprising a septic tank and a soak pit • Allot 3 points to the FES • Proceed to evaluate the next feasibility factor
Water and Electricity Supply	5, 5	<ul style="list-style-type: none"> ✓ Availability of water either through piped supply or through bore-well ✓ Availability of electricity through normal city supply or diesel generator set 	<ul style="list-style-type: none"> • Piped water supply is available, but not adequate • Adequate electricity supply is available 	<ul style="list-style-type: none"> • Provide for bore-well and pumping arrangements to supplement piped water supply; Allot 4 points to the FES • Allot 5 points to the FES • Allot 5 points to the FES

The feasibility evaluation shows a score of 18, which points to high priority and can therefore be taken up. According to the primary survey, the number of WCs (seats) required in the CTC is 10.

(2) Pilot Study Site: Daboli West



Social Profile: This Slum comes under the Govindpuri Vidhan Sabha mainly consists of people from different caste and creed and basically has the majority of Daily wage earners and most of the Male are doing the job of Kabariwala or few of them are also employed with mills nearby. The women are basically employed as Maid servants in the neighbouring colonies of KDA. The total Demographic area covered by this particular Slum is of around 4 to 5 Sq Km and consist of Kutcha Pucca structures.

Current Facilities Present in the Locality: This slum is a recognized as per the KDA directive and is connected with a Brick lined Road along the Canal as developed by DUDA, The land is of Irrigation department but no one has ever turned to keep a check on these land grabbing sphere and the present condition of the slum is that the total Population is Defecating in the Open ground at the far-end of the slum behind the Roller and bearing Mill and children finding it more convenient to discharge themselves directly into irrigation Canal flowing in front of this particular slum which ultimately flows in the river Ganga. Soak pits are the only solutions which have been constructed by people who have already started living into the Colonies developed by Development Authority.

Urgent Requirements: An urgent need for a Community Toilet Complex with around 20 seats. 85% of the Participants expressed their willingness to contribute in form of O&M to the said proposal of providing a CTC.

Table 4.14 Feasibility Matrix for Daboli West Basti Pilot Project

Feasibility Factor	Maximum Feasibility Evaluation Score (FES)	Check List	Existing Status	Proposed Action
Availability of Land	5	<ul style="list-style-type: none"> ✓ Ownership of the space or area identified ✓ Land free from all encumbrances ✓ Adequacy-of-area criterion – adequacy of space for the construction of a community toilet complex (CTC) comprising the number of toilet seats determined on the basis of demand-and-need analysis ✓ Farthest-distance criterion – the distance between the farthest dwelling unit in the area covered by proposed CTC does not exceed 500 metres 	<ul style="list-style-type: none"> • Land belongs to DUDA/Nagar Nigam • CTC proposed at the present open ground used for defecation • The two criteria of adequacy-of-area, and farthest-distance are satisfied 	<ul style="list-style-type: none"> • Allot 5 points to the FES • Proceed to evaluate the next feasibility factor
Sewage (waste-water) disposal	5	<ul style="list-style-type: none"> ✓ Location of the closest point on the existing sewerage system ✓ Location of the closest point on the existing open storm water drainage system ✓ Soil conditions and ground water status 	<ul style="list-style-type: none"> • The cost of construction of an on-site waste-water disposal system is lower than the cost of laying a sewer line as no sewerage system exists within the area • Existing soil and ground water conditions considered suitable for setting-up an on-site waste-water treatment and disposal system comprising a septic tank and a soak pit 	<ul style="list-style-type: none"> • Evaluate the feasibility of setting-up an on-site waste-water treatment and disposal system considering the existing soil and ground water conditions • Choose the option of on-site waste-water treatment and disposal system comprising a septic tank and a soak pit • Allot 3 points to the FES • Proceed to evaluate the next feasibility factor
Water and Electricity Supply	5,5	<ul style="list-style-type: none"> ✓ Availability of water either through piped supply or through bore-well ✓ Availability of electricity through normal city supply or diesel generator set 	<ul style="list-style-type: none"> • Piped water supply is available, but not adequate • Adequate electricity supply is available 	<ul style="list-style-type: none"> • Provide for bore-well and pumping arrangements to supplement piped water supply; Allot 4 points to the FES • Allot 5 points to the FES • Allot 5 points to the FES

The feasibility evaluation shows a score of 18, which points to high priority and can therefore be taken up. According to the primary survey, the number of WCs (seats) required in the CTC is 20.

CHAPTER 5
CONSTRUCTED DHOBIGHAT PROGRAMME

CHAPTER 5 CONSTRUCTED DHOBIGHAT PROGRAMME

5.1 PLANNING AND DESIGNING

5.1.1 Key Planning Factors

The findings of the primary survey and the lessons learnt thereof on the existing scenario of traditional/constructed Dhobighats in Kanpur identifies the shortcomings in the ongoing construction Dhobighat (DG) programme, the constraints faced with regard to design and O&M and the key factors that have to be considered for successfully implementing a constructed DG programme involving construction of new Dhobighats/rehabilitating the existing ones.

Key Factors

- The demand-and-need assessment for the facility(ies)
- Collective ownership for O&M with clear cut formulation of roles and responsibilities for the users and project implementation agency(ies)
- Formation/strengthening of Dhobi associations to build in conflict resolution mechanisms; for the development of an understanding on the importance of self-management of the facility for a sustainable livelihood within the group; for the participation of the users in planning, design and project implementation stages; for assisting the Dhobis in becoming financially independent; and for the development of leaders who can provide direction to the association

The key planning parameters are:

- Number of Dhobis estimated to use the proposed facility/are using the existing facility
- Average distance of the residence of Dhobis from the Ghats
- Number of existing traditional DGs, and possibility of providing of one or more constructed DGs as a common facility for the present users of the traditional DGs
- Existing relationship, if any, between the Dhobi associations at different DGs
- Availability of land
- Availability/requirement of water and electricity
- Disposal of used water

Technical appropriateness of the design would depend on factors listed below. Therefore, the implementing agency should take into account these factors in the best of their ability to design a technically appropriate option for DGs.

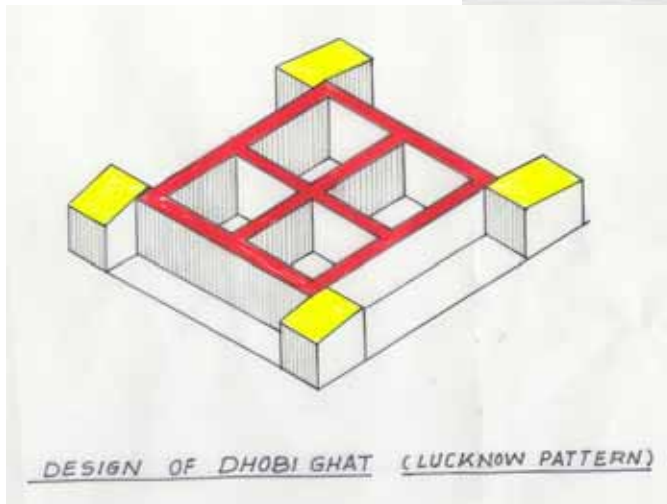
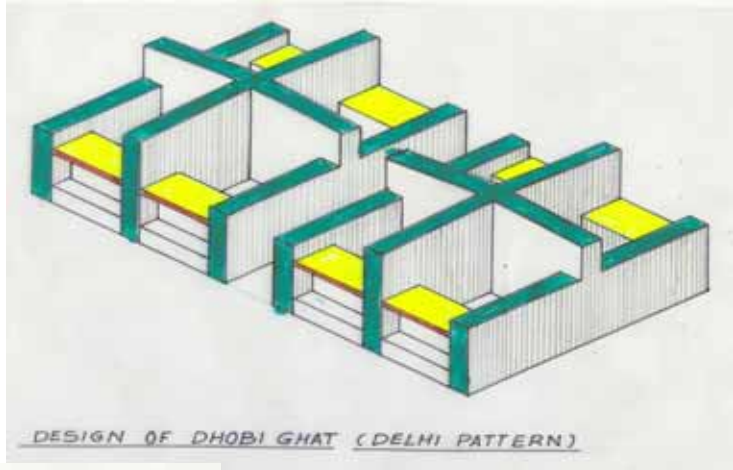
- Cultural acceptability
- Environmentally safe and user friendly (Design should match the method of working of the Dhobis to the extent possible. If changes are necessary, then the PP/PA programmes will require to mobilize the Dhobis to adapt themselves to the changes with particular emphasis on the benefits of these changes for environment protection in general, and their personal health and hygiene in particular)
- Adequate and consistent availability of water
- Affordability
- Usage in a day
- Land availability
- Legal clearances
- Occupational hazards
- Space requirement for each Dhobi (while washing clothes)
- Type and permeability of soil, if on-site sanitation disposal is warranted.

