Asian Development Bank

National Capital Region Planning Board

Hapur
City Level Environmental Infrastructure Investment Plan

ADB TA No. 7055-IND

Capacity Development of the NCRPB (Component B)

WilburSmith ASSOCIATES

January 2011

Asian Development Bank
National Capital Region Planning Board

ADB TA 7055-IND
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Component B

City Level Environmental Infrastructure Investment Plan

Hapur

January 2011

Wilbur Smith Associates Inc

Abbreviations

AC	:	Asbestos Cement
ADB	:	Asian Development Bank
C.C	:	Cement Concrete
BCM	:	Billion Cubic Metre
BOQ	:	Bill of Quantities
CGWB	:	Central Ground Water Board
CI	:	Cast Iron
COD	:	Chemical Oxygen Demand
CPCB	:	Central Pollution Control Board
CPHEEO	:	Central Public Health & Environmental Engineering Organization
CPWD	:	Central Public Works Department
C:N	:	Carbon to Nitrogen Ratio
DI	:	Ductile Iron
GDA	:	Gazhiabad Development Authority
Ha	:	Hectares
HDPE	:	High Density Poly Ethylene
HMC	:	Hapur Municipal Council
HNP	:	Hapur Nagar Palika
HP	:	Horse Power
HPDA	:	Hapur Pilkhuva Development Authority
HQ	:	Head Quarters
KL	:	Kilo Litre
lpcd	:	Litre Per Capita Per Day
LPS	:	Litres per Second
MLD	:	Million Litres per Day
Mm	:	Milli meters
MoEF	:	Ministry of Environment & Forests
MPS	:	Main Pumping Station
NAAQS	:	National Ambient Air Quality Standards
NCRPB	:	National Capital Region Planning Board
NEERI	:	National Environmental Engineering Research Institute
NH	:	National Highway
O&M	:	Operation & Maintenance
PWD	:	Public Works Department
RCC	:	Reinforced Cement Concrete
SFRC	:	Steel Fibre Reinforced Concrete
SPS	:	Sewage Pumping Station
Sq. Km	:	Square Kilometre
STP	:	Sewage Treatment Plant
SWM	:	Solid Waste Management
TA	:	Technical Assistance
UIDSSMT	:	Urban Infrastructure Development Scheme for Small & Medium Towns
ULB	:	Urban Local Body
UPPCB	:	Uttar Pradesh Pollution Control Board
XEN	:	Executive Engineer

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I. INTRODUCTION

A. Background

1. The National Capital Region Planning Board, constituted in 1985 under the provisions of NCRPB Act, 1985, is a statutory body functioning under the Ministry of Urban Development, Government of India. NCRPB has a mandate to systematically develop the National Capital Region (NCR) of India. It is one of the functions of the Board to arrange and oversee the financing of selected development projects in the NCR through Central and State Plan funds and other sources of revenue.

2. On Government of India's request, Asian Development Bank (ADB) has formulated the technical assistance (TA) to enhance the capacities of National Capital Region Planning Board and its associated implementing agencies. The TA has been designed in three components:

   (i) *Component A* relates to improving the business processes in NCRPB;
   (ii) *Component B* relates to improving the capacity of the implementing agencies in project identification, feasibility studies and preparing detailed engineering design; and
   (iii) *Component C* relates to urban planning and other activities.

3. ADB has appointed M/s Wilbur Smith Associates to perform consultancy services envisaged under Component B. In the context of this contract, City Level Environmental Infrastructure Plans are prepared for the towns Hapur, Panipat and Khurja.

1. Aim and Objective

4. The aim of the City Level Environmental Infrastructure Plan is to prepare a Perspective Plan for the Project ULBs for the next 30 years (2041). The objectives are set as below:

   (i) Prepare a Comprehensive City Level Environmental Infrastructure Plan for future 30 years.

   (ii) Access the financial status of ULB status and sustainability level of ULB for the proposed investments; and

   (iii) Prepare the investment and recovery plan for the ULB

2. Scope of work

The proposed study will be mainly based on secondary data available with the various concerned departments. DPRs were prepared for a few sectors by the M/s Wilbur Smith Associates, hence the same investment is considered for the sectors. For other sectors, block cost estimates are prepared. The preparation of CLIEP broadly include the following:

(i) *Study of Present Urban Infrastructure Scenario.* Assessment of existing situation, needs, deficiencies, and future requirements in the sectors of water supply, sewerage and sanitation, solid waste management, drainage, basic services to urban poor/slums etc.

(ii) *Study of Growth Potential and Proposed Development Strategy.* Assessment of past growth and likely future trends in urbanization and spatial expansion of the town and preparation of conceptual plan for the town stating various sectoral development strategies to provide high quality life to citizens.

(iii) *Institutional and Financial Strengthening.* Assessment of human resource, technical and financial capacity and sustainability of ULBs to undertake improvement works in basic service delivery.

(iv) *City Level Environmental Infrastructure Plan.* Preparation of urban infrastructure development plan for the town (comprising of sectoral plans for various service sectors) for the next 30 years (2041); considering future growth trends, economic development, and institutional and financial sustainability of the ULB. This will also include prioritization of sub-projects and investments.

3. Approach and Methodology

The City Level Environmental Infrastructure Plan feasibility study is based on JNNURM / UIDSSMT guidelines:

(i) Preparation of City Level Environmental Infrastructure Plan (CLEIP). CLEIP will be prepared for 30 years (up to 2041) and will mainly involve existing situation analysis and identification of key issues in service delivery. Based on this, sectoral future strategies are worked out to fix Goals and a VISION for CLEIP-2041. A list of sub-projects will be identified along with the costing for investments to be taken up during the CLEIP period.

B. Structure of the Report

5. This Environmental Infrastructure Master Plan for Hapur Town Report comprises of seven sections:

(i) Section I provides an overview of the City Level Environmental Infrastructure plan Project.

(ii) Section II provides profile of Hapur town with a demographic and spatial land use assessment. This also identifies future directions and pace of development & population growth.

(iii) Section III reviews the existing municipal infrastructure services in NCR region, which includes water supply, sewerage & sanitation, solid waste management and storm water drains. This section is includes investment required for environmental infrastructure in NCR Region.

(iv) Section IV reviews the existing water supply system in Hapur Town. This section also discussed about the deficiencies and issues related to water supply system in the town.

(v) Section V reviews the existing sewerage & sanitation system in Hapur Town. This section also discussed about the deficiencies and issues related to existing sewerage & sanitation system in the town.

(vi) Section VI reviews the existing solid waste management system in Hapur Town. This section also discussed about the deficiencies and issues related to solid waste management system in the town.

(vii) Section VII reviews the existing storm water drainage system in Hapur Town. This section also discussed about the deficiencies and issues related to storm water drainage system in the town.

(viii) Section VIII presents urban environment status of Hapur Town

(ix) Section IX on Urban Governance deals with the legal and regulatory framework governing municipal service delivery and institutional structure of Hapur ULB

(x) Section XI reviews the existing financial situation of Hapur Nagar Palika, analyses the future municipal revenues and estimates the financial sustainable capacity of the Hapur Municipality.

(xi) Section XI is presents CLEIP Subprojects and Costing, along with the implementation phasing.

II. TOWN PROFILE

A. Overview

6. Hapur Town is administratively part of Ghaziabad District in Uttar Pradesh State, and is an important town of National Capital Region. The population of Hapur Town as per census 2001 was 211,983. Hapur Municipality (Hapur Nagar Palika Parishad) was established in 1982. At present, the municipal area of Hapur is 1,401 ha (14 sq. Km, Map II-2) and Utter Pradesh Town and Country Planning Department has prepared approved Master plan in 1993 and enforced till 2005. As per the Hapur Master Plan the commanded area is 46.33 sq. Km (Map II-3). The development area contains Hapur municipal area and nine rural villages.

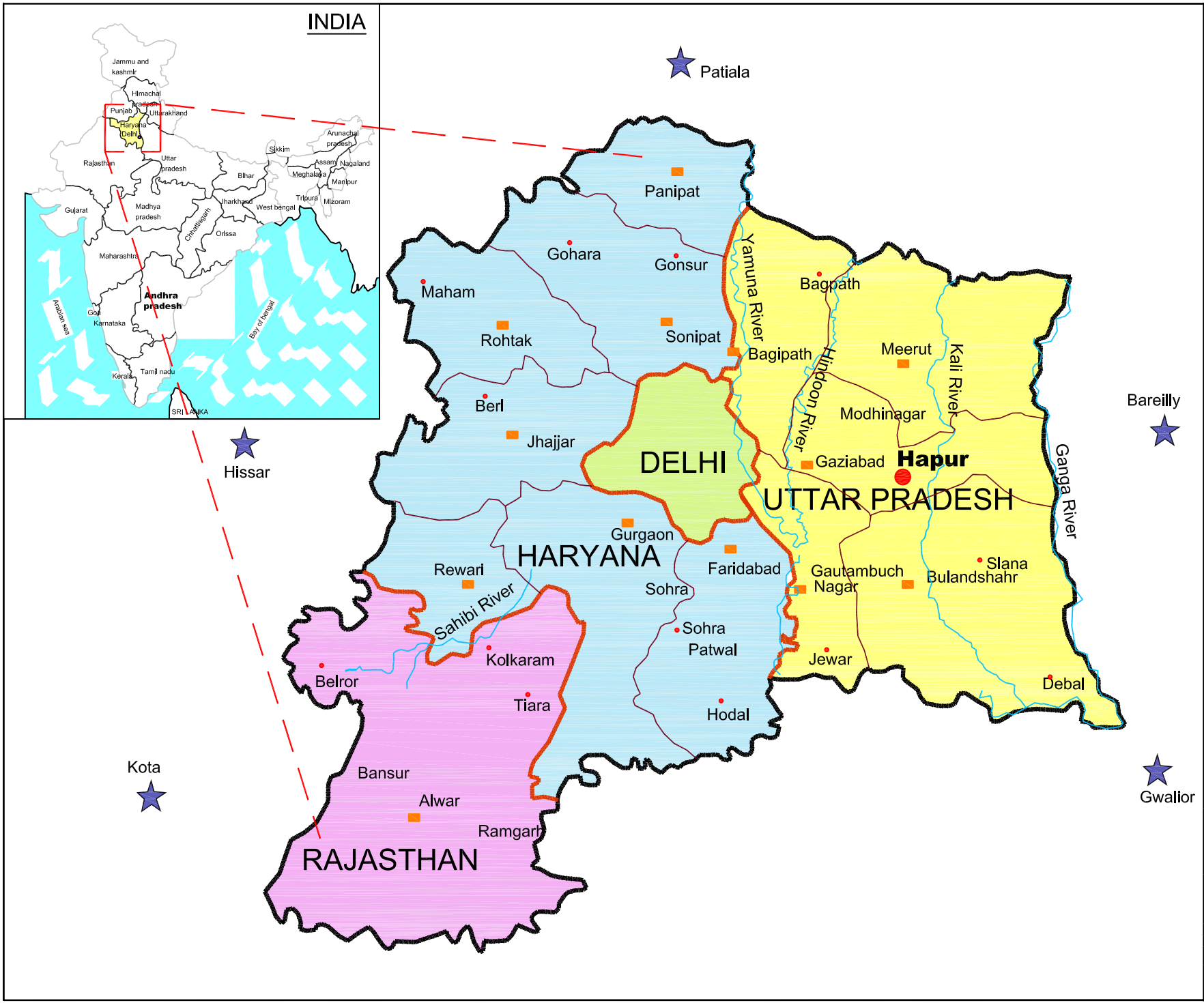
1. Location and Connectivity

7. The town is located at a distance of 65 km from Delhi towards east and 36 km from district headquarters of Ghaziabad. Geographically it is situated at 28^0 44' N latitude and 77^0 47' E Longitude. It is well connected with important cities of country. National Highway 24 (Delhi-Lucknow-Muradabad Road) and State Highway 18 (Meerut-Bulandsahar Road) passes through Hapur city. The main Rail Line of Delhi- Lucknow-Howra also passes through Hapur Town. Hapur city is situated at about 54 Km east of Delhi, 32 Km from Meerut, 39 Km from Bulandsahar and 432 Km from the State Capital, Lucknow.

2. History and Regional Importance

8. There are many stories around establishment and the name of Hapur. It is said that Hapur was established by King Harischandra. Some say, Shree Haridutt of Meerut/Bulandsahar established it and gave the name of Haripar. The word Hapar means garden and so the name of city is Hapur. In the 19^{th} century a French General name Pairan appointed by Marathas started distribution of financial assistance to retired and incapacitated persons. British used this city traditionally for many years to provide land to retired and incapacitated persons after clearing forest bushes. In the year 1805, Tahasildar of Hapur Ibrahim Ali saved and protected the town from an attack by Aamir Khan Pindary. During 1857 at the time of India's struggle for independence Walidad Khan of Malagarh planned invasion of this city but because of resistance of Jats of Bhadhona it was not successful.

9. The town was surrounded all around by a wall with five gates- Delhi, Meerut, Garh Mukteshwar, Kothy and Sikandra. However, now none of these exists except some remnants. Jama Masjid in the town was constructed in the year 1670 during the rule of Emperor Aurangazeb.



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Location of Hapur Town

Legend

- NCR
- State Boundary
- District Boundary
- District Hq.
- Counter Magnet Areas
- River / Stream

Client:
Aslan Development Bank
National Capital Region Planning Board

Consultant:
Wilbur Smith Associates

Drawn: Roopa	Checked: NSS
Date: January, 2011	Approved: NSS
Scale: NTS	

Map II-1

3. Topography

10. The town has almost flat topography except a small portion in the south, which is a marginally higher than the general ground level. The general slope of the town is from north to south. The difference between the maximum and minimum ground levels is about 3 m - varies from 213 to 210 m above mean sea level. The depth of groundwater in the town varies from 9-12 m. The town is located in the catchment area of the Ganges River, the most important and perennial river of India, flowing at a distance of 30 km east of the town. River Kali, a tributary of River Ganges, flows in the eastern outskirts of the town in the north-south direction. Hapur Town drains into this Kali River. The general nature of the soil is sand mixed with clay.

4. Climate

11. Typical humid subtropical climate of North India prevails in Hapur, with high variation between summer and winter temperatures and precipitation. The average temperature ranges from a minimum of 1.8 ^{o}C to a maximum of 44.9 ^{o}C; occasional extremes may in the ranges of 0.6 ^{o}C to 47 ^{o}C. Predominant winds are from north, northwest and west. The region receives rainfall mainly under the influence of southwest monsoon from July to September. Over 75 percent of the total rainfall is received from July to September. The annual average rainfall is 745 mm.

B. Demography

1. Population Growth

12. Urbanization and urban population growth are pointers towards the change in the occupational pattern of the community, from agriculture and allied livelihoods to industrial and other non-agriculture occupations. Population of Hapur was 146,591 in 1991 and 211,983 in 2001 indicating a decadal growth rate of 44.6 percent. The preceding decade of 1981-91 also experienced a higher growth (42.5 percent). Following **Table II-1** shows the population growth of Hapur in the municipal limits. The town witnessed high population growth from 1971 onwards. Growth in the last few decades (1971-2001) is attributed mainly to the extension of town boundaries and merger of adjoining villages with the town as well.

13. As per the Master Plan there are nine villages are under urban agglomeration area. The total population of the villages recorded as 27,257 as per 2001 census. Past data on population of these villages is not available.

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Table II-1: Population Growth of Hapur

Year	Population (town)	Population (urban agglomeration area)	Decadal Growth Rate (town)
	Nos.		
1951	49,260		
1961	55,248		12.16
1971	71,266		28.99
1981	102,837		44.30
1991	146,591		42.55
2001	211,983	27,257	44.61

Source: Census of India

14. *Population Density*. The municipal area of Hapur Nagar Palika jurisdiction extends to an area of 14 sq. km. Gross average density has increased from 10,471 persons per sq. km in 1991 to 15,142 persons per sq. km in 2001. Out of total 27 wards eleven wards are exhibiting high dense wards, seven wards are medium dense and nine wards are low dense wards as per the Master Plan density criteria. High dense wards are located along the NH 24 and CDB areas, surround these wards are medium dense and outer areas are low density areas. The details of wards wise densities are shown in **Table II-2** and **Map II-4**.

Table II-2: Wards wise density Details

Sl. No.	Range	Wards	Remarks
	Persons per Hector		
1	High Dense: More than 300	3,9,10,12,14,16,17,20,21,26, 27	CBD area and along NH 24
2	Medium Dense: In between 200 to 300	5, 8, 13, 15, 18, 19, 25	Surrounding CBD
3	Low Dense: Less than 200	1, 2, 4, 6, 7, 11, 22, 23, 24	Outer areas within the municipal boundary

Source: analysis

15. *SC Population*. Schedule Caste (SC) comprises 28.52 percent of the total population. This is higher than the district level SC population at 21.15 percent. In agglomeration area, SC population exhibits 33 percent of the total village population.

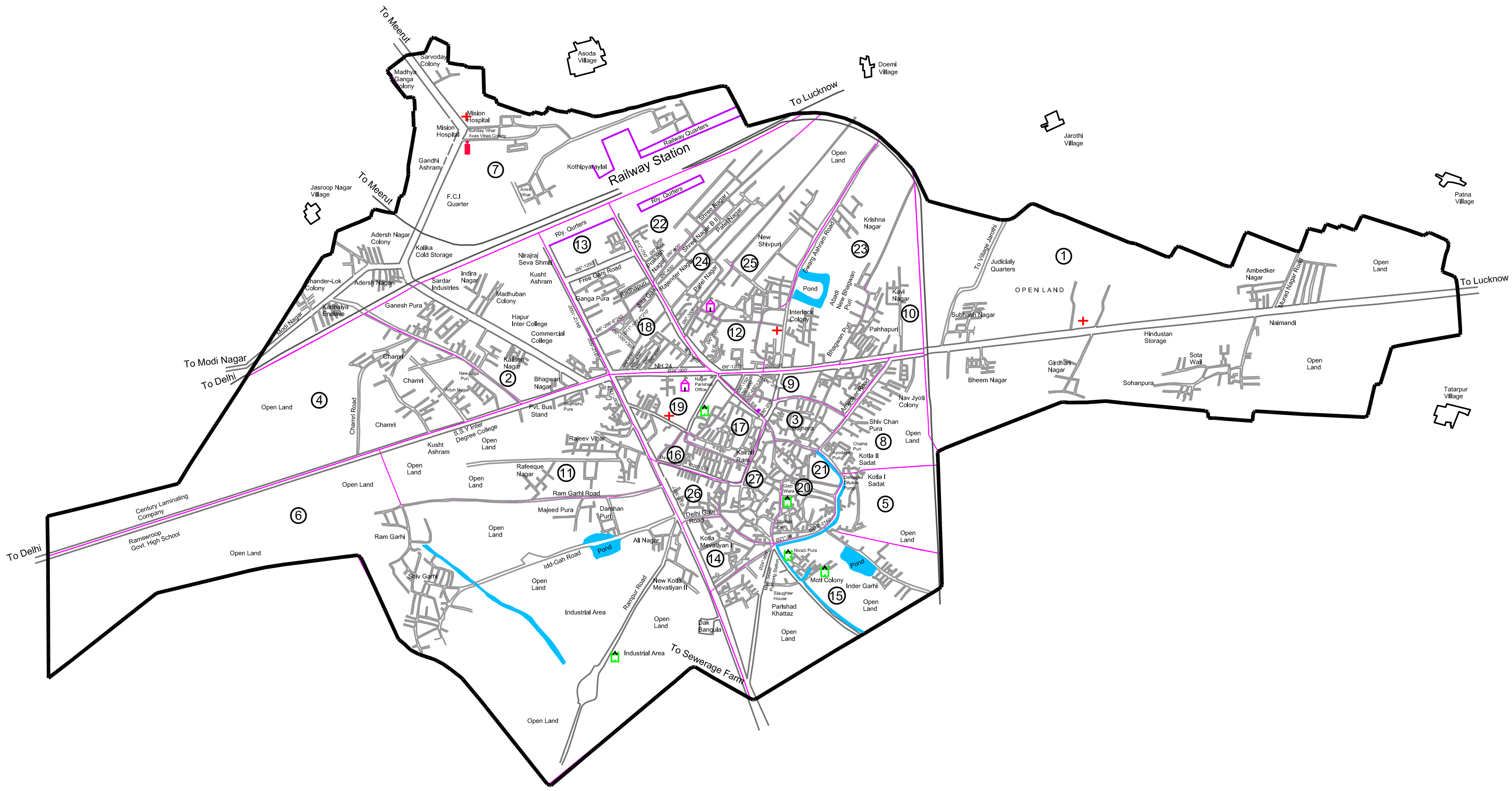
16. Sex Ratio. The current sex ratio (female population per 1,000 male population) in Hapur is 873, which is higher than the district figure of 860. However, a healthy sex ratio is more than 970 for 1000 male population. Hence the Govt. of UP has to take measures for maintain healthy sex ratio.

17. *Literacy Rate*. As per the 2001 census, 57.19 percent of literacy recorded to the total Hapur population. It is almost equal to the literacy level of Ghaziabad district (57.73 percent) and higher than State Urban average (45.56 percent). In the agglomeration area, literacy is recorded as 52 percent, which is higher than the state. The main reason behind the high literacy rate is due to the presence of good number of educational institutions and other governmental offices in the town and it is near to Capital City of India.

18. *Household Size*. As per Census 2001, the total number of households in Hapur is 31,174 with a household size of 6.80. The household size in Hapur is above the national average household size of 6.3 (Census 2001).

Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Nagar Palika's Jurisdiction



Legend

Municipal Boundary	
Major Roads	
Minor Roads	
Railway Line	
Masjid	
Temple	
Church	
Hospital	
Water Course	

Overlay Legend

Ward Boundary	
Ward Number	8

Source:
Municipal Council Hapur

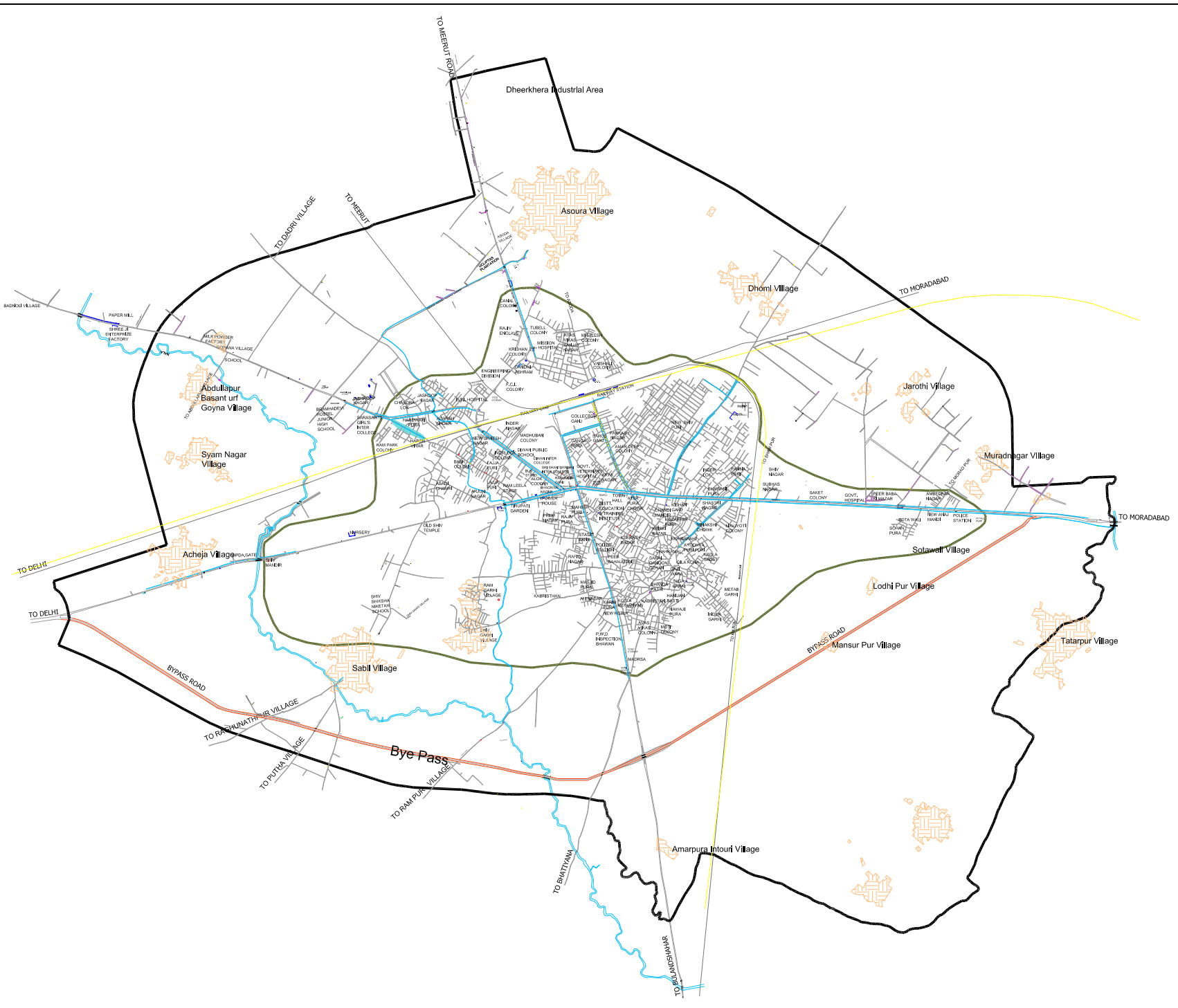
Client
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn: SK | Checked: NSS
Date: January, 2011 | Approved: NSS

Scale: 0 150 300 450 600 750 Meters

Map II-2



Capclty Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Master Plan Jurisdiction

Legend

- Master Plan Boundary
- Municipal Boundary
- Bypass Road
- Road
- Railway Line
- Drain

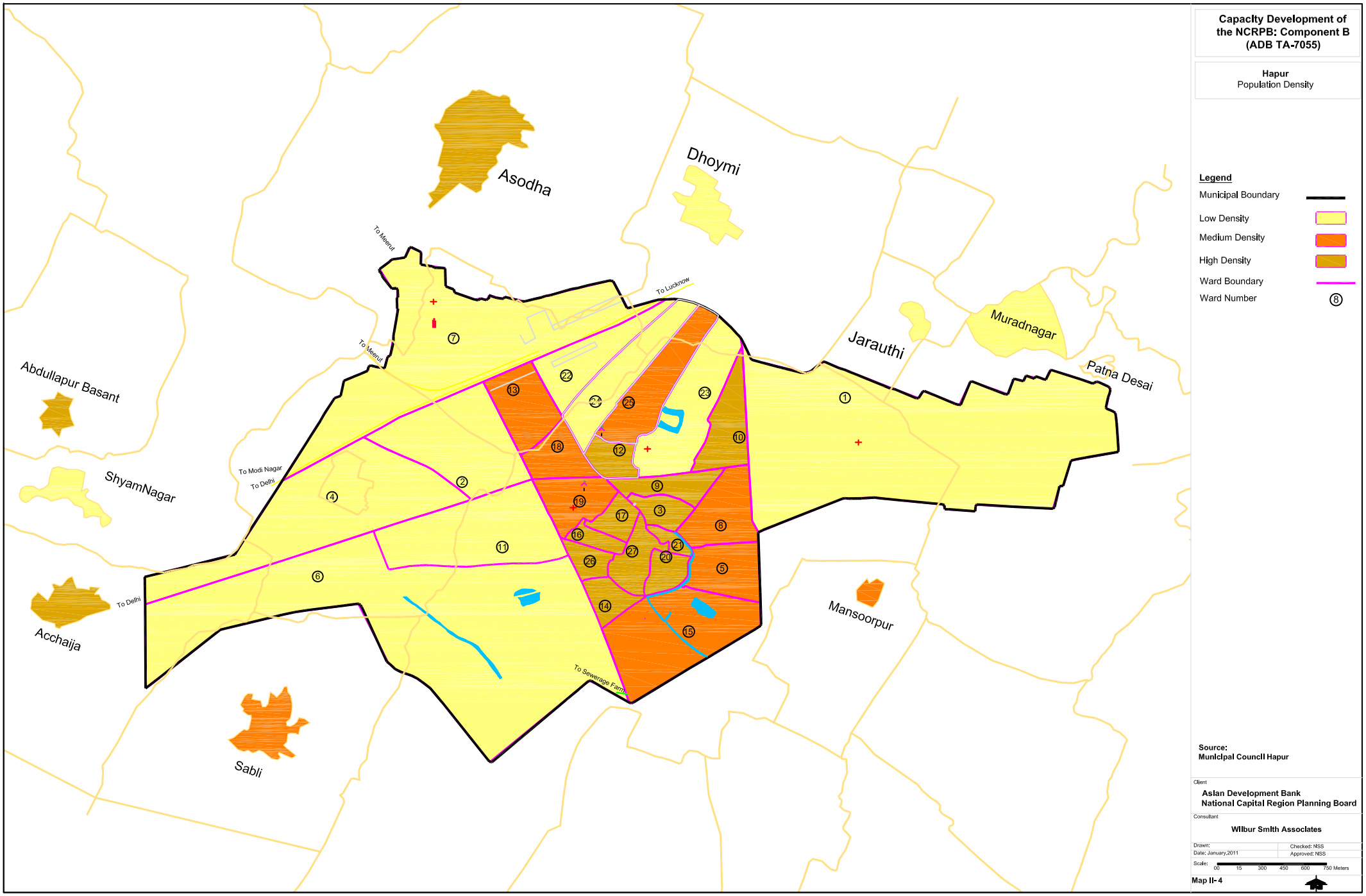
Client:
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn:SK	Checked: HVS
Date: January. 2011	Approved: NSS

Scale: 0 300 600 900 1200 Meters

Map II-3


Capacity Development of the NCRPB: Component B (ADB TA-7055)
Hapur
Population Density
Legend
Municipal Boundary
Low Density
Medium Density
High Density
Ward Boundary
Ward Number
Asodha
Dhoymi
Jarauthi
Muradnagar
Patna Desai
Abdullapur Basant
ShyamNagar
Acchaija
Sabli
Mansoorpur
To Meerut
To Lucknow
To Modi Nagar
To Delhi
To Sewerage Farm
Source:
Municipal Council Hapur
Client
Asian Development Bank
National Capital Region Planning Board
Consultant
Wilbur Smith Associates
Drawn:
Checked: NSS
Date: January,2011
Approved: NSS
Scale:
0 0 15 300 450 600 750 Meters
Map II- 4

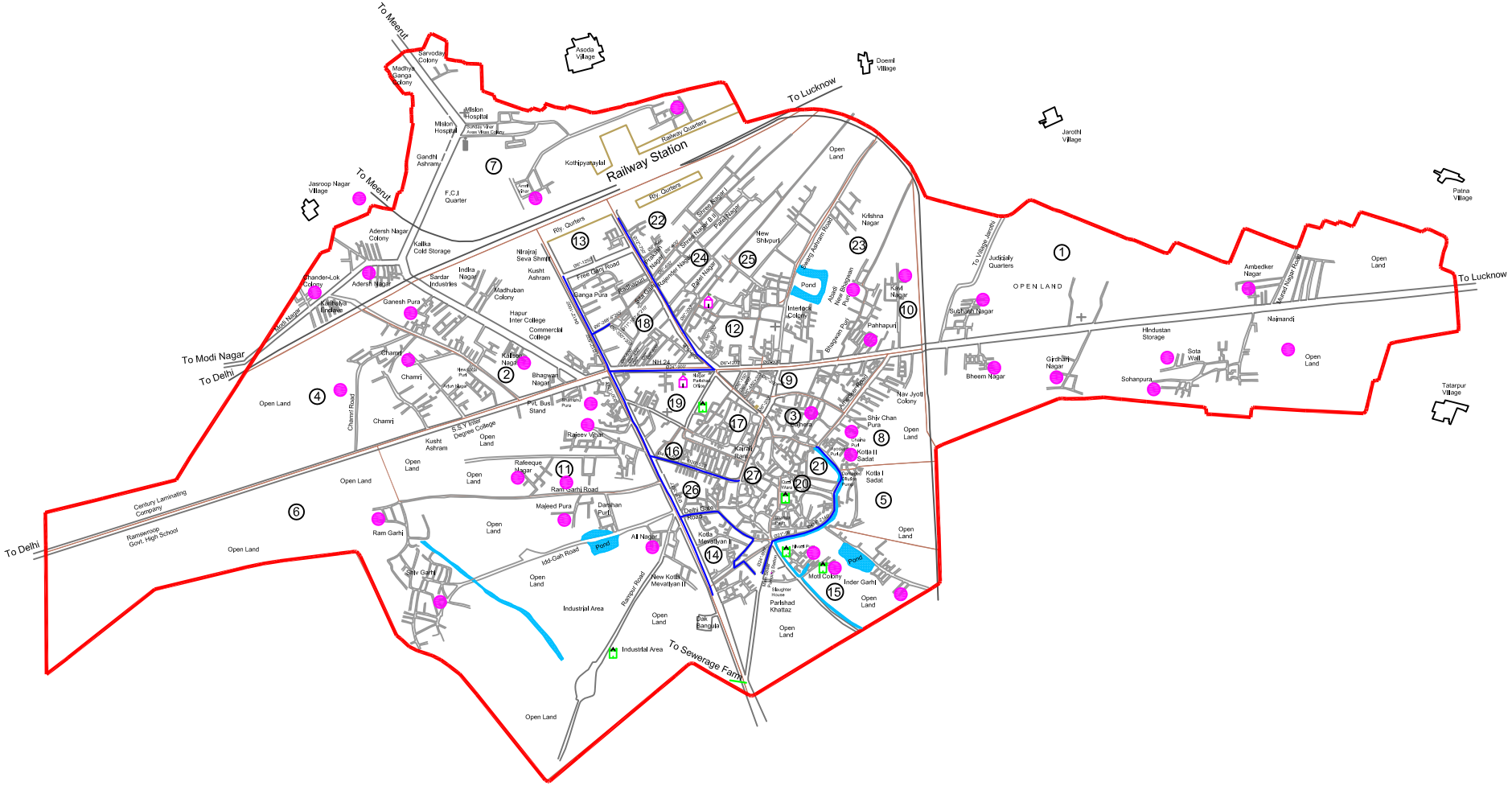
C. Slums

19. *Slums*. As per Census 2001, the total slum population in Hapur town is 90,977 (48,762 are males and 42,215 are female) and the no. of households are 13,540. The slum population is about 43 percent of the total population. The average household size exhibits around 6.7, which is considerable in high. The ULB is not implementing urban poor empowerment programs in municipal limits of Hapur, hence the municipality is not having information regarding slums infrastructure in the town. The list of slums are shown in the Table II-3 and located slum in Map II-5.

Table II-3: Name of the Slums

Sl. No	Slum Name
1	Adarsh Nagar
2	Chandralok
3	Ganeshpura
4	Chamri
5	Ramgarhi
6	Shivgarhi
7	Ali Nagar
8	Nivazipura
9	Moti colony
10	New Bhasham pura
11	Rajiv Vihar
12	Chamar vada
13	Trilokpuram
14	Mazidpura
15	Rafiq Nagar
16	Mehtabgarhi
17	Indragarhi
18	Phoolgarhi
19	Chaina puri
20	Ayodhyapuri
21	Bajhera
22	Kavi Nagar
23	Subhash Nagar
24	Bheem Nagar
25	Ambedkar Nagar
26	Sotawali
27	Ghirdharpura
28	Sohanpura
29	Kailson Nagar
30	Gandhi Vihar
31	Amrit vihar

Source: Nagar Palika, Hapur



Capacity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Slum Location

Legend

- Municipal Boundary
- Major Roads
- Minor Roads
- Railway Line
- Masjid
- Temple
- Church
- Hospital
- Water Course

Overlay Legend

- Location of Slums

Source:
Municipal Council Hapur

Client
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn: SK | Checked: NSS
Date: January 2011 | Approved: NSS

Scale: 0 15 300 450 600 750 Meters

Map II-5

D. Urban Economy and Employment

1. Workforce Participation

20. Hapur is an important centre for trade and commerce in Western UP sub-region. The workforce participation rate is almost constant but the size of work force in the town has maintained its increasing trend as shown in the following Table II-4.

Table II-4: Workforce Participation Rate (WFPR)

Sl. No	Year	Population	Work Force	WFPR
		Nos.	*Nos.*	*%*
1	1971	71,266	18,123	25
2	1981	10,2837	26,585	26
3	1991	14,6591	36,648	25
4	2001	21,1983	72,983	34

Source: Master Plan 2005 and Census of India 2001

Figure II-1: Occupational Structure as per 2001 Census

21. Total workers in Hapur is 53,759 including main and marginal workers. Table II-4 shows the workers in Agricultural, Household, cultivators and other workers in Hapur. Chart II-1 shows the Occupational Structure as per Census 2001. It is observed that the work force participation ratio was constant from 1971 to 1991 and increased to 34 percent in 2001. Majority of work force mainly engaged in other workers around 91 percent of total workforce. Table II-5 shows the percentage of different workers in the town.

Table II-5: Work force participation in Hapur

Sl. No	Workers type	Number	% to the total workers
1	Cultivators	821	2
2	Agricultural Workers	1,663	3
3	Household Workers	2,329	4
4	Other Workers	48,946	91
	Total Workers(Main + Marginal)	53,759	
Urban Agglomeration Area			
5	Surrounding 9 villages	6,996	*25.67

* Percentage to the total village population
Source: Census of India, 2001

22. *Industry*: In Hapur town, there are different kinds of industries functioning. The main products from these industries are micro-nutrient fertilizers, pesticides, electronics & home appliances, digital inverters, stabilizers, batteries, paper products like paper cones, tubes, food products and electrodes, etc. are located along Delhi- Lucknow Highway (NH-24). These finished goods are exporting across the country. The details of industries are illustrated in Table II-6.

Table II-6: Details of large and small scale Industries in Hapur

Sl. No.	Type of Industries	No of Units
1	Leather Units	19
2	Bone Dependent Units	16
3	Paper Mills	11
4	Textile Mills	65
5	Chemical Units	5
6	Wooden Mills	55
7	Printing Units	20
8	Light Manufacturers	6
9	Metal Units	5
10	Ice Factories	13
11	Steel-Nickel Polishing Units	30
12	Steel Fabrication Units	15

Source: Master Plan Report 2005

2. Agriculture

23. The main crop seasons are Kharif and Rabi. The main crops of the area are wheat, paddy, maize, gram, peas and sugar cane. Among the cash crops, the major crops are sugar cane and potatoes. Due to enormous growth of potatoes in the area around, there are many cold storages in the town. Improved agricultural practices as use of high yielding variety of seeds, fertilizers, improved agricultural implements; plant protection measures are being increasingly adopted. The flowers are exporting Europe, the Middle East, Southeast Asia and other parts of the country from Hapur. Growing flowers from gladiolus to tuberoses, from dahlias to gerberas, many of the cultivators have erected huge poly houses with the support of the District Horticulture Department and Horticulture Mission.

24. Scientists from Holland also pay regular visits to this area in order to provide expertise to farm owners to develop novel techniques to boost their produce. Horticulture officials and some farm cultivators reveal that the production of high-grade flowers and vegetables in the Hapur area in the last two years has surpassed that of other areas around Delhi, Haryana, Rajasthan and Punjab.

E. Existing and Proposed Land Use Distribution

25. The Government of Uttar Pradesh in 1978 declared the area falling under Hapur local body, which includes 31 villages of Hapur and Meerut Tehsils as Hapur Viniyamit Area. Subsequently, GoUP in 1993 extended area by including Pilkhuwa Municipal Area, Babugarh Nagar Punchayat and other 51 villages. In 1998, Hapur Pilkhuwa Development Authority (HPDA) was created to implement Master Plan and area under Viniyamit Area. The first Hapur Master Plan for period of 1979-2001 and targeted population around 200,000 and it was approved in 1983 by GoUP.

26. Under the UP Urban Planning and Development Act, 1973 and UP Regulation of Building Operation Act 1958, the second Master Plan for Hapur was prepared in 1993 and it was enforced till 2005. As per the second Master Plan the total area demarcated under developed land is 1,511.96 ha, however at present developed land is around 444.89 ha. Which is one third of developments happened during the second Master Plan period.

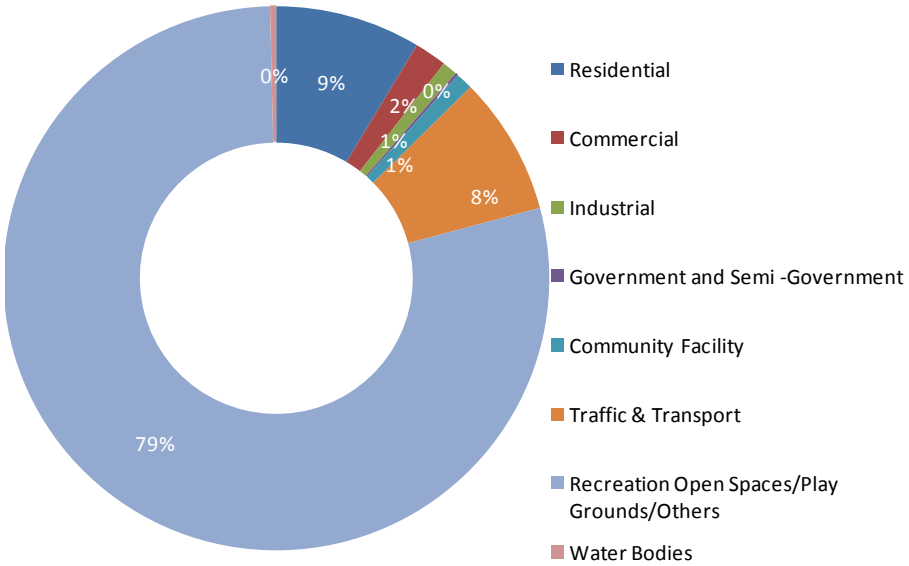
27. Uttar Pradesh Housing Development Corporation has developed only two residential colonies in Hapur along Meerut and Bulandshar road. Uttar Pradesh Mandi Council constructed a Mandi near Garh Marg (road). At present preparation of third master plan is under process by respective departments. The landuse details are illustrated in Table II-7. The existing and proposed landuse is shown in Map II-6 and Map II-7 respectively.

Table II-7: Existing and Proposed landuse

Sl. No	Land use Category	Existing Landuse (1994)		Proposed Landuse (2005)	
		Sk. km	*%*	*Sk. Km*	*%*
1	Residential	4.00	8.63	27.32	58.97
2	Commercial	0.89	1.92	1.98	4.27
3	Industrial	0.41	0.88	2.28	4.92
4	Government and Semi –Government	0.08	0.17	0.85	1.83
5	Community Facility	0.47	1.01	0.47	1.01
6	Traffic & Transport	3.81	8.22	8.45	18.24
7	Recreation Open Spaces/Play Grounds/Others	36.50	78.78	4.81	10.38
8	Water Bodies	0.17	0.37	0.17	0.37
	Total	46.33	100.00	46.33	100.00

Source: Master Plan Report 2005

Figure II-2: Percentage of Existing Landuse



(i) Residential. As per the existing landuse 1994, only 4.0 sq. km was under the residential activity, in the proposed master plan 27 sq. km demarcated for the residential which will accommodate master plan projected population (2001) of 4.5 lakh. According to the master plan residential areas are bifurcate low residential, medium residential and residential density. However, the municipal population has not reached master plan estimated population. The Table II-8 describes locations of proposed residential areas around the town according to the densities.

Table II-8: Master Plan Density Classification wise areas

Type of Residential	Proposed Density	Locations having proposed densities
High Residential Density	>300 persons/ ht	Southeast – between Bulandshahr railway line and Delhi Muradabad NH 24
Medium Residential Density	200 to 300 Persons /ht	Either side of Muradabad road towards Mansurpur village and Muradnagar village Along NH 24 towards Acheja village In-between Modinagar road and Meerat road towards Jssrup Nagar Northeast direction of Delhi Muradabad railway line towards Asoura and Dhoami villages
Low Residential Density	<200 persons/ht	Along the boundary of master plan, towards Northeast (Patnadesai Village) and Northwest (Shyam Nagar and Abdullapur Basant Urf Goyana villages) Extreme South in-between Bulandshahr road and Bulandshahr railway line

Source: Master Plan 1993

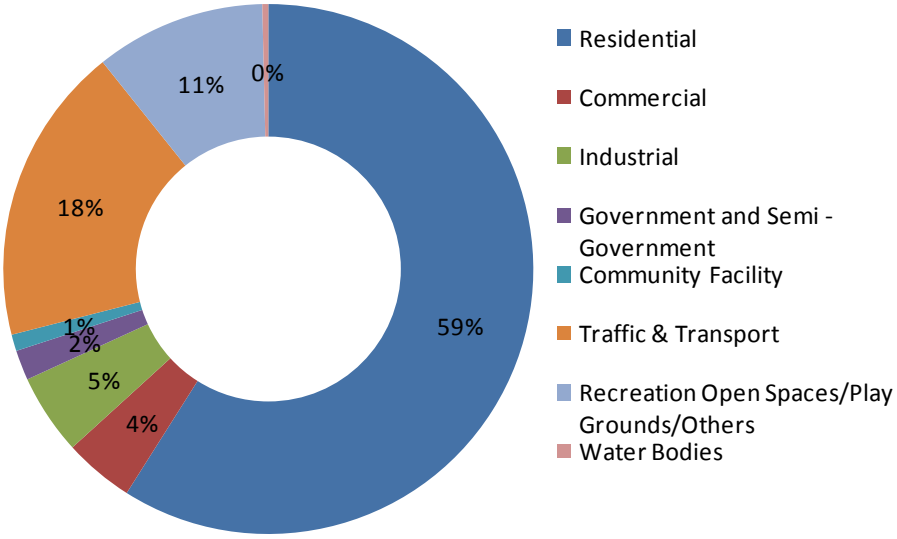
(ii) Commercial. Commercial areas are exists along major corridors like NH 24 and SH 18 etc. There are four main markets existing in the town, which are (i) Anaj Mandi, (ii) Vegetable and fruit Market (iii) Timber Market and (iv) Leather Market. Apart from the existing, there are four major commercial areas proposed in the town, which are market in Jaspur Nagar towards Modinagar road, commercial market at Asoura village towards Meerat road, South side Delhi road and south side of Gharmukteswar Marge.

(iii) Industrial: Industrial areas are concentrated along Meerut road, Modi Nagar Road, Delhi – Muradabad Road, Dheerkhera road and towards Meerut road. Under the present land use, 0.41 sq. km (41 Ha) of area is under industrial use. The proposed area under industrial landuse is 1.87 sq. km. (187 Ha). The proposed industrial areas are in between Delhi Muradabad National Highway and bypass road (City Center area at Anandvihar extension).

(iv) Pubic and Semi Public. Hapur is an administrative head quarters for Hapur Tasil in Ghaziabad District. Owing to this more number of Central, State Government and Semi-government offices is functioning in town. Hapur town has 93 educational centers, 4 health centers in addition to number of religious places. Most of the existing and proposed public and semi-public areas are at the heart of the town. Majority of public and semi public activities are proposed in between NH 24 and Delhi Muradabad railway line.

(v) Traffic and Transportation. Under the proposed land use, 4.64 sq. km (464 Ha) area is earmarked for traffic and transportation. The area includes land for roads, railways and bus stand. A ring road also proposed for the town. At present there is a bypass exists for NH 24 towards Bulandshahr road.

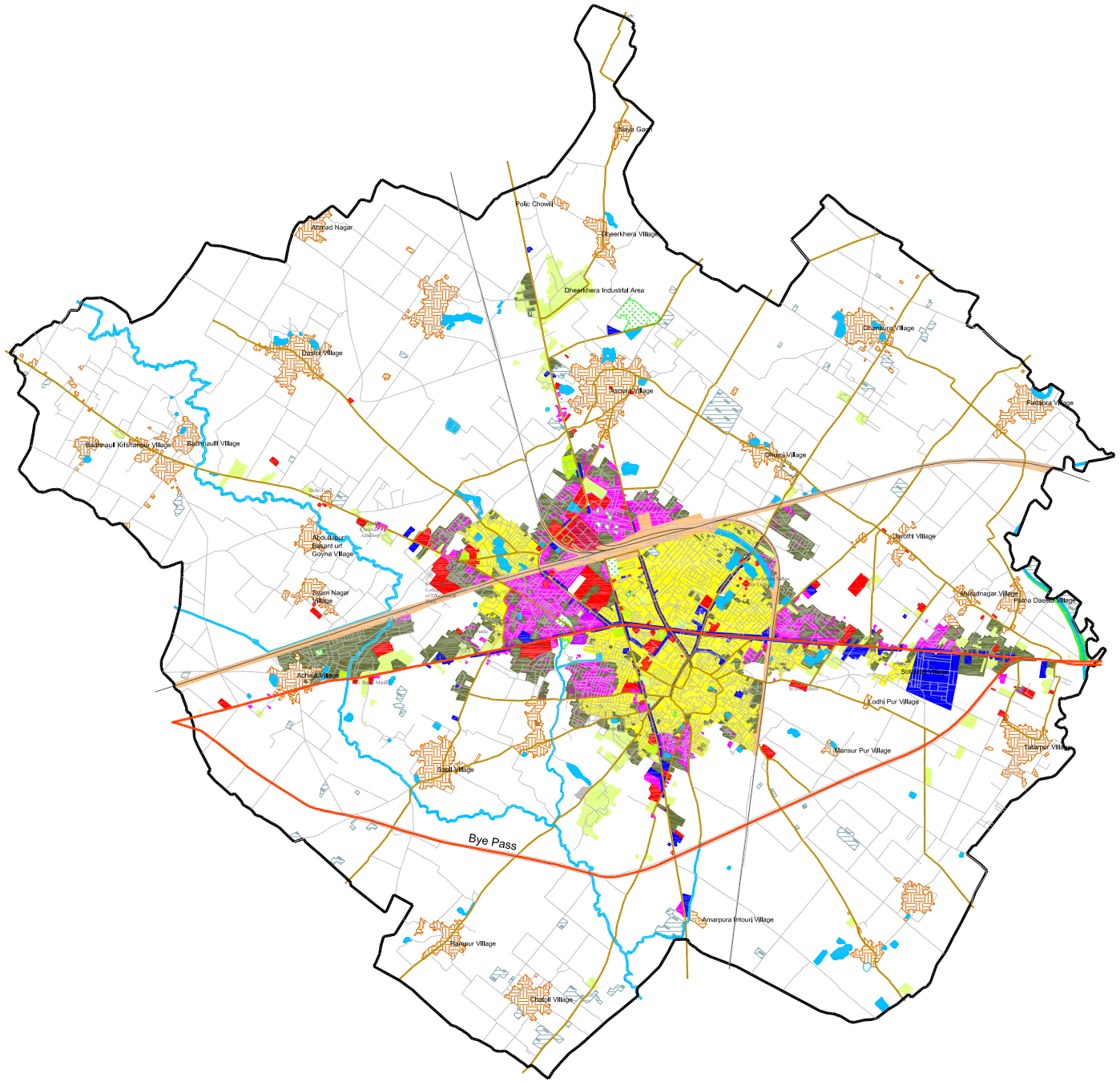
Figure II-3: Percentage of Proposed Landuse



1. Future Spatial Growth

28. There are a few constraints for developments towards Northwest, Southeast and Northeast directions due to the physical barriers (railway track). However, except Northeast and Northwest, development activities are found in other areas of the town. The majority of developments are happening towards Southeast. It is mainly due to HPDA developing industrial and residential activities in this area. It is also observed that the developments are happening along NH 24 and towards Meerut road. There is one road over bridge under construction towards Meerat road, this will augment more developments towards Meerat road.

29. The areas are in between Bhulandsahar road and Delhi Muradabad NH 24, Hapur Pilkhuwa Development Authority (HPDA) is developing industrial areas (Leather Park and IT Park) and residential areas as per the proposed Master Plan. It is observed that a few new road formations, electricity works are executing in this locality by HPDA.



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Existing Landuse - 2007

Legend

- Land Use Boundary
- National Highway
- Major Roads
- Minor Roads
- Railway Line
- Railway Area
- Rural Builtup
- Builtup
- Residential
- Commercial
- Storage Area
- Community Facility & Services
- Offices
- Industry
- Transportation
- Parks, Play Ground
- Open Spaces
- Orchid
- Green Belt
- Cremation & Graveyard
- Agricultural
- Water Course

Source:
NCR Cell, UP

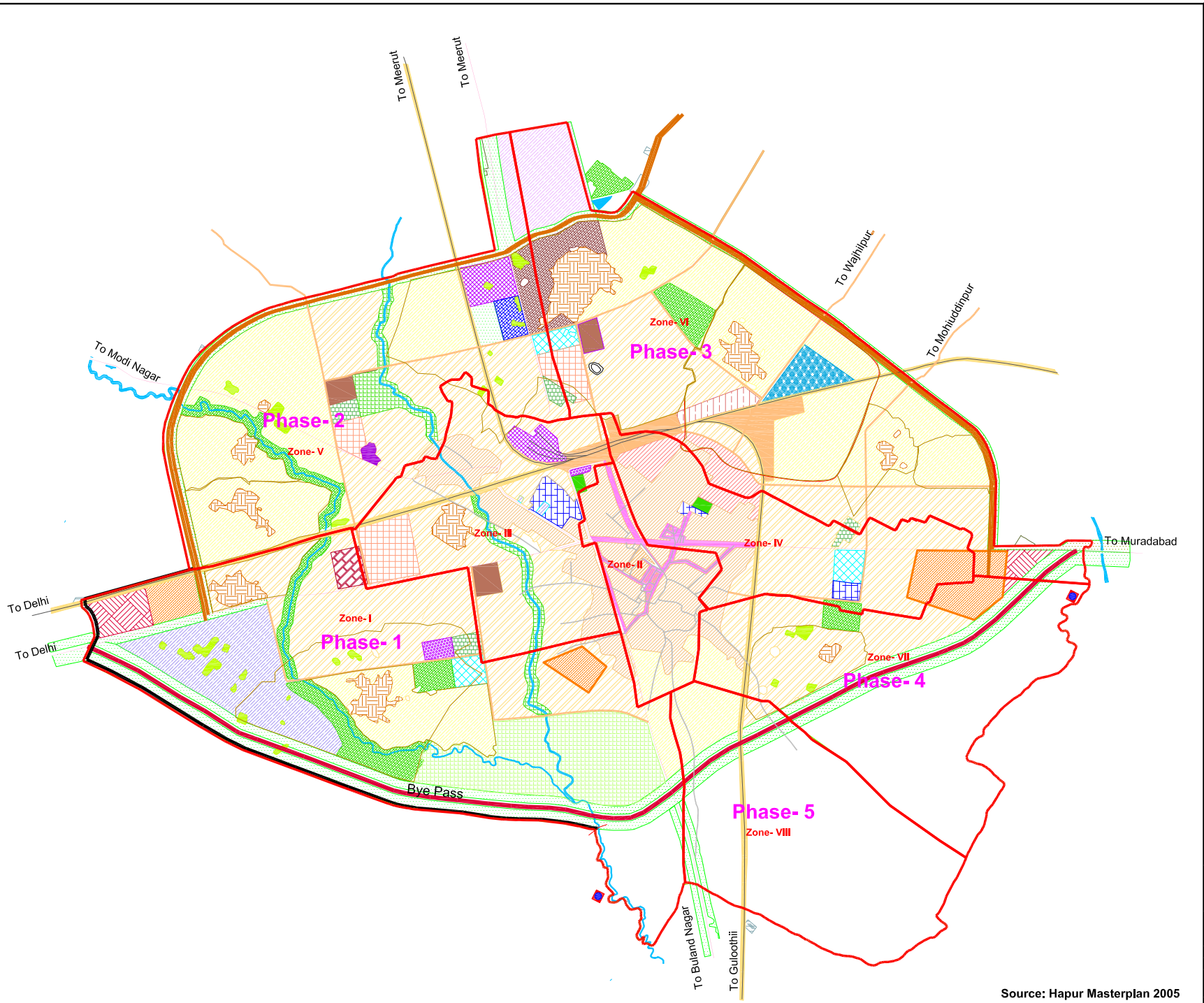
Client
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn: SK | Checked: NSS
Date: January, 2011 | Approved: NSS

Scale: 00 320 640 960 1280 1600 Metres

Map II- 6



Source: Hapur Masterplan 2005
Uttar Pradesh

Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Proposed Land Use as per Master Plan 2005

Legend

- Master Plan Boundary
- Minor Roads
- Proposed 30m Roads
- Proposed 36m and 45m Roads
- Proposed 75m Byepass Road
- Railway Line
- Railway Land
- Urban Bullt Area
- Rural Built Area
- Residential Density
- Medium Residential Density
- Low Residential Density
- Urban Trade Centre
- Reglonal Trade Centre
- Wholesale Trade Centre
- Warehouse
- Mineral
- Small and Light Industry
- Light & Medium Industry
- Office
- Instltuatlons
- Hospital
- Regional Park
- Park & Open Green
- Green Belt
- Bus Stand
- Truck Stand
- Inland Container Services
- Orchid
- Agricultural Land
- Garden
- Sewerage Farm
- Water Course

Client
Asian Development Bank
Natlonal Capltal Reglon Plannlng Board

Consultant
Wllbur Smlth Assoclates

Drawn: SK	Checked: NSS
Date: January, 2011	Approved: NSS

Scale: 00 500 1000 1500 Metres

Map II-7

F. Population Projection

30. Different prevalent methods such as Arithmetical Increase, Incremental Increase, Geometrical Increase, Graphical Method, etc. were used to project Hapur population. However, considering high growth proposed in National Capital Regional Plan, Geometrical Increase Method has been adopted to estimate future population as it resembles to the projections carried out in Regional Plan 2021.

The following **Table II-9** presents the population projection carried out for different years for Hapur town and also presented estimated population projected by different departments. UP Jal Nigam has considered lower growth rate for population projection in preparation of Water Supply DPR for the Hapur town. The Geometrical Increase Method is considered for population projection. Based on the estimated population, the requirement of investment for environmental infrastructure is estimated.

The equation for the Geometrical Increase Method is,

Base year Population (Pt) = $P(1+rg)^t$

Where, P is population of the known year, t is no. of decades to be projected and rg is growth rate.

Table II-9: Population Projections for Hapur Town

Year	Projected Population as per Sewerage DPR and SWM estimated by WSA including Urban Agglomeration Area	Projected Population as per Water Supply DPR UP Jal Nigam	NCRPB	Village Population
	Nos.			
2001	211,983	211,983	211,983	29,087
2009		248,771		
2011	278,143		300,000	38,104
2021	364,951		450,000	49,916
2024		343,507		
2031	478,853			65,390
2034		425,331		
2041	628,302			85,661

Source: Analysis, UP Jal Nigam and NCRPB

G. Service Adequacy and Issues

31. Preparation of Master Plan for landuse zoning/planning and development control regulations; its timely implementation and revision are the key factors for planned development and in regulating haphazard growth of any town. Since Hapur ULB has been covered under Uttar Pradesh Urban Planning and Development Act, 1973, the Master Plan for the Hapur town has prepared in 1993 and effective till 2005. The UP Urban Planning department is in process of revising the Master Plan for next 20 years.

Hapur has an important railway junction in Gaziabad district and well connected with other parts of the country by roads. The town is well established with small scale industries and commercial hub for surrounding villages. The town is exporting agriculture product to the Capital City of India. The above activities are influencing the town growth. The key issues in growth management hence can be envisaged as:

(i) Densification of areas and wards along NH-24 towards Muradabad from Delhi;
(ii) Spill over of growth in Municipal boundary Limits;
(iii) Lack of housing layouts to guide planned development of the town;
(iv) Lack of housing layouts/areas demarcated for urban poor;
(v) Violation of zoning and building bylaws leading to haphazard development; and
(vii) Congested main roads due to encroachments.

H. City Physical Growth Goal and Future Strategies

32. The Environmental Infrastructure Plan has developed sectoral goals and strategies for town's physical growth, municipal and social infrastructure, urban governance and finance etc. which together will form a VISION for Hapur ULB for the year 2041.

Box 1: Town Physical Growth Goal
'Achieve Sustainable Urban Growth and Preserve Socio-economic and Socio-cultural Fabric of the Town'

Future Strategies

(i) Planned development of the town in line with the UP Urban Planning and Development Act, 1973
(ii) Integration of landuse planning with the Environmental Infrastructure Plans

III. URBAN ENVIRONMENTAL INFRASTRUCTURE IN NCR

A. Overview

33. The unprecedented growth of metropolitan cities in the country has become a source of serious concern to Government of India, on the one hand, and metro-city corporators, planners, demographers and social scientists, on the other. The Census 2001 reveals that the number of million-plus cities has almost tripled over the last three decades, jumping from a mere 12 in 1981 to 23 in 1991 and 35 in 2001. In this contest, the Govt. of India moved a legislation which would control and regulate development in the region and finally Parliament enacted the National Capital Region Planning Board Act in 1985 with the concurrence of the constituent States "*to provide for the constitution of a Planning Board for the preparation of a plan for the development of the National Capital Region and for coordinating and monitoring the implementation of such plan and for evolving harmonised policies for the control of land uses and development of infrastructure in the National Capital Region so as to avoid any haphazard development of that Region and for matters connected therewith or incidental thereto*".

1. Constituent Areas

34. The National Capital Region covers an area of 30,242 sq kms. The region includes the Delhi State and parts of the States of Haryana, Rajasthan and Uttar Pradesh. The Administrative units are as follows:

(i) Delhi State;
(ii) Haryana Sub-region comprising Faridabad, Gurgaon, Rohtak and Sonepat districts; Rewari tehsil of Mahendragarh district and Panipat tehsil of Karnal district;
(iii) Rajasthan Sub-region comprising six tehsils of Alwar district, namely, Alwar, Ramgarh, Behror, Mandawar, Kishangarh and Tijara; and
(iv) Uttar Pradesh Sub-region comprising three districts namely, Meerut, Ghaziabad and Bulandshahr.

B. Location and Hydrology

1. Location

35. The National Capital Region lies between 27^0 03' and 29^0 29' North latitude and 76^0 07' and 78^0 29' East longitude. The region includes the National Capital Territory of Delhi and parts of the States of Haryana, Rajasthan and Uttar Pradesh. The physiography of the region is characterised by the presence of the Ganga skirting it as its eastern boundary, the Yamuna traversing north-south forming the boundary between Uttar Pradesh and Haryana, and the sand dunes and barren low hills of the Aravalli chain and its outcrops in the west, flat topped prominent and precipitous hills of the Aravalli range enclosing fertile valleys and high table lands in the south-west, and the rolling plains dominated by rain-fed torrents in the south. The rest of the region is plain with a gentle slope of north-east to south and south-west.

2. Availability of Ground Water

36. The major rivers in NCR are the Ganga, the Yamuna, Hindon and Kali, which flows from north to south and a small part of Sahibi, which flows in the south-western part. Most of the NCR is also predominantly irrigated through well-developed canal network except Alwar and Gurgaon districts, which are irrigated by ground water.

37. Mostly the top water table zone and the deeper semi-confined aquifer have the same static water level surface because of their interconnections. The depth of water table below ground level varies in general between 5-20 metres. A number of ground water structures by way of open wells and shallow tube wells (60-70 metres deep) exist in this formation in different parts of NCR with varying degrees of discharge rates. On the whole, discharges around 2-3 cubic metres per hour and at times even less (down to one cubic metre) or more (upto 4-5 cubic metres), with an average of about 15-20 metres of the aquifer-zone are available.

38. The thickness of the alluvium and the proportion of clean granular zones in aggregate within the same are the two main criteria, which determine the availability of ground water in the alluvium. A major portion of NCR is covered by alluvium, which is fairly thick. It is more than 450 metres thick in some parts of Haryana in the upper Yamuna basin (Sonepat, Panipat, etc.). In general, the thickness increases as we proceed towards the northern and eastern areas of NCR away from the hard-rock outcrops, with modifications resulting from tectonics or the bedrock topography sub-surface. Depending upon the thickness of the alluvium, one or more aquifer zones have been identified in the alluvium. The occurrence of ground water sub-area wise, under water table and confined to semi-confined conditions has been described in the following paragraphs. Phreatic water surface is generally shallow, about 3 to 5 metres below ground level (m.b.g.l.). It could be even as low as one metre or so, in the newer alluvium along the present day flood plains or the low level terraces. Such shallow water levels may be encountered even in the older alluvium.

39. Deeper confined aquifers or medium deep semi-confined aquifers have their piezometric surfaces within about 20-25 m b.g.l. in general. Open wells, shallow tube wells, gravity wells and deep tube wells are abundant in the areas covered by the alluvium. Their discharges vary anywhere from 18 to 25 cubic metres per hour for about 2 to 3 metres draw downs in the open wells to about 162 per cubic metre per hour for about 8-12 metres draw downs in the deep tube wells tapping granular zones about 70-100 metres in aggregate thickness. As far as ground water quality is concerned, there are few fresh water pockets in the north-east and the south-east corners of NCR area, otherwise in these areas the Total Dissolved Solids (TDS) are more than the desirable limits and the other quality parameters are within the desirable range. The TDS, nitrate and fluorides are more than the desirable limits in the NCT-Delhi area and most parts of the north-west and south-west portions of NCR. However, in the central part of the north-west zone of NCR, fluorides are within the desirable limits.

C. Urban Demography in NCR Region

1. Population Distribution

40. The NCR comprises the entire NCT of Delhi, eight districts of Haryana, one district of Rajasthan and five districts of Uttar Pradesh with a population of over 371 lakhs in 2001. The Sub-regions of NCT-Delhi, Haryana, Rajasthan and Uttar Pradesh accommodated 37.33%, 23.42%, 8.07% and 31.19% of NCR's population respectively. The relative share of NCT-Delhi in the population of NCR has been steadily increasing during the last two decades, as seen in Table III-1 and it reveals that during the past two decades, the urban share in NCR has registered a higher growth rate as compared to its rural counterpart. The urban share increased from 45.87% in 1981 to 50.23% in 1991 and 56.39% in 2001. However, in NCR excluding NCT-Delhi, the share of urban population in 1991 was only 29% and there has been practically very little increase during 1991-2001. Sub-region wise urban population growth during 1981-2001 was about 146%, 122%, 137% and 124% in Haryana, Rajasthan, Uttar Pradesh and NCT-Delhi respectively.

Table III-1: NCR Region population and its growth

Sub region / Year	Population (Person)			Decadal Growth Rate (%)		Share of Population (%)		
Year	1981	1991	2001	1981-1991	1991-2001	1981	1991	2001
NCT-Delhi	62,20,406	94,20,644	1,38,50,507	51.45	47.02	31.28	34.43	37.33
Haryana	49,38,541	66,43,604	86,87,050	34.53	30.76	24.84	24.28	23.42
Rajasthan	17,55,575	22,96,580	29,92,592	30.82	30.31	8.83	8.39	8.06
Uttar Pradesh	69,68,646	0,01,704	1,15,70,117	29.17	28.53	35.05	32.9	31.19
NCR	1,98,83,168	2,73,62,532	3,71,00,266	37.62	35.59	100	100	100

Source: NCRPB Regional Plan 2021

2. Density

41. The density of population in NCR including NCT-Delhi is 1,105 persons per sq km against the all India average of 324 persons per sq km in 2001, while excluding NCT-Delhi it is 724 persons per sq km. The Sub-region wise population density is shown in Table III-2.

Table III-2: Region wise Existing Population Density

Sub-region/	Density (Person/sq km)	
Year	1981	2001
NCT-Delhi	4,192	9,340
Uttar Pradesh	642	1,066
Haryana	368	648

Sub-region/ Year	Density (Person/sq km)	
	1981	2001
Rajasthan*	238	382
NCR	634	1,105

Source: NCRPB Regional Plan 2021

3. Population Projection

42. Total population of NCR is projected to be 641.38 lakhs by 2021, which is proposed to be accommodated within the region. Keeping in view the population assignment for NCT-Delhi additional expected population has been distributed proportionately amongst Haryana, Rajasthan and Uttar Pradesh Sub-regions. The assigned population for NCR is given in Table III-3.

Table III-3: Population Projection in NCR Region

		NCT-Delhi		Haryana		Rajasthan		Uttar Pradesh	
Year	NCR Total	Population	% to total	Population	% to total	Population	% to total	Population	% to total
		in lakhs		*in lakhs*		*in lakhs*		*in lakhs*	
2001	371	138.5	37.33	86.87	23.42	29.92	8.06	115.7	31.19
2021	641.38	225	35.08	163.5	25.49	49.38	7.7	203.5	31.73
Hapur – Pilkhua Complex									
2001								2.12	
2011								3.00	42
2021								4.50	50

Source: NCRPB Regional Plan 2021

D. Environmental Infrastructure in NCR Region: Water Supply

1. Water Supply Existing

43. As per the available data during preparation of NCR Regional Plan 2001, it is estimated that an average water availability of 225 lpcd in Delhi, in urban centres of Haryana Sub-region ranges from 45 lpcd in Ganaur to 145 lpcd in Panipat, 35 lpcd in Shahjahanpur to 98 lpcd in Alwar in Rajasthan Sub-region and 28 lpcd in Phalauda to 142 lpcd in Meerut in Uttar Pradesh Sub-region. Per capita availability of water in most of the urban centres has dwindled over the last decade due to rapid urbanisation and lack of financial resources for augmentation.

44. The status in rural areas presented a dismal picture since not enough database was available to exactly determine the position of water supply in these areas. Moreover, many villages did not have local sources of water and almost equal numbers did not have adequate sources.

2. Issues regarding water supply

45. *Lack of Regional Planning Approach:* Towns/Cities have so far been planned by their

respective authorities for their individual needs. There has been total lack of regional approach for sustainable use of available water and its conveyance from areas of plenty to scarcity. The raw water augmentation should not be territory specific but it should be region wise irrespective of State boundaries.

46. *Dependence on Outside Sources:* In order to meet the raw water requirement of NCR, the major sources have been through inter- state allocations of the Yamuna water, Ganga water and, in future, through storage dams to be developed in Himachal Pradesh and Uttaranchal. However, so far these water storage reservoirs/dams have been considered as source only for Delhi and not for other parts of the region. Further, there has been lack of emphasis on planning and development of ground water sources including recharge of ground water through rainwater harvesting and schemes to harness the sources/potential of water in NCR which are necessary for sustainable development.

47. *Unaccounted for Water (UFW):* There are significantly high losses at different stages of water supply system ranging from 30% to 50% in conveyance and distribution system apart from treatment plants including pilferages. These need to be capped to 15%.

48. *Dependence on Plan Funds:* State Governments and their local bodies operating and maintaining the water supply schemes are totally dependent on plan funds. There is a wide gap between revenue and expenditure of the local bodies. Characteristics like ineffective billing, poor collection of revenue and operation and maintenance inefficiencies etc. attribute to bad financial health of the local bodies. There is need to introduce efficiency of services i.e., efficiency in cost recovery and demand management through telescopic pricing in order to improve the revenue generation.