5.1.2 Design Alternatives

Based on single cubicle:

(a) Dhobi stands inside the cubicle:

- Dhobis stands inside the cubicle while washing clothes.
- While doing so, the Dhobi has to stand in polluted water for long periods, which not only is harmful to the skin but also may affect the general efficiency.
- Also, the design in itself is inconvenient as the Dhobi has to jump over the platform to get into the cubicle.



(b) Dhobi standing outside the cubicle: this option obviates the impact of having to stand in water containing washing chemicals

In both (a) and (b), the Dhobi first washes clothes by beating them on the platform and then empties the cubicle and fills it with clean water for final rinsing. This not only increases the time required to complete the washing operation but also leads to higher consumption of water.

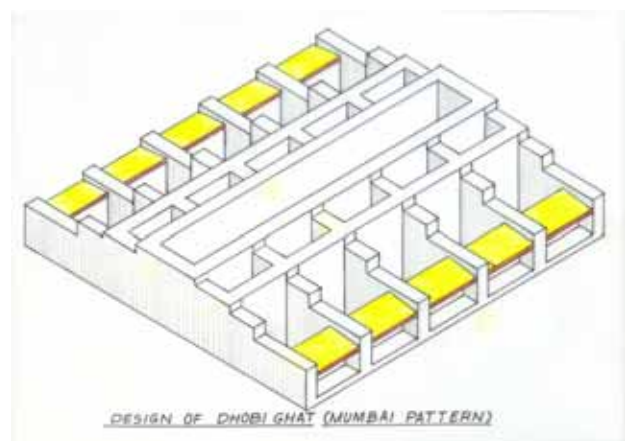
Based on combined cubicle:

In this option, there are two cubicles for the Dhobi – step one of the operation of beating and rubbing of clothes is done using water filled in one of the cubicles and step two of rinsing is done in a second cubicle, which contains clean water. In this system, the time taken for complete operations is less and consumption of water is comparatively lesser than the single cubicle system.

5.1.3 Planning Parameters

The planning parameters for a DG are described in the following passages focusing on cubicles, water supply, wastewater disposal etc.

Cubicles



- One cubicle is required for 6 Dhobi on the basis that three shifts in a day with each Dhobi using the DG once in 2 days.
- The optimum size of cubicle is 1200 mm x 1200 mm x 600 mm. The number of cubicles at a DG depends on the number of Dhobis using or likely to use the DG. While firming up on the location of a new constructed DG, it is desirable that distance of travel for a Dhobi from his place of residence does not exceed 2 Km.

Water supply

- Undoubtedly, reliable water supply in sufficient quantity is a must for proper functioning of a DG. This can be either from a piped water supply system or an independent tube-well, or a combination of the two sources, which is recommended option.
- The provision of a standby pumping set for the tube-well is desirable to facilitate regular maintenance or in the eventuality of a break-down to ensure that the operations at the DG run smoothly.

Disposal waste water

- Method of disposal of wastewater should ensure that there is no adverse effect on soil, ground water and the general environment in around the DG.
- It is recommended that the disposal takes place into a sewer or a drain provided they are tapped for diversion to a wastewater treatment plant. In the absence of these options, a mini-ETP with the provision of re-using part of the wastewater after recycling will have to be considered despite additional capital and O&M costs, and susceptibility to failures in electricity supply.

Space for drying clothes

- Sufficient paved space with proper arrangement for spreading the clothes should be available. Normally a Dhobi washes 20-50 clothes per day depending on the size and type of clothes. The space for drying should be planned on the basis of number of Dhobis working in one shift.

Shed over cubicles

- A shed over the cubicles should be provided to facilitate continuous operations under all weather conditions.
- The roof area can be used for providing space for ironing and drying of clothes.

Store for soiled clothes

- Provision for a lockable store should be made to enable the Dhobis to keep the unwashed clothes.

Rest room

- Rest room for the Dhobis and their family members should also be provided to enable the Dhobis to take necessary breaks during their working time.

Bhattis (boiling arrangement)

- Soaking of clothes in hot/warm water becomes essential in case of some of the soiled clothes to remove “adamant” stains.

Toilets

- Separate toilet blocks both for men as well as women should be provided
- Stand-post should be provided for drinking water

Safety

- Boundary wall with a gate all along the periphery of the DG should be provided for safety of clothes and belongings of the Dhobis.

5.1.4 Wastewater Disposal Options

The effluent from the DG primarily comprises suspended solids from dirty clothes and phosphate from soaps, detergents, washing soda and other materials used in the washing process. The best option is to dispose the used water into the nearest sewer, or an open drain provided the latter is being tapped for diverting the wastewater to a treatment plant. In most urban cities, the domestic and industrial wastewater is getting mixed with the storm water, and direct disposal of the discharge into the river is causing significant pollution to the river although the share of Dhobighats can be considered to be insignificant. Disposal of the wastewater into stagnant water bodies can cause development of algae and other aquatic plants such as the water hyacinth.

The option of setting of a small effluent treatment plant, although offering the benefit of recycling part of the wastewater, does not appear to be financially feasible, and also has its own O&M difficulties in cities which witness long hours of no electricity supply.

Therefore, the ideal option is to connect the wastewater disposal to the nearest sewer. If not available, the facility has to be connected to a drain, which is finally tapped and diverted to a municipal sewage treatment plant.

5.2 OPERATION AND MAINTENANCE

5.2.1 Institutional arrangement for sustainable O &M

The primary survey shows that the Dhobis are members of their own Association. Considering that the Nagar Nigam is reluctant to take the responsibility of O&M of constructed DGs, it is best to hand over the O&M to the respective Dhobi associations, the willingness for which has been confirmed by the primary survey.

5.2.2 Evaluation of the Proposed Institutional Mechanism

The following table brings out the pros and cons of handing over the responsibility of O&M to the Dhobi Association.

O&M by	Pros	Cons
Dhobi Association	<ul style="list-style-type: none"> ▪ Sense of ownership; will ensure optimal utilization; ▪ Willingness of users to contribute towards various activities as part of O&M can help build the ownership spirit. ▪ The availability of such ready infrastructure for commercial activities (e.g. Chicken clothing for domestic and export demand) can generate additional revenue for O &M 	<ul style="list-style-type: none"> ▪ Need "hand-holding" over initial year in respect of technical matters such as repair and maintenance works.

5.2.3 Set-up for a Dhobi Association

All present and potential users should be encouraged to join and form a Dhobi Association identifiable by a specific name/location. Institutional capacity building measures are to be assessed based upon their expected contribution to O&M activities. Such Association may be informal or registered under Society Act.

The mission of the Dhobi Association earmarked for O&M of a DG should be clearly agreed by members. The goals and objectives for a Dhobi Association could include:

- Regular and consistent use by all its members;
- Maintenance of the hygienic conditions and cleanliness in and around the DG;
- Maintenance of Dhobighat in good and usable condition at times; and
- Generation of revenue for O&M through the levy of user charges and other sources to exceed the projected O&M costs.

For the finalization of the structure and its institutional set-up, the bye-laws should be prepared in consultation with the different stakeholders. The Dhobi Association should select/elect a President, a Secretary, a Treasurer and Members of the Management Committee either on a rotational basis or through an annual election process. The responsibilities and duties for each position should be defined so as to avoid ambiguity and achieve the underlying objectives.

5.2.4 Capacity Building and Training

All community-based organizations face constraints that need to be understood, analyzed and overcome to make a success of any community development programme, which also has a parallel programme for environment improvement.

The general constraints faced by a community-based organization can be categorized as follows:

- Poor management skills
- Lack of technical skills related to O&M (for example, carrying out civil or mechanical repairs)
- Limited financial resources and difficulties in accessing donor agencies

The capacity building and training measures have to target overcoming the aforesaid constraints. The following list is an indicative list of activities, which may be required for institutional strengthening of the Dhobi Associations:

- Leadership training for committee members; e.g. conducting meetings, conflict resolution etc.
- Developing business plans for O&M with the objective of generating revenue surplus necessary for the creation of a fund to be used for future capital works and provision of pension schemes
- Developing linkages with local, state and central government social welfare schemes
- Improving internal administrative and financial procedures (accounting, personnel etc.)
- Role definition and its monitoring
- Determination of user charges and periodic financial reviews
- Defining operating policies (i.e disbursement approvals, use of equipment, collection of user charges etc.)
- Training on technical aspects such as civil and mechanical repair works and capacity-building for supervision of these works
- Determination of benchmarks for O&M for periodic review
- Sharing/dissemination of best practices

5.2.5 Suggested Institutional Mechanism for Sustainable O & M Dhobighats

The implementing agency transfers the responsibility and accountability for sustainable O & M of Dhobighats to PMUs in each city. The PMU shall be responsible, inter alia, for the following:

- Construction and completion of the pilot as well as the main components of the project;
- Involvement of and ownership by communities during implementation of the project;
- Create a community apex institution which shall be responsible for sustainable O & M as well as capacity building institution for the CBOs/SHGs/Dhobi Associations during and after the project is completed;
- Perform necessary monitoring and evaluation functions for successful implementation of the project with full accountability to IAs and funding agencies.
- Responsible for funds allocation and management to Training/Capacity Building Centres/ Apex body for CBOs/SHGs/Dhobi Associations
- Dissemination of information about the project
- Accountable for the specific and measurable project deliverables.