49. *Regional Plan-2001: Norms and Standards:* The drinking water supply norms proposed in Regional Plan-2001 and Master Plan for Delhi-2001 could not be met because neither adequate financial resources were allocated to meet their requirement nor physical efforts to tie up the water resources management had been undertaken.

50. *Depletion of Ground Water:* Ground water is depleting at a very fast pace in the region and the quality of ground water is also deteriorating due to over exploitation and contamination. Historical water bodies/ponds are being neglected or encroached upon.

3. Norms and Standards

51. Minimum norms and standards should be adopted for drinking water supply in the region as follows: The norms for urban settlements are presented in Table III-4.

Table III-4: Norms for Urban Settlements

Towns/Cities	Recommended Water Supply
	Lpcd
NCT-Delhi	225
Population one lakh and above	200
Population below one lakh	135

Note: This includes demand for commercial areas and floating population.
Source: NCR Regional Plan – 2021

52. *Rural Settlements:* A minimum of 70 lpcd including a supply of 30 lpcd for cattle is proposed. If independent connections are proposed to be given, a minimum rate of 100

lpcd of water supply has been advised. Spot sources may supply a minimum of 40 lpcd, which can supplement the piped supply. In rural areas, where water is provided through public standposts, 40 lpcd should be considered. In urban villages rate of water supply should be similar to the town with which it is surrounded.

53. Unaccounted for water should be limited to 15%.

54. The bulk requirement of institutional establishment should be assessed separately with proper justification.

55. Fire fighting requirement should be added to this as per norms in the CPHEEO water supply Manual.

4. Demand of Water Supply in NCR Region

56. Total tentative projected drinking water supply demand for the region in the year 2021 is 11,984 mld (11.984 MCM/day or 4,374 MCM/annum), which includes 5,822 mld demand for Delhi also. An equivalent demand has to be considered for industrial use. Therefore, integrated Regional Plan to augment water should be done for about 23,968 mld of water. The future demand for drinking water is illustrated in Table III-5.

Table III-5: Demand for Drinking Water in NCR Region

Sub-region	**Drinking Water Requirement (mld)**	
	2001	*2021*
Haryana	1,046	2,412
Rajasthan	266	664
Uttar Pradesh	1,433	3,086
NCT-Delhi	3,584	5,822
Total	**6,329**	**11,984**
	6.329 MCM/day	11.984 MCM/day
	2310. 07 MCM/annum	4374.27 MCM/annum

Source: NCR Regional Plan – 2021

5. Water Supply Investment Plan

57. Total water requirement in the region would be 11,984 mld by the year 2021. Accordingly, there will be need to produce additional water and to strengthen/expand the water supply distribution system in the region. Total investment required for the production / augmentation of water would be about Rs.5,992.15 crores by the year 2021 and for strengthening/expansion of distribution system/network, it would be about Rs.7,190.57 crores. This cost does not include the cost of conveying water from long distances through canals/pipes. Sub-region wise fund requirement for the region has been given in the following Table III-6.

Table III-6: Proposed Investment for Water Supply Sector in NCR Region

Sub-region	Distribution Network	Production of Water	Total
	(@ Rs. 0.60 crores per mld)	*(@Rs. 0.50 crores per mld)*	*Rs in Crore*
Haryana	1,447.21	1,206.01	2,653.22
Rajasthan	398.24	331.87	730.11
Uttar Pradesh	1,851.99	1,543.33	3,395.32
NCT-Delhi	3,493.13	2,910.94	6,404.06
Total	**7,190.57**	**5,992.15**	**13,182.72**

Source: NCR Regional Plan – 2021

E. Environmental Infrastructure in NCR Region: Sewerage

1. Sewerage Existing Situation

58. At present barring Delhi, where 80% population is covered under sewerage and 1,500 mld of waste water is being treated, the sewerage cover ranges from 30 to 70% in U.P. and 60% to 80% in Haryana in the DMA (now CNCR) towns only. Among the CNCR towns, treatment facilities are available in Faridabad, Gurgaon, Ghaziabad and NOIDA. No sewerage treatment facility is available in any of the priority towns of U.P. Sub-region or Rajasthan Sub-region. Coverage of sewerage system in various priority towns ranges from 40.0% to 70.0% in Haryana, 3.0% to 5.0 % in Rajasthan and 0.0% to 30% in Uttar Pradesh. Not enough database is available to determine the position of sanitation in rural areas. However, the overall picture is dismal. High incidence of water borne diseases in NCR is indicative of the poor state of sanitation in the region.

2. Issues

The major issues are regarding sewerage is as follows:

(i) System Drawbacks and Lack of Coverage;
(ii) Lack of Operation & Maintenance and Management Effort;
(iii) Lack of Waste Minimization and Recycling/Reuse; and
(iv) Population living in marginal settlements and slum areas lack coverage.

3. Norms and Standards

59. As per the CPHEEO norms, towns within NCR, which do not have sufficient resources or have unsuitable terrain to provide proper sewerage system and treatment facilities, may initially be provided with low cost sanitation systems which can be upgraded in the later stages within the time frame of this Plan.

4. Investment Plan

60. Total estimated sewage generation in the urban areas of the region is estimated to be 6,935 mld by the year 2021. Accordingly, there will be need to strengthen/expand the sewerage system and its treatment capacities. Total investment required for laying of sewerage system would be Rs.3,467.47 crores by the year 2021 and for treatment of waste water, the

investment would amount to Rs.4,854.46 crores. Sub-region wise and Plan wise fund requirement for the region has been given in the following Table III-7.

Table III-7: Proposed Investment for Sewerage Sector in NCR Region

Sub-region	Sewerage System	Sewage Treatment Plant	Total
	(@ Rs. 0.50 crores per mld)	*(@ Rs. 0.70 crores per mld)*	*Rs in Crore*
Haryana	561.49	786.08	1,347.57
Rajasthan	140.8	197.13	337.93
Uttar Pradesh	740.18	1,036.25	1,776.43
NCT-Delhi	2,025.00	2,835.00	4,860.00
Total	**3,467.47**	**4,854.46**	**8,321.93**

Source: NCR Regional Plan – 2021

F. Environmental Infrastructure in NCR Region: Solid Waste Management

1. Existing Situation SWM

61. None of the towns in the region are disposing of solid waste in environmental friendly manner. The landfill sites are not lined to protect the ground water from leachate percolating into it. No other disposal system has been adopted by the local bodies.

62. As per estimates, at present 13,499 MT/day of garbage was being generated in the year 2001 in the region, of which about 1,540 MT/day was being generated from Haryana Sub-region, 201 MT/day was being generated from Rajasthan Sub-region and 2,270 MT/day was being generated from U.P. Sub-region and remaining from the NCT-Delhi Sub-region. Total garbage generation in the region is likely to be about 27,236 MT/day by the year 2021 and handling of this kind of waste will need special efforts and funds. Sub-region wise details have been given in Table III-8.

Table III-8: Generation of Garbage in NCR Region

Sub-region	Garbage Generation	
	2001	**2021**
	(in MT/day)	
NCT-Delhi	9,488	15,413
Haryana	1,540	4,569
Rajasthan	201	1,116
Uttar Pradesh	2,270	6,138
Total	**13,499**	**27,236**

Source: NCR Regional Plan – 2021

2. Issues in SWM

The major issues are regarding sewerage is as follows:

(i) Lack of Knowledge of the Local Bodies regarding Solid Waste Management
(ii) Non-availability of suitable Land for Solid Waste Disposal in Environmental Friendly Manner
(iii) Lack of Public Awareness
(iv) Non-Availability of Funds

(v) Piecemeal Approach for Handling of Solid Waste
(vi) Dependence on Departmental Staff causing Labor Related Problems
(vii) Lack of coverage
(viii) Poor collection system especially in the narrow and circuitous lanes, making the collection more difficult
(ix) Mixed variety of organic and inorganic solid waste
(x) Non-involvement of NGOs/informal sector and private agencies.
(xi) Unsanitary conditions in and around community bins.
(xii) Handling of specialized wastes
(xiii) Shortage of vehicles
xiv) Shortcomings at landfill sites
(xv) Organizational inadequacies
(xvi) Shortage of equipment and committed supervisory staff
(xvii) Financial stringency

3. Norms and Standards

63. Norms and standards provided in the CPHEEO Manual for solid waste management which provides guidelines for collection, transfer, transport and disposal of solid waste in environmental friendly manner should be followed. This also provides the directions for handling of medical and hazardous wastes. In this regard, the notification of the Ministry of Environment and Forests under the Environmental Protection Act, 1986 should also be followed.

4. Investment Plan

64. Total solid waste generation in the urban areas of the region would be about 27,236 MT/day by the year 2021 and accordingly, there will be need to develop appropriate system for collection, transportation and disposal of solid waste in environmental friendly manner either through properly designed sanitary land filling or through other treatment methods. Total investment required for this would be about Rs.1,361.81 crores up to the year 2021. However, Sub-region wise and Plan wise fund requirement for the region has been given in the following Table III-9.

Table III-9: Proposed Investment for Solid Waste Management in NCR Region

Sub-region	**Requirement**
	(Rs. in Crores) @ Rs. 0.05 crores per MT
Haryana	228.46
Rajasthan	55.8
Uttar Pradesh	306.92
NCT-Delhi	770.63
Total	**1,361.81**

Source: NCR Regional Plan – 2021

G. Environmental Infrastructure in NCR Region: Drainage

1. Existing Situation and issues

65. Studies have revealed that there is lack of integrated planning in the drainage for storm

water which is not local but has got regional bearing covering areas in Haryana, Rajasthan, U.P. and NCT-Delhi Subregions. Untreated sewage continues to flow in most of the drains in the region and ultimately falls into the rivers Ganga and Yamuna. Encroachment by slum dwellers along the drains causes choking of drains and flooding in the upstream areas due to reduced carrying capacity. Major issues are related to storm water drainage system is (i) Lack of regional approach and (ii) Lack of funds

2. Norms and Standards

66. The urban drainage system may be designed for maximum rainfall of five years frequency storm for internal as well as peripheral drains and ten years frequency storm for the main drains. The likely time of concentration for each case may be worked out and corresponding storm values adopted. Usually the system is designed for a maximum rainfall of one-hour duration.

67. The rural drainage system may be designed for three days rainfall of five years frequency to be drained in three days. An appropriate area dispersal factor should be adopted for computing the run off.

68. The coefficient of runoff may be calculated for areas with composite land use pattern on the basis of anticipated land use in the new areas and existing land use pattern for the areas already developed.

69. Where it is not possible to work out the run off coefficient due to land use policies not indicated, run off coefficient not less than 0.2 may be adopted for rural areas with flat to moderate slopes and 0.4 for steeper slopes. For urban area, run off coefficient not less than 0.6 may be adopted in absence of adequate details of the areas.

3. Investment Plan

70. Investment requirement in this sector will depend upon the District Level drainage Master Plans to be prepared by the respective State Governments and the Integrated Regional Drainage Plan, therefore, Investment Plan cannot be proposed in the Regional Plan.

H. Summary of Environmental Infrastructure investment in NCR Region

The total proposed investment is required for environmental infrastructure except storm water drainage is Rs. 22,866 crores till 2021 in NCR region. The summary of investment is presented in Table III-10.

Table III-10: Summary of Proposed Investment in NCR Region except SWD

Item	2021 Investment
	Rs in crores
Water Supply	13,182.72
Sewerage	8,321.93
Solid Waste Management	1,361.81
Total	22,866.46

Source: NCR Regional Plan – 2021

IV. HAPUR WATER SUPPLY SYSTEM

A. Overview

71. In Uttar Pradesh State, while Uttar Pradesh Jal Nigam (UPJN) is responsible for the creating capital assets of water supply and sewerage infrastructure, the respective ULBs are responsible for operation and maintenance in their jurisdictions. In Hapur, Hapur Municipality provides basic urban services like water supply, wastewater, storm water drainage and solid waste management. This section presents the assessment of existing situation of water supply service, which will set goals to be achieved as a part of Hapur Vision 2041 and identify prospective interventions required to achieve the sector goals..

1. Service Delivery

72. *Scheme I:* The first water supply scheme was executed for Hapur Town in 1955 with the estimated cost of Rs. 11.5 lakhs. The scheme was designed for projected population of 5,500 at 135 lpcd. The scheme was executed and maintained by the Hapur Municipality. Due to non availability of surface water source, it was designed to extract water from ground with the help of four tube wells. Subsequently, due to urbanization, the demand for drinking water has increased. Hence, on behalf of Hapur Nagar Palika Local Self Government Department was executed second scheme to improve the existing supply system in Hapur.

73. *Scheme II:* The scheme was executed during 1971 – 72 by Local Self Government Department (LSGD). The estimated cost for the second scheme was Rs. 27.4 lakhs. The scheme was designed at the rate of 180 lpcd. The details of scheme I and II are illustrated in Table IV-1. In this scheme, installed another two tube wells and extended distribution system in the town. The town was divided into three water supply zones.

Table IV-1: Scheme I and II details of Water Supply System in Hapur

Details	Scheme I	Scheme II
Year of Commissioning	1955	1971-72
Source	Ground Water	Ground Water
Commissioning Agency	ULB	LSGD
Estimated Cost	11.526 lakhs	27.37 Lakhs
Number of Tube wells	4	4 old +2 new
Designed lpcd	135	180

Source: Hapur Nagar Nigam

74. *Water Abstraction*. In vicinity of Hapur municipality there is no surface water source, which can serve drinking water to the town. Hence the municipality is depending on ground water source[1].

[1] Central Ground Water Board has released a status paper on Ground Water variation in Ghaziabad District (Ground Water Brochure of Ghaziabad district, U.P. (A.A.P.: 2008-2009)). According to the CGWB shows that except at a few places, the entire district exhibit a declining trend of water level resulting in drying out the number of dug wells and also shallow ground water structures particularly in Non Canal Command areas. It is estimated based on the data recorded in the piezometers of GWD, the

At present, ground water is available in sufficient quantity for domestic purposes at shallow depth around 9 to 12 m throughout the year. The quality of ground water in and around Hapur is good enough for human consumption[2].

75. After the scheme II, due to increase in demand the ULB identified and executed 11 tube wells in municipal area. Currently, the municipality is extracting water from the 19 tube wells (of which two are out of order) around 27.34 MLD. The average yield of each tube well is 1.61 ML per day and each tube well operates 16 hours per day. The tube wells are fitted with submersible pump/vertical turbines pumps with a capacity of 30 to 60 HP as shown in adjacent picture. As per the 2001 censes population the municipality is supplying water at a rate of 129 lpcd to the town. The locations of tube wells are illustrated in Table IV-2.

Table IV-2: Tube well Locations in Hapur

Sl. No.	Location of Tube wells	Total (No)	Yield(LPM)
1	Navajyoti Colony, Mangali Mata Road and Near Avas Vikas Colony	3	5600
2	Near Bhanda Patti and Near Taga Sarai	2	4250
3	Chah Kamal, Town Hall and Sarai Bashant Ali	4	6000
4	Bhagwati Ganj and Churkhi	2	3400
5	Station Road and near by	3	3750
6	Arya Nagar	1	1250
7	Alok Colony	1	2250
8	Avas vikas Sanjay Nagar	1	2000
	Total	**17**	

Source: Hapur Nagar Palika

76. *Water Treatment*. The raw water is being extracting from ground, hence the raw water may not require treatment. Water is disinfected before the supply. The ULB is having a setup of 100 liters capacity of chlorination tanks at every tubewell. The discharge of liquid chlorine tank is connected to the raw water main, which releases at the rate of 0.5 ppm. There is no monitoring system with the Municipality to measure the residual chlorine at the consumer end.

77. *Storage*. Hapur has only 13 percent of storage capacity over daily supply of water. As per the CPHEEO norms 33 percent of storage capacity against total supply of water should require. Hapur has a total storage capacity of 3.63 ML comprising five elevated storage

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declining trend of water level is 25.7 cm/year (1998-2007).

[2] As per the CGWB (Ground Water Brochure of Ghaziabad district, U.P. (A.A.P.: 2008-2009)): Ground water in phreatic aquifers, in general, is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water in phreatic zone ranges from 527 to 3318 µs/cm at 250C. Conductance below 750 µs/cm at 250C has been observed in a 44% of the analysed samples, whereas, above 2250 µs/cm at 250 Sl. No. C in 11% of the samples. It is observed that the ground water is suitable for drinking and domestic uses in respect to all constituents except for total Hardness & Nitrate.

reservoirs (Over Head Tanks). However, the municipality directly pumping into the distribution system from 11 tube wells. These eleven bore wells were installed at low pressure areas identified in distribution network. This incurs heavy losses of water in distribution system and uneven pressure fluctuations during supply. The details and locations of Over Head Reservoirs are shown in Table IV-3.

Table IV-3: Details of Over Head Tanks

Sl. No	Location	OHSR	Storage Capacity (ML)
		Number	*ML*
1	Bhanda Patti	1	1.20
2	Ater Pura Chowk	1	0.68
3	A.K.P INT. College	1	0.35
4	Collector Ganj	1	1.05
5	Near Gandhi Ashram	1	0.35
	Total	5	3.63

Source: Hapur Nagar Palika

78. *Distribution System*. At present, the municipality divided ULB area into 11 water supply zones. The total length of existing water distribution network in Hapur town is around 150 km, which includes transmission mains, feeder mails and distribution mains. After the second scheme, municipality extended distribution lines as per the requirement. The existing distribution system covers 38.5 percent of road length. The rest of uncovered areas are depending on their own system of bore wells and public hand pumps. The material used for pipe diameter below 150 mm was PVC, AC, CI and more than 150 mm CI material. The length of the pipe in Zone 4, Zone 6A & 6B and Zone 9 and pipe material is shown in the Table IV-4, length and material details are not available for other zones.

Table IV-4: Length of Network and material details in a few zones

Diameter	Material	Length in Zone 4, Zone 6A & 6B and Zone 9
mm		*M*
50 mm	PVC, A.C and C.I Pipes	5,918
80 mm	PVC, A.C and C.I Pipes	12,694
125 mm	PVC, A.C and C.I Pipes	333
150 mm	PVC, A.C and C.I Pipes	681
200 mm	C.I Pipes	993
250 mm	C.I Pipes	1,490
300 mm	C.I Pipes	622
350 mm	C.I Pipes	501
		23,232

Source: Hapur Water Supply Reorganization Scheme- DPR UIDSSMT

79. *Service Connections*. Hapur Nagar Palika delivers water to the civic through service connections and public stand-posts. The existing water supply service connections are covered only 35 percent of total property tax assessments in the Town. All water connections are un-metered including commercial and industrial connections. In total, there are 14,454 domestic and non-domestic water connections, and 150 public stand posts. Among the total water connections, 8,207 are domestic connections and 6,247 are non-domestic connections. Based on rough estimation the Municipality serving potable water to 39.5 percent of Hapur population (estimated by Jal Nigam for the year 2009). Remaining households/population are depending on public stand posts. Apart from piped water supply, municipality provided 810 hand pumps across the town. Out of 810 public

stand posts, 90 percent of hand pumps are functioning at present. The connection details are illustrated in Table IV-5.

Table IV-5: Domestic and Non Domestic connection details

Mode of Delivery	Numbers
Domestic water service connections	8,207
Non-Domestic water service connections	6,247
Total	14,454
Number of House Holds as per 2001	31,174
Stand Posts	150
Hand Pumps	810

Source: Hapur Nagar Palika

80. *Water Charges*. There are no metered consumer connections in Hapur Municipality. Municipality is charging as bulk fee to the consumers as given in Table IV-6. At present Nagar Palika is charging a monthly charge of Rs. 50 for domestic and Rs. 400 for non domestic connections. Hapur Nagar Palika collects one-time connection deposit Rs. 600 for domestic and Rs. 4,800 for non domestic connections.

Table IV-6: Water Supply Connection Fee and Deposit

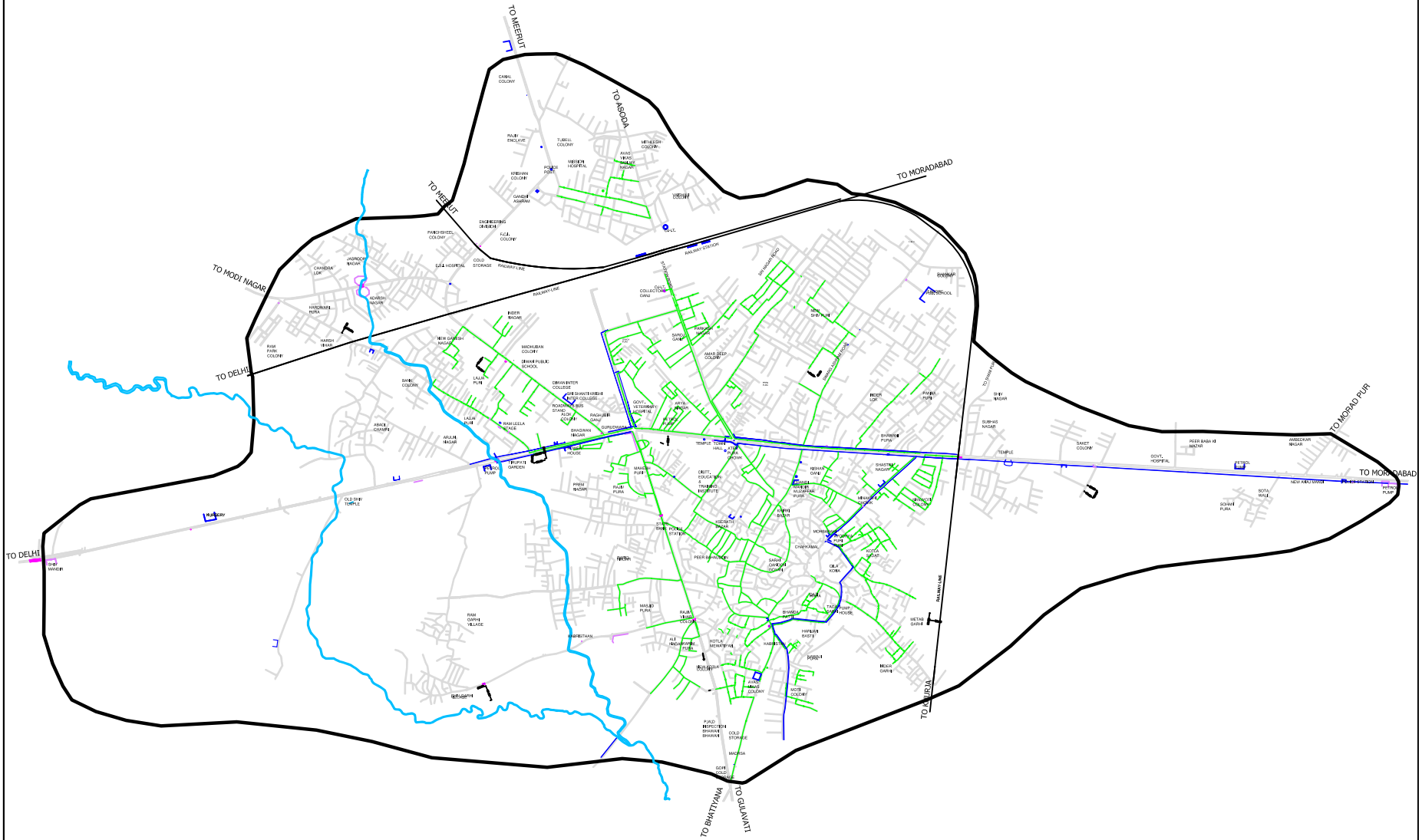
Type of Connection	Monthly Tariff	Connection Deposit
	Per Month in Rs.	*Rs.*
Domestic	50.00	600.00
Non-domestic/commercial	400.00	4,800.00

Source: Hapur Nagar Palika

81. UIDSSMT *Water Supply Project (Third Water Supply Scheme):* As the town has been growing rapidly both in area and population the existing water supply arrangement has become inadequate with respect to the available quantity of water from the existing tube wells, storage capacity as well as the distribution system. The existing pipeline network is also to be strengthened taking into consideration the increase in population density of Hapur town. Some new areas/localities have also developed in the town, which are yet to be supplied with potable water.

82. Thus, there is urgent need to extend, revamp and reorganize the entire water supply arrangement to mitigate the requirement of adequate, safe and potable water supply to the inhabitants of Hapur town. Considering this, UP Jal Nigam has proposed a new water supply scheme under UIDSSMT with an estimated cost of 284.89 million, which covers entire town. At present this project is under implementation by Jal Nigam and it would be complete by end of 2011.

83. In third water supply scheme the entire town is divided into twelve water supply zones. There are ten OHRs and four CWRs (Clear Water Reservoirs) under execution. The pumping mains from the tube wells are connected to the proposed CWRs and pumping clear water to the various OHTs across the town. Key features of proposed scheme are given in Table IV-7**.**



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Existing Water Supply System

Legend

- Municipal Boundary
- Road
- Railway Line
- Existing Drain
- Water Course

Overlay Legend

- Existing Line
- Existing O.H.T

Source: UP Jalnigam

Client:
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn:SK	Checked: NSS
Date: January. 2011	Approved: NSS
Scale: NTS	

Map IV-1

Table IV-7: Proposed Comprehensive Water Supply Scheme

Third Water Supply Scheme	Details
Commissioning Agency	UP Jal Nigam
Design Period and Year	25 years from 2009-2034
Design Population	4.25 Lakhs in 2034
Design Demand	62.853 MLD in 2034
Design rate of Supply as per CPHEEO	135 lpcd and extra 15% for unaccounted water, 80.5 lpcd for public stand posts
Distribution Network	165 km in uncovered and rehabilitation areas.
No. of Tube Wells	18
No. of OHSRs	10
No. of CWRs	4

Source: Hapur Nagar Palika

84. Details of various infrastructure components being developed under the UIDSSMT water supply scheme in Hapur are presented below:

85. *Source:* Under this scheme 18 new tube wells are proposed for extraction of water. With a size of 350 X 200 mm diameter and 120 m deep, each tube well is design for a discharge of 2000 lpm. The total water to be abstracted from 18 tube well is 35.5 MLD at the end of design period. The details of tube wells proposed in Table IV-8.

86. *Pumping Plants and Chlorination:* The proposed 18 tube wells will be fitted with submersible pumps having 20/40 HP capacity at a depth of 25/50 meter head. These submersible pumps are proposed to work for 16 hours per day. At each tube well one room pump house is proposed, which will contain one chlorination tank. This system will operate during pumping and maintains 0.5 ppm residual chlorine in the raw water. The extracted chlorinated water will be collected in four Clear Water Reservoirs (CWS) which are proposed in zone 1, 8, 9 and 10 A. Four pumping stations proposed at each CWRs to pump the clear water to the various OHTs for further supply into distribution network. Each pumping house has two centrifugal pumps (one stand by) having capacity of 115/75/60 HP. The details of tube wells, type of pumps and its capacities are illustrated in Table IV-8.

Table IV-8: Proposed Tube wells, type of pumps and its capacity etc.

Zone	Tube Wells	Type of Pumps	HP	Discharge (LPM)	Head (m)
Zone no. 1	3	Submersible	20	2000	25
	1 +1 (one stand by)	Centrifugal	75	6000	30
Zone no. 2	1	Submersible	40	2000	50
Zone no. 4	1	Submersible	40	2000	50
Zone no. 5	1	Submersible	40	2000	50
Zone no. 6B	1	Submersible	40	2000	50
Zone no. 7	2	Submersible	40	2000	50
Zone no. 8	4	Submersible	20	2000	25
	1+1(one stand by)	Centrifugal	115	8000	35
Zone no. 9	2	Submersible	20	2000	25
	1+1(one stand by)	Centrifugal	60	4000	35
Zone no. 10 A	2	Submersible	20	2000	25

Zone	Tube Wells	Type of Pumps	HP	Discharge (LPM)	Head (m)
	1+1(one stand by)	Centrifugal	60	4000	35
Zone no. 10 B	1	Submersible	40	2000	50

87. *Raising Main.* Two types of materials are proposed for raising mains, which are DI (K-7) and AC (Class-15). The diameters are varying from 200 to 400 mm. These raising mains are proposed economical for the ultimate population. In addition to this a few existing tube wells which are connected to direct distribution network at present will be disconnected and new rising mains are proposed to connect CWRs with respective areas. The details of proposed rising mains are illustrated in Table IV-9.

Table IV-9: Proposed Rising Main Details

Sl. No	Pipe Material	Size	Length	Remarks
		Mm	*M*	
1.	D.I (k-7)	400	50	For proposed tube wells
2	D.I (k-7)	350	35	For proposed tube wells
3	D.I (k-7)	300	80	For proposed tube wells
4	D.I (k-7)	250	1,890	For proposed tube wells
5	D.I (k-7)	200	50	For proposed tube wells
6	A.C (Class-15)	250	2,720	For proposed tube wells
7	D.I (K-7)	250	4,437	For existing tube wells
8	D.I (K-7)	200	260	For existing tube wells

Source: Hapur Nagar Palika

88. *Storage Capacity.* Under this water supply scheme, there are additional ten Over Head Tanks and four Clear Water Reservoirs are proposed. At present the municipality is having 3.6 ML storage capacity and it will be enhanced to 24 ML including CWRs. The scheme estimated ultimate demand of water supply in 2034 is 63 MLD, as per the norms 33 percent of storage capacity is sufficient for effective distribution. The existing and proposed storage capacity works out 38 percent compare to design stage. The zone wise storage capacity of proposed OHT/ CWR are shown in Table IV-10.

Table IV-10: Details zone wise storage capacities

Sl. No.	Zone	Existing OHT	Proposed OHT	Proposed CWR	Total Storage Capacity
		KL	*KL*	*KL*	*KL*
1.	Zone no. 1		2,250	900	3.150
2.	Zone no. 2		2,250		2,250
3.	Zone no. 3	1,250			1,250
4.	Zone no. 4	675	2,250		2,925
5.	Zone no. 5	350	2,250		2,600
6.	Zone no. 6 A	1,050			1,050
7.	Zone no. 6 B		800		800
8.	Zone no. 7		1,500		1,500
9.	Zone no. 8		2,250	2,750	5,000
10.	Zone no. 9		2,250	900	3150
11.	Zone no. 10 A	350	2,250	600	3,200
12.	Zone no. 10 B		1,100		1,100
	Total	**3,675**	**19,150**	**5,150**	**24,828**

Source: Hapur Nagar Palika.

89. *Feeder Mails and Distribution Network:* The designed diameter for feeder mains and distribution mains are varying from 110 to 400 mm. Total proposed length of distribution network is 163 km, which covers mostly unnerved areas. As per the requirement, after scheme I and II, municipality laid distribution network in adhoc basis and the proposals includes rehabilitation of existing distribution network. The distribution network details are shown in Table IV-11.

Table IV-11: Details of Proposed Distribution Network

Sl. No.	Type of pipe	Size	Length
		Mm	*m*
1.	A.C. pipe (class – 15)	400	1,788
2.	A.C. pipe (class – 15)	350	1,191
3.	A.C. pipe (class – 15)	300	4,349
4.	A.C. pipe (class – 15)	250	5,504
5.	P.V.C. pipe (4 kg/cm2)	189 mm dia (200mm O.D.)	5,454
6.	P.V.C. pipe (4 kg/cm2)	151mm dia (160mm O.D.)	3,005
7.	P.V.C. pipe (4 kg/cm2)	132mm dia (140 mm O.D.)	6,178
8.	P.V.C. pipe (4 kg/cm2)	104mm dia (110 mm O.D.)	1,35,699
		Total	**1,63,168**

Source: Hapur Nagar Palika.

90. The suitable provision for sluice valves, scour valves, air valves, fire hydrants and vandal proof single tap stand posts has also been provided. Sufficient provision for road cutting and reinstatement of the same, interconnecting the proposed distribution lines with the existing distribution system at various locations, disconnecting the distribution system to segregate the zonal distribution network etc. has also been made.

91. The scheme was prepared by Jal Nigam under UIDSSMT and it is under implementation. By end of 2011 all the works proposed under the scheme will be completed. The Hapur municipality is getting 71 percent of capital cost from Central Govt, 20 percent cost from State Govt. as grant and municipality is contributing 9 percent of total capital cost of the project. The details of fund allocation are shown in Table IV-12

Table IV-12: Fund Contribution for UIDSSMT water supply project

Sl. No.	Institution	Share	Contribution
		Rs in millions	*%*
1	Government of India (Grant)	199.42	70
2	Government of Uttar Pradesh (Grant)	56.97	20
3	Urban Local Body (Own Contribution)	28.49	10
	Total	284.89	100

Source: DPR UIDSSMT

2. Existing Situation in Villages

92. There are nine villages falling within the boundary of existing master plan. Out of nine villages only one village (Asodha village) at present has piped water supply and rest of eight villages are depend on hand pumps. In Asodha village, water is extracted from a tube well and pupmped to a two lakh liter capacity OHT, from where water is distributed through 12.29 km length of network to the people. Ninety percent of the village area is

covered with piped water supply. There are around 500 domestic connections are existing out of 2400 households. Village Panchayat is charging Rs. 20 per month as water charges and Rs. 1,020 as deposit for new connection. Apart from this, there are 150 public stand posts serving those are not having individual connections. Around 130 hand pumps are serving uncovered areas of the village.

B. Service Adequacy

93. *Source augmentation:* Hapur Municipality is responsible for day-to-day operation and maintenance of water supply system. Piped water supply system in the town was provided in the town in 1950's, expanded subsequently from time to time. Only 38.5 percent areas covered as per the road length with water supply, 35 percent coverage as property tax assessments, and present rate of water supply in the town is about 100 lpcd as per 2001 census populations which is less than normal design rate of supply 135 lpcd. It is estimated that total demand at design stage will be around 62.85 MLD at 2034, hence there is need to augmentation of source to 36 MLD, which is proposed in UIDSSMT water supply DPR. This scheme is under execution.

The design period for the CLEIP is 2041 and this project covers entire Master Plan of Hapur Town. The demand and gap worked out for entire Master Plan area including villages. There is need of water augmentation immediately in the villages and phase wise augmentation is require in the Master Plan area. The demand and gap is shown in Table IV-14.

Table IV-13: Fund Contribution for UIDSSMT water supply project

Year	**Population**		**Supply**	**Supply**	**Demand**	**Gap**
	Jal Nigam	*WSA Estimate*	*At Present*	*After Scheme III*	*mld*	*mld*
2034	4,25,331		27.34	62.85	62.85	0
2041		6,28,302	27.34	62.85	100.05	37.2*

*Gap including village demand

94. *Water Losses:* Groundwater is abstracted from 18 tube wells, and water from 11 tube wells are directly connected to the distribution system. These tube wells are away from the CWRs, OHTs and near low pressure areas, hence the ULB connected clear water mains into the direct distribution system. This practice causes for more water losses. No arrangement has been made to predict unaccounted for water in Hapur Town.

95. *Chlorine Measurement:* There is no equipment with the Municipality to measure the residual chlorine at clear water stage and end user point.

96. *Power Shortage:* Due to the power deflections and regular power cuts, sometimes the ULB is unable to extract the water as required.

97. *Systems Operation and Maintenance Issues:* Absence of preventive maintenance procedures and lack of updated O&M procedures.

98. There are no measures to improve ground water table, though the Municipality is depending on ground water as source. However in the Scheme – III Jal Nigam proposed rain water harvesting schemes.

99. Very less involvement of ULB staff with UP Jal Nigam in execution of water supply capital assets

100. Except one village there is no safe drinking water supply mechanism.

C. Water Supply Indicators

101. Table below provides an assessment of key water supply indicators:

Table IV-14: Water Supply – Service Level Indicators in Hapur town

Service Indicators	Unit	Value	Value after Scheme III	Norms
Daily per capita supply (gross) as per 2001 Census Population	Litres	100	135	135-150
WSCs as percentage of properties	Percent	35	80	80-90
Population Covered under Safe Drinking Water	Percent	39.5	80	100
Supply Duration	Hrs/daily	< 2	3	24
Roads covered by Distribution Network	Percent	38.5	80.5	80-90
Total Storage Capacity to present supply	Percent	13	38	33-50

Source: Analysis.

1. Water Supply Sector Goal and Future Strategies

Box 2: Water Supply Sector Goal
'Provide Safe and Reliable Drinking Water to all Citizens of Hapur ULB'

Future Strategies

(i) Water is accessible to all citizens, everyday
(ii) The quality and quantity of water available to citizens conforms to the Central Public Health and Environmental Engineering Organization (CPHEEO) standards.
(iii) Full cost of water service is achieved by the year 2041.
(iv) Improve ground water table by construction of rain water harvesting structures
(v) Minimize water leakages and un accounted for water

V. SEWERAGE AND SANITATION

A. Overview

102. Sewerage system in the town was developed by UP Jal Nigam during 1972-1974. The present sewerage system exists in about 30 percent area of the old town and is almost defunct. Municipal authorities maintaining the sewerage system informed that the existing sewers are choked and over-flowing in number of areas. The sewage flow is so less that at present pumping is done for two hours a day and that too with one pump operating against installation of four pumps. This also indicates that most of the sewers are choked or connected to drains. The map of existing sewerage system showing trunk mains, sewage pumping station and laterals is given in **Map V-1**.

B. Existing Sanitation Facilities

1. Household Latrines

103. There are total 31,174 households in Hapur Nagar Palika, in which around 28,000 of households are having individual sanitation facilities. Most of slum dwellers and BPL families are depend on public toilets in Hapur Nagar Palika.

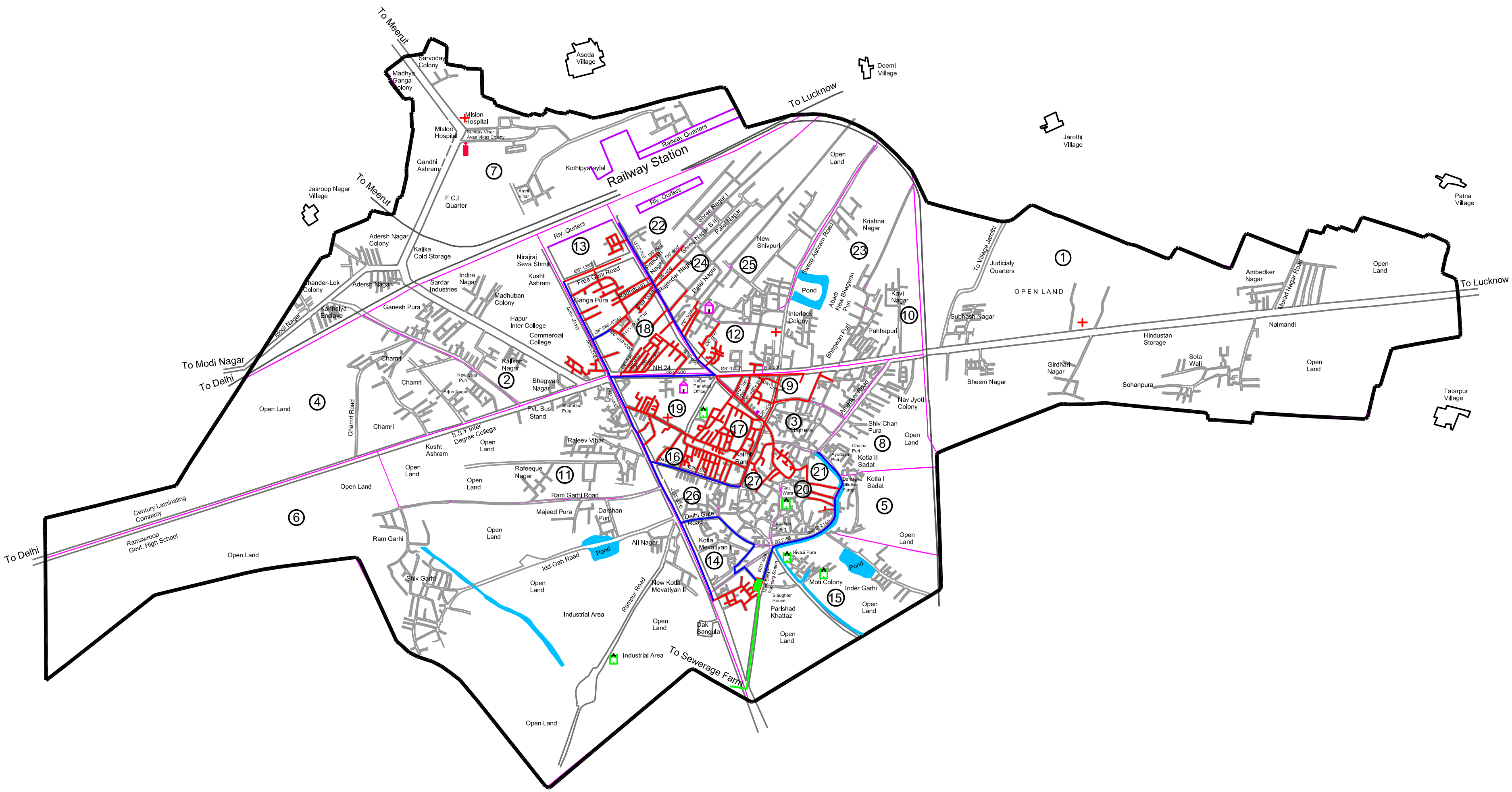
2. Public Latrines

104. Hapur Nagar Palika has constructed seven public convenience facilities with a total capacity of 24 seats. However, due to lack of maintenance most of these public conveniences are in nasty condition. Only two public conveniences (near pvt.bus stand and along the NH-24 near Nagar parishad Circle) are working and mostly used by commuters to Hapur.

3. Sewerage System

105. *Sewer Network*. Existing sewer lines are of RCC (Reinforced Cement Concrete), with a minimum diameter of 150 mm (lateral sewers) to a maximum of 850 mm. Total length of sewer line in Hapur is about 15 km. Of the 27 wards, sewers were laid in 11 wards partly (ward no 9, and 12 to 22).There are four main/trunk sewers laid to convey sewage collected through laterals to the Sewage Pumping Station (SPS) and then to the sewage farm. Diameter of these sewers varies from 300 mm to 850 mm.

106. Most of the sewer lines are blocked and are overflowing. Due to blockages in the system, most of the sewers are discharging sewage into open drains. Almost all of the open drains in the congested city area are carrying sewage. As a result, the total sewage reaching the sewage pumping station is very minimal. At present pumping is done for 2 hours a day with one pump operating against installed capacity of four pumps. The sewage reaching sewage pumping station is hardly 5-10 percent of design flow; which confirms that the existing sewerage system is almost defunct.



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Existing Sewerage System

Legend

- Municipal Boundary
- Major Roads
- Minor Roads
- Railway Line
- Masjid
- Temple
- Church
- Hospital
- Water Course

Overlay Legend

- Existing Trunck Sewer
- Existing Lateral Sewer
- Risingmain
- Sewage Pumping Station
- Ward Boundary
- Ward Number

Source:
Municipal Council Hapur

Client
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn: SK | Checked: NSS
Date: January, 2011 | Approved: NSS

Scale: 00 150 300 450 600 750 Meters

Map V-1

107. *Sewage Pumping Station*. As part of the system a Sewage Pumping Station was developed near Awas Vikas Colony (Ward 15), along Circular Road. The sewage that reaches SPS through trunk sewers is pumped for sewage farming. There are four open clog turbine pumps of capacity 30 KW each. The electric motor is of 960 RPM rated 55 Amperes. The Mechanical and Electrical equipments are in use for almost 30 years, and needs immediate replacement.

108. *Rising Main*. A rising main – of 450 mm diameter, partly of Cast Iron, and partly of RCC, was laid from SPS to agriculture farms in the south of the town.

109. *Sewage Treatment Plant*. The sewerage system in Hapur was developed without a sewage treatment facility. Sewage pumped from SPS is used for irrigation in the surrounding agricultural fields without any treatment. There was a large demand for raw sewage from farmers, but due to urbanization, the farming activity has greatly been reduced, and at present there is no demand, and untreated sewage is disposed off directly. It was the practice of Hapur Municipality to sell the raw sewage to the farmers to generate some additional revenues.

110. Master Plan 2005 has identified two sites for development of STP; however, these sites needs to acquired as they are under private ownership and are currently used for agriculture.

111. *Institutional Arrangement:* Sewerage system is maintained by Hapur Municipality. The capital works, rehabilitation, extension and up gradation in sewerage system is done by UP Jal Nigam. In Municipal Corporation, Assistant Engineer is in charge of the operation and maintenance of sewerage system.

4. Existing situation in surrounding villages

112. At present, surrounding villages are not having 100 percent safe sanitation system. Based on discussions and secondary data there are around 58.6 percent of households are having safe sanitation facilities. Rest of the villagers are having practices of open defecation, which causes for unhygienic conditions. The details of sanitation facilities are illustrated in Table V-1.

Table V-1: Existing situation of Sanitation in villages, Hapur Master Plan area

Sl. No	Name of the Village	Total HH (~)	HH having LCS(~)	Percentage of Safe Sanitation
1	Sabli Village	700	300	42.86
2	Dhomi & Jarothi village	550	225	40.91
3	Acheja Village	750	600	80.00
4	Shyam Nagar village	260	220	84.62
5	Abdullapur Basant Village	400	200	50.00
6	Asoura Village	2,400	1,900	79.17
7	Mansourpur Village	126	105	83.33
8	Murandnagar	1,200	200	16.67
9	Patna Desai Village	600	300	50.00
	Total	**6,986**	**4,050**	**Average 58.62**

Source: Secondary and Primary data

5. Service Adequacy and Issues

113. Only 30% of population connected to sewerage system in the Hapur town and is almost defunct. Due to lack of free flow in the system, most of the sewers are discharging sewage into open drains and sewer network are blocked at a few places are overflowing. Almost all of the open drains in the congested city area are carrying sewage. Remaining 70 % are having own septic tank or letting out waste in drain or practice open defecation. Since there is no sewage treatment facility, sewage pumped from SPS is discharged directly into Choyya Nala and this untreated wastewater is used for irrigation.

114. Poor Maintenance of Public Latrines. The existing public latrines are very poorly maintained. Water storage is not adequately provided owing to scarcity of water in the city and its use is mainly affected due to unavailability of water. Public latrines in Hapur Nagar Palika lack the basic facilities like water supply or safe disposal of the waste.

115. Absence of Safe Disposal System. The town does not have UGD system. In addition, due to dearth in sanitary units a majority of the population having own septic tanks and remaining practices open defecation and sullage and night soil is disposed into roadside/storm water drains. This has resulted into roadside/storm water drains leading to nuisance related health and hygiene implications.

116. Absence of Safe Disposal System in villages. Surrounding nine villages are not having 100 percent safe sanitation facilities. Only 58 percent of HH are having LCS system and remaining villagers are having practices of open defecation. This practice leading to nuisance related health and hygiene implications.

6. Wastewater Indicators

117. Table V-2 below provide an assessment of key wastewater supply indicators:

Table V-3: Indicators for Sewerage and Sanitation

Service Indicators	Unit	Value
Households with Septic Tank	Nos.	~31,174
Households with Other Systems	Nos.	NA
Percentage of Population covered	Percent	62
Septic Tank to Property Tax Assessments	Percent	76
HH covered with LCS	Percentage	~ 58

Source: Analysis.

7. Sewerage and Sanitation Sector Goal and Future Strategies

Box 3: Sewerage and Sanitation Sector Goal
'Improve Sanitation Conditions through Safe Disposal of Human Waste'

Future Strategies

(i) Safe sanitation facilities are accessible to all citizens
(ii) Public safe sanitation facilities are provided with basic infrastructure and are regularly maintained
(iii) Public awareness is increased of safe sanitary practice and of citizens' responsibilities to achieve and maintain hygienic environment
(iv) Appropriate options for wastewater recycling and reuse are introduced to supplement water for non-domestic usage.

VI. SOLID WASTE MANAGEMENT

A. Overview

118. Metropolitan cities in India with growing population, changing life styles, migration of people from rural areas to cities and rapidly growing up of tourism end up generating an enormous quantity of Municipal Solid Waste (MSW) every day. By and large, the Municipal Bodies / Urban Local Bodies (ULB) in various cities collect the MSW, transport it to the dump yards and dispose it off in open ground dumping or non-sanitary landfill. These landfill sites are an environmental hazard – emanating methane causing greenhouse effect, smell & dirt causing health problems, and leachate contaminating the ground water, etc.

119. In Uttar Pradesh, Solid waste Management is the major challenge faced by the state governments and urban local bodies in urban areas. The collection efficiency of solid waste is much better in larger cities than in smaller urban centers. This could also be due to the motorized transportation vehicles deployed in larger cities. Some of the smaller urban centers still depend on tricycles and animal carts for waste collection. A factor that affects waste collection and transportation is the maintenance of vehicles. Poor maintenance of fleet affects collection and transportation efficiency. Vehicles, especially in smaller urban centers, are often not replaced even when there is a need to replace them. Lack of finances for fleet replacement is a major cause of this state of affairs.

1. Service Delivery

120. Municipal solid waste management is an obligatory function of the urban local bodies in India. As per the definition provided by the Municipal Solid Waste (Management and Handling) Rules, 2000 of Government of India, Municipal Solid Waste (MSW) includes commercial and residential wastes generated in municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes. With growing population and increasing waste generation, solid waste management has become a major environmental issue. ULBs across India face similar challenges in handling and disposal of municipal solid waste: lack of adequate financial and human resources, poor technology and lack of public participation to list a few. Solid waste management in Hapur is the responsibility of Hapur Municipality. Existing solid waste management system of Hapur is presented in this section.

2. Solid Waste Generation

121. Spreading over an area of 14.01 sq. km, the Hapur Municipal Area is divided into 27 municipal wards for administrative purposes. Hapur Nagar Palika undertakes solid waste management in all 27 wards. Total road length is 389 km.

122. As per the current estimates (2009) of the Hapur Nagar Palika, about 84 tons of solid waste is generated daily in Hapur –at a per capita waste generation rate of 305 gm per day per person (projected population of 2009 is 275,000). The main solid waste generation sources are residential, commercial and institutional establishments, vegetable and meat markets, hospitals, hotels and restaurants, and construction and demolition waste (debris).

Due to a large number of small scale industrial units (mostly agro-based) in the town, industrial solid waste also enters illegally into municipal solid waste. The source of waste generation is presented in Table V-1.

Table VI-1: Solid Waste Generation Sources in Hapur

S. No	Source	Quantity	% of Waste
		Tons	*%*
1	Residential	58.0	69.0
2	Commercial	12.0	4.3
3	Hotels	2.0	2.4
4	Institutions	1.0	1.2
5	Hospitals	0.5	0.6
6	Markets(Vegetable, Fruit & Meat)	4.0	4.8
7	Construction & Street Sweeping	5.0	6.0
8	Garden Waste	0.5	0.6
9	Industrial	0.5	0.6
10	Other Waste	0.5	0.6
	Total	**84.0**	**100**

Source: Hapur Nagar Palika

3. Solid Waste Composition & Characteristics

123. No data on composition of waste generated in Hapur is available. A study conducted in Ghaziabad in 2009 indicated the composition as: biodegradable - 56 percent, recyclable - 28 percent, and inert and other waste – 16 percent. Based on a study conducted by NEERI in 2005 in 59 cities across India, the following **Table VI-2Error! Reference source not found.** provides waste composition in the towns of similar population size as Hapur (1-5 lakhs population).

Table VI-2: Composition of Waste in Indian Cities of 1-5 lakh Population

S. No	Composition	Value/Fraction
1	Compostable Matter	34% - 62%
2	Recyclable Fraction	13%-36%
3	Moisture Content	24% - 63%
4	C:N Ratio	14% - 37%

Source: "Assessment of Status of Municipal Solid Wastes Management in Metro Cities and State Capitals", study conducted in 59 cities by NEERI/CPCB in 2005

124. In absence of waste composition data from Hapur, as per the eye judgment and discussions with Municipal staff, tentative percentages are estimated for Compostable, Recyclable and Inert and others.

(i) Compostable matter – 56 percent
(ii) Recyclable fraction – 15 percent
(iii) Inert and other waste – 29 percent

4. Solid Waste Collection

125. Primary Collection. There is no door to door solid waste collection system in Hapur. Waste collection is through community dust bins. ULB provided 20 collection bins for the purpose, but there are many unauthorized open collection points. The municipality regularly collects the waste from these open dumping points. Due to lack of proper collection system and civic sense, almost all households throw waste onto the streets, drains and open spaces within the localities creating unhealthy conditions. Lack of door-to-door collection is also one the main reason for this situation. Most open drains in the city are choked due to indiscriminate solid waste disposal. There are a number of open points where people dump waste regularly. The municipality provided one collection bin per around 19 km.

126. Street Sweeping. One of the major activities of the solid waste management is street sweeping, which is time consuming and labour intensive. Due to open drain system, regular desilting of drains is also necessary. Since throwing and indiscriminate disposal of waste on to streets is prevalent, collection of waste is mainly through street and road sweeping. Hapur Nagar Palika carries out both street sweeping and drain desilting activities in all 27 wards. Sweepers use traditional short-handled brooms to sweep, and collect and transport community bins/intermediate collection points using wheel barrows. The sweeping is carried on the basis of a single-tier system by forming “beats”. Each beat is allocated to a sanitation worker/sweeper. Sweepers work in single shift. There are 5 intermediate collection points for waste collection in addition to 20 waste collection points.

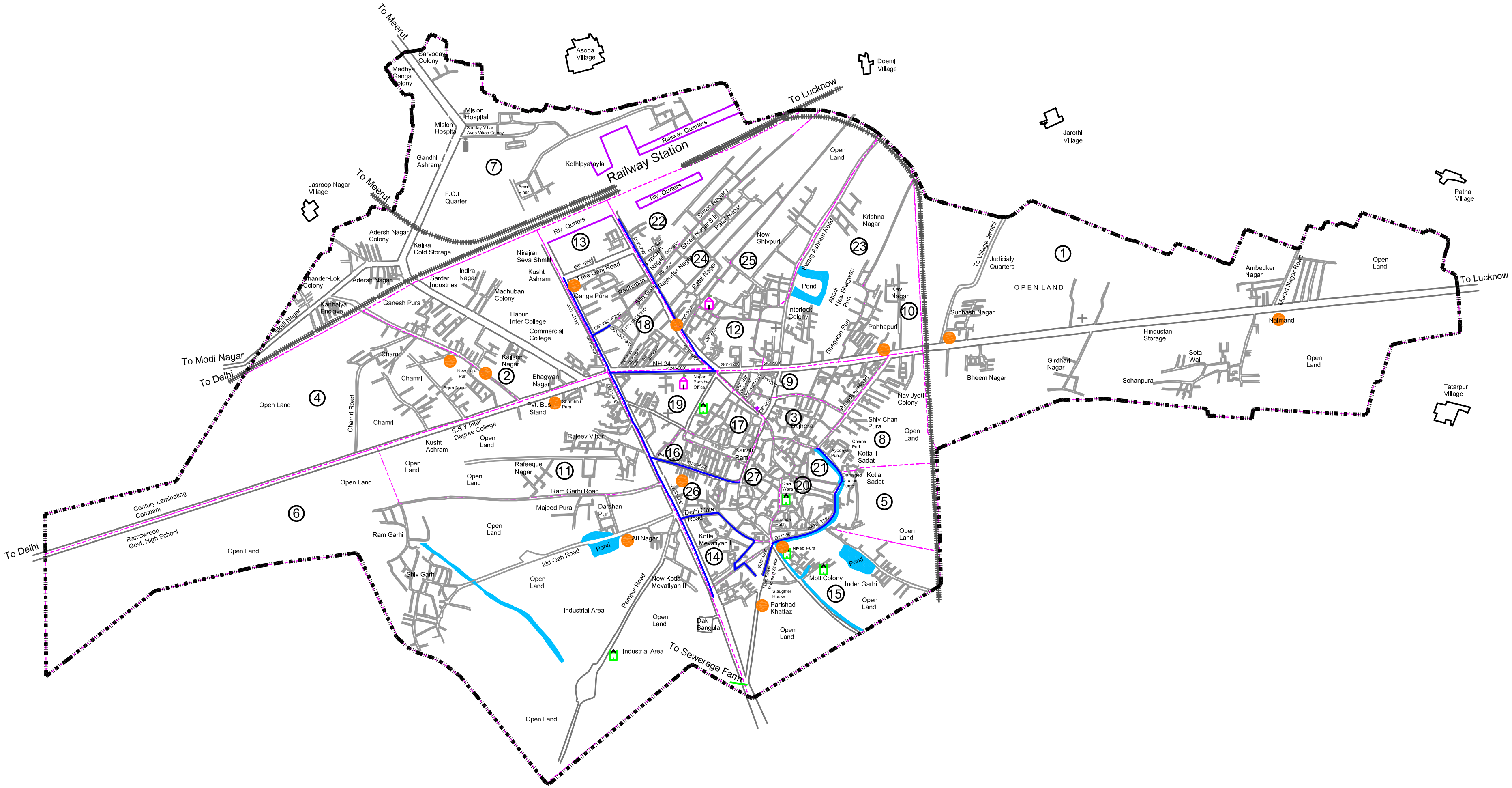
5. Transportation of Solid Waste

127. Waste from community dust bins/open collected points is manually lifted into vehicles for transportation to disposal site along Rampur Road. HNP transports waste using tractors and dumper placers. Of the total generated 84 tons, HNP collects and transports just about 33 percent daily.

Table VI-3: Details of Transportation Vehicles

Description	**Owner Ship**	**Nos.**	**Vehicle Capacity**	**Trips / Day**	**Total Quantity**
			Tons	*Nos.*	*Tons*
Tractor-Trolley	HNP	4	1.5	5	7.5
Dumper placer	HNP	4	2.0	5	10.0
JCB	HNP	2			
Loader	HNP	3			
Truck	HNP	4			
Tractors	HNP		2	5	10.22
Hand Carts	HNP	103			
Total		**120**	**-**	**-**	**27.72**

Source: Hapur Nagar Palika


To Meerut
To Lucknow
Railway Station
Rly. Quarters
Railway Quarters
To Modi Nagar
To Delhi
To Sewerage Farm
NH 24
Delhi Gate Road
Ram Garhi Road
Idd-Gah Road
Pond
Open Land
OPEN LAND
Industrial Area
Asoda Village
Doemi Village
Jarothi Village
Patna Village
Tatarpur Village
Jasroop Nagar Village
Century Laminating Company
Ramswroop Govt. High School
Hindustan Storage
Sohanpura
Bheem Nagar
Subhash Nagar
Judicialy Quarters
Ambedker Nagar
Navmandi
Girdhari Nagar
Ganesh Pura
Chamri
Chamri Road
Kalika Cold Storage
Sardar Industries
Indira Nagar
Madhuban Colony
Hapur Inter College
Commercial College
Bhagwati Nagar
Pvt. Bus Stand
Rajeev Vihar
Rafeeque Nagar
Majeed Pura
Darshan Puri
Ali Nagar
New Kotla Mevatyan II
Kotla Mevatyan
Motii Colony
Inder Garhi
Parishad Khattaz
Dak Bangala
Kotla I Sadat
Kotla II Sadat
Shiv Chan Pura
Nav Jyoti Colony
Pahhapuri
Kavi Nagar
Krishna Nagar
New Shivpuri
Interlock Colony
F.C.I Quarter
Gandhi Ashram
Mision Hospital
Sarvoday Colony
Madhya Ganga Colony
Adersh Nagar Colony
Adersh Nagar
Chander-Lok Colony
Kanhaiya Enclave
Shiv Garhi
Ram Garhi
Kusht Ashram
S.S.V Inter Degree College
Ganga Pura
Kothipyarelal
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Capacity Development of the NCRPB: Component B (ADB TA-7055)

Hapur Existing
Solid Waste collection locations

Legend

- Municipal Boundary
- Major Roads
- Minor Roads
- Railway Line
- Masjid
- Temple
- Church
- Hospital
- Water Course

Overlay Legend

- Solid Waste collection locations

Source:
Municipal Council Hapur

Client
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn: SK
Checked: NSS
Date: January 2011
Approved: NSS

Scale: 00 15 300 450 600 750 Meters

Map VI-1

6. Solid Waste Disposal

Figure VI-1: Approach road and Land fill site

128. There is no scientific solid waste processing or disposal facility in Hapur; waste collected from the city is disposed at a site along Rampur Road which is 4 km away from the town. Approach road from Bhulandshahr road to land fill site is shown in Figure VI-1. Since 25 years municipality is using this site for landfill. The site is around 5 acres which is undulated terrain surrounded by agricultural fields. There are no habitations and water bodies near to the landfill, however a few small scale industries are along Rampur Road. The list of indicators are shown in Table VI-4.

7. Existing situation in Villages

There is no proper Solid Waste Management system in any of the villages surrounded by Hapur. Open waste collection points are found in each village at end of streets outside the house premises. There is no responsible person from Panchayat to collect and dispose the solid waste.

8. Service Adequacy and Issues

129. Hapur municipality collects nearly 33 percent of the waste. Indiscriminate disposal of solid waste into drains, roads and vacant plots is prevalent. In most of the areas, drains are chocked with solid waste, and surroundings are very unhygienic. Due to crude open dumping the areas have become unhygienic.

130. Waste is collected and loaded on to tractors/trucks manually and is not covered during transportation. Workers use no safety or protective equipment while loading the waste manually. Currently, there is neither proper safe waste disposal facility nor a designated disposal site. Waste is disposed by open crude dumping method along the roads. Waste due to winds often finds its way onto roads and surrounding areas and the areas are filthy and unhealthy posing threat to the health and environment.

Table VI-4: Solid Waste Management – Service Level Indicators

Description	Value	Remarks
Per capita waste generation	305 gm/day	No proper estimates of waste generation are available with HNP
Collection performance	33%	Acceptable is over 95%.
Door-to-door waste collection coverage	Nil	No door-to-door waste collection system in Hapur
Average distance between dust bins	-	There are only 20 dust bins covering total road length of 100 km. Acceptable spacing is 100 m.
Waste segregation percentage	Nil	Not practiced. Waste is collected and disposed unsegregated, although street rag pickers collect recyclable waste from dust bins, streets and disposal area.
Waste collection frequency	Frequency varies from a day to 1 month	This refers to waste collection and disposal from community dust bins/open points. It is necessary that biodegradable waste is collected and disposed daily. Since waste is not segregated, total waste generated shall be disposed daily.
Collection type	Multiple and manual collection	Multiple waste collection and handling is often inefficient and some waste left on ground at each point. Manual waste handling is unhealthy.
Road length per sweeper		Data not available
Disposal	No safe disposal facility	Waste is disposed by crude open dumping method at the disposal site of PMC. There are no facilities and no fencing. This practice poses potential pollution and health risk.
Private sector participation in SWM	Nil	No private sector participation in SWM activities in Hapur
O & M expenditure on SWM	-	Details not available

Source: Analysis

131. Some of the key issues are:

(i) There is no door to door collection in the town and villages.

(ii) There are many open waste disposal points locations in the town and villages

(iii) The dumping yard is not properly managed.

(iv) Collected solid waste is disposed without treatment at disposal site.

(v) Due to crude dumping at disposal site, plastic covers and other light weight waste flying into nearby agricultural fields. **Picture No. 4** reflects the problem.

(vi) No weigh bridge and log book facilities available at disposal site.

Picture No. 4

(viii) No collection, transportation and disposal of waste in villages.

9. Solid Waste Management Sector Goal and Future Strategies

Box 4**:** Solid Waste Management Sector Goal

'Improve Quality of Life of Citizens through Environmentally Safe and Healthy Solid Waste Management Practices'

Future Strategies

(i) Developing waste management practices conform to MSWM Rules, 2000.
(ii) Municipal Solid Waste Management covers the entire town;
(iii) Public awareness is increased to achieve and maintain hygienic environment;

VII. STORM WATER DRAINAGE

A. Overview

132. The existing municipal boundary of Hapur Town encompasses about 14 Sq. Km. area, whereas the Master Plan area is about 46.33 Sq. Km. The elevation of the Town is in range of 210 - 213 m above the Mean Sea Level (MSL). The general topography of the town is flat having slopes towards North-West to South-East. The region receives rainfall mainly under the influence of southwest monsoon from July to September. Over 75 percent of the total rainfall is received from July to September. The annual average rainfall is 745 mm.

1. Service Delivery

133. *Natural Drains*. There are four major natural drains flowing through the master plan area of the Hapur viz Drain No1, Drian No 2 (Choya nallah), Drain No 3 (Circular road drain) and Drain No 4 (Delhi Garh road drain). Out of these, three drains (Drain No 2, 3 & 4) flow through the municipal boundary of the town. Further the Drain No 4 flows into the Drain No 2.

134. All the drains ultimately flow into the Kali River, which is at the south of the town. **Drain No 1** and Choya Nallah converge at Rampur road near Haddi meel and flow in to the Kali River. Map VII-1 shows the existing drain network in Hapur.

Table VII-1: Details of Natural Drains

Sl. No.	Name of the Drain	Flowing from and to	Length in
			km
1	Drain No1	Badnauli to Kali River	8.7
2	Drian No 2 (Choya nallah)	Hasoda village to Kali River	4.0
3	Drain No 3 (Circular road drain)	Delhi Garh road to Kali River	2.1
4	Drain No 4 (Delhi Garh road drain)	Khurja Delhi railway crossing to Kali River	2.0

Source: Survey

135. *Drain No. 1:* This drain flows outside the municipal boundary of the town. The drain enters into the master plan area from Badnauli and flows to Sabli village converging with Choya Nallah and draining into the Kali River beyond the Hapur Bypass. The length of the drain is about 8.7 km (within the master plan area)

136. *Drain No. 2 (Choya Nallah):* This is the main drain of the Hapur city and most important drain of the city. The drain enters the master plan area at Hasoda village and flows to Kali River passing through Jasroop Nagar, Adarsh Nagar, New Ganesh nagar, Lajja puri, Ramgarhi village and Shiv garhi village of the town. The length of the drain within the master plan area is about 4 Km. For study purpose, the drain has been divided in following seven sections and the details of each section are mentioned below:

Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Existing Drain Network

Legend

- Master Plan Boundary
- Municipal Boundary
- Bypass Road
- Road
- Railway Line

Overlay Legend

- Drain -1
- Drain -2
- Drain -3
- Drain -4
- Drain -5
- Other Drains

Client:
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn:SK	Checked: HVS
Date: January. 2011	Approved: NSS

Scale: 0 300 600 900 1200 Meters

Map VII-1

137. *Drain No. 3 (Circular Road Drain):* This is a channeled drain along with the circular road of the town and flows from near Shastri Nagar at Delhi Garh road to sikander gate to Kali River. The drain passes through Shastri Nagar, Minakhshi Chowk, Ayodhya Puri, Qila Kona, Harijan Basti, Kabristan and Moti colony. The section at the start is almost a small drain with 0.3m width which increases from 0.8mx0.45m at Garh Ghati chowki to 3m x2.8m at Sikander gate. Here also the drain takes the waste water of all the habitations in course of this drain. The length of the drain is about 2.1 Km.

138. *Drain No. 4 (Delhi Garh Road Drain):* The part of the drain from Khurja Delhi railway crossing flows westwards and flows ultimately to the Kali River. The major part of the other portion flows towards the Choya Nallah. The drains are at both sides of the road with a width ranging from 1.5 m to 2.5 m. The length of the drain is about 2 km.

139. *Flood Prone Areas*. The information about the flood prone area was gathered from public representatives, municipal corporation officials and local public and following areas were identified. The area was physically inspected and problems were discussed with local residents. Map VII-2 shows the flood prone areas. The details of the problematic areas are as follows:

(i) Adarsh Nagar. This is the area in the basin of Choya Nallah and in this area the nallah disappears and the water spreads in to the field and the colony. In absence of any course for the drain the problem acute during the rain. The habitation has been settled on the bed of Choya Nallah and due to house construction and other residential activities the area has become flood prone.

(ii) Ganesh Nagar. This area is also on the basin of Choya nallah and the drain passes through the area. As the area is densely populated the course of the nallha has been restricted to about 2m width and flows in between the houses. In absence of sewerage and proper solid waste management system, the drain acts as sewer and is blocked by solid waste.

(iii) Lajja Puri. The area's problem is similar to that of Ganesh nagar and the small drains also are full of waste water and do not take path into the drain due to inadequate size of the main drain, inadequate slope of the drain and blockage of drains due to solid waste.

(iv) Gol Market. The area is just at the Delhi Garh road. The section at this area is small and the drain flows below the shops. Due to break in the Delhi Garh drain, the water from this road takes path into this area and causes flooding

Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Flood Prone Areas

Legend

- Master Plan Boundary
- Municipal Boundary
- Bypass Road
- Road
- Railway Line
- Drain

Overlay Legend

- Flood Prone Area

Client:
Asian Development Bank
National Capital Region Planning Board

Consultant
WIlbur Smith Associates

Drawn:SK	Checked: HVS
Date: January. 2011	Approved: NSS

Scale: 0 300 600 900 1200 Meters

Map VII-2

2. Road Side Drains

140. *Roadside Drainage*. Due to lack of existing data on road side drains, on eye judgment during town visits, it is assumed that 40 percent of total road length is pacca drains in good condition. Remaining 60 percent of the roads will be proposed for pacca drains both sides of roads. Total road length is around 389 km, in which 156 km of road length is having both side pacca drains. There is requirement of 233 km of drains on both sides of roads in the town.

3. Road Side Drains in Villages

141. As per the eye judgment and discussions with Pradhans, the existing drains are in bad condition. Only 30 percent of the village area covered under drains and rest of the areas are directly let into roads. This practice is making village areas are unhygienic.

4. Service Adequacy and Issues

142. Open drainage system is provided in the town to cater for collection and conveyance of storm water during rains. This open drain network consisting of primary, secondary and tertiary drains. Tertiary drains collect water from various streets and disposes into secondary drains, which are further connected to primary drains, and to natural stream.

143. Following are the key issues:

(i) In absence of the sewerage system in most part of the town, the drains act as carrier of wastewater.
(ii) Due to encroachment of streams and flood plains, during monsoon rains, many areas experiences flooding.
(iii) Drains are choked with silt, solid waste in town and villages etc.
(iv) Lack of proper cleaning maintenance.
(v) Villages are not having proper drainage facilities

5. Storm Water Drainage Sector Goal and Future Strategies

Box 5**:** Storm Water Drainage Sector Goal
‘**Improve Sanitation Conditions through Safe Disposal of Storm Water Runoff’**

Future Strategies
(i) Storm water drainage facilities to be provided throughout the town
(ii) Storm water runoff is appropriately collected and discharged into natural drainage

VIII. URBAN ENVIRONMENT

A. Water Quality

1. Surface water

144. The town is located in the catchment area of the Ganges River, one of the perennial rivers in India. River Kali, a tributary of River Ganges, flows towards eastern outskirts of the town from north to south near Tatarpur Village. The terrain of Hapur Town is sloping towards eastern side and storm water flows into Kali River. Most of the town drains into Choyya Nala flowing through the town, which meets Kali River about 10 km south of the town. River Kali ultimately meets the Ganges far downstream.