In each city, the PMU shall be headed by Project coordinator with accountability to the concerned Implementing Agency in the city, State department and donor agency. The PMU shall have representation from IA, elected representatives involving affected communities, a representative each from DUDA & SUDA, apex body of CBOs and prominent NGOs known for their contributions for promotion of health and hygiene and environmental work in affected communities.

Initially, A Training /Capacity-building Centre in each city shall be set up through concerted efforts, which shall be responsible for capacity building of CBOs/SHGs /Dhobi Associations during implementation and after completion of the project on self-sustainable basis. This unit shall be headed by a competent and experienced Training Officer with capability to manage capacity-building initiatives. This unit shall also have a community mobilization specialist who shall guide and assist in creation and strengthening the CBOs/ SHGs /Dhobi Associations. During implementation of the project as well as after the project is completed, this unit shall be responsible for continued awareness building, technical and managerial capacity-building as per attached institutional framework.

As the project proceeds towards completion, the management of the Training Centre shall be handed over to a newly created apex body representing CBOs, SHGs /Dhobi Associations. The general body members of this Apex body should have representative from each CBO. The resources created under the project shall also be handed over to the Apex body of CBOs/ SHGs /Dhobi Associations.

It is recommended that this apex body is registered under Society Registration Act. This representative body shall be undertaking the responsibility for sustainable O & M after the project is completed. This unit should be able to sustain itself through mutually agreed contributions from individual CBOs, IAs and other relevant departments responsible for health, hygiene, urban development and poverty alleviations.

5.3 OPERATION AND MAINTENANCE COST RECOVERY

The objective of the financial evaluation is to propose a cost recovery model aimed at sustainability of O&M considering that the capital costs (refer next section) are proposed to be provided through grant funds in this project.

(1) Capital Cost Estimation

The capital cost for Dhobighat comprising 25 and 50 washing cubicles are summarized below:-

Table 5.1 Preliminary Capital Costs (INR) for Constructed DG

	10 cubicles	25 cubicles	50 cubicles
Constructed Dhobighat	1,600,000	3,000,000	5,000,000

Note:

1. The facility includes roof, rest room, bore well (2 nos. for 25- and 50-cubicle DGs; for 10-cubicle DG, 1 bore-well and additional piped water supply recommended) and toilets.
2. Detail cost estimation is attached in appendix.

Table 5.2 Rehabilitation of Existing Dhobighat

Facility	Purpose	Cost
Average cost of civil works	New building to cover the existing cubicles with space and facilities for ironing, resting, toilets etc. and boundary wall with gate	240,000
Provision for submersible pump, bore-well	Inadequacy of water supply has been noted; it is desirable to provide additional water supply arrangement from a bore-well to the existing piped water supply	50,000
Generator	Back up power supply	50,000
Electrical works	General lighting, ironing of clothes etc.	9,000
Average cost of rehabilitation per Dhobighat		349,000
Say		350,000

(2) Operation and Maintenance Costs

The O&M costs for a Constructed DG comprise expenses/costs/charges for electricity, salary and wages for the supervisor and security, repairs etc. Among all the cost heads, the main components are wages and electricity. The O&M cost for a Constructed DG with 10, 25 and 50 cubicles are summarized below:-

Table 5.3 Estimated Monthly Operation and Maintenance Costs in INR

Cost Head	10 cubicles	25 cubicles	50 cubicles
Care taker cum watchman	2,500	2,500	2,500
Electricity	1,575	3,150	5,250
General Maintenance per month (average) including the pumps	450	900	1,500
Total	4,525	6,550	9,250

(3) Cost Recovery Measures

Sustainability of the project will depend on maximum usage of the DG. The criteria for cost recovery mechanism must have the following attributes:

- Simple to administer;
- Induce maximum usage (in the interest of project deliverables); and
- Ensure full recovery from the users.

To ensure full recovery, cost per family/Dhobi per month was estimated assuming DG usage levels of 100, 75 and 50 per cent as shown in Table below. A conservative usage level of 50 per cent may be assumed as a benchmark. However, the Dhobi Association should target to attain and achieve 100 per cent usage, i.e. operation and use of each of the cubicles in all the three shifts.

Table 5.4 O&M Cost per family/Dhobi per month in INR

	10 cubicles	25 cubicles	50 cubicles
Total operation & maintenance costs except electricity	2,940	3,400	4000
Electricity costs			
Full usage	1,575	3,150	5,250
75 % usage	1,181	2,363	3,938
50 % usage	788	1,575	2,625
Total costs by % of users			
Full usage	4,515	6,550	9,250
75 % usage	4,121	5,763	7,938
50 % usage	3,728	4,975	6,625
Cost per family/Dhobi per month per usage rate			
Assuming full usage	75	44	31
Assuming 75% usage	92	51	35
Assuming 50% usage	125	66	44

Note: One cubicle is assumed to be used by 6 Dhobis on the basis of three shifts/day and each Dhobi visits/uses the DG once in 2 days.

The above table clearly shows that the incidence of cost per family/person increases with decrease in usage level. Monthly user charges for 10-, 25- and 50 cubicle DG are Rs. 92, Rs. 51 and Rs. 35 per Dhobi for 75 per cent usage level. Based on the results of the primary survey, which indicated a willingness-to-pay user charges up to Rs. 100 per month, the project is expected to be financially sustainable and is therefore recommended. In case of the poor paying capacity of some of the users, these users should share the costs, especially of watchman through contribution of their labour.

5.4 SOCIAL AND ECONOMIC BENEFITS

This section deals with the benefits, both tangible and intangible, in respect of the construction/renovation of DGs. These benefits can be conveniently classified in the following groups:

(1) Environmental benefits:

Once all the constructed Dhobighats envisaged under this project become fully operational, the level of pollutants going into the rivers is expected to reduce. The construction of Dhobighats shall result in reduction of detergents flowing into the river every day. This shall, inter alia, result in improvement of quality of water in the rivers besides generating important health benefits and positive environmental externalities.

(2) Health-related benefits:

Improvement of water quality shall result in reduction in the incidence of water-borne diseases. Also, properly designed facility would also reduce the incidence of skin infections amongst the Dhobis.

(3) Institutional benefits:

The project is expected to strengthen the Dhobi Associations through capacity-building in areas like financial management and leadership, and will result in overall empowerment of community organizations.

(4) Economic Benefits:

Economic benefits include productivity gains, secondary economic benefits and developmental impact due to improved health and lower incidence of water-borne diseases. This project shall ensure access

of convenient facilities to the Dhobis at affordable prices.

5.5 IMPLEMENTATION OF DG PROGRAMME

5.5.1 Requirement of DGs

(1) New Dhobighat Facility

Currently, no permanent washing facility was found during the primary survey in October 2004. However, 4 small traditional DGs used by 64-80 Dhobis were identified during an earlier survey conducted by the JICA team.

At present, five (5) Constructed DGs have been planned by local authorities and sanctioned by the state government. These planned dhobighats is expected to meet required capacity of Constructed Dhobighat.

(2) Improvement of Existing Dhobighat

Following rehabilitation works have been identified during preliminary survey.

- New building to cover the existing cubicles with space and facilities for ironing, resting and toilets etc.
- New submersible pump, generator and electricity works
- Boundary wall with gate

The estimated capital cost of improvement works per Dhobighat is Rs. 350,000.00. Four existing Dhobighats have been identified in Kanpur for improvement. Therefore, the total capital cost of improvement works for the existing facilities is estimated as Rs. 1,400,000.00.

Table 5.5 Existing Dhobighats for Improvement

Sr. No.	Name of Existing Dhobi Ghat	No. of unit
1	Gola Ghat	15
2	Bhairon Ghat	110
3	Juhi Bamhuria	10
4	Juhi Parampurwa	10

5.5.2 Programme Implementation Strategy

(1) Project Implementation Concepts for Improvement of Existing Constructed DGs

The proposed Dhobighat programme to relocate the existing traditional DGs/improve or renovate the existing DGs adopts a community-based approach in planning, implementing, operating and maintaining Constructed DGs. In Kanpur, no new facilities (besides those already on the anvil) have been proposed in this project, although improvement works have been proposed. To manage the improved facilities in an appropriate manner, the functioning of the existing Dhobi Associations will require improvements through a process of capacity building. To do so, the JICA Study Team recommends that a pilot project to manage Constructed DGs be implemented and a good example or model for O&M be created. This model project can then be extended to other facilities in the City.

(2) Institutional Setting Up for Monitoring

The proposed institutional set-up is graphically presented in Figure 5.1. Nagar Nigam, the main body responsible for health and hygiene, should regularly monitor the functioning of the DGs within Municipal limits. It should interact with the coordination committee comprising elected members of

the Associations and representatives of DUDA and KDA besides their own representatives including the Health Officer. This committee will discuss the problems faced by the associations in the O&M of DGs and find solutions, elicit feedback from the associations and facilitate the monitoring, evaluation and learning process. These activities will have to be dovetailed with the proposed activities of Public Participation and Awareness for non-sewerage schemes.