145. Due to seasonal and low rainfall concentrated for short duration, drains carry mostly the wastewater. Absence of proper sewerage and drainage system is one of the main reasons for wastewater entering into the drains and reaching River Kali, and then ultimately to the Ganges. The main drain of Hapur, Chhoya Nala enters the town from north. The Nala enters into the town with polluted water, which it received mainly from Dheerkukheda industrial area, and other habitations upstream of Hapur. Once it enters Hapur, due to lack of sewerage system, the domestic wastewater – including sewage in some cases, discharges into the drains through network of drains. Another drain – known as Circular Drain, carries wastewater from a part of the town and drains directly into Kali River on the eastern outskirts. Indiscriminate disposal of solid waste into the drains is prevalent. Chocking, blocking and overflowing of drains is common. The drains, due to accumulation of wastewater, acts as mosquito breeding grounds and giving rise to diseases.

2. Groundwater

146. Hapur is located in Central Gangetic Alluvium of quaternary age. The alluvium comprises of clay mixed kankar and fine and medium sand. The ground water in the area occurs under the unconfined to semi confined conditions. As per the subsurface configuration study of the nearby area, the saturated/tapped granular zones occur between the depth ranges of 70 - 100 meter below ground level. Yield of tube wells is 750-1,000 LPM. Depth of tube wells is about 110 meters. As per study and evaluation of chemical analysis results, it has been found that the formation water of upper and middle aquifer is potable. The chemical analysis results of the tube wells up to the depth of 110 meter below ground level indicate fresh/potable water. Groundwater is the prime and only source of water supply to Hapur Town.

B. Air Quality and Noise Pollution

147. There are no data on ambient air quality in Hapur Town, which is not subject to monitoring by the Uttar Pradesh Pollution Control Board (UPPCB) as there are no major industries in and around the town. Dry weather coupled with dusty roads, particulate matter is likely to be high, particularly during summer months. Traffic is the only significant pollutant, so levels of oxides of sulphur and nitrogen are likely to be well within the National Ambient Air Quality Standards (NAAQS).

148. The major sources of sound pollution in the city are from the vehicles and indiscriminate use of loud speakers. Uttar Pradesh State Pollution Control Board (UPSPCB) monitors air and noise pollution in the state.

C. Environmental Issues

149. Water, air quality and noise pollution will have direct impacts on civic health and hence it is essential to monitor the same regularly. The following can be stated as key environmental problems in Hapur and surrounding villages:

(i) No practice of safe disposal methods for wastewater and solid waste;
(ii) Discharging untreated wastewater to the drains;
(iii) Lack of monitoring facilities for air and noise pollution
(iv) Lack of preventive measures such as – lack of traffic management, adding to congestion and leading to air and noise pollution.
(v) Inadequate and poor condition of drains and culverts resulting in overflow, flooding and contamination of environment (soil, wells, ponds)
(vi) Lack of awareness and public responsibility regarding disposal of effluent from septic tanks and disposal of solid wastes.

IX. URBAN GOVERNANCE

A. Overview

150. Conforming to the 74th Constitutional Amendment Act, Hapur Nagar Plaika will be the implementing agency for projects proposed within the municipal limits, however due to administration setup water supply & sewerage projects has been implement by Jal Nigam, Major roads by PWD etc. Urban Governance section hence mainly focuses on existing institutional arrangements, its capacity, and policy context to address institutional strengthening issues.

B. Legal and Regulatory Framework

151. Urban services delivery and management in Hapur ULB is governed by various legislative and administrative reforms undertaken by Government of Uttar Pradesh (GoUP) and Government of India (GoI). The silent features of the same are as given below:

1. Uttar Pradesh State Acts

152. *Uttar Pradesh Municipalities (UPM) Act 1916*. Municipal Boards (*Nagar Palika Parishad*) in the State are formed and governed by the provisions of this Act. Provision and maintenance of water supply, sanitation, drainage, roads, solid waste disposal service, street lighting etc. are obligatory functions of Nagar Palika Parishad under Section 7 of the UP Act.

153. *The water (prevention & control of pollution) act, 1974. [ACT NO. 6 OF 1974]:* This Act was enacted for prevention and control of water pollution and maintaining or restoring of wholesomeness of water. The Central and State Pollution Control Boards have been constituted under section 3 and 4 of the Act respectively. The Act was amended in 1978 and 1988 to clarify certain ambiguities and to vest more powers in Pollution Control Board.

154. *The Air (Prevention & Control Of Pollution) Act, 1981:* This is an Act to provide for the prevention, control and abatement of air pollution in the country so as to preserve the quality of air. Central and State Boards constituted under section 3 and 4 of Water (Prevention and Control Pollution) Act, 1974 were deemed also as Central and State Boards for Prevention and Control of Air Pollution.

155. *The Environment (Protection) Act, 1986:* This is an Act to provide for the protection and improvement of environment and for matters connected there with. This is a comprehensive umbrella legislation.

156. *The Water (Prevention & Control Of Pollution) Cess Act, 1977:* This is an Act to provide for the collection and levy of cess with a view to augment the resources of Pollution Control Board.

157. *Uttar Pradesh Water Supply and Sewerage Act, 1975:* The Uttar Pradesh Water Supply and Sewerage Act was enacted in the year 1975. This Act created two entities: (i) Uttar Pradesh Jal Nigam (UPJN) which was entrusted with the responsibility of planning, designing, and implementing all water supply and sewerage schemes in the State of U.P.; and (ii) U.P. Jal Sansthan (UPJS) that was entrusted with the responsibility of O&M of all schemes implemented by UPJN and handed over to it on completion. Both of these entities are statutory corporations, with their respective Boards and budgets. The area of operation of the UPJS was restricted to the Bundelkhand, Garhwal and Kumaun regions and the 5 KAVAL cities (Kanpur, Allahabad, Varanasi, Aligarh and Lucknow). The other urban local bodies (ULBs) in U.P. continued to manage the O&M functions related to water supply and sewerage by themselves or through private companies. In Khurja, O&M of water supply and sewerage is the responsibility of Hapur Nagar Palika.

158. *Uttar Pradesh Special Areas Development Act, 1956:* Provides for declaration and development of special areas of importance. Set-up of Special Area Development Authority to prepare Master Plans, and regulate construction and land development activities. Formulation of development control regulations and building bye-laws in their jurisdiction

159. *Uttar Pradesh Regulations of Building Operations Act, 1958:* Declaration of regulated areas and appointment of Controlling Authority. Controlling Authority to prepare Master Plans, and regulate construction and land development activities. Formulation of development control regulations and building bye-laws in their jurisdiction.

160. Uttar Pradesh Urban Planning and Development Act, 1973: Formation of development areas and Development Authorities. Development Authority to prepare Master Plans and Zonal Development Plans, and regulate construction and land development activities. Formulation of development control regulations and building bye-laws in their jurisdiction.

2. Central Acts/Policies/Guidelines

161. *74th Constitutional Amendment Act (CAA).* The 74th CAA lays out an agenda for restructuring local authorities to address the processes of decentralization, devolution and privatization of delivery and maintenance of urban infrastructure, formation of new partnerships for the supply and management of public services and amenities. The passage of the 74th Constitution Amendment Act (CAA) provided momentum to urban sector reforms in the country. The 74th CAA intended to create a democratic governance structure, with local responsibilities being assumed and managed at the local-level.

162. *The Municipal Solid Waste (Management and Handling) Rules, 2000.* Every municipal authority is responsible for implementation of provisions under these Rules. As per this legislation, the municipal authority shall make an application for grant of authorization for setting up waste processing and disposal facility from the State Pollution Control Board (in Hapur, UPPCB). The Rules outline the guidelines and principles for collection, segregation, storage, transportation, processing and disposal of waste. The Rules specify the criteria for selection of landfill site and monitoring activities to be carried out before and after commissioning of the landfill.

163. *Central Public Health and Environmental Engineering Organization (CPHEEO).* CPHEEO is a Technical Wing of Ministry of Urban Development, Government of India, and deals with the matters related to urban water supply and sanitation including solid

C. Institutional Framework

164. There are eight major stakeholders having active participation in town development. The institutions are listed and explained their responsibilities, coverage in the following Table IX-1.

Table IX-1: Municipal Service Delivery and Administrative Structure

Agency	Responsibilities	Coverage
Housing and Urban planning, Govt. of UP	Policy, planning and administration of all urban departments, Corporations and Development Authorities. Directly oversee Lucknow based urban agencies, City Corporation and Development Authorities.	Uttar Pradesh
Urban Development, Govt. of UP	Urban policy, supervision of municipalities, redressal of public grievances co-ordination of select State and national level programs and projects.	City and municipal councils and Panchayats' Local Areas
Municipalities and Corporations	Delivery and maintenance of obligatory, special and discretionary services and functions stipulated under each Act and subsequent amendments.	Within the area under their jurisdiction
Town and country Planning Department	Enforcement of Uttar Pradesh Town and Country Planning Act, 1919. Preparation of outline and comprehensive development plans for towns, regional development plans and advises the State Town Planning Board on matters relating to planning.	Urban areas in Uttar Pradesh.
Jal Nigam	The State Government Constituted a Corporation by the name of UTTAR PRADESH JAL NIGAM in the year 1975 which came into existence with effect from 18th June 1975. Its area of operation extends to whole of Uttar Pradesh excluding Cantonment areas under an Act called as Uttar Pradesh Water Supply & Sewerage Act, 1975. The basic objective of creating this corporation is development and regulation of water supply & sewerage services and for matters connected therewith.	Urban areas in Uttar Pradesh.
Development Authorities (DA)	Implementation of Uttar Pradesh Town & Country Planning Act, 1919 in designated areas in terms of preparing outline and comprehensive development plans, implement plan (scrutiny and approve) and land development.	Corporations and Urban Local Bodies in UP
U.P. Housing and Development Board	Development of urban housing.	Corporations and Urban Local Bodies in UP
Urban Employment & Poverty Alleviation Department. (SUDA UP)	Implementation of slum improvement programs.	Corporations and Urban Local Bodies in UP

D. Structure of Hapur ULB

165. As per The Uttar Pradesh Municipalities Act, 1916, Hapur ULBs obligatory functions include: (i) supply of potable water; (ii) operation and maintenance of drainage and sewerage systems; (iii) public lighting; (iv) sanitation and public hygiene; (v) construction and maintenance of bus terminals, roads, culverts, and bridges; (vi) maintenance of public parks and gardens; (vii) ensuring systematic urban growth; (viii) regulation of building construction; (ix) licensing of commercial activities etc. Figure IX-1 gives the organizational structure of Hapur ULB. Hapru ULB is governed by two wings – the administrative wing comprising of elected councilors and the executive wing comprising of municipal workers. A President heads the administrative wing while a Chief Officer heads the executive wing.

1. Administrative Wing

166. The municipal council, which is the elected governing body of the Nagar Palika, comprises elected members depending on the number of wards. Apart from these elected members, there are Government nominated members and the corresponding MLAs and MPs, a majority of whose constituencies falls within the jurisdiction of the ULB. There will be direct voting for president of ULB. The nominated members from the Government are residents of the ULB with special knowledge and experience in municipal administration or matters relating to health, town planning, education and social work. The nominated members do not have a voting power in the meetings of the municipal council.

167. The council functions through standing committees and monthly meetings of the councilors and the executive. The councilors elect a Standing Committee consisting of councilors, not more than eleven or less than five as the ULB may decide (the President and the vice-president are not eligible for election as members of the standing committee, but are ex-officio members without voting powers), which holds office for a period of one year. As per The Uttar Pradesh Municipalities Act, 1916, the Standing Committees discuss and decide on matters relating to: (i) taxation, finance and appeals; (ii) public health, education and social justice; (iii) town planning and city improvement; and (iv) accounts.

168. The Municipal President and the Executive Officer act as linkages between the elected representatives and the bureaucracy. The Executive Officer is responsible for preparation of a list of resolutions in the order in which they were received and is responsible for communicating to the councilors whose resolutions have not been admitted indicating the reasons for disallowance. The President also has the power to decide which of the resolutions communicated to him by the councilors is to be admitted for submission at the general meeting. Each agenda is discussed in detail in the joint meeting and action plans are drawn up in these meetings. Resolutions of the Standing Committees are submitted to the general meeting and these resolutions are moved and seconded by the members of the concerned committees for adoption by the General Body of the ULB. Any work proposal of the ULB and the corresponding allocation has to be sanctioned in these meetings.

2. Executive Wing

169. The Executive Officer heads the executive wing of the ULB, and various officers in charge of different departments or sections assist the Executive Officer in managing the ULB. The personnel include a manager, an accounts superintendent, senior health officers, a revenue officer and junior engineers. These officers are assisted in their work by junior officials. Roles and responsibilities of ULB departments/key staff are as follows:

(i) Executive Officer. The Executive Officer is at the apex of this structure and is responsible for all activities carried out by the ULB. The Executive Officer is responsible for preparation and certification of all periodical records, returns and furnishes all information as may from time to time be required by the Municipal Council or the Standing committees. He is also responsible for preparation of accounts. At each general meeting, the Executive Officer along with some other key officials, discuss various issues with the elected representatives. The Executive Officer is responsible for the preparation of the agenda for the monthly meetings under the direction of the President.

(ii) General Administration. Manager heads the General Administration Section. The Manager follows the Executive Officer in the hierarchy and is responsible for the daily functioning of the ULB. He/she collects information from different departments and provides inputs for the monthly meetings. The clerical staff assists the Manager. The Manager disburses monthly salaries to the staff.

(iii) Accounts Section. The Accounts Section is a key department of ULB which manages Municipal finances and monitors the use of allocated funds for different schemes. It plays a major role in the formulation of the budget. The Accounts Superintendent is responsible for supervising all financial transactions related to the ULB, advising the Executive Officer on all internal financial matters, updating financial receipts and expenditure details in accordance with the utilization of funds, reporting deviations in expenditure of funds in any of the allocated schemes, assisting preparation of the Municipal budget, maintenance of accounts regarding stamp duty, SFC Grants, MP Grants, maintenance of petty cash book and general cash book and attending to audit requirements and other such accounts-related duties.

(iv) Revenue Section. The Revenue Section is another key section of ULB, consisting of a Revenue Officer, first-grade/division revenue inspector and several bill/tax collectors. Revenue Officer oversee collection of various taxes (such as trade tax, house tax, advertisement tax, and entertainment tax); and development charges; transfer of properties; collection of duty; and issuing notices for recovery of tax.

(v) Engineering Section. One Assistant Engineer (AE), one Sanitary Officer for public health engineering works (water supply, sewerage and sanitation, drainage etc.) and no separate staff for PWD works (roads, buildings etc.) work under Engineering Section of ULB.

(vi) Public Health Section. The Public Health Section is responsible for solid waste management services in the ULB. Environmental Engineer heads the section who is further assisted by health inspectors, sanitary supervisors, sanitary workers, cleaners, sweepers etc.

170. At present Hapur Municipality is operating and maintaining water supply and sewerage system. It has five departments. There is only one qualified engineer in town administration. Capital works are done by UP Jal Nigam. UP Jal Nigam is a competent organization. Municipality lacks managerial and technical capacity and shortage of financial resources to operate and maintain the water supply and sewerage system. The municipality needs to be strengthened to handle water and sewerage system professionally.

The engineering department of ULB should be restructured such that at least Executive Engineer heads all engineering operations (water and wastewater), supported by four Assistant Engineers, one assistant engineer will be in charge of sewerage operations that will be supported by 4 junior engineers dealing exclusively with sewerage. Municipality should be in charge of capital works also. However if required by them capital works can be got done from any other agency but Municipality should have capacity to over view the works. The existing organization of the Hapur Municipality and the proposed organization structure for services is given below.

Figure IX-1: Organizational Structure of Hapur Municipality

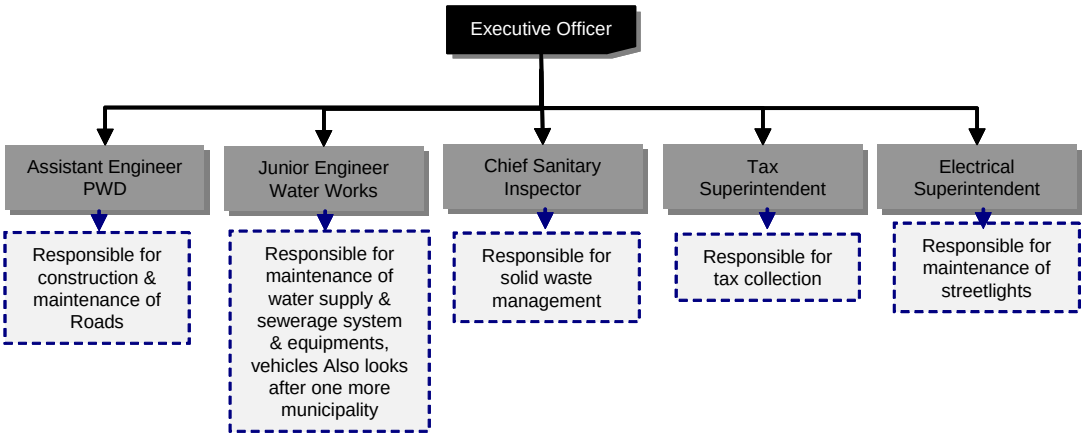
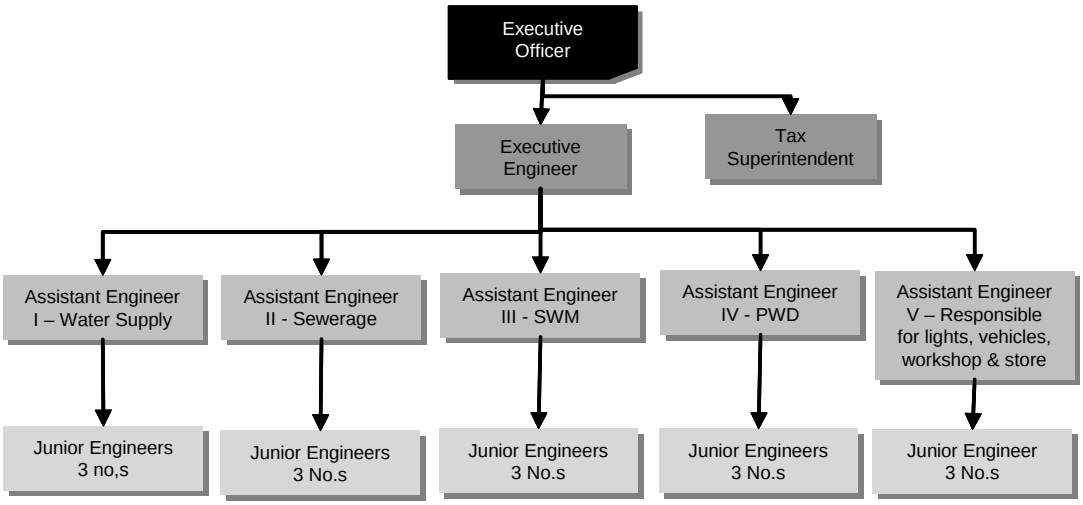


Figure IX-2: Proposed Organizational Structure



E. Issues

171. Service delivery is directly linked with the institutional capacity and management. Hence key issues in institutional strengthening for implementation of CLEIP Project can be:

(i) Low understanding level of technical staff affecting service delivery and O&M

(ii) Inadequate technical qualifications or up-to-date knowledge to oversee service delivery

(iii) Inadequate staff strength to undertake high level investment

(iv) Inadequate management and accounting skills

(v) Lack of external support and training to upgrade skills

(vi) Missing efforts from ULB side in water supply and sewerage capital works execution

F. Urban Governance Sector Goal and Future Strategies

Box 6: Urban Governance Sector Goal
'Provide Efficient Management Service to Citizens, which is Transparent, Accessible and Inclusive'

Future Strategies

(i) Efficient utilization of human resources to provide sustainable services in equitable manner to all citizens
(ii) Capacity building of technical and administrative staff
(iii) Community participation and public involvement
(iv) Private sector participation in service delivery
(v) Transparency in administration, planning and implementation of the projects

X. MUNICIPAL FINANCE

A. Overview

172. The objective of this chapter is to assess the current fiscal situation of the urban local body and forecast the finances of the local body for period of 20 years to assess the financial sustenance capacity. The objective of assessing the financial sustenance capacity is to assess the financial capability of the local body to execute the proposed projects.

B. Review of Municipal Accounts

173. The Municipality maintains the accounts on a cash basis single entry system. The detailed accounts of Hapur Municipality have been reviewed for the period of four years starting from 2004-09. For the purpose of review the municipal accounts have been classified under two major heads revenue items and capital items;

(a) Revenue Account: All recurring items of income and expenditure are included under this head. These include taxes, charges, salaries, maintenance expenditure, debt servicing etc.

(b) Capital Account: Income and expenditure items under this account are primarily non-recurring in nature. Income items include loans, contributions by GoUP, other agencies and capital grants under various State and Central Government programmes. Expenditure items include expenses booked under developmental works and purchase of capital assets.

1. Municipal Fiscal Situation

174. Revenue income of Hapur Municipality has grown to a level of INR 275 million in the FY 2009-10 from INR 90 million in FY 2006-07, thus registering an average annual growth of over 136 percent (CAGR), while revenue expenditure increased at an average annual rate of 103 percent during the same period. Hapur Municipality had consistently maintained a good revenue, however capital income and expenditure have been fluctuating from negative in first financial years and positive in next consecutive years and again falling in to negative during the review period. The summary of actual income and expenditure are presented in Table X-1 and the detail annual accounts, indicating actual transaction amounts, sectoral contributions and growth trends are presented in **Appendix 1.**

Table X-1: Summary of Municipal Finances

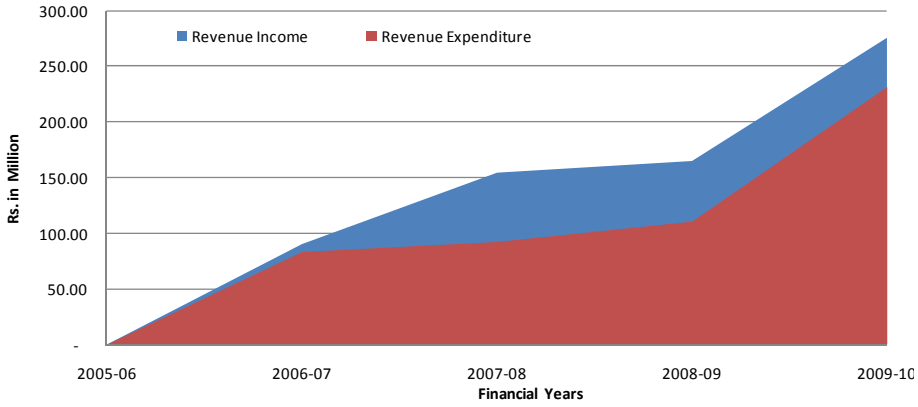
Item	2006-07	2007-08	2008-09	2009-10
	Amount in Rs. Million			
Revenue Account				
Revenue income	90.06	153.99	164.49	275.06
Revenue expenditure	83.24	92.34	110.51	231.65
Surplus/Deficit	**6.82**	**61.65**	**53.98**	**43.41**
Capital Account				
Capital income	6.73	11.02	149.17	35.50

Item	2006-07	2007-08	2008-09	2009-10
	Amount in Rs. Million			
Revenue Account				
Capital expenditure	29.00	37.55	63.89	79.70
Surplus/Deficit	**(22.28)**	**(26.54)**	**85.28**	**(44.20)**
Overall Fiscal Status	**(15.46)**	**35.11**	**139.26**	**(0.79)**

Source: Hapur Municipality and Analysis

2. Revenue Account

Figure X-1: Revenue Income and Expenditure



175. The Revenue Account comprises of recurring items of income and expenditure. These are essentially all financial transactions related to the day-to-day operations of the municipality. Table X-2 summarizes the status of the Revenue Account. The details of each of major revenue contributing items are discussed in the following section. The figures of overall status of revenue account indicate that the Municipality has maintained surplus revenue account status during the review period.

Table X-2: Revenue Account Status

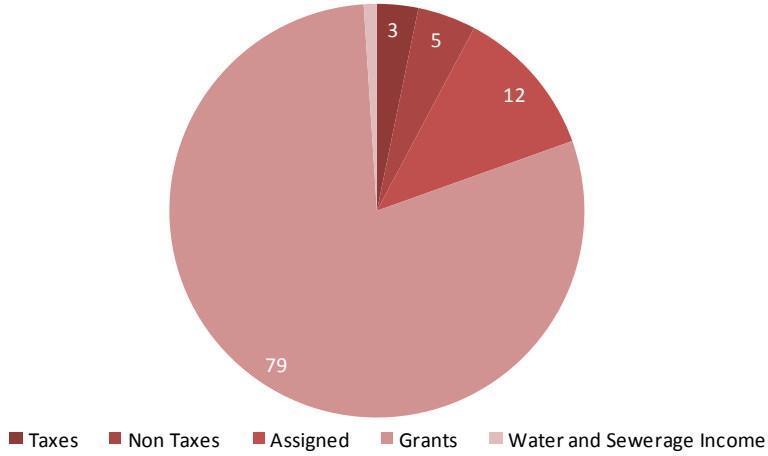
Item	2006-07	2007-08	2008-09	2009-10
	Amount in Rs. Million			
Revenue Income				
Taxes	4.58	3.79	4.50	9.15
Non Taxes	2.84	2.84	20.38	5.15
Assigned	1.02	1.68	24.45	53.26
Grants	80.39	144.25	113.27	205.00
Water and Sewerage Income	1.22	1.43	1.88	2.50
Total- Revenue Income	**90.06**	**153.99**	**164.49**	**275.06**
Revenue Expenditure				
Establishment cost	20.77	27.91	24.83	42.47
O & M	22.60	26.74	30.96	68.30
Water and Sewerage Establishment	35.76	35.17	39.51	113.39
Water Supply and Sewerage O & M	3.95	2.46	3.16	2.50
Debt Serving	0.15	0.07	12.04	5.00
Total- Revenue Expenditure	**83.24**	**92.34**	**110.51**	**231.65**
Revenue Account Status	**6.82**	**61.65**	**53.98**	**43.41**
Status of Water Account	**(38.49)**	**(36.19)**	**(40.79)**	**(113.39)**

Source: Hapur Municipality and Analysis

176. *Property Tax:* This item head comprises of income sourced primarily from House tax, water tax and sewerage tax, the ULB raising one bill including these three taxes together to the individual assessments. Property tax alone contributes minimal of 3.4 per cent of

municipal revenue income, property tax that is levied on all assessed properties on as percentage of ARV. Currently there are about 40,774 assessments with an annual demand of INR 6.4 million.

Figure X-2: Composition of Revenue Income



177. *Non Tax*. This item head comprises of income from trade license fee Building permission, development charges, fee for ULB assets and other miscellaneous income. On an average, through the assessment period, own source/non tax income constitutes over 4.8 percent of the total revenue income.

178. *Assigned Revenues*. This item head comprises of income collected by various departments of Government of Uttar Pradesh on behalf of the local bodies. The income items generally include surcharge on Property Transfer tax, Kanji House rent from the Govt., per capita grant, and other transfers. Assigned revenue constitutes about 9 percent of the Municipal revenue income and it has fluctuating during assessment period.

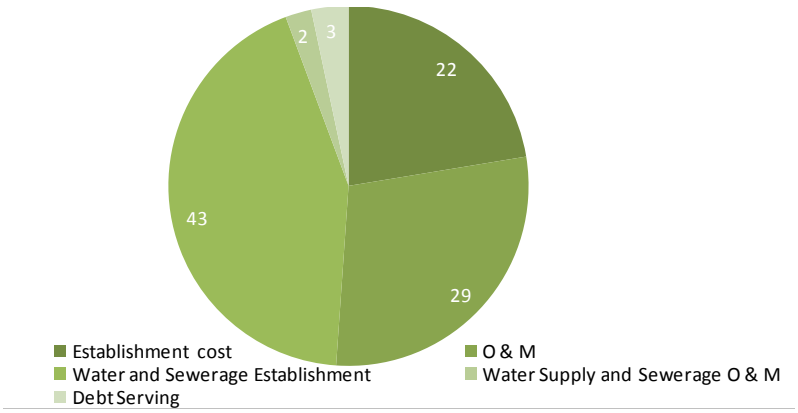
179. *Revenue Grants*. This item mainly comprises State and Central government grants towards specific programmes of the government like NSDP, SJSRY, MP/MLA Fund, 12th Finance Commission and some grants are on ad-hoc basis to meet state programs etc. In case of Hapur ULB, revenue grants are contributing about 81.58 percent of the total revenue income and the growth has been inconsistent with an average annual growth rate of about 46 percent during the assessment period.

180. *Income from Water Account*. Hapur municipality is responsible for providing potable water to the civic. The municipality is maintain water as separate head, but it is not treated as separate account head, in order to assess the cost recovery aspect of this major service, while doing the analysis the water heads have reviewed a separate account to assess the cost recovery and recommend tariff structure to achieve full cost recovery. It is noticed that the water account is in deficit during the assessment period. The figures are presented in Table X-2 indicates that during the last four year water account was in deficit and it could achieve only 3 percent of recovery.

181. *Revenue Expenditure:* The revenue expenditure of Hapur Municipality has increasing during assessment period, it exhibits an average growth rate of 46.74 percent during the review period against the growth in revenue income by 48.34 percent. Revenue expenditure comprises broadly of three categories of expenditure – establishment, operation and maintenance and debt servicing.

Figure X-3: Composition of Revenue Expenditure

182. *Establishment Expenditure:* This head comprises expenditure on pay and allowances of salary and pension and gratuity related to all functions including salaries of water supply staff. Expenditure under this head accounts for about 65.44 percent of the total revenue expenditure contributing to establishments.



183. *Operation and Maintenance Expenditure:* This item of expenditure includes all recurring maintenance cost and other consumables etc, except for water supply operations. The total expenditure on this head of account is about 28 per cent of which roads and street lighting sectors are incurring 20percent of the O & M cost.

184. *Water and Sanitation:* Water and sanitation O & M accounts for about 3 per cent of the total revenue expenditure. This growth has been inconsistent, mainly due to repairs and electricity charges variation.

185. *Debt Servicing:* As per the Municipal accounts, the ULB is not having loans to repay. For all the major capital will be meeting through state and central Govt. grants. However, the municipality has to pay back the advance amount, which may be procured from the contractor as security deposits.

3. Capital Account

186. The Capital Account comprises of income and expenditure, for and on capital works.

Table X-3 summarizes the capital account of the ULB. The capital account of the ULB shows a deficit status in three years, thus indicating utilization of revenue surplus for funding the capital expenditure, which is positive sign. However, the Municipality is mobilizing these additional funds from state Govt. grants.

187. The sources of capital income comprise largely of grants under state Govt. /central government schemes (UIDSSMT). But the capital income is very much inconsistent and expenditure is mainly on road works, water supply and others.

Table X-3: Capital Account Status

Item	2006-07	2007-08	2008-09	2009-10
	Amount in Rs. Million			
Capital Income				
Loans (Advance Payments / Deposits)	6.73	11.02	6.72	10.50
Grant under Scheme I.D.S.S.M.T/U.I.D.S.S.M.T	-	-	128.20	-
Revolving fund	-	-	14.25	25.00
Others				
Total- Capital Income	**6.73**	**11.02**	**149.17**	**35.50**
Capital Expenditure				
Roads	10.52	8.83	40.27	47.00
Drains				
Building				
Water Supply	3.30	4.75	11.03	10.00
Sanitation	6.12	6.56	1.86	6.00
Others	9.07	17.42	10.73	16.70
Total- Capital Expenditure	**29.00**	**37.55**	**63.89**	**79.70**
Capital Account Status	**(22.28)**	**(26.54)**	**85.28**	**(44.20)**

Source: Hapur Municipality and Analysis

C. Key Financial Indicators

188. A set of key financial indicators has been derived using the financial data procured from the Municipality for the assessment period. Table 1.4 presents these indicators. These indicators are used to assess the ULB performance with regards resource mobilization, fund utilization, financial performance and collection efficiencies.

Table X-4: Key Financial Indicators

Item	2006-07	2007-08	2008-09	2009-10	Average
Own Income Share -%	10	5	16	6	9
Dependency on Grants-%	89	94	69	75	82
Operating Ratio	0.92	0.60	0.67	0.84	0.76
Capital Utilisation Ratio	4.31	3.41	0.43	2.25	2.60
Establishment cost as % of Rev. Exp.	68	68	58	67	65
Establishment cost as % of Revenue Income	63	41	39	57	50
Debt Servicing Cost as % of Revenue Income	0	0	7	2	2

Source: Analysis

189. *Resource Mobilization Indicators*. These indicators summarize the performance of the ULB with regards sources of funds. Hapur Municipality derives about 9 percent of its revenue income from own sources, while dependency on grants is about 82%, thus about 9 percent of ULB income is from assigned. This is not healthy financial situation, any ULB can have 20 percent dependency on grants and 80 percent of income should be mobilised from own source (including assigned revenue).

190. *Fund Application Indicators*. These indicators are a measure to ascertain the utilization from the Municipal fund. Over 65 percent of the revenue expenditure is spent on establishment heads, leaving only about 35 percent for O&M, debt serving and new capital works. In terms of revenue income about 50% is spent on salaries, which seems quite high.

191. *Overall Financial Performance Indicators*. These indicators are a measure to assess the overall financial performance of the ULB with regards to operational performance and effective growth in revenue income and expenditure. The average operating ratio during the assessment period was an effective 0.76 and the capital utilization ratio was also high at 2.6 indicating effective utilization of revenue surpluses in asset creation. Currently the debt servicing ratio to revenue income is very low at 2% which would be paid for electricity and advance repayment etc.

1. Key Issues

(i) Maintenance and Reporting of Accounts
(ii) Revenue Realization
(iii) Fund Application
(iv) Operating Ratio

Box 1: Municipal Finance Sector Goal

Future Strategies

(i) A common accounting and financial reporting code, updated annually, with interim updations when required, supported with a user manual
(ii) Widening the coverage of taxes and charges with better collection efficiency
(iii) Sustainable and efficient tariff structure
(iv) Upto-date information with regard to actual assets and liabilities
(v) Increase the revenue base and control over the revenue expenditure so as to have operating ratio with less than unity continuously.

Prospective Interventions:

(i) Double entry computerized accounting system with adequate training to municipal officials
(ii) Development of GIS based property and other service details through MIS and achievement of 85 percent collection efficiency for both property tax and water charges
(iii) Sector based accounting system for service deliveries and sustainable tariff system that ensure full O&M recovery and part capital cost recovery
(iv) Detailed MIS on assets and liabilities for better fiscal control
(v) Increase the revenue base through own sources and better control over establishment expenditure

XI. CLEIP SUBPROJECTS AND COSTING

A. Water Supply

1. Sub-Project Rational and Design Criteria

192. Performance benchmarking of the existing water supply system indicates per capita water supply of 100 lpcd against norms of 135 lpcd, storage 13% of water supply against norms of 33%, distribution system covers 38.5% road length against requirement of 100%. Moreover consumer meters are not provided on domestic and non domestic consumers, water losses and unaccounted for water (UFW) is very high, scheme is financially non sustainable. Although a scheme is under implementation under UIDSSMT to increase coverage and storage capacity yet improvements are required to have sustainable scheme. Moreover so far no planning has been done on larger scale to think of providing water supply in the likely urbanize area in year 2041. Thus this project has been prepared to plan water supply system to meet requirements of year 2041 for the project area which corresponds to likely urbanize area in year 2041. The project also proposes measures to improve performance and make water supply system sustainable efficient and responsive to beneficiaries.

193. The planning of the water supply will be based on following design criteria:

(i) As per the recommendations of CPHEEO, water supply at consumer end will be 135 lpcd with UFW as 15%. Thus water supply shall be designed for 160 lpcd. Water requirement of major industries, commercial establishments and institutions with bulk requirement will be met by themselves.

(ii) CPHEEO manual on water supply recommends that piped water supplies should be designed on continuous 24 hours basis to distribute water to consumers at adequate pressure at all points. The terminal pressure at ferrule point is specified as 7 m for single storied buildings, 12 m for 2 storied buildings and 17 m for 3 storied buildings in the above manual. Continuous 24 hours water supply is ideal on following grounds amongst others:

- It provides the most economical project design and best utilization of resources.
- It ensures that there is no intrusion of pollution in the distribution system thus ensuring quality of water distributed
- It provides high level of consumer satisfaction.
- It saves from substantial indirect costs on local storages and purification/disinfections equipments to be provided at consumer end by the consumers.

(iii) Based on the recommendations in the CPHEEO Manual on water supply, following design periods have been adopted:

- Water Treatment Plant 15 years
- Canal Outlet 30 years
- Raw and Clear Water main pipe lines 30 years

- Distribution system 30 years
- Clear water ground/over-head tanks 15 years
- Pump house buildings 30 years
- Pumping equipment (E&M) 15 years

(iv) Reducing unaccounted for water (UFW) by repairs and replacement of the existing old distribution system and by demand management measures like metering of water connections

(v) Reducing the O & M costs by better management of the system

2. Sub-Project Identification and Costing

194. This City Level Environmental Infrastructure Investment Plan (CLEIP) is proposed to be implemented over a period of 30 years (2011-2041), and accordingly improvements and augmentation required for water supply system in the Town and villages, which comes within the boundary of Master Plan. These sub-projects are proposed for implementation in three phases: Phase I (2009-13); Phase II (2014-18); Phase III (2019-23); Phase IV (2024-28) and Phase V (2029-33). The implementation phases are shown in Map XI-1.

195. As mentioned in the Chapter IV, UP Jal Nigam is executing water supply Scheme – III project. The components included are augmentation of source, chlorination, storage, extension of distribution network & rehabilitation of existing distribution network within the municipal limits of Hapur. The scheme is designed for year 2034 but geographically provides water supply system in existing municipal boundary. Design population is 4.25 lacs and design demand is 62.85 MLD. 18 tube wells of 2000 LPM with submersible pump set and rising mains, 10 over Head Service Reservoirs having total capacity of 19.15 ML, 4 CWRs of 5.15 ML capacity and 163 KM distribution network has been proposed.

196. *Water Supply Demand*: Population of Hapur municipal area and villages out side municipal area has been projected. Per capita supply of 135 LPCH has been taken. The losses and Non Revenue Water at present is assumed at 45%. After implementation of these master plan proposals the losses in system are proposed to be reduced to 35% in year 2021, 25% in year 2026 and15% in year 2031.Fire demand has been taken as per water supply manual. Present source has been taken as the quantity of water to be supplied after completion of ongoing UIDSSMT scheme. Deficit in future shall be 9.73 MLD in year 2026 and 37.2 MLD in year 2041. The demand for water supply in future is illustrated in Table XI-1.

Table XI-1: Water supply demand in Hapur Master Plan area

Year	**Population**		**LPCD**	**Losses**	**Demand**	**Losses**	**Fire Demand**	**Total**	**Present Source**	**Deficit**
	Hapur	*Villages*		*%*	*MLD*	*MLD*	*MLD*	*MLD*	*MLD*	*MLD*
2011	278143	38104	135	45	37.55	16.90	1.67	56.11	62.85	-
2016	318568	43712	135	45	43.01	19.35	1.78	64.14	62.85	1.29
2021	364951	49916	135	35	49.27	17.24	1.91	68.42	62.85	5.57
2026	417961	57350	135	25	56.42	14.11	2.04	72.58	62.85	9.73
2031	478853	65390	135	15	64.65	9.70	2.19	76.53	62.85	13.68
2036	548365	75243	135	15	74.03	11.10	2.34	87.48	62.85	24.63

Year	Population		LPCD	Losses	Demand	Losses	Fire Demand	Total	Present Source	Deficit
	Hapur	*Villages*		*%*	*MLD*	*MLD*	*MLD*	*MLD*	*MLD*	*MLD*
2041	628302	85661	135	15	84.82	12.72	2.51	100.05	62.85	37.20

Source: Analysis

197. *Water Supply Source:* Adequate quantity of ground water is available and as such ground water shall continue to be the source of water supply. Hence, there is a need of schemes for ground water recharge.

198. Augmentation of Source: Yield of tube wells as per available record of existing tube wells is 2000 LPM and pumping hours as per availability of power is 16 hours in the day. Thus each tube well can produce 1.92 MLD water. Additional quantity of water required in different years is given in Table XI-1. No of tube wells required to produce additional quantity of water is given in Table XI-2. The life of tube well is 15 years as such existing 11 tube wells will be required to be replaced in year 2021 and 18 tube wells recently constructed under UIDSSMT scheme would also be required to be replaced in year 2026. Pumping sets will be procured 50% standby. Requirement of pump sets is worked out and given in Table XI-2.Submersible pumping sets of 15 KW 2000 LPM at 25 m head shall be required. The tube well pump will pump water in CWR to be constructed in each distribution zone. Water from CWR will be pumped in to OHSR –one in each distribution zone. The pumping head shall be water table 15 m + draw down 2.5 m+ seasonal variation in water table 2.5 m + losses in Rising Main 5 m=25 m. Pump efficiency shall be 60% and this gives pump of 15 Kilo Watt.

Table XI-2: Requirement of Additional Tube wells

Year	Deficit	T/W Reqd	Phasing	Replacement of old Tube wells	Total Reqd	Pumps Reqd
	MLD					
2016	1.29	1	Phase 1		1	2
2021	5.57	3	Phase 2	11	14	21
2026	9.73	5	Phase 3	18	23	35
2031	13.68	7	Phase 4		7	11
2036	24.63	13	Phase 5		13	20
2041	37.20	19	Phase 5		19	30

Source: Analysis

199. *Pumping Main:* The pumping main to take 2000 LPM water from one tube well shall be of 250 mm diameter as per economical analysis done. Generally 3 tube wells will feed in one CWR and all 3 shall be radially connected and location of tube well shall be suitable for radial connection. Length of pumping main shall be 300 m per tube well. In some cases two tube well water may combine and in that case combined discharge shall be 4000 LPM and economical pipe sizing for this quantity of water will be 300 mm. Quantity of 300 mm pipe has been taken at 100 m per tube well.

200. *Storage:* Clear Water Level Reservoir (CWR) Capacity and OHSR capacity has been kept 35% of supply. OHSR capacity of 35% is to take care of fluctuating demand in water during the day. Assuming continuous water supply the excess demand in peak

consumption period will be taken care by the 35% capacity of OHSR. CWR capacity equal to 35% or 8 hour pumping shall take care of power outage of maximum 8 hours in a day. Capacity of each OHSR and CWR shall be 2 ML. No of OHSRs and CWRs required is given in Table XI-3.

Table XI-3: Storage Capacity Required

Year	Water Demand	Required capacity of OHSRs	Existing capacity of OHSRs	Additional capacity required	Number of OHSRs	No of GLSRs	Phasing of investment
	MLD	*35%*	*ML*	*ML*	*No*	*No*	
1926	72.58	25.4	22.8	2.6	2	2	Phase 2
1941	100.05	35.0175	22.8	12.2	7	7	Phase 3

Assumptions: Capacity of each OHSR and CWR 2 ML
Source: Analysis

201. *Clear Water Pumping Station:* It is proposed that 3 tube wells will pump water in CWR and from CWR water will be pumped in OHSR. OHSR shall be filled in 8 hours i e 2 ML pumping from CWR to OHSR in 8 hours. Using one working and one standby pump in Clear Water pumping Station the discharge of pump shall be 70 LPS. The pump head shall be staging of OHSR 20 m + water column in OHSR 6 m + losses in pumping main 4 m =30 m. Assuming pump set efficiency of 60% the motor Kilo Watt works out to 37 KW. No of CWPS will be 2 in phase 2 and 7 in phase 3.

202. *Distribution System:* The road length in present municipal area is 208 km. Municipal area being 1400 hectares the unit road length per hectare area is150 m. On this basis road length estimation for outside municipal area but in development area i e 3805 hectares is 570.75 KM. Distribution system in UIDSSMT scheme is being laid to cover all roads in municipal boundary and as such no distribution system is required in municipal boundary. The distribution required in outside municipal area over the period 2016-2035 in 4 phases is 570.75 KM. The distribution system required in each of 4 phases shall be 142.7 KM. Distribution system shall be of HDPE pipes PE 100 Class 8.Minimum size shall be 100 mm dia.

203. *Consumer Metering:* It is proposed to have 100% consumer metering. This is essential for conservation of water, water audit to reduce losses (NRW) and make water supply sustainable. It is proposed to provide meters to all consumers (domestic, commercial, industrial and institutional). In phase 1 bulk consumers having connection size 25 mm and above and all commercial, industrial and institutional consumers shall be covered. In phase 2 and 3 remaining consumers shall be provided with water meters. The contract will be supply of water meters, installation and maintenance of meters for 5 or 7 years. Meter specifications shall ensure good quality of meters so that maintenance is less. The contract will also include meter reading preparation of bills and distribution of bills to consumers.

204. *Bulk Metering:* It is proposed to provide one meter for each tube well to know quantity of water produced from each tube well. It is also proposed to provide one meter in delivery header of Clear Water Pumping Station to assess discharge of pumps and efficiency of pumps. This will help to undertake energy audit of CWPSs. Bulk meters shall also be installed at outlet of each OHSR to know the quantity of water supplied in a distribution zone. The existing tube wells, OHSRs and proposed under UIDSSMT will be provided bulk meters in phase 1. In other phases bulk meters shall be provided as and when tube well, OHSR, CWPS will be developed.

205. *Chlorination:* Source being ground water the only treatment required is disinfection. This will be achieved by providing vacuum chlorinators in each CWPS. Chlorine gas will be fed in inlet pipe of CWR or in delivery header of CWPS. Chlorine tonners will also be provided.

206. *Reduction of Non Revenue Water:* It is important to reduce Non revenue Water as with present level of 45% NRW the water supply scheme cannot be made financially sustainable. About 70% of Physical losses are in consumer lines and in ferule/saddle piece. As such it is proposed to replace consumer service lines by MDPE pipes. Each distribution zone shall be further divided in smaller zones called District Meter Area (DMA). Each DMA will be distinct and bifurcated from other areas. Bifurcation will be done by providing sluice valves. Adequate bulk meters will be installed to know quantity of water incoming in the DMA. Assessment of losses will be done for each DMA by knowing water supplied in DMA and water consumption as sum of consumption shown in water meters of consumers in that DMA. Consistent efforts will be done to reduce losses and reach target level of maximum allowable losses of 15%. This being a long exercise it will spread in phase 1, 2, 3 and 4.

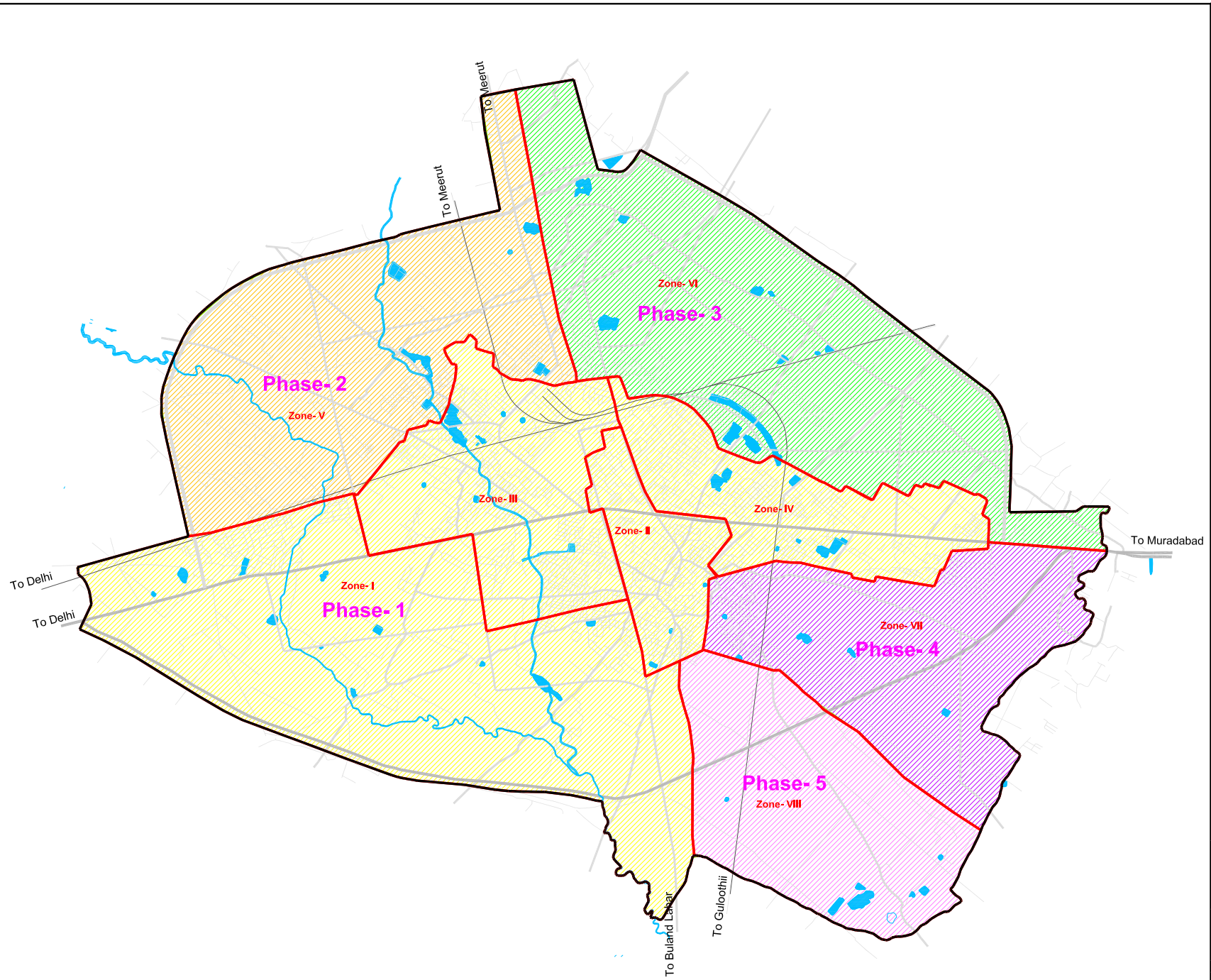
207. *Water Supply Development in Villages:* The villages outside municipal boundary but with in development area will be provided with water supply system. There are 9 villages and at present one village Asodha partly has piped water supply through one tube well and OHSR. Other villages have hand pumps. Now it is proposed to construct tube wells and provide distribution system in phase 1 so as to provide safe water supply system immediately. OHSRs shall be in subsequent phases and OHSRs will not be for individual village but for bigger distribution zones as proposed separately above in the development area. Thus in villages tube wells and distribution system shall be provided immediately so that inhabitants get benefits of protected water supply. Details of works proposed are given in **Appendix 3.**

208. *Estimated Cost*: A summary of the total investments required for improvement of water supply system in the planning area is presented in **Table XI-4.** The total investments are divided into five phases for implementation to satisfy the design demand of 2041, the last phase of investment being 2031-2035. The total investment requirement is estimated as INR 1,312 million. **Appendix 3** presents the detailed costs estimates.

Table XI-4: Summary of water supply investment

Sl No	Item	Total Phase 1 to 5	Phase 1: 2011-2015	Phase 2 : 2016-2020	Phase 3: 2021-2025	Phase 4 : 2026-2030	Phase 5 : 2031-2035
		Rs mn	*Rs million*				
1	Construction of Tube wells	62.1	0.90	2.70	21.60	7.20	29.70
2	Construction of Pump House civil	13.8	0.20	0.60	4.80	1.60	6.60
3	Pump set with elecrical & mechanical	2.63	0.05	0.13	0.90	0.30	1.25
4	Construction of CWRs	54	-	12.00	42.00	-	-
5	Construction of OHSRs	144	-	32.00	112.00	-	-
6	Clear Water Pumping Station	16.65	-	3.70	12.95	-	-
7	Rising Main DI Pipe K7	0					
	250 mm diameter	62.25	0.90	2.71	21.65	7.22	29.77
	300 mm diameter	26.31	0.38	1.14	9.15	3.05	12.59
8	Distribution system	599.13	-	-	199.71	199.71	199.71
9	Domestic Meters	26.89	-	10.00	16.89	-	-
10	Bulk Consumer Meters	3	3.00				
11	Bulk System Meters for Tube wells	5.2	1.80	0.15	1.20	0.40	1.65
12	Bulk System Meters for OHSRs	7.2	4.50	0.60	2.10	-	-
13	Bulk System Meters for CWPS	2.6	0.80	0.40	1.40	-	-
14	Chlorinaters and tonners	3.6	2.25	0.30	1.05	-	-
15	Reduction of NRW & Replace Service Line	28.91	4.00	6.00	8.00	10.91	-
16	Electric Connection on Tube Wells	5.19	0.08	0.23	1.80	0.60	2.48
17	Electric Connection on CWPS	1.35	-	0.30	1.05	-	-
18	Water supply in Villages	47.56		47.56			
19	Sub Total	1,112.35	18.86	120.51	458.25	230.99	283.74
20	Contingencies @ 18%	200.22	3.39	21.69	82.49	41.58	51.07
21	Grand Total	**1,312.57**	**22.25**	**142.21**	**540.74**	**272.56**	**334.81**

Source: Analysis.



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Implementation Phases

Legend

- Extended Master Plan Boundary
- National Highway
- Major Roads Existing & Proposed
- Minor Roads
- Railway Line
- Water Course

Overlay Legend

- Zone Boundary
- Zone- VI — Zone Number
- Phase 1(Zone I,II,III & IV)
- Phase 2 (Zone V)
- Phase 3 (Zone VI)
- Phase 4 (Zone VII)
- Phase 5 (Zone VIII)

Client

Asian Development Bank
National Capital Region Planning Board

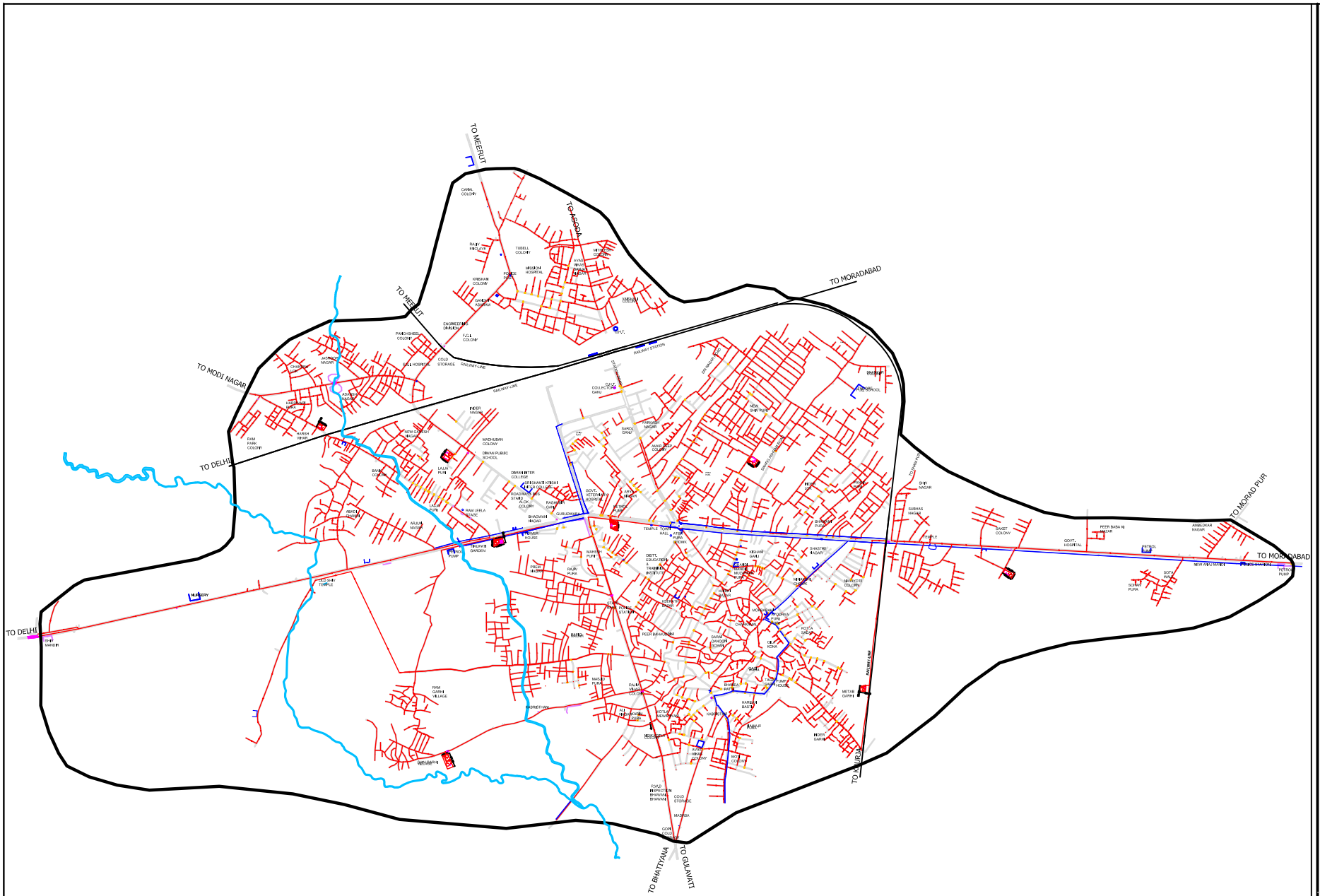
Consultant

WIlbur Smlth Assoclates

Drawn: SK	Checked: NSS
Date: January. 2011	Approved:NSS

Scale: 00 250 500 750 1000 1250 1500 Metres

Map XI- 1



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Proposed Water Supply System

Legend

- Municipal Boundary
- Road
- Railway Line
- Existing Drain
- Water Course

Overlay Legend

- Proposed Line
- Rising Main
- Proposed O.H.T
- Interconnection

Source: UP Jalnigam

Client:
Asian Development Bank
National Capital Region Planning Board

Consultant
Wilbur Smith Associates

Drawn:SK	Checked: NSS
Date: January. 2011	Approved: NSS
Scale: NTS	

Map XI-2

B. Sewerage and Sanitation

1. Sub-Project Rational and Design Criteria

209. Need for Sewerage Project: The existing sewerage system covers only about 10% of road length and is non functional and very old (More than 30 years old). The sewers are blocked and disposing waste water in drains. Due to less coverage and non functional sewers the households are disposing sewage in drains. This creates unhygienic conditions, ground water pollution and degradation of environment. Open defecation is prevalent due to lack of sewerage system. Sewage pumping station is also more than 30 years old and pumping machinery has outlived its useful life. Sewage treatment plant is not provided; as such the waste water remains untreated and is discharged without treatment. Thus it violates waste water disposal standards as set out in environment protection act. The waste water finally goes to river Ganges and thus pollutes the river water used for water supply for many towns. Waste water reuse system is non functional and thus this resource is not used. Moreover, piped water supply system exists in Hapur city and this is being extended to cover complete city. Thus sewerage system is essentially required in Hapur city.

210. Planning Area: The area considered for planning sewerage and sanitation system is the likely urbanize area in year 2041 i e development area planned for year 2041. Whole of the proposed development area for year 2041 will be covered with sanitation system. The implementation phases are shown in Map XI-1.

211. Phasing of Investment: The sewerage and sanitation system will be developed in 5 phases each of 5 years, Phase I (2011-15); Phase II (2016-20); Phase III (2021-25); Phase IV (2026-30) and Phase V (2031-35).

212. Design Criteria: Existing service adequacy gaps and demand for CLEIP period (2011-2041) will be met based on the following design criteria:

(i) Providing underground sewerage system to collect, transmit and treat the sewage generated in the town) before its disposal;

(ii) The rate of water supply has been adopted as per the norms of CPHEEO manual as 135 lpcd at consumer end throughout the whole design period. 80 percent of the water supply has been considered as sewage flow into the sewerage system which works out 108 LPCD. In case of bulk consumers rate of water supply has been taken as per CPHEEO manual with a return factor of 80 percent or as per actual measured quantity of effluent.

(iii) Sewer network is designed as a gravity flow system; pumping stations are minimized with flow dependent entirely on slopes.

(iv) Estimate of flow in sanitary sewers includes flows due to infiltration of ground water where the sewer has been proposed below the subsoil water level. However, where the groundwater level is much below the sewer line no infiltration is considered. Where the sub-soil level is high, infiltration rate of 5000 Lit./ Hectare / day has been adopted as per CPHEEO manual.

(v) Industrial sewage should be treated to the standards prescribed by the Pollution

Control Boards before being discharged into sewers.

(vi) Design Period; Design period for sewer network shall be 30 years, land acquisition for 30 years, in case of SPS, civil works shall be 30 years but electrical and mechanical equipment shall be 15 years. STP shall be modular with initial capacity of about 10 years.

2. Sub-Project Identification

213. *Rehabilitation of existing sewerage network.* The existing pumping station shall be used under new system with discharge capacity same as designed earlier. The pump head will now increase corresponding to take flow up to new STP south. The mechanical and electrical equipment and installation will require total change as it has survived more than its life. Existing sump and pump house building shall be used after repairs.

214. *Low Cost Sanitation Options*: Community/Public toilets will be provided for slum sanitation and sewage generated from the toilet blocks is either to be treated by constructing septic tanks followed by soak pits in the areas where sewer line is not available and sufficient space is available for its construction or to be disposed into the nearby sewer line and treated at the treatment plant. The norms for use of such toilets are 50 persons per seat; therefore the number of users for 10 seat complex shall be 500.

215. In Hapur city about 76% residents are having toilets and 24 % do not have toilets. Those households who are having space to construct toilet, the material cost shall be borne under the project and labour cost will be borne by beneficiaries. The remaining residents who do not have space for construction of toilets within the house shall be provided community toilets.

216. Experience of community toilets has not been good due to poor maintenance and after some time community toilets remain unutilized. Therefore community toilets shall be constructed only if beneficiaries can maintain and pay for use. Connection to sewerage system shall be encouraged. In slums also connection to sewerage system shall be encouraged. Construction of toilets in all houses should be ensured to have city open defecation free

217. Their are about 9 villages outside municipal boundary but with in the development area. These villages do not have any sewerage system at present and in phase 1 sewerage system is not proposed in these villages. However looking to urgent requirement of sanitation system it is proposed to provide house hold toilet and soak pit in the houses which do not have toilets are used to open defecation.

218. Low cost sanitation measures are proposed in phase 1 due to urgency. No of community toilets and no of household toilets required are calculated in **Appendix 4**. The estimated cost is Rs 30.5 million.

219. In Hapur the project area has been divided into 8 sewerage zones, named zone 1 to 8. The contour map shows that Meerut–Bulandsahar road is at contour of 213 m and area on west side of Meerut –Bulandsahar road drains towards east and south, lowest point being near proposed STP south which is at 210 m contour. The area on west of Meerut –Bulandsahar road is generally flat at contour of 213 m, but the lowest point is towards Tatarpur village where Kali river passes. The contour here is of 210 m. In the master plan 2005 two sites for STPs have been marked, one near Tatarpur village and on east side of city and is near

to Kali River. Other site shown in the master plan is towards south near Chatoli village. These sites are suitable from engineering aspects as situated towards depression, low levels. The zone 1,2, 3, 5 and 8 will drain in STP south and zone 4,6, and 7 will drain in STP east. Proposed sewerage zones are shown in Map XI-4.

220. The sewage flow in different years from different zones is given in Table XI-5.

Table XI-5: STP capacity required for different zones

STP South					STP East				
Zone No.	Flow in MLD				Zone No.	Flow in MLD			
	2011	2021	2031	2041		2011	2021	2031	2041
1	5.3	7.1	9.5	12.5	4	3.9	4.6	5.4	6.4
2	6.6	7.3	8.1	9.0	6	1.0	2.7	4.8	7.8
3	10.7	12.4	14.3	16.5	7	0.6	1.6	2.8	4.6
5	0.9	2.2	4.0	6.5					
8	0.5	1.4	2.5	4.0					
Total	24	30.4	38.4	48.5	Total	5.5	8.9	13.0	18.8

Source: Analysis

221. Phase I is for zones 1, 2, 3 and 4 for which sewerage is to be provided on first priority. Phase II, III, IV and V are for zones 5, 6, 7 and 8 which are of second priority. In phase I, capacity required is given in the Table XI-7.

Table XI-6: Capacity of STP required in Phase 1

Zone No.	Flow in MLD for STP South				Zone No.	Flow in MLD for STP East			
	2011	2021	2031	2041		2011	2021	2031	2041
1	5.3	7.1	9.5	12.5	4	3.9	4.6	5.4	6.4
2	6.6	7.3	8.1	9					
3	10.7	12.4	14.3	16.5					
Total	22.6	26.8	31.9	38	Total	3.9	4.6	5.4	6.4

Source: Analysis

222. Connectivity to sewer system is very slow and STPs generally does not receive the anticipated flow and remain unutilized. Therefore STPs have been proposed modular such that planning will be done for year 2041but construction will be in phases so that initially less capacity will be developed and subsequently capacity shall be added for optimum use and minimum investments. Accordingly STP South is proposed for 25 MLD capacities and STP East is proposed for 5 MLD capacities. This capacity will serve demand of phase 1for year 2020. It is proposed to further increase capacity of South STP by 24 MLD in phase 2 and to increase capacity of East STP by 14 MLD in phase 3.

C. Sewage Treatment Plant: Process

223. There are a number of treatment technologies that have been applied for sewage treatment in India under different schemes including Ganga Action Plan and other River Action Plans of NRCD. The treatment technologies for organic pollution load that have been used are mostly biological processes and have their own merits and demerits. The strategy for sewage treatment is to provide low cost treatment with a robust process that takes into account local conditions. The effluents from the STPs should confirm to the standards as presented in Table XI-8.

Table XI-7: Effluent Standards

Discharge of Effluent	BOD5	TSS	Feacal Coliform
Into the river	30 mg/l	50 mg/l	1,000 MPN
On land for irrigation purposes	50 mg/l	50 mg/l	1,000 MPN

Source: CPHEEO

224. Waste stabilization pond consists of anaerobic ponds, aerobic ponds and maturation pond. WSP is a natural treatment process and does not consume energy in treatment process. Maintenance cost of WSP is less due to less mechanical parts. In view of poor resource availability in municipal corporation Hapur and rugged ness and less requirement of maintenance, WSP process has been proposed.

225. The land required for waste stabilization plant for year 2041 for STP south of 49 MLD at 1.25 hectares per MLD is 61 hectares. The requirement, for STP east of 19 MLD at 1.25 hectares per MLD is 24 hectares. The land required for Activated sludge process is 10 hectares for STP south and 4 hectares for STP east. The land location shown in master plan at both locations has agricultural use and it is fertile land. HPDA/ Municipal Corporation Hapur should proceed to acquire land as required for waste stabilization plant.

D. Water Reuse

226. The effluents after treatment in the respective STPs can be used for irrigation with faecal coli forms within the desired limits. Phosphates and nitrates are present in the effluent which is advantageous for irrigation. The treated water can also be used for industrial purposes, with further treatment as required. Considering approximately 10 percent as reduction in volume after treatment the minimum quantity of water available for reuse is given in Table XI-8.

Table XI-8: Quantity of Water Available for Reuse

Location of STP	Water for Reuse (MLD)		
	2011	2026	2041
STP South	20.3	26.0	43.7
South East	3.5	6.6	16.8

Source: Analysis

227. *Potential for Irrigation*. The water requirement to irrigate depends on the type of crops that are to be cultivated, type of soil and the climatic conditions. The average quantity of water required per day will be 125 - 250 m3/ha during dry seasons. The total area that can be irrigated per day in Hapur is given in Table XI-9. In wetter periods of the year when only supplementary irrigation is required a greater area could be irrigated.

Table XI-9: Area for Irrigation

Location	Area for Irrigation (ha)		
	2011	2026	2041
STP South	102	130	219
South East	18	33	84

Source: Analysis

228. For sewer cleaning a high pressure water jetting machine will be required together with a suction tanker.

229. At present Municipal Corporation Hapur is operating and maintaining sewerage system. The maintenance is under Juniour Engineer. Capital works are done by UP Jal Nigam. UP Jal Nigam is a competent organization. Municipal Corporation lacks managerial and technical capacity and shortage of financial resources to operate and maintain the sewerage system. The municipal corporation need to be strengthened to handle sewerage system professionally. The engineering department of corporation should be restructured such that at least Executive Engineer heads all engineering operations, supported by four Assistant Engineers, one assistant engineer will be in charge of sewerage operations that will be supported by 4 junior engineers dealing exclusively with sewerage. Municipal Corporation should be in charge of capital works also. However if required by them capital works can be got done from any other agency but Municipal Corporation should have capacity to over view the works.

230. House Sewer Connections: Connection of waste to sewers: It is proposed to lay 110 mm/140 mm uPVC pipe under the project to connect sewage from house door to sewer man hole. This will ensure fast connectivity and avoid damage to manhole by unskilled people during connection.

E. Sustainability

231. Operation and maintenance cost should be recovered fully from beneficiaries so that proper maintenance is possible and scheme becomes sustainable.

F. Capital Cost

232. The total estimated cost in 5 phases is Rs 50119 lacs. This is based on current prices and excludes price contingency. However physical contingency at 10%, design and supervision services at 5%, Environmental mitigation at 1%, Social Interventions at 1% and Institutional Development Interventions at 1% has been included. The main components and basis of estimation is given below

(i) Rehabilitation of Existing Sewerage System: The cost includes repair and desilting of sewers, repair and replacement of man holes and footsteps, extension of 600 mm diameter PSCC pipe 1300 m long rising main up to STP south, rehabilitation of sewage pumping station- providing 4pumps of 40 KW each and replacing all mechanical and electrical equipment and installation etc. The present pumps are of 30 KW, discharge of pumps will be same but pumping head will increase due to increased length as such pump KW will increase from 30 to 40 KW. Cost of pumping sets and other mechanical and electrical equipments have been estimated at Rs 10000 per KW. Existing sump and pump house building shall be used after repairs.

(ii) Laterals: Lateral sewers at 125 meter per hectare have been taken. On this basis length will be about 650 KM in whole project area. RCC NP3 and NP4 pipes diameter 150 mm and 200 mm shall be used. PVC pipe 110 mm and 160 mm shall be used for making connection from house to sewer. The length of PVC pipe shall be approximately 410 Km. Rate of RCC pipes including excavation, laying, road repair, bedding, man hole, has been taken at Rs 4000 per meter.

(iii) Interceptors, Trunk Mains and Outfall sewer: RCC NP4/NP3 pipes shall be used; diameter shall be 250 mm -1100 mm. The length of interceptor, trunk main and

outfall sewers shall be taken10% of the laterals i.e. about 65 Km in length. Road reinstatement has been taken 40 % of total length of sewers considering laying of sewers on right of way but outside bituminous road as far as possible. Average rate for pipes 250-1100 mm pipe has been taken at Rs 6000 per meter.