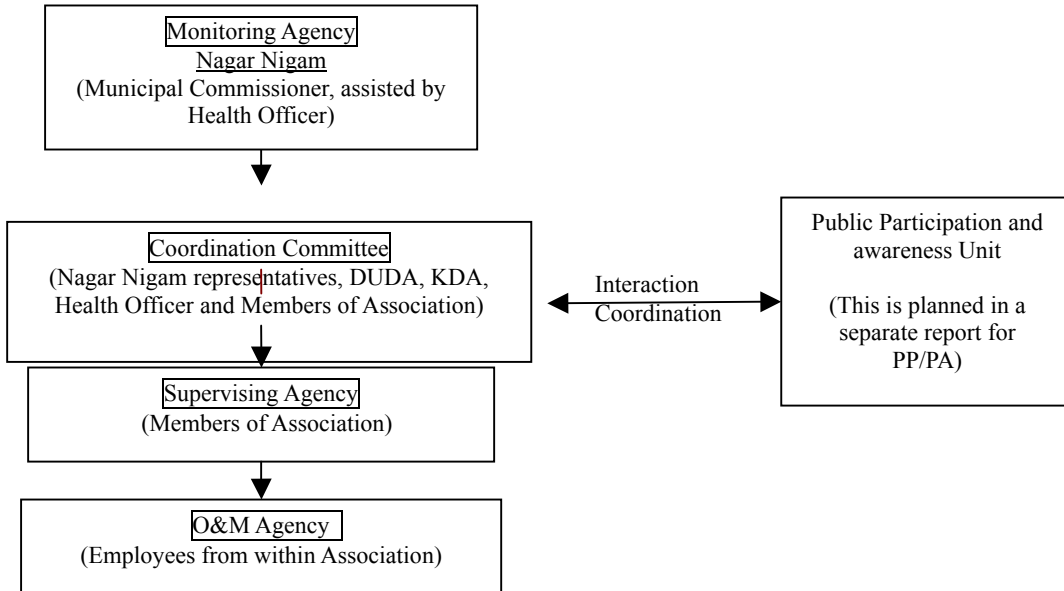


Figure 5.1 Proposed Institutional Set Up for Dhobighat Monitoring

(3) Operation & Maintenance and Monitoring Plan

The day to day O&M is proposed under the aegis of respective Dhobi Associations. They will also be key players in the monitoring and evaluation process.

Based on the guidelines suggested in this report, the implementing agency should develop a mechanism for monitoring and evaluation considering the following aspects:

- It has to be an ongoing process – assess the situation, analyze it, take corrective measures where necessary and record the same as part of the lessons learnt;
- Follow-up on the above to ensure that the members of the Dhobi Association are learning from successes and mistakes;
- Implementation plans should be prepared on an annual basis; the process should incorporate quarterly, half-yearly and annual assessments besides regular fortnightly visits to enable trouble-shooting; the intermediate assessments will also facilitate revisions to the implementation plan wherever necessary;
- The reports should be delivered to the responsible departments/agencies at city/district/state government/central government levels as well as the funding agency; this process will facilitate any initiatives that may become necessary at legal or policy levels;

The “Constructed Dhobi Ghat” monitoring and evaluation cell constituted at Nagar Nigam will monitor the programme in order to make an ongoing assessment of the program and take action where necessary. The Dhobi Association will monitor construction of ghats, and water and electricity supply required for their work.

The evaluation cell should comprise representatives of the Nagar Nigam, DUDA, SUDA, Jal Sansthan, State Electricity Board, Dhobi Association and other social groups whose leadership is valued and who are currently active in improving the working conditions of the Dhobis.

(4) Public Participation and Awareness for Constructed DG Programme

The role of PP/PA does not get diminished for Dhobighats by virtue of their relative simplicity of O&M. In addition to educating the members about the norms to be observed for use of ghat, use of chemicals and monitoring devices, they can also be assisted in preparing checklists and fixing periodicity for O&M. As in the case of CTCs, role of PP/PA can extend beyond O&M and supervision, and include extension programmes for family and community welfare.

The PP/PA programme in case of Dhobighats will have to address some of the following critical issues:

- Educating the Dhobis on the negative impact of washing clothes/fabrics on the river banks;
- Explaining the benefits of constructed Dhobighats;
- Developing a CBO wherein an environment to facilitate exchange of ideas on adopting new practices (e.g. better detergents instead of a harmful mix of acid and "soda") can be created;
- Involving the association(s) of Dhobis to build a sense of ownership, and transfer the responsibility of O&M to the users of the constructed Dhobighats; this can not only facilitate change in practices, but also encourage acceptance of "new" ideas, and facilitate suitable cost recovery model - "pay-as-you-use";

Capacity building and awareness campaign

Orientation workshop should be held so as to include representatives of dhobis associations and their sub-groups from all the ghats. The recommended agenda for these workshops is as follows:

- Presentation on institutional arrangement
- Overview on formation of CBO
- Overview on functioning, role and responsibility of CBO
- User charges and collection; accounting and book-keeping
- Role of urban local bodies
- Operation and maintenance
- Monitoring of Dhobighats
- Maintenance of water pump and other facilities at the constructed Dhobighats
- Reporting to the Nagar Nigam
- Mobilizing membership
- Setting ground rules for members User charge recovery accounting and bookkeeping
- Operation and maintenance log
- Monitoring of Dhobi ghats

(5) Programme Monitoring

The process of monitoring, evaluation and learning will serve the need for interventions where necessary and facilitate improvements on an ongoing basis. A checklist with the benchmarks is proposed to identify any deviations and initiate course-correction measures. Table 5.6 proposes a schedule for different monitoring activities.

Table 5.6 Monitoring Items

Data requirement	Frequency of data collection	Data collectors
Training		
Number of workshop held	Monthly reports	Implementing agency (NGO/Consultants)
Number of participants in workshops	Monthly reports	Implementing agency (NGO/Consultants)
Program expense	Monthly reports	Implementing agency (NGO/Consultants)
Distribution of communication material	Monthly report	Implementing agency (NGO/Consultants)
Construction related		
Number of dhobi ghats developed	Monthly report	Dhobi association and Local Body
Adherence to approved drawing and estimates	Periodically	Engineering div, Local Body
Progress of construction as per time chart	Periodically	Engineering div, Local Body
Quality of construction	Regular checking during construction	Engineering div, Local Body
Operation and maintenance		
Water consumption pattern	Monthly	Water Dept/Local body
Electricity consumption	Monthly	Electricity department
Quality of maintenance Of the ghat and the facilities	Random checking	Local Body
Evaluation		
Indicators		
Degree of abatement of pollution in the river	Quarterly	Pollution control board
Rate of acceptability of ghats	Quarterly	Dhobi association and local body
Improvement in general health of dhobis	Six monthly	Health department

5.5.3 Total Program Cost of Proposed Constructed Dhobighat

Table 5.7 Cost Details of DGs Required for Kanpur City

Type of Works	Cost per Dhobighat (In Rs)	No of Proposed Dhobighat	Total Cost(In Rs)
Improvement works	350,000	4	1,400,000
Total Capital Cost	-	4	1,400,000

5.5.4 Preliminary Implementation Cost for Constructed Dhobighats

Based on following planning conditions, yearly total project costs have been worked as shown in Table below. Total project implementation cost will be Rs.1.75 million.

- One pilot project
- Improvement works only
- Physical contingency is 5 per cent of the capital cost
- Consulting and engineering costs is 10 per cent of the capital cost
- Project Administration costs is 10 per cent of the capital cost

Kanpur	Year	
	2007	2008
New facility	0	0
Improvement works	1	3
Capital Costs	350,000	1,050,000
Physical contingency (5%)	17,500	52,500
Consulting and Engineering Costs (10%)	35,000	105,000
Project Administration Costs (10%)	35,000	105,000
Total	437,500	1,312,500

CHAPTER 6

CONCLUSION AND RECOMMENDATION

CHAPTER 6 CONCLUSION AND RECOMMENDATION

The objectives of this study are to formulate programs of development/ management of Community Toilet Complexes (CTCs) and Constructed Dhobighats (DG); to assess the technical, institutional, financial and economic viability; and to assess the environmental and social soundness of the proposed programs.

The objective of the proposed programmes is to improve slums and DGs' sanitary conditions, thus improving water quality of rivers.

The shortcomings in the operation and maintenance (O&M) of existing CTCs in slum areas and Dhobighats are causing serious problems in proper functioning and general sanitation in the surrounding areas. O&M aspect is one of the main factors to be considered in formulating sustainable programmes of CTC and Constructed DG. Keeping this in mind and on the basis of the assessment of existing conditions of the target areas and facilities as well as the needs and demand of slum dwellers / Dhobis, the proposed programmes are formulated.