(iv) Sewage Pumping Stations and Rising Mains: The estimate includes two no sewage pumping stations near STP south and STP east, wet wells and DI rising main. For planning purposes, it is assumed that the maximum distance that can drain to an STP is about 4.00 km. Non clog Submersible pumping sets have been proposed. In phase 1, in SPS south five pumps of 40 KW each, (Pumps to be same size and equal to 4 nos. for peak flow with 1 no standby) and in SPS east 3 pumps of 20 KW each, (2 working & 1 no standby for peak flow) has been proposed. These pumps will meet the flow of year 2026. Rate has been taken Rs 20000 per KW including civil works. In phase 2, pumps provided under phase 1 will be replaced and additional pumps of 100 KW at SPS south and 95 KW at SPS east shall be provided to cater the flow for year 2041. Rate of equipment and installation has been taken at Rs 10000 per KW as the civil works constructed in phase 1 will serve purpose of phase 2 also. The wet well storage shall be 3.75 minutes at peak flow

(v) Sewage Treatment Plant South and East: The total capacity of STP required for year 2041 will be 67 MLD. The construction shall be modular. Initially 25 MLD capacity shall be provided for STP south and 5 MLD for STP east. Subsequently in second phase capacity of STP south shall be further increased by 24 MLD. In third phase 14MLD capacity shall be additionally provided for STP east. The treatment process shall be waste stabilization pond consisting of anaerobic ponds, aerobic pond and maturation pond. The land required shall be 1.25 ha per MLD, i.e. 61 hectares for STP south & 24 hectares for STP east. The provision for land acquisition has been made in first phase at Rs 10.0 million per hactare. The unit cost for STPs has been taken at Rs 5.0 million per MLD

233. Investment phasing has been done based on the following priority of interventions: (i) rehabilitation of existing system and land acquisition for STPs and pump houses; (ii) interceptors, trunk mains and outfall sewers for Zone 1; (iii) sewerage in Zone 2 & 3, and SPS; (iv) laterals in Zone 1; (v) STP South and East; (vi) sewerage in Zones 5 to 8. Priority among these will be as per development plan priority of HPDA. Accordingly, the total Master Plan investments are distributed in five Phases:

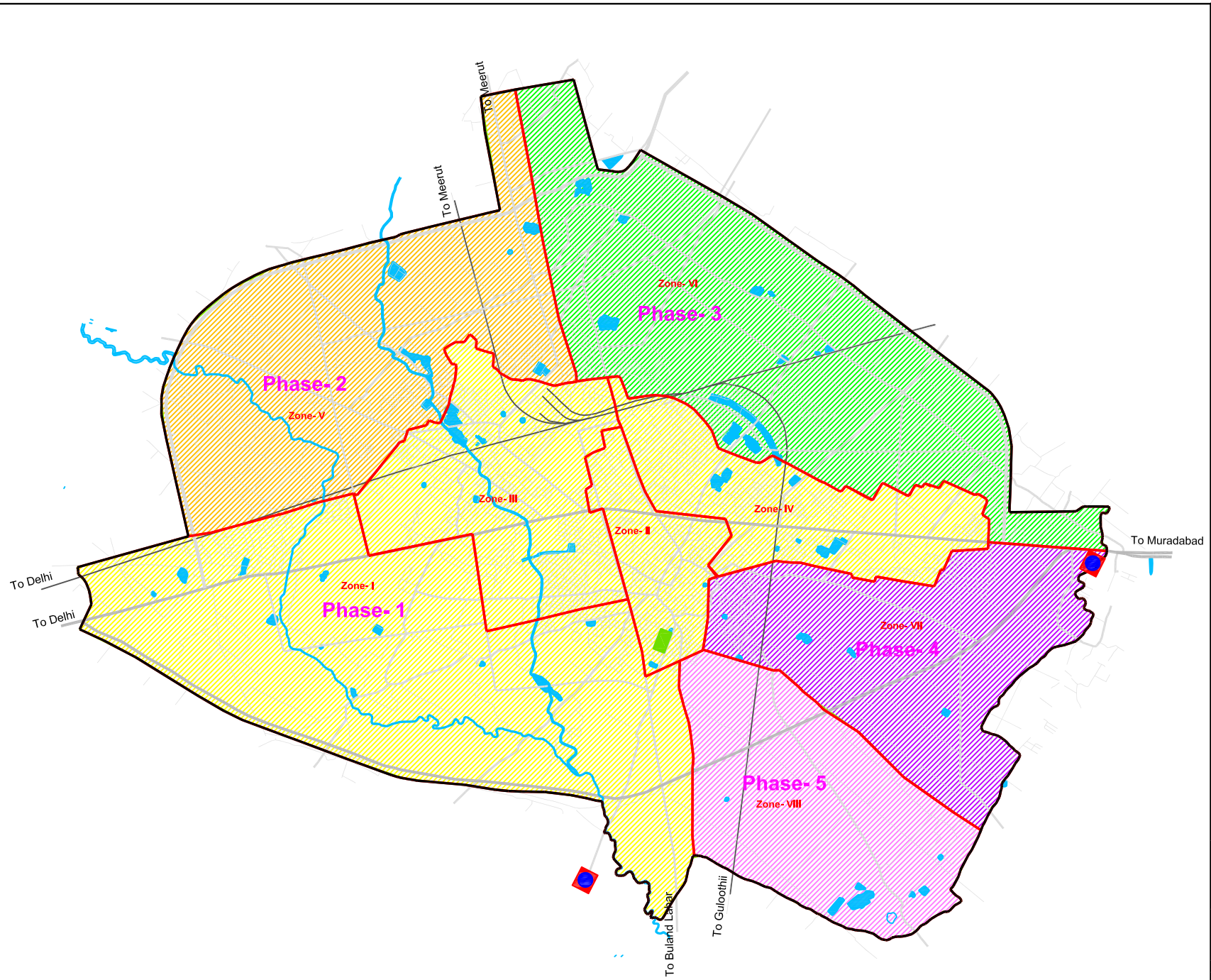
(i) Phase I: Rehabilitation of existing system in zone 4; land acquisition for STP and SPS; sewerage system in zone 1,2 and 3; STP at south and east with SPS; providing house hold toilets and community toilets.

(ii) Phase II to V: Sewerage system will be developed in Zone 5 to 8 covering a Zone in each Phase.

Table XI-10: Abstract Cost Estimates

S No	Item	Phase 1 20011-15	Phase 2 2016-20	Phase 3 2021-25	Phase 4 2026-30	Phase 5 2031-35	Grand Total
		Rs. Million					
1	Rehabilitation of existing system	19.8					19.8
2	Laterals New	1002.5	455.00	545.00	320	280	2602.5
3	Trunk Mains New	150.4	68.3	81.8	48.0	42.0	390.4
4	Sewage Pump House	4.7		4.5			9.2
5	STP	150.0	120.0	70.0			240
6	Land Acquisition	850.0					850
7	Low Cost Sanitation	30.5					20
8	Equipment	5.0					5.0
8	Total	2212.8	643.3	701.3	368.0	322.0	4247.4
9	**With Contingencies**	**2611.1**	**759.0**	**827.5**	**434.2**	**380.0**	**5011.9**

Source: Analysis



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Phase-wise Development as per Master Plan for Sewerage System

Legend

- Extended Master Plan Boundary
- National Highway
- Major Roads Existing & Proposed
- Minor Roads
- Railway Line
- Water Course
- Existing Pump House

Overlay Legend

- Zone Boundary
- Zone- VI — Zone Number
- Phase 1(Zone I,II,III & IV)
- Phase 2 (Zone V)
- Phase 3 (Zone VI)
- Phase 4 (Zone VII)
- Phase 5 (Zone VIII)
- Proposed STP & Pump House

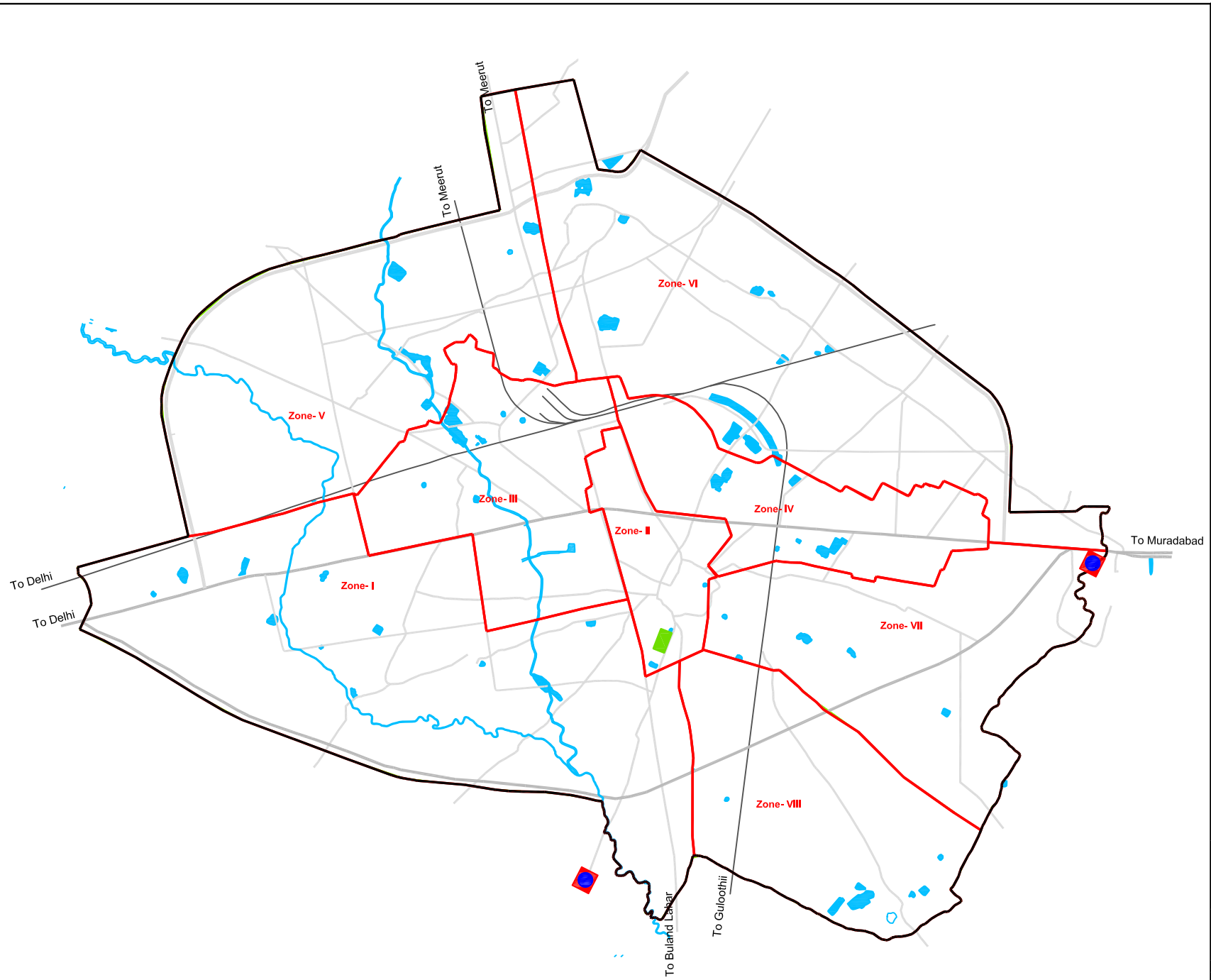
Client
Asian Development Bank
National Capital Region Planning Board

Consultant
WIlbur Smlth Assoclates

Drawn: SK	Checked: NSS
Date: January. 2011	Approved:NSS

Scale: 00 250 500 750 1000 1250 1500 Metres

Map XI-3



Capcity Development of the NCRPB: Component B (ADB TA-7055)

Hapur
Proposed Sewerage Zones

Legend

- Extended Master Plan Boundary
- National Highway
- Major Roads Existing & Proposed
- Minor Roads
- Railway Line
- Water Course
- Existing Pump House

Overlay Legend

- Zone Boundary
- Zone- VI — Zone Number
- Proposed STP & Pump House

Client
Asian Development Bank
National Capital Region Planning Board

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Drawn: SK	Checked: NSS
Date: January. 2011	Approved:NSS

Scale: 00 250 500 750 1000 1250 1500 Metres

Map XI-4

G. Solid Waste Management

1. Sub-Project Rational and Design Criteria

234. Existing service adequacy gaps and demand for CLEIP period (2011-2041) will be met based on the following design criteria:

(i) Develop a process with above 90% door-to-door collection option
(ii) Ensure daily collection and safe disposal of bio-degradable waste
(iii) Streamlining street sweeping activities
(iv) Synchronizing the waste collection and transportation system across all wards
(v) Developing process for waste recycling in phases and developing sanitary landfill complying to the provisions laid in the Municipal Solid Waste (Management and Handling) Rules, 2000.
(vii) Integrating 4Rs (reduce, reuse, recycle and recover) concepts into the SWM as a long term strategy; and,
(viii) Information Education and Communication (IEC) activities

2. Sub-Project Identification and Costing

235. This City Level Environmental Infrastructure Plan (CLEIP) is proposed to be implemented over a period of 30 years (2011-2041), and accordingly solid waste management in the town and villages. This comes within the boundary of Master Plan. These sub-projects are proposed for implementation in five phases: Phase I (20011-16); Phase II (2016-21); Phase III (2021-26); Phase IV (2026-31), and Phase V (2031-41).

236. *Waste Projection*. According to the CPHEEO SWM Manual, the per capita waste generation increases 1.41 percent annually. Current per capita waste generation of 305 gm/day will increase to 478 gm/day in 2041. Subsequently, city-level waste generated would increase from 84 tons/day in 2009 to 341 tons/day in 2041.Table XI-11 indicates the growth in per capita waste and city-level waste generated over the CLEIP period.

Table XI-11: Projected Solid Waste Generation

Year	Per Capita Generation	Urban Area	Villages
	Gms/Day	*Tons/Day*	*Tons/Day*
2011	314	90	9
2021	361	140	10
2031	416	214	12
2041	478	328	13

Source: Analysis.

237. The component specific interventions comprise:

(i) Primary Collection. Door-to-door waste collection shall be introduced on priority and the waste shall be collected on a daily basis in the morning (06:30 hrs to 12:30 hrs). Waste collectors shall be provided with autos/push carts depending on the areas of collection, and collected waste shall be deposited in container bins. Each collection team (2 persons for auto collection, 1 for push cart collection) shall

collect in a fixed area every day at a predetermined schedule. Litterbins shall be provided along main roads to avoid littering. Number of autos and pushcarts are estimated based on net demand and replacements required after vehicle/equipment operational life.

(ii) Street Sweeping. High density areas comprising residential, commercial and market areas will be swept daily; medium density areas will be swept on alternative days/weekly twice and fringe areas will be swept weekly and undeveloped areas will be swept occasionally. Wheelbarrows with an operational life of 5 years, street cleaning implements will be provided to conservancy staff and litter bins will be provided on roads.

(iii) Waste Collection from Bulk Generators. Hapur Nagar Palika shall undertake direct collection of waste from large and medium sized hotels, restaurants, party halls, hospitals (domestic and non-bio medical waste) and from construction sites. Separate tractors with adequate crew shall be provided for the purpose and the collection shall be carried out on a fixed daily schedule; waste shall be directly transported to disposal site. Existing waste transport vehicles available with Nagar Plaika will be utilized and therefore no new equipment is proposed. Each vehicle will employ two sanitary workers and two vehicle crew, including the driver.

(iv) Temporary Waste Storage. Closed metal container bins will be provided at appropriate places. Two separate container bins shall be provided at each location for bio-degradable and other waste streams; containers will be replaced every seven years. Bio-degradable waste will be collected on a daily basis and non-biodegradable waste collected on alternative days.

(v) Waste Transportation from Containers to Disposal Site. Since the transportation system will be in synchronization with temporary storage container bins, manual handling of waste is eliminated. Filled up container bins will be lifted mechanically and transported to the disposal site.

(vi) Waste Processing and Disposal. Nagar Plaika, in compliance with the MSWM Rules, 2000, has proposed to set up an integrated waste processing and disposal facility and has procured a site of 5 acres along Rampur, about 4 km from the town. It is proposed to set up a composting plant with private sector participation; for the landfill capacity, it is estimated that the final waste that reaches landfill is about 55 percent (including composting rejects) of total waste generation. With a 10 m high sanitary landfill, the gross site requirement (including buffer areas) is estimated at 2.8 ha with a design life of 25 years. Hapur Nagar Plaika needs to procure additional land (0.5 ha.) based on the design site requirements. Landfill will be designed and constructed as per the provisions of the MSWM, Rules 2000 and will be provided with necessary vehicle and equipment.

238. *Long-term Solid Waste Management Strategy*. The implementation of the above proposed sub projects can ensure that the solid waste management operations in Hapur are safe and efficient and confirm to the national regulations. The success however depends on many factors, important of which is the public participation, co-operation, and support. In addition to this as long terms strategy, it is important to make the solid waste management economical and environmentally safe. As seen above, the per capita waste generation is likely to increase at a rate of 1.41 percent annually, and therefore the quantity to be handled will increase manifold, and coupled with resource constraints (land and financial),

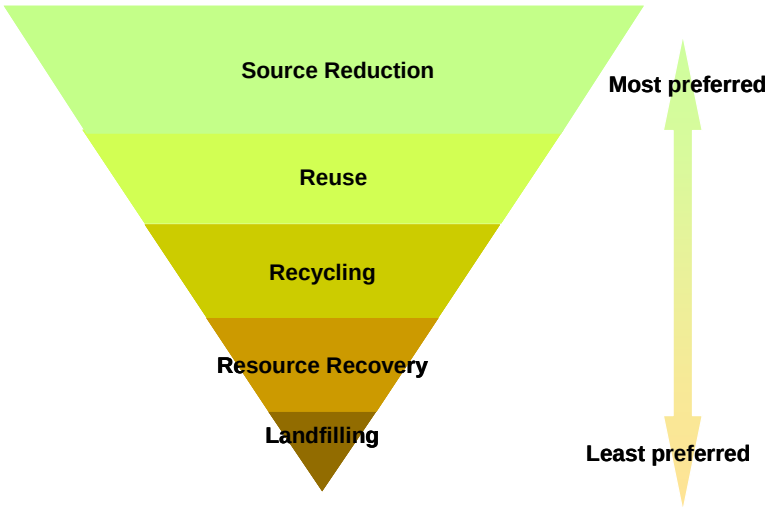
the SWM will be an appalling task. Therefore it is suggested to integrate 4Rs (Reduce; Reuse; Recycle; and Recover) strategy into the SWM.

(i) Public Participation: Swachata Samities (SSs), at ward level, shall be created. Door-to-door waste collection can be brought into the direct monitoring of SSs. A stakeholder based monitoring system shall be initiated to check the quality of service delivery and the SS would certify door-to-door collection, street sweeping and container lifting services under their jurisdiction. At the city-level, a monitoring system shall be developed with the participation of NGOs.

(ii) Public Awareness Creation. In addition to awareness on public health and SWM linkages, awareness about source reduction, reuse, segregation and temporary storage of waste at household level is crucial. Source reduction and reuse will reduce the net quantity of waste to be handled. Improved segregation at household level will essentially enhance the waste recovery ratio thus reducing the net quantity to be land filled and secure additional revenue from waste recovery. Practice of temporary waste storage at household level would mitigate street littering. Awareness creation through short films, neighborhood-level meetings shall be initiated; films/information will be screened/disseminated in the city with the help of local cable TV network. Public awareness shall be a continuous activity.

(iii) Integrate 4 Rs Strategy. As a long term strategy, the ULB shall initiate programs to integrate the 4Rs strategy into the solid waste management. As depicted in the following figure, the priority shall be first source reduction, then to reuse, recycle and recover. The aim of this is to reduce the quantity of waste to be handled and disposed by the ULB.

Chart XI-1: 4R Strategy for Solid Waste Management



(iv) Source Reduction is any action that reduces or eliminates the generation of waste at source, usually within a process. Source reduction measures include process modifications, material substitutions, improvements in housekeeping and management practices, and recycling within a process. For example, an individual resident could achieve source reduction by bringing bags to the grocery store to package their purchases. It is imperative that the ULB practices the source reduction strategies at its facilities and offices, to set an example for the public to follow. The ULB can also influence decisions made by residents and businesses by public

education and promotion. The fundamental goal of this effort is to influence attitudes and change behaviour.

(v) Reuse is the process of separating a given solid waste material from the waste stream and using it, without processing or changing its form, other than possible size reduction, for the same or another end use. For example, building materials that are removed during renovation or demolition can be installed in another building. Used clothing and household items can be collected for resale and reuse.

(vi) Recycling is the process of separating a given waste material from the waste stream and processing it so that it may be used again as a raw material for a product, which may or may not be similar to the original product. Recycling primarily addresses materials such as: metals, glass, plastic and paper fiber. In Hapur, recycling is practiced through informal rag picking activity on streets. However, as the waste is disposed unsegregated, recovery of recycled material is low. The current unhealthy informal activity needs to be streamlined and waste segregation at source shall be implemented.

(vii) Resource Recovery is the recovery of a usable produce like compost/fuel pellets or energy from the solid waste. These processes reduce the volume of waste to be disposed safely through a landfill. Thus reduces the land and resource requirement for waste landfill. This also provides additional financial resources to the ULBs through selling of resource recovered like compost product.

239. The total investments over the planning period are Rs. 253.29 million. Table XI-12 provides a breakdown of investment over the planning period. Detailed estimation is presented in **Appendix 5.**

Table XI-12: Hapur Sub-Projects and Costing – Solid Waste Management

Particulars	Total (2011-41)	2011-16	2016-21	2021-26	2026-31	2031-41
	Rs. Million					
Equipment & Vehicles (Collection & Transportation)						
Containerized Push Carts for D2D Collection	16.27	1.88	2.15	2.47	2.83	6.94
Auto Tippers for D2D Collection	2.00	0.75			1.00	0.25
Push Carts for Street sweeping	9.16	1.41	1.45	1.49	1.54	3.27
Litter Bins	8.14	1.25	1.29	1.33	1.37	2.91
Closed Containers (3 m3 capacity)	19.55	3.35	0.75	4.25	1.90	9.30
Dumper Placers (twin containers of 3 m3)	11.40	3.00	0.60	0.60	3.60	3.60
Closed Containers (4.5 m3 capacity)	11.38	1.95	0.46	2.47	1.11	5.40
Dumper Placers (twin containers of 4.5 m3)	8.10	1.80	0.90		2.70	2.70
Total - Collection & Transportation	86.00	15.39	7.59	12.61	16.05	34.37
Landfill Facility						
Equipment						
Backhoe Loader	4.00	2.00				2.00
Bull Dozer	12.00	6.00				6.00
Sub-total	16.00	8.00				8.00
Civil Works						
Landfill Cell Development	93.92	8.27	10.16	12.48	15.34	47.67

Other infrastructure (roads, drains, fencing, building, etc	10.27	5.06				5.21
Sub-total	104.19	13.33	10.16	12.48	15.34	52.88
Total - Landfill Facility	120.19	21.33	10.16	12.48	15.34	60.88
Compost Plant						
Equipment						
Backhoe Loader	4.00	2.00				2.00
Tipper Truck	4.80	2.40				2.40
Tipper Tractor	1.60	1.60				
Water Tanker (3000 lt)	0.60	0.30				0.30
Weight Bridge (20 MT)	2.00	1.00				1.00
Plant & Machinery	20.00	10.00				10.00
Sub-total	33.00	17.30				15.70
Civil Works						
Internal roads, drains, tipping floor, office building, store, etc	14.65	9.92				4.73
Total - Compost Plant	47.65	27.22				20.43
Total	**253.83**	**63.94**	**17.75**	**25.09**	**31.38**	**115.7**

Source: Analysis.

H. Storm Water Drainage

1. Sub-Project Rational and Design Criteria

240. Existing service adequacy gaps and demand for CLEIP period (2009-2041) will be met based on the following design criteria:

(i) Expansion of drains to cover entire road network to collect and dispose the storm runoff safely in town and villages
(ii) Rehabilitating existing drains in town and villages
(iii) Desilting and rehabilitating natural drains
(iv) Considering both side drains for roads

2. Sub-Project Identification and Costing

241. This City Level Environmental Infrastructure Investment Plan (CLEIP) is proposed to be implemented over a period of 30 years (2011-2041), and accordingly improvements and new infrastructure required for the storm water drainage system in the Towns are identified. This comes within the boundary of Master Plan. These sub-projects are proposed for implementation in three phases: Phase I (2009-13); Phase II (2014-18); Phase III (2019-23); Phase IV (2024-28) and Phase V (2029-33). The implementation phases are shown in Map XI-1.

3. Rehabilitation and Augmentation of Existing Drains

242. The Drain no 1 and Drain No 2 (choya nallah) are earthen drains and needs to be desilted and needs to be channeled with regular shape and size as per the estimated discharge. The section wise recommendations for rehabilitation and augmentation are as follows:

(i) Drain No 1.

(a) *From railway crossing to crossing at NH24*. Though the section is channelized, but weeds have grown, thereby blocking the flow. This needs to be rehabilitated.

(b) *From Crossing at NH24 to Rampur road via Sabli village*. As the drain is kutcha in this area, the drain needs to be channelized and made pucca. The tentative size required for this section is 32 Sqm.

(ii) Drain No 2 (Choya Nallah). This need to be linked with Drain No 1 for distributing of excess flow from upstream of this drain to Drain no 1. Presently, Hapur Pilukhwa Development authority is planning for a byepass from drain near Dastoi road to Drain No 1 through a chak road. As link in drain no 2 breaks at this section, this will divert the flow from Dheerukhera industrial area to Drain No 1. The section wise recommendations are as follows:

(a). *Hasoda to Dastoi road*. As the drain carries the waste water, the arrangement for diverting this waste water to sewerage system is the prime necessity. As this is pucca, the drain required to be provided with cover.

(b). *Dastoi Road to Modinagar road crossing and further to Delhi Moradabad railway crossing*. The drain has to be constructed in this portion. As the residential area has come up in this portion, the option for alignment either through existing roads or alignment available between the residential available has to be checked during detailed designing. The pond near Modinagar road crossing needs to be revamped, as it will prevent flooding. The tentative size of the drain required is 5m x 3m.

(c). *Railway crossing to chamri road crossing and further to Delhi Garh road*. As the drain passes through the populated area and sewerage makes way into the drain. It is recommended to eliminate the sewerage from the existing drain through sewerage system in adjoining colonies. The option of taking drain along the Chamri road may be explored or augmentation of existing drain may be checked, if land available. Presently, as the solid waste is dumped near the drain at chamri road crossing, the solid waste enters into the drain. It is recommended to provide a waste bin at this location. At crossing, the pipe culverts need to be redesigned as they have been blocked due to insufficient size. The tentative size of the drain required is 8m x 4m.

(d). *Delhi Garh road crossing to Ramgarhi village and further to kali river*. As the drain is kutcha in this area, the drain needs to be remodeled and channelized and made pucca.

(iii) Circular Road Drain. As the drain takes the waste water of all the habitations in course of this drain, sewerage system of the adjacent colonies is the prime requirement. The drain requires desilting and cleaning to take care of storm water flow. The drain requires to be covered.

(iv) Delhi Garh Road Drain. The drain from Khurja railway line to Tirupati garden is the main secondary drain of Choya nallah and need to be augmented. The missing link from town hall to Merrut road is to be provided. The discharge has been checked for drains on both sides. The elimination of sewerage from this drain is also required.

4. New Proposed Drains

243. A drain along with the Merrut-Gulavati road has been proposed with a branch along the Idgah road to meet at Choya nallha. The proposed drains are shown in **Map XI-5**.

244. *Secondary and Tertiary Drains*. In addition to the main drains, all the roads should have secondary drains and colonies road should have tertiary drains. The tertiary drains may be integrated along with the roads and proper slope should be provided as to drain out the storm water. During construction of roads, proper camber should be provided and sufficient longitudinal slope need to be designed and accordingly the road should be drain. It is estimated that 470 km of drains need to be construct on both sides of roads. Apart from this, the new drains to be developed in phase 2 to 5 including villages also estimated.

245. The total investment in storm water drainage sector to meet the ultimate demand of 2041 is estimated as Rs. 1,595 million and details are illustrated in Table XI-13. Detailed estimation is presented in **Appendix 6.**

Table XI-13: Hapur Sub-Projects and Costing – Storm Water Drainage

Item	**Phase 1 20011-15**	**Phase 2 2016-20**	**Phase 3 2021-25**	**Phase 4 2026-30**	**Phase 5 2031-35**	**Grand Total**
	Rs in Million					
Remodeling and channelization with construction of missing link	370.00					370.00
Provision of drain covers	25.00					25.00
Construction a new major drain	35.00					35.00
Construction/ remodeling of secondary & tertiary drains	120.00	227.70	272.50	160.00	140.00	920.20
Villages: New Construction of Secondary & Tertiary drains		99.83				99.83
Sub Total	**550.00**	**327.53**	**272.50**	**160.00**	**140.00**	**1,450.03**
Physical contingencies @10% of sub total	55.00	32.75	27.25	16.00	14.00	145.00
Total	**605.00**	**360.28**	**299.75**	**176.00**	**154.00**	**1,595.03**

Source: Analysis.

I. Summary of Costing

246. The total investment estimated for Hapur CLEIP is Rs. 8,748 million. Base cost of sub-project components were determined using the NCRPB toolkit Rates and where designs / detailed reports were available. The cost summary is indicated in **Table XI-14.**

Table XI-14: Summary of CLEIP investment

S. No	Item	Phase 1 20011-15	Phase 2 2016-20	Phase 3 2021-25	Phase 4 2026-30	Phase 5 2031-35	Grand Total
		Rs. Million					
1	Water Supply	22.25	142.21	540.74	272.56	334.81	1,312.57
2	Sewerage & Sanitation	2611.1	759.0	827.5	434.2	380.0	5011.9
3	Solid Waste	63.94	17.75	25.09	31.38	115.67	828.19
4	Storm Water Drainage	605.00	360.28	299.75	176.00	154.00	1,595.03
	Total	**3302.29**	**1279.24**	**1693.08**	**914.14**	**984.48**	**8,747.69**

Source: Analysis

XII. FINANCIAL OPERATING PLAN

A. Proposed Investments

247. The objective of this section is to assess the investment sustenance of the Hapur Municipality vis-à-vis for the envisaged CLEIP estimated investments for proposed project. The preceding sections reviewed the Municipal fiscal situation, while this section determines the capital sustenance capacity of the local body, as the funds for the proposed project assumed to be on loan basis. This exercise will carry out in three conditions, which are (i) Base case scenario and (ii) Improved Scenario (based on proposed reforms and assumptions) (iii) UIDSSMT Scenario.

248. *Proposed Investments*. Following **Table XIIII-** presents the estimated CLEIP investments for various sectors. The total estimated investment requirement is Rs. 8,748 million (875 crores), in which 3,302 million (330 crores) is proposed in Phase 1.

Table XIIII-1: Summary of CLEIP investment

S. No	Item	Phase 1 20011-15	Phase 2 2016-20	Phase 3 2021-25	Phase 4 2026-30	Phase 5 2031-35	Grand Total
		Rs. Million					
1	Water Supply	22.25	142.21	540.74	272.56	334.81	1,312.57
2	Sewerage & Sanitation	2611.1	759.0	827.5	434.2	380.0	5011.9
3	Solid Waste	63.94	17.75	25.09	31.38	115.67	828.19
4	Storm Water Drainage	605.00	360.28	299.75	176.00	154.00	1,595.03
	Total	**3302.29**	**1279.24**	**1693.08**	**914.14**	**984.48**	**8,747.69**

Source: Analysis

B. Base Case Scenario

249. In this scenario, the performance of the ULB will remains same for the future. With same conditions financial operating plan (FOP) prepared for the Hapur Municipality for the period 2011-31. The municipality is able to take 6.5 crores as loan. That loan is for 20 years and five years moratorium period. If the municipality continues the same trend, after the projected year i.e. 2031 the overall income of the ULB will be in deficit. National inflation i.e. ~10 percent is assumed for all the revenue, capital income and expenditure heads projection. The overall status of Municipal accounts is shown in **Table XIIII-.**

Table XIIII-2: Scenario 1 – Base Cause

Item	2011	2015	2021	2031
	Rs. Million			
Revenue Account				
Opening Balance	106.55	170.67	137.45	2.14
Revenue Income	412.76	587.42	1,028.38	2,158.19
Revenue Expenditure	322.09	473.77	823.51	1,718.06
Closing Balance	126.36	174.54	124.82	(23.95)
Capital Account				

Item	2011	2015	2021	2031
	Rs. Million			
Capital Income	13.00	13.00	-	-
Capital Expenditure	83.85	122.77	217.49	466.22
Capital Status	(70.85)	(109.77)	(217.49)	(466.22)

Source: Analysis

C. Improved Scenario

250. The sustainability analysis assumes that the Municipality will carry out minimum reforms indicated as assumptions for financial projections. A financial operating plan (FOP) prepared for the Hapur Municipality for the period of 2011-31 taking into proposed investment for the next five years. The final output of this section is to assess the Municipal fund status and the extent of investment it can sustain on loan and in addition to meet the debt commitment, additional O & M arising out of new investment.

251. Basic Assumptions for Projections

(i) Revenue Income: Revenue Income is projected based on two major income sources: property tax and water charges. Property tax is projected on the basis of the Average tax demand per assessment and at present collection performance of 20 percent of arrears and 50 percent of current demand. It is also assumed that the ARV will be revised every 3 years by 25% and the next revision will be in effect from FY 2012-13 and by FY 2015-16 the collection performance for current and arrears will improve by 70 percent and from FY 2020-21 collection performance assumed as 80 percent till end of the projected year.

(ii) Water charges are increased at 25 percent every 3 years, and at present the collection performance of current and arrears are recorded as 50 and 20 respectively. It is assumed on a collection performance of 75 percent of arrears and 80 percent of current demand at the end of projected year– it is assumed that water connections will be provided to 75 percent and of the property tax assessments.

(iii) Revenue Expenditure: The Revenue Expenditure items were forecasted based on the past trend subject to inflation of 10 percent per annum. For the heads of loans, repayment towards deposits, establishment expenditure and O & M are contributing significant expenditure, hence ULB should minimize expenditure towards these heads.

(iv) Proposed New Investment: The proposed investment will start from the year of 2011-12 to five years, implementation period is five years. The investment estimated by CLEIP is considered for wastewater with considering operation and maintenance. It is assumed that the loan shall be financed at an interest rate of 9 per cent repayable in 20 years including 5-year moratorium, interest being capitalized during the moratorium period.

(v) As the proposed investment is for new assets or infrastructure, Municipality will have to provide certain additional funds for the regular maintenance in addition to its current o & M cost, it is assumed that this additional O & M will be 6 percent for water supply projects, 8 percent for sewerage projects and 4 percent for other capital investment.

252. Based on the above assumptions, the Financial Operating Plan (FOP) had been generated from FY 2011-12 to FY 2030-31. The details of financial review, assumption and FOP are presented in the **Appendix 2.**

253. The result of the FOP in this scenario indicates that Hapur Municipality will able to sustain three percent of proposed investment in phase one i.e. Rs. 110 million, with above mentioned reforms, 70 percent loan, 20 percent grant and 10 percent own contribution. However, the ULB need to take serious steps to improve collection performance of their own source of fund like property tax and water supply. It is also noticed that there are many un assessed properties in the Municipality, it need to regularize and increase the water supply connections within the jurisdiction. The status of improved case scenario is illustrated in **Table XIIII-**.