The proposed programmes adopt a needs-driven and community-driven approach in planning, implementing, operating and maintaining the facilities and suggest that the O&M is facilitated through local CBOs/SHGs or local Dhobi Associations. Implementation by this approach will make the programmes technically, financially, socially and culturally viable.

For successful implementation of the programmes, the followings are required:

- Involvement and assistance of NGOs/Consultants for training and monitoring
- Regular monitoring, evaluation and feedback on the functioning of CTCs and Constructed DGs by Nagar Nigam in coordination with SUDA, DUDA and representatives of CBO/SHG.
- Appropriate implementation steps as follows to ensure involvement and training of CBOs/SHGs or Dhobi Associations:

Step 1: Needs survey of slum / Constructed DG
Step 2: Creation of CBOs/SHGs/ Dhobi Association
Step 3: Planning and designing
Step 4: Selection of location of CTC/Constructed DG including land acquisition clearance
Step 5: Construction
Step 6: Training of CBOs/SHGs/ Dhobi Association during construction
Step 7: Operation and maintenance
Step 8: Monitoring, evaluation and learning
Step 9: Feed back

Creation of a CBO/SHG for O&M of CTCs has not been attempted earlier. Therefore, it is proposed that a pilot project to manage CTC through CBO be implemented and a good model for O&M of CTC be created before implementing full-scale project. Similarly, to manage the improved or new facilities of Constructed DGs in an appropriate manner, the functioning of the existing Dhobi Associations will require improvements through a process of capacity building. This capacity building will be also tested through a pilot project. This model project can then be extended to other proposed facilities.

One of the important constraints relating to O&M is the lack of funds. To make the project financially feasible, a minimum monthly charge of Rs. 70 per household, is required to be levied alongwith subsidy for electricity and sludge disposal costs (where applicable) by the local bodies and part of manpower costs being provided by the community through voluntary activities. This level of user charge was assessed affordable and acceptable even for low-income communities as their willingness to participate in the project is very high. Besides, if the facilities are well maintained and kept clean the willingness to pay will improve and the project will become financially more viable.

The estimated monthly user charge per member for O&M of a Constructed DG is Rs. 35 to Rs. 92. Based on the results of the primary survey, which indicated a willingness to pay user charges up to Rs. 100 per month, the project is expected to be financially feasible.

If followings are considered in the proposed facilities, the projects are expected to be technically feasible and would also ensure adequate O&M of the facilities.

CTCs

- Constant water supply for flushing and cleaning of water closets (seats)
- Sufficient capacity of storage tank for constant water supply
- Regular electricity for tube well and lighting

Constructed DGs

- Appropriate design and quality of construction to ensure no leakage
- Constant water supply
- Amenities (toilet, rest room, safety measure, shed, etc)

Land availability for both CTC and Constructed DG facilities is the most critical aspect for the feasibility of the study. The results of primary surveys to assess the land availability in several slums indicated that the land for CTC can be made available in 2/3rd of the slums surveyed. These lands are mostly owned by the various government bodies and efforts have been made to select lands without any disputes or encumbrance. However, more detailed surveys are required to decide the best location by matching the demand for CTC and the availability of lands. A detailed study should be done at the detailed design stage with the help of hired NGO/Consultants and communities.

Environment and sanitation condition of slums and DG will improve by the implementation of these programmes by reducing pollution load caused by open defecation and improving the facilities. However, if wastewater of the facilities is not properly disposed off, it would create other problems for the environment. In the programme, on-site wastewater treatment plant is not proposed since it requires very high capital and operation and maintenance costs and is not financially feasible at present. Also it requires high skill and technical knowledge to operate and maintain. Therefore, it is recommended that CTCs and Constructed DGs be connected to existing/proposed sewer line if nearby sewer is available and if not available, then septic tank/soak pit system could be connected with CTCs. As for Dhobighat, if no sewer line is available, the facility has to be connected to a drain, which should be finally tapped and diverted to a municipal sewage treatment plant.

The project shall generate tangible and intangible benefits as follows:

- Environmental benefits are expressed through reduction of pollution load caused by open defecation
- Health-related benefits include reduction of the incidence of water-borne diseases resulting from poor sanitation.
- Economic benefits include productive gains, secondary economic benefits and developmental impact due to improved health and reduced health costs
- Social or equity benefits include gender, regional and income-related equity through appropriate sanitation for women and girls who are most affected by poor sanitation. This project empowers the women's group and assists in improving earnings for the communities. Also, this project ensures access to quality services for affected communities.

Institutional benefits are expressed to strengthen the CBO/SHGs through capacity-building.

Appendix A

SURVEY SHEET FOR ABATEMENT OF POLLUTION IN REGARD TO COMMUNITY IN LUCKNOW / KANPUR & ALLAHABAD CITY

Schdule no.	Name of investigator	date
1	Name	
1.2	Gender	Male <input type="checkbox"/> female <input type="checkbox"/>
1.3	Educational status	a) Illiterate b) Literate c) Below primary status d) 8 th pass e) 10 th pass f) graduate g) Post graduate h) Other
1.4	Average monthly income.	Rupees
1.5	Are you belong to this city	Yes <input type="checkbox"/> No <input type="checkbox"/>
1.6	If not from where	
1.7	Since when are you living here	
2	General questions	
2-1	Do you take care of your health?	Yes <input type="checkbox"/> No <input type="checkbox"/>
2-2	Are you aware of microorganisms and diseases caused by them?.	Yes <input type="checkbox"/> No <input type="checkbox"/>
2-3	Are you aware of the garbage around your habitation	Yes <input type="checkbox"/> No <input type="checkbox"/>
3	Community toilet complexes	
3-11-	Do you know about the existence of the public toilet in your area?	Yes <input type="checkbox"/> No <input type="checkbox"/>
3-2	If yes how do you know about them?	a) Poster b) Through Public awareness programmes c) Regional /community politician d) Health center e) other
3-3	Do you utilise the public toilets?	yes <input type="checkbox"/> no <input type="checkbox"/>
	If the answer is no then see Q 3-20	

3-4	If yes how many times	Always / daily Often Very often	
3-5	What is the main concept of having public toilets (etc)	a) For defecation b) For urination c) For bath d) Other	
3-6	Do you pay for using public toilets	Yes	No
3-7	If yes than what amount.	Rupees (per person / daily) Rupees (family / monthly)	
3-8	What is your opinion about the cost ?	a) costly b) Resonable c) Low d) Can't say	
3-9	Why do you use public toilets?	e) No individual household toilet f) Privacy g) Near to house h) Prohibit diseases tospread i) Other	
3-10	Do you know the advantages of using public toilets?	Yes	No
3-11	If yes ,what is it ? .	a) To have a clean environment b) To stop spreading the diseases c) Privacy d) Other	
3-12	Where did you go for defecation before construction of the toilets in your area.	e) Public toilets in other areas f) Open area g) Neighbour's toilet h) Other	
3-13	Do you intend to utilise these public toilets always	a) Yes b) No c) Can't say d) Not aware of	
3-14	You the think the no. of seats of public toilets are enough .	Yes	No
3-15	Do you want bathing facility in the public toilets also	Yes	No
3-16	How is the maintanece of this public toilets?.	a) Very good b) Satisfactory c) Bad d) Very bad	

3-17	According to you what are the loopholes in the upkeepment of the public toilet.	<ul style="list-style-type: none"> a) Not clean/hygienic b) Water scarcity c) Lack of Privacy d) Erratic power supply e) Others 	
3-18	Do you have any improved idea to make these public toilets more effective.	Yes	No
3-19	If yes than what are these? Please inform	<ul style="list-style-type: none"> a) Increase public awareness programme b) Impart Training to the care takers. c) Lodge complain to Nagar Nigam from time to time about existing problems. d) Don't know / not aware. e) Other 	
Responder who has given the answer of question no.3-3 in no :Qno.3-20 to 3-22			
3-20	Current position of public toilet.	<ul style="list-style-type: none"> a) Household toilet b) Neighbour 's toilet c) Open ground d) Other 	
3-21	What are the reasons for not using the public toilets.	<ul style="list-style-type: none"> a) Don't know b) Pay money c) Very far d) Not clean e) No privacy f) Other 	
3-22	What are your suggestions to make the public toilets more effective and better.	Specify:	
4	River and related issues:-		
4-1	What is your opinion about the quality of river water.	<ul style="list-style-type: none"> a) clean b) Polluted c) Don't know / can't say 	
4-2	Do you think that there is need to improve the quality of river water.	Yes	No
4-3	In your opinion, What are the main sources of river pollution?	<ul style="list-style-type: none"> Household sewage water Live stock / sewerage Loundary /dhobi Bathing Disposal of dead bodies Open defecation Others 	
4-4	Do you know that open defecation is harmful for health and environment .	Yes	No

4-5	Do you think that public toilet should be constructed to reduce river pollution.	Yes No Can't say /don't know	
4-6	Are you willing to pay for using public toilets.	Yes	No
		Can't say / don't know	
4-7	If yes what amount .	50p 1Rs Others	
5	People 's Participation		
5-1	Do you like to participate in community programmes for reducing river pollution.	Yes	No
5-2	If yes then how do you want to participate.	Cleaning activities Raising Money To initiate Public awareness programmes Others	
5-3	How do you like to participate in increasing optimal utilisation of public toilets among common people?	By initiating public awareness programmes. By paritcipating in operationand maintenance of the facilities . Others	

Personal Observations

Focused Group Discussio

Appendix B

SURVEY SHEET FOR ABATEMENT OF POLLUTION IN REGARD TO DHOBIGHATS IN LUCKNOW / KANPUR & ALLAHABAD CITY

Name of Investigator: Mr. / Ms

Date of investigation: /October / 2004.

1 Socio-economic Profile									
1.1	Name of the Respondent								
1.2	Address								
1.3	Location								
1.4	Name of the head of the household								
1.5	Religion								
1.6	Type of the family	Joint	Nuclear	Extended					
1.7	Total no of family members								
1.8	Total no of adults in the household								
1.9	Total no of children in the household								
		Male	Age	Female	Age				
1.10	Total no of male/ female								
1.11	Literate/illiterate								
1.12	Children going to school & collages								
1.13	Total no. of family members engaged in washing								
1.14	Any other occupation undertaken by the family	Specify							
1.15	Are you suffering from any Chronic Disease	a) Eyes b) Breathing Problem c) Skin Infection d) Stomach e) Any Other							
1.16	Where do you go for your Treatment?	a) Private Clinic b) Govt. Hospital c) Vaid d) Homeopathic e) Self Treatment							
2 Current Practices									
2.1	Average no. of clothes washed everyday	> 50	< 50						
2.2	Material Used	Acid	Beaching Powder	Castic Soda	Washing soda	Sweet Soda	Low cost detergent	Other	All of them
2.3	Quantity used per day								
2.4	Source of water	River	Pond	Well	Bore Well	Other			
2.5	Water Disposal system								
3 Current Status									
3.1	Facilities currently available	a) Water b) Electricity c) Drying Space d) CTCs. e) Any other							

3.2	Are you a member of any association	Yes	No
3.3	If yes, give details of Association		
3.4	Amount charged for washing per item of Clothing		
3.5	Are you satisfied with the present system for carrying out the washing practices	Yes	No
3.6	If 'No' give reasons		
3.7	DO you want a comprehensive complex to be constructed	Yes	No
3.8	Where to constructed		
3.9	What do you think are the requirements for a Dhobighat	<ul style="list-style-type: none"> a) Water b) Electricity c) Platform d) Drying Area e) Distance From Home f) Provision of Bhatti g) Space For Ironing h) Crèche Cum School i) Medical Room j) Rest Room (Male/Female) k) Canteen l) Approach road m) Mode of transport 	
3.10	Do you think the rate of washing need to be enhanced to meet the extra burden	Yes	No
3.11	If yes, indicate the revised rate of washing		
4 Level of awareness			
4.1	Do you think that the present system of washing clothes is polluting water of river	Yes	No
4.2	If 'Yes' what are your suggestions to check the pollution		
5 Operation & Maintenance			
5.1	Are you willing to contribute for the construction of Dhobighats	Yes	No
5.2	If yes, then How will you contribute	<ul style="list-style-type: none"> a) In cash b) Sharamdan c) Any other 	

5.3	Would you like to pay charges for facilities to be provided for improving Dhobighats	YES		NO	
5.4	If yes, indicate the amount per month which you can pay	<100	>100		
5.5	How would you like to manage the ghats	Nagar Nigam	DUDA	NGOs	Own Association
5.6	Any other suggestion/comments				

Personal Observations

Focused Group Discussion

Appendix C

Focal Group Discussion – Kanpur

Area and Ward: **Vijay Nagar – Plot No: 12.**

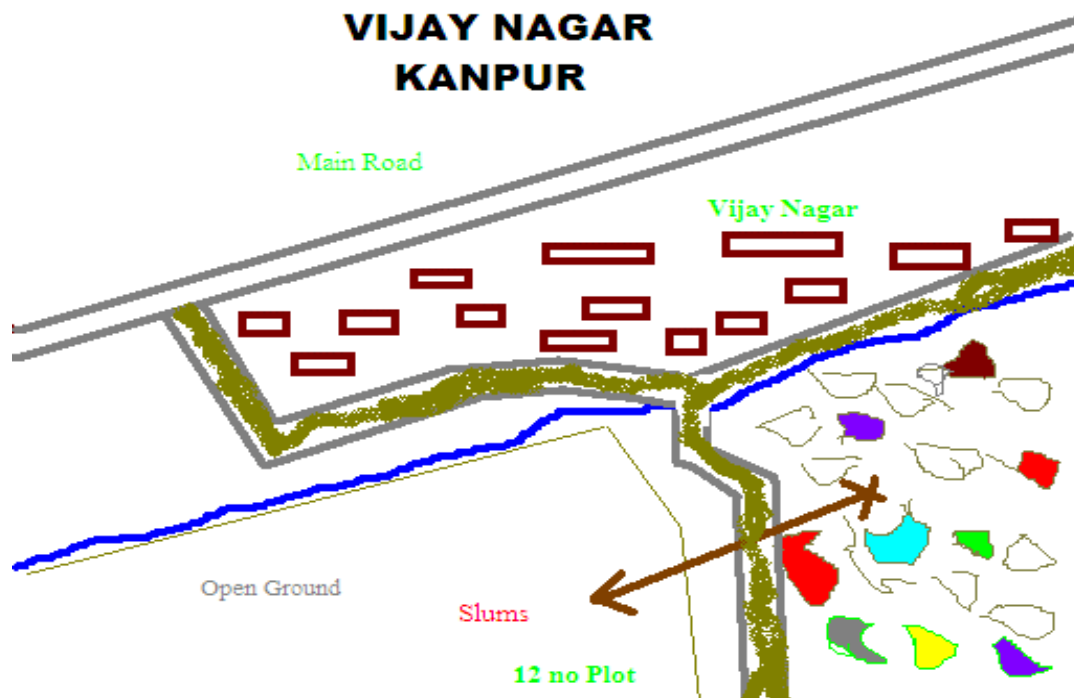
Population: 1800

Social Structure:

This ward mainly consists of people from different caste and creed and basically has the majority of Daily wage earners. The women are basically employed as Mai servants in the neighboring colonies of KDA. The total area covered by this particular Slum is of around 2.7 Sq Km and consist of Kutcha Pucca structures. The major Problem of this area is none of the hutments has got latrines or pits in with them and the total Population is Defecating in the Open ground or into the adjacent Drain which ultimately meets the Canal and subsequently flows in the river. There is no sewerage network available in the adjoining area and only solution to the problem is soak pits. Some people whose houses are near to the semi covered drain have directly connected their sewer pipelines to the same.

Urgent Requirements:

An urgent need for a Community Toilet Complex was felt as per the FGD held on 02 December 2004. 75% of the Participants expressed their willingness to contribute to the said proposal of making a Facility out there and were ready to take part in with O&M of the complex if constructed.



Appendix D

**NON SEWERAGE WORKSHOP
KANPUR
18 DECEMBER 2004**

Sr.No	NAME	DESIGNATION/ADDRESS
1	Prashant Trivedi, IAS	District Collector – Kanpur
2	Arun Kumar, IAS (retd)	Team Leader Study Team
3	S. Vijaykrishnan	Director (Operations) Haskoning India Private Limited
4	Ajay Kumar Singh	JICA Study Team
5	Anuj Sharma	Project Manager
6	Shishir Lal	Project Team
7	Utparn Dubey	Project Team
8	Dharmendra Kumar	DUDA Kanpur
9	Jagdish Yadav	President Lok Vikash Mandal
10	Nirmal Kr. Singh	Vice Chairman, Sulabh International
11	Anoop Bajpai	Project Officer DUDA, Kanpur
12	M.S.Siddiqui	Junior Engineer NEDA, Kanpur
13	A.K. Mishra	J.E. DUDA, Kanpur
14	A.K. Pandey	A.E. DUDA, Kanpur
15	Sanjiv Sinha	A.P.O. DUDA, Kanpur
16	Mahatma Prasad	Dy Director, Nagar Nigam, U.C.D
17	S.K. Gupta	P.O. , NEDA, Vikas Bhavan Rawatpur, Kanpur
18	R.N. Mishra	A.P.O, DUDA, Kanpur
19	Krishna Chaudhari	C.D.S., DUDA, Kanpur
20	Asha Singh	C.D.S., DUDA Disha Vikas, Jajmau Gowlghat, Kanpur
21	Asha Srivastava	C.D.S., DUDA, Manvata Vikas Samiti, 83/60 Choti Juhi, Kanpur
22	Girija Dwivedi	C.D.S. DUDA, Rachana Vikas Samiti, Pahadpur
23	Meera Baijpai	C.D.S, Gaon Vikas Samiti
24	Vimla(Bindu)	C.D.S., Adhyaksha Antyodaya Vikas Samiti, Rajapurwa, Kanpur
25	Anita Bhadauriya	Srijan Vikas Samiti Adhyaksha
26	Sushama Mishra	Nai Disha Vikas Samiti
27	Neelam Verma	Ujval Vikas Samiti Adhyaksha
28	Phoolmati Keval	Pragati Vikas Samiti Adhyaksha
29	Kamla Tiwari	Kalyan Vikas Samiti
30	Asha Mishra	Utthan Vikas Samiti
31	Smt. Malti	Dristi Vikas Samiti
32	Saroj Sidhartha	Vishva Jyoti Vikas Samiti
33	Satish Kumar Triwedi	Lok Vikas Mandal Shakha Dabauli
34	Rajesh Gautam	Lok Vikas Mandal
35	Dinesh Upadhyay	Lok Vikas Mandal Go.Nagar Prabhari
36	Guru Prasad Pal	Lok Vikas Mandal, Kendriya Mantri
37	Hira Lal	Lok Vikas Mandal, Karyakram Prabhari
38	Rampal Yadav	Lok Vikas Mandal Dabauli
39	Shiv Shankar Gupta	Lok Vikas Mandal Shakha, Mauraiya Kheda

		Adhyaksha
40	Sita Ram Thakur	Mauraiya Kheda Upadhyaksha
41	Dr. M.D. Girdhari	Upper Nagar Svasthya Adhikari, Nagar Nigam
42	Sushama Mishra	Nai Disha Vikash Samiti
43	Rajiv Saxena	DUDA Kanpur
44	Lal Bahadur	Jal Jagaran Sansthan

Appendix E

गंगा व गोमती नदी मलिनिकरण पर काबू पाने के लिए सफाई प्रबन्ध योजना का अध्ययन
कानपुर, दिसम्बर 18, 2004

क्र. स.	नाम	पद एवं पता	हस्ताक्षर
1	Jagannath Yadav	Presidenti Lokvikash Mandal	4/2
2	Nirmal Kr Singh	Vice chairman, Sulabh International	NA
3	Chandrasekhar Bhatnagar	PROJECT OFFICER KAMPUR NAGAR	10/12/04
4	M.S. Siddiqui	Junior Engr. NEDA Kampur Nagar	10/12/04
5	A.K. Mishra	J.E. D.U.D.A. KAMPUR NAGAR	10/12/04
6	A.K. Pandey	A.E. D.U.D.A. Kampur Nagar	18/12/04
7	Sanjay Sunka	A.P.O DUDA Kampur Nagar	10/12/04
8	M. Mahesh Pd.	Sy. Div. Kampur Nagar	10/12/04
9	S. K. Gupta	P.O. (NEDA) Vikash Bhawan Kampur Nagar	10/12/04
10	R.N. Mishra	A.P.O (Duda) Kampur Nagar	10/12/04
11	Krishna Chandra	C.D.S. Duda Kampur Nagar	10/12/04
12	Asha Singh	C.D.S. (Duda) Disha Vikash Duma Gaurashalla	10/12/04
13	अमरजीव शर्मा	सी डी एस (डी) मा. क. व. ल. विकास सं. प्र. 83/80 दी. दी. दी.	10/12/04
14	गिरजा शर्मा	सी डी एस (डी) योजना विकास सं. प्र. 83/80 दी. दी. दी.	गिरजा शर्मा

गंगा व गोमती नदी मलिनिकरण पर काबू पाने के लिए सफाई प्रबन्ध योजना का अध्ययन
कानपुर, दिसम्बर 18, 2004

क्र. स.	नाम	पद एवं पता	हस्ताक्षर
15.	श्रीशक्तिदेई	श्री-डी.एच. गौंव विकास समिति	श्रीशक्तिदेई
16	विभलावती (वि-ए)	ए-ए-ए-ए अध्यक्ष म-एपो दय सिंह अभिषेक शर्मा पुत्रा का.पु.ट	(Signature)
19	अनीता अर्वाका	सृजन विकास समिति (अध्यक्ष)	(Signature)
18	शुभमो मिश्रा	नर्मदा विकास समिति	(Signature)
14	नीलकवती	उज्ज्वल विकास समिति महाष्टराहा	(Signature)
20	पूजावती अवाल	प्रवाह विकास समिति अध्यक्ष	पूजावती अवाल
21	कमला सिन्हा	कल्याण विकास समिति	कमला सिन्हा
22	अश्विनी मिश्रा	उत्थान विकास समिति	अश्विनी मिश्रा
23	श्रीमती मालती	दृष्टि विकास समिति	मालती
24.	सरोज सिन्हा	विश्व ज्योति विकास समिति	(Signature)
25	सतीशकुमार सिन्हा	लोक विकास मंडल (अध्यक्ष) का.पु.ट	(Signature)
26	राजेश गौतम	लोक विकास मंडल (अध्यक्ष)	(Signature)
27	विजेश कुमार	लोक विकास मंडल (अध्यक्ष) का.पु.ट	(Signature)
28	अशोक मिश्रा	लोक विकास मंडल (अध्यक्ष) का.पु.ट	(Signature)
29	दीपा अवाल	लोक विकास मंडल (अध्यक्ष) का.पु.ट	(Signature)

गंगा व गोमती नदी मलिनिकरण पर काबू पाने के लिए सफाई प्रबन्ध योजना का अध्ययन
कानपुर, दिसम्बर 18, 2004

क्र. स.	नाम	पद एवं पता	हस्ताक्षर
30	राजेश पांडे	लोक विकास मंडल विकास विभाग	राजेश पांडे
31	शिवशंकर गुप्ता	लोक विकास मंडल शाखा नौरावा रवेडा अंचल	शिवशंकर गुप्ता
32	सीताराम ठाकुर	नौरावा रवेडा उपांचल	सीताराम ठाकुर
33	डा. एम डी प्रियान्त	डॉ. ए. ए. ए. नगर विकास	डा. एम डी प्रियान्त
34	अरुण कुमार	अध्ययन दल	अ. कुमार
35	एस. विजय कृष्ण	अध्ययन दल	विजय
36	अजय कुमार सिंह	JCCA अध्ययन दल	अजय
37	पुल मनी शंकर	नगर विकास समिति अंचल	पुल मनी शंकर
38	नीलम वर्मा	उत्पन्न विकास समिति	Neelam
39	सुखता प्रिया	नगर विकास समिति अंचल	Sukta
40	जी. गीता मालती	ट्रिपल विकास समिति	मालती
41	अमल तिवारी	उत्पन्न विकास समिति	अमल तिवारी
42	आशा मिश्रा	उत्पन्न विकास समिति	आशा मिश्रा
43	सरोज सिन्हा	विद्युत जोड़ विकास समिति	Saroj SINGH
44	विकास विभाग	इ. डी. कानपुर	विकास विभाग

गंगा व गोमती नदी मलिनिकरण पर काबू पाने के लिए सफाई प्रबन्ध योजना का अध्ययन
कानपुर, दिसम्बर 18, 2004

क्र. स.	नाम	पद एवं पता	हस्ताक्षर
45	बिश्मिल लाल	प्रोजेक्ट टीम	बिश्मिल लाल
46	अनुज शर्मा	प्रोजेक्ट टीम	अनुज शर्मा
47	Rajiv Saxena	रजि. DUDA Kanpur area	Rajiv Saxena
48	Jal Bahadur	जन जागरण स्थान	Jal Bahadur
49	Dainik AJ		Dainik AJ

Appendix F

Table A.7 : Demographic Profile of Kanpur

					Household size			
Number of Household					714,380			6.0
	P	M			F			67.1
Population-Total	4,167,999	2,247,216			1,920,783			855
Population-Rural	1,370,488	738,072			632,416			869
Population-Urban	2,797,511	1,509,144			1,288,367			856
Population (0-6)	591,301	316,438			274,863		P	F
SC Population	685,809	369,488			316,321		16.5	16.4
ST Population	2,051	1,078			973		0.0	0.0
Number of Literates	2,659,833	1,549,505			1,110,328		74.4	80.3
Number of Illiterates	1,508,166	697,711			810,455		42.2	36.1
Total Workers	1,247,833	1,061,401			186,432		29.9	47.2
Main workers	1,040,278	929,839			110,439		25.0	41.4
Marginal workers	207,555	131,562			75,993		5.0	5.9
Non workers	2,920,166	1,185,815			1,734,351		70.1	52.8
Cultivators	222,772	179,005			43,767		17.9	16.9
Agricultural labourers	155,243	105,175			50,068		12.4	9.9
Workers in household industries	48,723	37,191			11,532		3.9	3.5
Other workers	821,095	740,030			81,065		65.8	69.7
								43.5

P : Persons, Male and female

M : Male Population

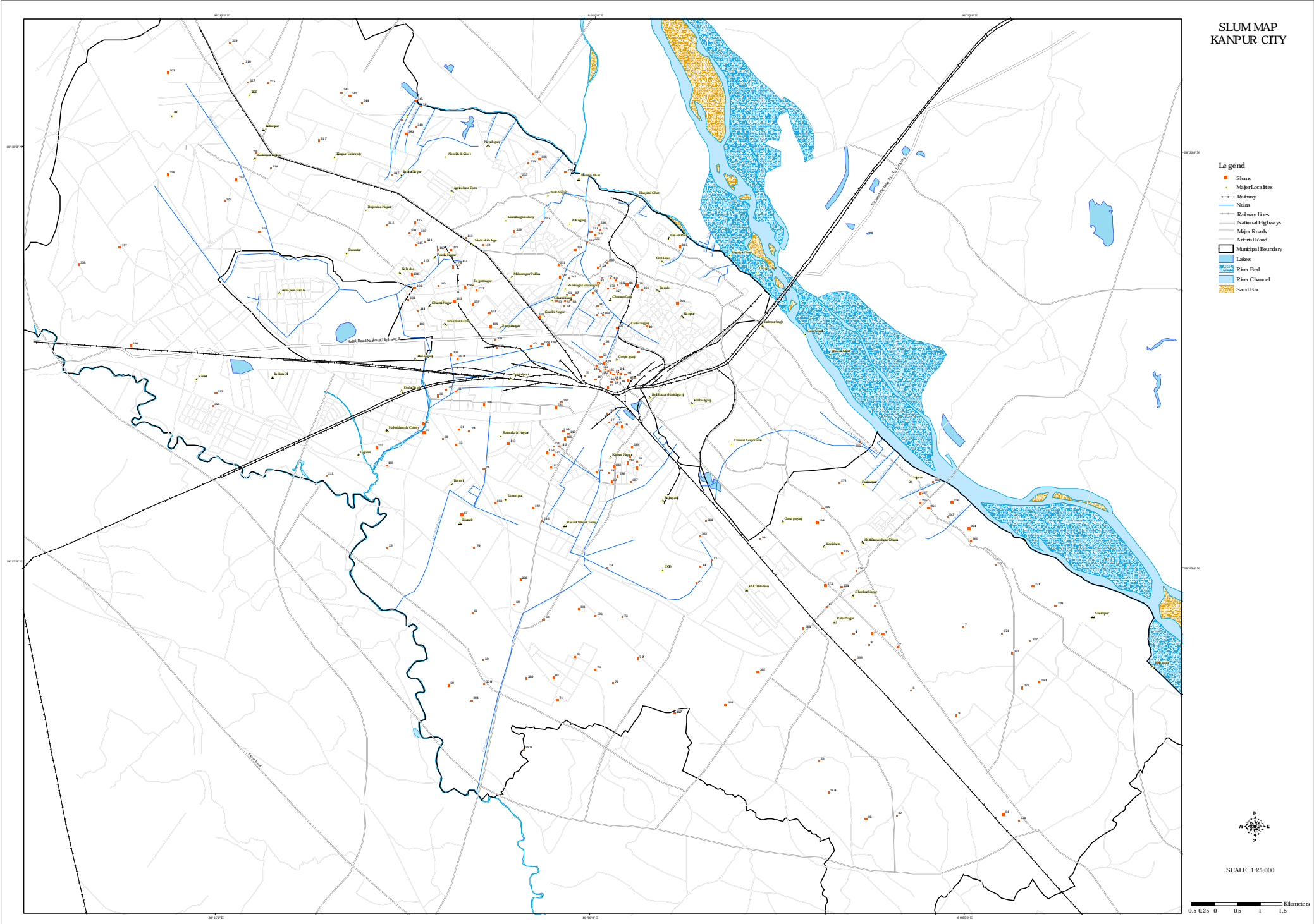
F : Female Population

Appendix G

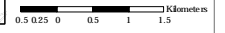
SLUM MAP
KANPUR CITY

Legend

- Shams
- Major Localities
- Railway
- Nalas
- Rainy Lines
- National Highways
- Major Roads
- Arterial Road
- Municipal Boundary
- Lakes
- River Bed
- River Channel
- Sand Bar



SCALE 1:25,000



LCSs MAP
KANPUR CITY

Legend

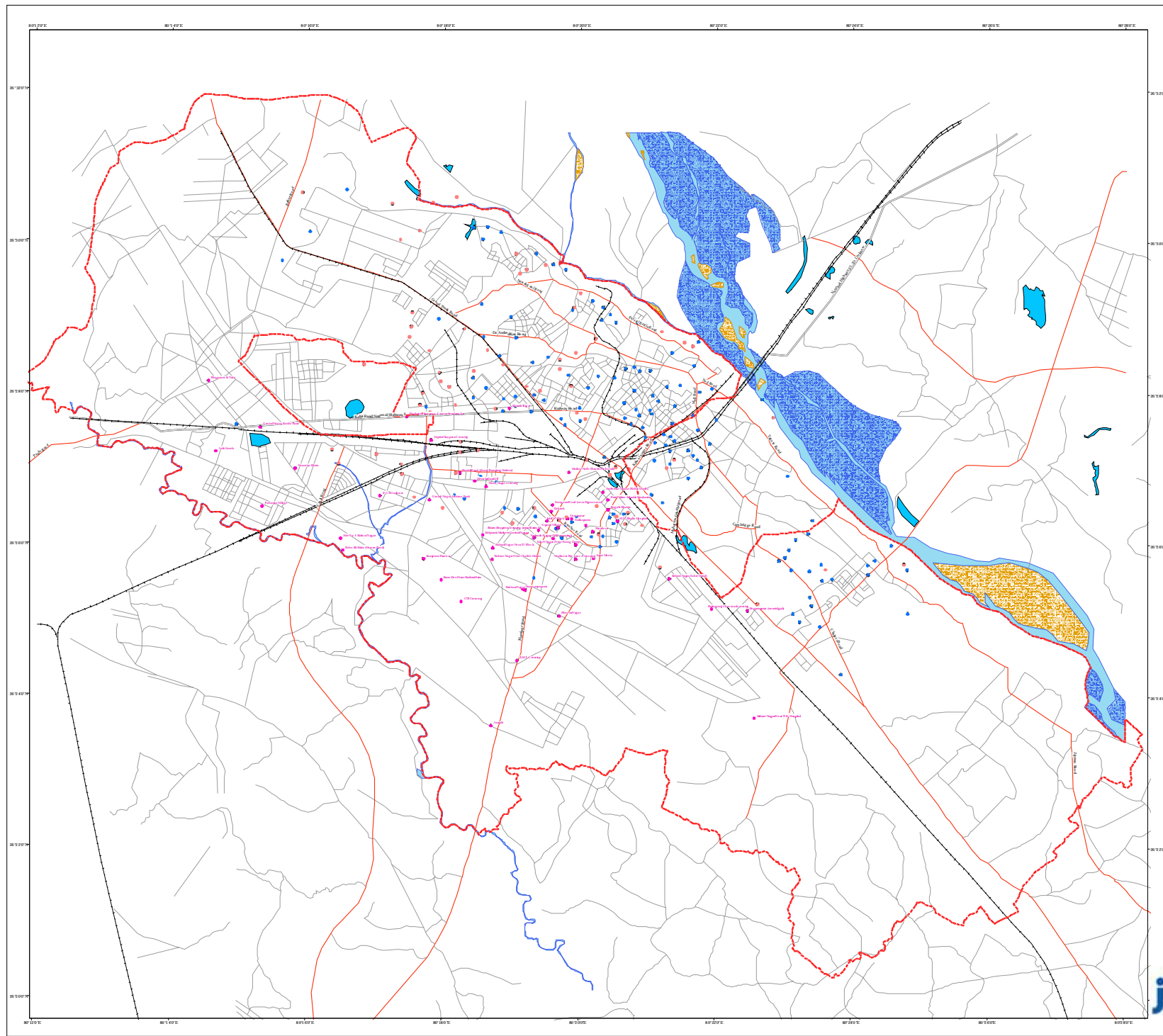
- LCSs By NEDA
- LCSs By Subhh International
- LCSs By Kanpur Nagar Nigam
- ▭ Municipal Boundary
- ▭ River Channel
- ▭ River Bed
- ▭ Lakes
- ▭ Sand Bar
- ▬ Railway
- ▬ Arterial Road
- ▬ City Major Road
- ▬ National Highway



SCALE 1:30,000



THE STUDY ON WATER QUALITY
MANAGEMENT PLAN FOR GANGA RIVER



SLUM MAP
KANPUR CITY

Legend

- Slums
- Major Localities
- Railway
- Nalas
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- River Bed
- River Channel
- Sand Bar
- Proposed CTC for Pilot Study

Proposed CTC for Pilot Study
(Vijay Nagar)

Proposed CTC for Pilot Study
(Daboli (W))



SCALE 1:25,000