Table XIIII-3: Scenario two – Improved Case

Item	2011	2015	2021	2031
	Rs. Million			
Revenue Account				
Opening Balance	106.55	207.89	157.28	1.03
Revenue Income	418.17	592.35	1,028.99	2,162.97
Revenue Expenditure	322.09	475.64	828.98	1,721.66
Closing Balance	136.37	219.43	139.79	(23.88)
Capital Account				
Capital Income	19.80	19.80	-	-
Capital Expenditure	86.05	124.97	217.49	466.22
Capital Status	(66.25)	(105.17)	(217.49)	(466.22)

Source: Analysis

254. Proposed sustainable investment for this scenario shown in the Table XIIII- and assumption for scenario two are in **Table** XIIII-.

Table XIIII-4: Proposed and Sustainable Investment

Item	Proposed Investment	Sustainable Investment
Phase 2011-2015	*Rs. in million*	
Wastewater		
Loan (30)		77.00
Grant (50)		22.00
Own Contribution (20)		11.00
Total	**2611**	**110.00**

Source: Analysis

Table XIIII-5: Assumptions for Scenario 2 & 3

No.	Item	Assumption for Forecast	Basis
1	Property Tax		
	ARV Revision	By 25% from the FY 2012/13	Proposals Every three year same percentage revision
	Growth in Assessments	1%	Current Average/Proposal in case of non availability of data
	Collection Performance	By 2015 collection performance will	Current total collection is

No.	Item	Assumption for Forecast	Basis
		improve as follows: Arrears Demand 70 % Current Demand 70%	50 % during 2009-10
2	Water Charges		
	Current Charges	Dom: Rs. 50/ month Non Dom. Rs. 400/month	Current Charges
	Revision of Charges	By 15% during FY 2011-12 and thereafter every 3 years	Proposals
	Coverage of Property Tax assessment through Individual House Service Connection	75% by 2031	Current Coverage 20%, will increase by 6% per annum
	Collection Performance	By 2015 collection performance will improve as follows: Arrears Demand 45 % Current Demand 70%	Arrears Demand 11 % Current Demand 31%
	New Connection Fee (One time initial charge)	Dom: Rs. 600 Non Dom. Rs. 4800	Current System
3	Wastewater Charges		
	Current Charges	Proposed after FY 2012	Current Charges Nil
	Revision of Charges	By 15% after FY 2015-16 and thereafter every 3 years	Proposals
	Sanitation	10 percent increase per annum	

Source: Analysis & Assumptions

D. Scenario 3 (UIDSSMT)

255. The third scenario is worked out assuming that the proposed investment for wastewater from 2011 to 2015. The operation and maintained is added to the FOP calculations. The same assumption in the scenario two and loan grant mix is considered as UIDSSMT fund contribution. In this scenario, fund contribution from central govt. 80 percent and 10 percent from state govt. as grant and 10 percent ULB contribution were adopted.

256. The result of the FOP in this scenario indicates that Hapur Municipality will able to sustain 23 percent of proposed investment in phase one i.e. Rs. 600 million, with above mentioned reforms, 90 percent grant and 10 percent own contribution. However, the ULB need to take serious steps to improve collection performance of their own source of fund like property tax and water supply. It is also noticed that there are many unassessed properties in the Municipality, it need to regularize and increase the water supply connections within the jurisdiction. The status of this scenario is illustrated in **Table XIIII-.**

Table XIIII-6: Scenario three – Improved Cause

Item	2011	2015	2021	2031
	Rs. Million			
Revenue Account				
Opening Balance	106.55	521.49	425.27	3.41
Revenue Income	418.17	592.35	1,028.99	2,162.97

Item	2011	2015	2021	2031
	Rs. Million			
Revenue Expenditure	322.09	463.64	856.18	1,760.86
Closing Balance	214.77	623.42	380.58	(60.69)
Capital Account				
Capital Income	108.00	108.00	-	-
Capital Expenditure	95.85	134.77	217.49	466.22
Capital Status	12.15	(26.77)	(217.49)	(466.22)

Source: Analysis

Table XII-7: Proposed and Sustainable Investment

Item	Proposed Investment	Sustainable Investment
Phase 2011-2015	*Rs. in million*	
Wastewater		
Loan (30)		
Grant (50)		540.00
Own Contribution (20)		60.00
Total	**2611**	**600.00**

Source: Analysis

Abstract of Detailed Municipal Accounts

Nagar Palika Hapur (Gaziabad)

Head of Accounts			2005-06	2006-07	2007-08	2008-09	2009-10	2005-06	2006-07	2007-08	2008-09	2009-10	Average	2005-06	2006-07	2007-08	2008-09	2009-10	Average
			Actual					*Sectoral Contribution*						*Growth Over Previous Year*					
			Rs. In lakhs					*Percentage*						*Percentage*					
	Opening Balance		1.00	1.00	(14.46)	20.66	159.92												
Revenue Account																			
Revenue Receipts																			
A	**Taxes**																		
	1	Property Tax		1.91	1.59	1.91	4.00	N.A.	2.12	1.03	1.16	1.45	1.44	-		(16.85)	20.04	109.96	37.72
	2	Water Tax		2.61	2.15	2.51	5.00	N.A.	2.90	1.40	1.53	1.82	1.91	-		(17.67)	16.78	99.19	32.77
	3	Sewere Tax		0.06	0.05	0.09	0.15	N.A.	0.07	0.03	0.05	0.05	0.05	-		(23.95)	76.47	73.53	42.02
	Sub Total A		**-**	**4.58**	**3.79**	**4.50**	**9.15**	**N.A.**	**5.09**	**2.46**	**2.74**	**3.33**	**3.40**	**-**		**(17.41)**	**18.92**	**103.26**	**34.92**
B	**Non Taxes**																		
	1			-	-	-	-	N.A.	-	-	-	-	-	-					
	2	Theater Tax		0.06	0.06	0.07	0.08	N.A.	0.07	0.04	0.04	0.03	0.05	-		1.31	0.83	14.57	5.57
	3	Licensing Fee		0.43	0.43	0.37	0.70	N.A.	0.48	0.28	0.23	0.25	0.31	-		(0.62)	(13.96)	88.53	24.65
	4	Parking Fee		0.92	0.77	0.74	1.00	N.A.	1.02	0.50	0.45	0.36	0.58	-		(16.81)	(3.25)	34.95	4.96
	5	Slautory		0.24	-	0.70	1.25	N.A.	0.27	-	0.43	0.45	0.29	-		(100.00)		78.11	(10.95)
	6	Rent (Land, House, Shop, Rental vehicles)		1.06	1.35	1.20	1.20	N.A.	1.18	0.88	0.73	0.44	0.81	-		27.31	(11.15)	(0.10)	5.35
	7	Miscellaneous		0.12	0.22	17.30	0.92	N.A.	0.13	0.14	10.52	0.33	2.78	-		81.54	7,738.80	(94.68)	2,575.22
	Sub Total B		**-**	**2.84**	**2.84**	**20.38**	**5.15**	**N.A.**	**3.16**	**1.84**	**12.39**	**1.87**	**4.81**	**-**		**(0.25)**	**618.84**	**(74.75)**	**181.28**
C	**Assigned Revenues**																		
	1	Kanji House						N.A.	-	-	-	-	-	-					
	2	Property Transfer Tax		-	-	23.31	50.00	N.A.	-	-	14.17	18.18	8.09	-				114.53	114.53
	3							N.A.	-	-	-	-	-	-					
	4	Others		1.02	1.68	1.14	3.26	N.A.	1.13	1.09	0.70	1.19	1.03	-		64.73	(32.02)	184.96	72.56
	Sub Total C		**-**	**1.02**	**1.68**	**24.45**	**53.26**	**N.A.**	**1.13**	**1.09**	**14.87**	**19.36**	**9.11**	**-**		**64.73**	**1,353.05**	**117.82**	**511.87**
D	**Revenue Grants**																		
	1	State Grants (State Finance Commission)		80.39	144.25	113.27	205.00	N.A.	89.26	93.68	68.86	74.53	81.58	-		79.44	(21.48)	80.98	46.32
	2	Twelve Finance Commission						N.A.	-	-	-	-	-	-					
	3							N.A.	-	-	-	-	-	-					
	4	SJSRY						N.A.	-	-	-	-	-	-					
	5	Grant under Scheme N.S.D.P/I.H.S.D.P						N.A.	-	-	-	-	-	-					
	6	Grant from MP/MLA Fund						N.A.	-	-	-	-	-	-					
	7	Golden Jubilee						N.A.	-	-	-	-	-	-					
	8							N.A.	-	-	-	-	-	-					
	9	Miscellaneous						N.A.	-	-	-	-	-	-					
	Sub Total D		**-**	**80.39**	**144.25**	**113.27**	**205.00**	**N.A.**	**89.26**	**93.68**	**68.86**	**74.53**	**81.58**	**-**		**79.44**	**(21.48)**	**80.98**	**46.32**
E	**Receipts from Water Tax and Sewerage Tax**																		
	1	Water Charges		1.22	1.43	1.88	2.50	N.A.	1.36	0.93	1.15	0.91	1.09	-		17.43	31.40	32.74	27.19
	2	Connection Fee						N.A.	-	-	-	-	-	-					
	3	Others						N.A.	-	-	-	-	-	-					
	4	Rent from Sewage Tanker						N.A.	-	-	-	-	-	-					
	5	Miscellaneous						N.A.	-	-	-	-	-	-					
	Sub Total E		**-**	**1.22**	**1.43**	**1.88**	**2.50**	**N.A.**	**1.36**	**0.93**	**1.15**	**0.91**	**1.09**	**-**		**17.43**	**31.40**	**32.74**	**27.19**
Grand Total Revenue Receipts			**-**	**90.06**	**153.99**	**164.49**	**275.06**	**N.A.**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**-**		**70.99**	**6.82**	**67.22**	**48.34**
Revenue Expenditure																			
A	**Establishment**																		
	1	Pay and Allowance to Municipal Staff		13.78	12.27	10.19	26.47	N.A.	16.56	13.29	9.22	11.42	12.62	-		(10.99)	(16.95)	159.74	43.93
	2	Pension Benefits		6.99	15.64	14.64	16.00	N.A.	8.39	16.94	13.25	6.91	11.37	-		123.85	(6.37)	9.25	42.25
	3	Miscellaneous						N.A.	-	-	-	-	-	-					
	Sub Total A		**-**	**20.77**	**27.91**	**24.83**	**42.47**	**N.A.**	**24.95**	**30.23**	**22.47**	**18.33**	**24.00**	**-**		**34.36**	**(11.02)**	**71.00**	**31.45**
B	**Operation & Maintenance -Municipal Services**																		
	1	Roads		7.68	7.43	17.26	20.00	N.A.	9.23	8.05	15.62	8.63	10.38	-		(3.23)	132.24	15.90	48.30
	2	Drains		3.03	1.43	1.70	11.70	N.A.	3.63	1.55	1.54	5.05	2.94	-		(52.58)	18.30	589.36	185.03
	3	Buildings		0.09	0.07	0.05	0.10	N.A.	0.11	0.07	0.04	0.04	0.07	-		(27.89)	(30.07)	109.74	17.26
	4	Lighting						N.A.	-	-	-	-	-	-					
	5	Public Health- Solid Waste Management		0.64	8.06	4.10	5.50	N.A.	0.77	8.73	3.71	2.37	3.90	-		1,156.75	(49.20)	34.28	380.61
	6	Fire						N.A.	-	-	-	-	-	-					
	7	Miscellaneous		11.16	9.74	7.86	31.00	N.A.	13.41	10.55	7.12	13.38	11.11	-		(12.73)	(19.27)	294.19	87.40
	Sub Total B		**-**	**22.60**	**26.74**	**30.96**	**68.30**	**N.A.**	**27.15**	**28.96**	**28.02**	**29.48**	**28.40**	**-**		**18.29**	**15.80**	**120.59**	**51.56**
C	Water Supply and Sewerage Establishment																		
	1	Water Supply		3.82	4.39	4.45	17.90	N.A.	4.59	4.76	4.02	7.73	5.27	-		15.00	1.24	302.43	106.22
	2	Sanitation		31.94	30.78	35.07	95.49	N.A.	38.37	33.33	31.73	41.22	36.16	-		(3.64)	13.94	172.30	60.87
	Sub Total C		**-**	**35.76**	**35.17**	**39.51**	**113.39**	**N.A.**	**42.96**	**38.09**	**35.76**	**48.95**	**41.44**	**-**		**(1.64)**	**12.35**	**186.95**	**65.89**
D	Water Supply and Sewerage O & M																		
	1	Transportation - Water Purchase						N.A.	-	-	-	-	-	-					
	2	Repair and Maintenance		3.95	2.46	3.16	2.50	N.A.	4.75	2.66	2.86	1.08	2.84	-		(37.89)	28.68	(20.89)	(10.03)
	3	Electricity Expenses						N.A.	-	-	-	-	-	-					
	4	Fuel and Oil Expenses						N.A.	-	-	-	-	-	-					
	5	Sewage Tank Purchase and Maintenance						N.A.	-	-	-	-	-	-					
	Sub Total D		**-**	**3.95**	**2.46**	**3.16**	**2.50**	**N.A.**	**4.75**	**2.66**	**2.86**	**1.08**	**2.84**	**-**		**(37.89)**	**28.68**	**(20.89)**	**(10.03)**

Financial Operating Plan: Scenario 1

Nagar Palika Hapur (Gaziabad)

	Head of Account	Current	Proposed Growth	Unit	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Opening Balance					*159.12*	*139.25*	*106.55*	*126.36*	*142.24*	*155.57*	*170.67*	*174.54*	*157.81*	*143.49*	*127.75*	*142.70*	*137.45*	*124.82*	*105.43*	*89.34*	*70.74*	*55.04*	*43.18*	*27.55*	*2.14*
	Revenue Account																									
	Revenue Receipts																									
A	**Taxes**																									
1	Property Tax	37.72	10	%	4.00	4.06	4.58	7.97	8.17	8.31	9.52	10.12	10.50	12.14	12.97	19.18	17.61	17.88	18.08	21.02	22.61	23.18	27.04	29.10	29.84	30.25
2	Water Tax	32.77	10	%	5.00	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00
3	Sewere Tax	42.02	10	%	0.15	0.17	0.18	0.20	0.22	0.24	0.27	0.29	0.32	0.35	0.39	0.43	0.47	0.52	0.57	0.63	0.69	0.76	0.83	0.92	1.01	1.11
	Sub Total A				**9.15**	**9.72**	**10.81**	**14.82**	**15.71**	**16.61**	**18.64**	**20.15**	**21.54**	**24.28**	**26.32**	**33.88**	**33.77**	**35.66**	**37.64**	**42.54**	**46.28**	**49.21**	**55.68**	**60.60**	**64.49**	**68.37**
B	**Non Taxes**																									
2	Theater Tax	5.57	10	%	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.24	0.26	0.28	0.31	0.34	0.38	0.42	0.46	0.50	0.56
3	Licensing Fee	24.65	10	%	0.70	0.77	0.85	0.93	1.02	1.13	1.24	1.36	1.50	1.65	1.82	2.00	2.20	2.42	2.66	2.92	3.22	3.54	3.89	4.28	4.71	5.18
4	Parking Fee	4.96	10	%	1.00	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.14	2.36	2.59	2.85	3.14	3.45	3.80	4.18	4.59	5.05	5.56	6.12	6.73	7.40
5	Slautory	(10.95)	10	%	1.25	1.38	1.51	1.66	1.83	2.01	2.21	2.44	2.68	2.95	3.24	3.57	3.92	4.32	4.75	5.22	5.74	6.32	6.95	7.64	8.41	9.25
6	Rent (Land, House, Shop, Rental vehicles)	5.35	10	%	1.20	1.32	1.45	1.60	1.76	1.93	2.13	2.34	2.57	2.83	3.11	3.42	3.77	4.14	4.56	5.01	5.51	6.07	6.67	7.34	8.07	8.88
7	Miscellaneous	2,575.22	10	%	0.92	1.01	1.11	1.22	1.35	1.48	1.63	1.79	1.97	2.17	2.39	2.62	2.89	3.18	3.49	3.84	4.23	4.65	5.12	5.63	6.19	6.81
	Sub Total B				**5.15**	**5.66**	**6.23**	**6.85**	**7.53**	**8.29**	**9.11**	**10.03**	**11.03**	**12.13**	**13.34**	**14.68**	**16.15**	**17.76**	**19.54**	**21.49**	**23.64**	**26.01**	**28.61**	**31.47**	**34.61**	**38.07**
C	**Assigned Revenues**																									
1	Kanji House		10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Property Transfer Tax	114.53	10	%	50.00	55.00	60.50	66.55	73.21	80.53	88.58	97.44	107.18	117.90	129.69	142.66	156.92	172.61	189.87	208.86	229.75	252.72	278.00	305.80	336.37	370.01
3	Others	72.56	10	%	3.26	3.59	3.94	4.34	4.77	5.25	5.78	6.35	6.99	7.69	8.46	9.30	10.23	11.25	12.38	13.62	14.98	16.48	18.13	19.94	21.93	24.12
	Sub Total C				**53.26**	**58.59**	**64.44**	**70.89**	**77.98**	**85.78**	**94.35**	**103.79**	**114.17**	**125.58**	**138.14**	**151.96**	**167.15**	**183.87**	**202.25**	**222.48**	**244.73**	**269.20**	**296.12**	**325.73**	**358.31**	**394.14**
D	**Revenue Grants**																									
1	State Grants (State Finance Commission)	46.32	10	%	205.00	225.50	248.05	272.86	300.14	330.15	363.17	399.49	439.44	483.38	531.72	584.89	643.38	707.72	778.49	856.34	941.97	1,036.17	1,139.78	1,253.76	1,379.14	1,517.05
	Sub Total D				**205.00**	**225.50**	**248.05**	**272.86**	**300.14**	**330.15**	**363.17**	**399.49**	**439.44**	**483.38**	**531.72**	**584.89**	**643.38**	**707.72**	**778.49**	**856.34**	**941.97**	**1,036.17**	**1,139.78**	**1,253.76**	**1,379.14**	**1,517.05**
E	**Receipts from Water Tax and Sewerage Tax**																									
1	Water Charges	27.19	10	%	2.50	22.74	26.36	45.03	45.73	46.46	50.81	53.26	55.05	60.84	64.14	94.69	82.76	82.49	83.63	92.91	98.63	101.62	113.48	120.72	124.58	139.32
2	Connection Fee		10	%	-	0.40	2.21	2.31	0.62	0.65	0.67	0.70	0.73	0.76	0.79	0.82	0.85	0.89	0.92	0.96	1.00	1.05	1.09	1.14	1.19	1.24
	Sub Total E				**2.50**	**23.14**	**28.57**	**47.34**	**46.36**	**47.10**	**51.48**	**53.96**	**55.77**	**61.59**	**64.92**	**95.51**	**83.61**	**83.38**	**84.55**	**93.87**	**99.63**	**102.67**	**114.57**	**121.86**	**125.77**	**140.56**
	Grand Total Revenue Receipts				**275.06**	**322.61**	**358.10**	**412.76**	**447.71**	**487.93**	**536.76**	**587.42**	**641.94**	**706.97**	**774.45**	**880.91**	**944.06**	**1,028.38**	**1,122.47**	**1,236.71**	**1,356.25**	**1,483.26**	**1,634.76**	**1,793.43**	**1,962.32**	**2,158.19**
	Revenue Expenditure																									
A	**Establishment**																									
1	Pay and Allowance to Municipal Staff	43.93	10	%	26.47	29.11	32.02	35.22	38.75	42.62	46.88	51.57	56.73	62.40	68.64	75.51	83.06	91.36	100.50	110.55	121.61	133.77	147.14	161.86	178.04	195.85
2	Pension Benefits	42.25	10	%	16.00	17.60	19.36	21.30	23.43	25.77	28.34	31.18	34.30	37.73	41.50	45.65	50.21	55.24	60.76	66.84	73.52	80.87	88.96	97.85	107.64	118.40
	Sub Total A				**42.47**	**46.71**	**51.38**	**56.52**	**62.17**	**68.39**	**75.23**	**82.75**	**91.03**	**100.13**	**110.14**	**121.16**	**133.27**	**146.60**	**161.26**	**177.39**	**195.13**	**214.64**	**236.10**	**259.71**	**285.68**	**314.25**
B	**Operation & Maintenance -Municipal Services**																									
1	Roads	48.30	10	%	20.00	22.00	24.20	26.62	29.28	32.21	35.43	38.97	42.87	47.16	51.87	57.06	62.77	69.05	75.95	83.54	91.90	101.09	111.20	122.32	134.55	148.00
2	Drains	185.03	10	%	11.70	12.87	14.16	15.57	17.13	18.84	20.73	22.80	25.08	27.59	30.35	33.38	36.72	40.39	44.43	48.87	53.76	59.14	65.05	71.56	78.71	86.58
3	Buildings	17.26	10	%	0.10	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.24	0.26	0.29	0.31	0.35	0.38	0.42	0.46	0.51	0.56	0.61	0.67	0.74
5	Public Health- Solid Waste Management	380.61	10	%	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00	40.70
7	Miscellaneous	87.40	10	%	31.00	34.10	37.51	41.26	45.39	49.93	54.92	60.41	66.45	73.10	80.41	88.45	97.29	107.02	117.72	129.49	142.44	156.69	172.36	189.59	208.55	229.41
	Sub Total B				**68.30**	**75.13**	**82.64**	**90.91**	**100.00**	**110.00**	**121.00**	**133.10**	**146.41**	**161.05**	**177.15**	**194.87**	**214.35**	**235.79**	**259.37**	**285.31**	**313.84**	**345.22**	**379.74**	**417.72**	**459.49**	**505.44**
C	**Water Supply and Sewerage Establishment**																									
1	Water Supply	106.22	10	%	17.90	19.69	21.66	23.82	26.21	28.83	31.71	34.88	38.37	42.21	46.43	51.07	56.18	61.80	67.98	74.77	82.25	90.48	99.52	109.47	120.42	132.46
2	Sanitation	60.87	10	%	95.49	105.03	115.54	127.09	139.80	153.78	169.16	186.07	204.68	225.15	247.66	272.43	299.67	329.64	362.60	398.86	438.75	482.63	530.89	583.98	642.38	706.61
	Sub Total C				**113.39**	**124.72**	**137.20**	**150.92**	**166.01**	**182.61**	**200.87**	**220.96**	**243.05**	**267.36**	**294.09**	**323.50**	**355.85**	**391.44**	**430.58**	**473.64**	**521.00**	**573.10**	**630.41**	**693.45**	**762.80**	**839.08**

Rs. in Lakhs

Financial Operating Plan: Scenario 1

Nagar Palika Hapur (Gaziabad)

	Head of Account	Current	Proposed Growth	Unit		2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
																										Rs. in Lakhs	
D	**Water Supply and Sewerage O & M**																										
1	Transportation - Water Purchase		10	%		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Repair and Maintenance	(10.03)	10	%		2.50	2.75	17.09	17.09	17.09	17.09	17.09	17.09	22.29	22.29	22.29	22.29	22.29	22.29	22.29	22.29	22.29	22.29	22.29	22.29	22.29	22.29
	Sub Total D					**2.50**	**2.75**	**17.09**	**17.09**	**17.09**	**17.09**	**17.09**	**17.09**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**	**22.29**
E	**Debt Servicing**																										
1	Loan Repayment	-	10	%		-	-	-	-	-	-	-	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	10.13	-	-	-	-	-	-
2	Advance	6,102.60	10	%		5.00	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00
	Sub Total E					**5.00**	**5.50**	**6.05**	**6.66**	**7.32**	**8.05**	**8.86**	**19.87**	**20.85**	**21.92**	**23.10**	**24.39**	**25.82**	**27.39**	**29.12**	**31.01**	**33.10**	**25.27**	**27.80**	**30.58**	**33.64**	**37.00**
	Grand Total Revenue Expenditure					**231.65**	**254.82**	**294.37**	**322.09**	**352.59**	**386.14**	**423.05**	**473.77**	**523.63**	**572.75**	**626.78**	**686.21**	**751.59**	**823.51**	**902.62**	**989.64**	**1,085.36**	**1,180.53**	**1,296.35**	**1,423.75**	**1,563.90**	**1,718.06**
	Revenue Account Status- Surplus/Deficit					**43.40**	**67.79**	**63.74**	**90.66**	**95.12**	**101.79**	**113.71**	**113.65**	**118.32**	**134.22**	**147.67**	**194.69**	**192.47**	**204.87**	**219.85**	**247.08**	**270.89**	**302.73**	**338.41**	**369.67**	**398.42**	**440.13**
	Capital Account																										
	Capital Receipts																										
A	**Loans and Grants**																										
1	Loans (Advance Payments / Deposits)	-	0	%		10.50	-	-	13.00	13.00	13.00	13.00	13.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Grant under Scheme I.D.S.S.M.T/U.I.D.S.S.M.T	(100.00)	10	%		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Revolving fund	75.50	10	%		25.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Others		10	%		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Grand Total Capital Income					**35.50**	**-**	**-**	**13.00**	**13.00**	**13.00**	**13.00**	**13.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Capital Expenditure																										
	Capital Works																										
1	Roads	118.91	10	%	#	47.00	51.70	56.87	62.56	68.81	75.69	83.26	91.59	100.75	110.82	121.91	134.10	147.51	162.26	178.48	196.33	215.96	237.56	261.32	287.45	316.19	347.81
4	Water Supply	55.68	10	%		10.00	11.00	12.10	13.31	14.64	16.11	17.72	19.49	21.44	23.58	25.94	28.53	31.38	34.52	37.97	41.77	45.95	50.54	55.60	61.16	67.27	74.00
5	Sanitation	52.65	10	%		6.00	6.60	7.26	7.99	8.78	9.66	10.63	11.69	12.86	14.15	15.56	17.12	18.83	20.71	22.78	25.06	27.57	30.33	33.36	36.70	40.36	44.40
6	Others	36.40	10	%		16.70	18.37	20.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Grand Total Capital Expenditure					**79.70**	**87.67**	**96.44**	**83.85**	**92.24**	**101.46**	**111.61**	**122.77**	**135.05**	**148.55**	**163.41**	**179.75**	**197.72**	**217.49**	**239.24**	**263.17**	**289.48**	**318.43**	**350.27**	**385.30**	**423.83**	**466.22**
	Capital Account Status- Surplus/Deficit					**(44.20)**	**(87.67)**	**(96.44)**	**(70.85)**	**(79.24)**	**(88.46)**	**(98.61)**	**(109.77)**	**(135.05)**	**(148.55)**	**(163.41)**	**(179.75)**	**(197.72)**	**(217.49)**	**(239.24)**	**(263.17)**	**(289.48)**	**(318.43)**	**(350.27)**	**(385.30)**	**(423.83)**	**(466.22)**
	Overall Account Status -Current Year					**(0.80)**	**(19.88)**	**(32.70)**	**19.81**	**15.88**	**13.32**	**15.10**	**3.88**	**(16.73)**	**(14.33)**	**(15.73)**	**14.95**	**(5.26)**	**(12.62)**	**(19.39)**	**(16.09)**	**(18.60)**	**(15.70)**	**(11.87)**	**(15.63)**	**(25.41)**	**(26.09)**
	Closing Balance					**159.12**	**139.25**	**106.55**	**126.36**	**142.24**	**155.57**	**170.67**	**174.54**	**157.81**	**143.49**	**127.75**	**142.70**	**137.45**	**124.82**	**105.43**	**89.34**	**70.74**	**55.04**	**43.18**	**27.55**	**2.14**	**(23.95)**
	Summary of Financial Indicators																										
1	Operating Ratio					0.84	0.79	0.82	0.78	0.79	0.79	0.79	0.81	0.82	0.81	0.81	0.78	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.79	0.80	0.80
2	Capital Utilisation Ratio					0.45	-	-	0.16	0.14	0.13	0.12	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Share of Estab.Cost including Terminal Benefits					67%	0.67	0.64	0.64	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.65	0.65	0.65	0.66	0.66	0.66	0.67	0.67	0.67	0.67	0.67
4	Share of Revenue Spent on Establishment					57%	0.53	0.53	0.50	0.51	0.51	0.51	0.52	0.52	0.52	0.52	0.50	0.52	0.52	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
5	Debt Servicing Cost as % of Revenue Income					2%	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
6	Annual Status of Accounts																										
	Water and Sewerage Account					(113.39)	(104.33)	(125.72)	(120.67)	(136.75)	(152.60)	(166.48)	(184.09)	(209.57)	(228.06)	(251.46)	(250.29)	(294.53)	(330.35)	(368.32)	(402.06)	(443.66)	(492.72)	(538.13)	(593.88)	(659.32)	(720.81)
	General Account					43.40	67.79	63.74	90.66	95.12	101.79	113.71	113.65	118.32	134.22	147.67	194.69	192.47	204.87	219.85	247.08	270.89	302.73	338.41	369.67	398.42	440.13
	Capital Deficit					(44.20)	(87.67)	(96.44)	(70.85)	(79.24)	(88.46)	(98.61)	(109.77)	(135.05)	(148.55)	(163.41)	(179.75)	(197.72)	(217.49)	(239.24)	(263.17)	(289.48)	(318.43)	(350.27)	(385.30)	(423.83)	(466.22)
7	Overal Municipal Account Status					(0.80)	(19.88)	(32.70)	19.81	15.88	13.32	15.10	3.88	(16.73)	(14.33)	(15.73)	14.95	(5.26)	(12.62)	(19.39)	(16.09)	(18.60)	(15.70)	(11.87)	(15.63)	(25.41)	(26.09)
8	Closing Balance					159.12	139.25	106.55	126.36	142.24	155.57	170.67	174.54	157.81	143.49	127.75	142.70	137.45	124.82	105.43	89.34	70.74	55.04	43.18	27.55	2.14	(23.95)

Item	2011	2015	2021	##
	Rs. Million			
Revenue Account				
Opening Balance	106.55	170.67	137.45	#
Revenue Income	412.76	587.42	######	#
Revenue Expenditure	322.09	473.77	823.51	#
Closing Balance	126.36	174.54	124.82	#
Capital Account				
Capital Income	13.00	13.00	-	#
Capital Expenditure	83.85	122.77	217.49	#
Capital Status	(70.85)	(109.77)	(217.49)	#

Financial Operating Plan: Scenario 2

Nagar Palika Hapur (Gaziabad)

								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Head of Account	**Current**	**Proposed Growth**	**Unit**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**
	Opening Balance					*159.12*	*139.25*	*106.55*	*136.37*	*159.91*	*179.60*	*207.89*	*219.43*	*200.15*	*184.48*	*165.82*	*166.96*	*157.28*	*139.79*	*115.44*	*97.88*	*75.26*	*56.79*	*46.36*	*28.97*	*1.03*
Revenue Account																										
Revenue Receipts																										
A	**Taxes**																									
1	Property Tax	37.72	10	%	4.00	4.06	4.58	8.80	8.63	8.58	10.96	10.93	10.97	12.97	13.45	17.80	18.01	18.01	18.15	22.00	22.90	23.30	28.30	29.48	30.00	30.35
2	Water Tax	32.77	10	%	5.00	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00
3	Sewere Tax	42.02	10	%	0.15	0.17	0.18	0.20	0.22	0.24	0.27	0.29	0.32	0.35	0.39	0.43	0.47	0.52	0.57	0.63	0.69	0.76	0.83	0.92	1.01	1.11
	Sub Total A				**9.15**	**9.72**	**10.81**	**15.66**	**16.17**	**16.87**	**20.08**	**20.97**	**22.01**	**25.12**	**26.81**	**32.49**	**34.17**	**35.79**	**37.71**	**43.51**	**46.57**	**49.33**	**56.93**	**60.98**	**64.64**	**68.46**
B	**Non Taxes**																									
2	Theater Tax	5.57	10	%	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.24	0.26	0.28	0.31	0.34	0.38	0.42	0.46	0.50	0.56
3	Licensing Fee	24.65	10	%	0.70	0.77	0.85	0.93	1.02	1.13	1.24	1.36	1.50	1.65	1.82	2.00	2.20	2.42	2.66	2.92	3.22	3.54	3.89	4.28	4.71	5.18
4	Parking Fee	4.96	10	%	1.00	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.14	2.36	2.59	2.85	3.14	3.45	3.80	4.18	4.59	5.05	5.56	6.12	6.73	7.40
5	Slautory	(10.95)	10	%	1.25	1.38	1.51	1.66	1.83	2.01	2.21	2.44	2.68	2.95	3.24	3.57	3.92	4.32	4.75	5.22	5.74	6.32	6.95	7.64	8.41	9.25
6	Rent (Land, House, Shop, Rental vehicles)	5.35	10	%	1.20	1.32	1.45	1.60	1.76	1.93	2.13	2.34	2.57	2.83	3.11	3.42	3.77	4.14	4.56	5.01	5.51	6.07	6.67	7.34	8.07	8.88
7	Miscellaneous	2,575.22	10	%	0.92	1.01	1.11	1.22	1.35	1.48	1.63	1.79	1.97	2.17	2.39	2.62	2.89	3.18	3.49	3.84	4.23	4.65	5.12	5.63	6.19	6.81
	Sub Total B				**5.15**	**5.66**	**6.23**	**6.85**	**7.53**	**8.29**	**9.11**	**10.03**	**11.03**	**12.13**	**13.34**	**14.68**	**16.15**	**17.76**	**19.54**	**21.49**	**23.64**	**26.01**	**28.61**	**31.47**	**34.61**	**38.07**
C	**Assigned Revenues**																									
1	Kanji House		10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Property Transfer Tax	114.53	10	%	50.00	55.00	60.50	66.55	73.21	80.53	88.58	97.44	107.18	117.90	129.69	142.66	156.92	172.61	189.87	208.86	229.75	252.72	278.00	305.80	336.37	370.01
3	Others	72.56	10	%	3.26	3.59	3.94	4.34	4.77	5.25	5.78	6.35	6.99	7.69	8.46	9.30	10.23	11.25	12.38	13.62	14.98	16.48	18.13	19.94	21.93	24.12
	Sub Total C				**53.26**	**58.59**	**64.44**	**70.89**	**77.98**	**85.78**	**94.35**	**103.79**	**114.17**	**125.58**	**138.14**	**151.96**	**167.15**	**183.87**	**202.25**	**222.48**	**244.73**	**269.20**	**296.12**	**325.73**	**358.31**	**394.14**
D	**Revenue Grants**																									
1	State Grants (State Finance Commission)	46.32	10	%	205.00	225.50	248.05	272.86	300.14	330.15	363.17	399.49	439.44	483.38	531.72	584.89	643.38	707.72	778.49	856.34	941.97	1,036.17	1,139.78	1,253.76	1,379.14	1,517.05
	Sub Total D				**205.00**	**225.50**	**248.05**	**272.86**	**300.14**	**330.15**	**363.17**	**399.49**	**439.44**	**483.38**	**531.72**	**584.89**	**643.38**	**707.72**	**778.49**	**856.34**	**941.97**	**1,036.17**	**1,139.78**	**1,253.76**	**1,379.14**	**1,517.05**
E	**Receipts from Water Tax and Sewerage Tax**																									
1	Water Charges	27.19	10	%	2.50	22.74	26.36	49.61	48.32	47.96	57.95	57.38	57.50	64.13	66.19	87.74	83.40	82.96	84.07	95.93	99.79	102.34	117.25	122.19	125.50	144.00
2	Connection Fee		10	%	-	0.40	2.21	2.31	0.62	0.65	0.67	0.70	0.73	0.76	0.79	0.82	0.85	0.89	0.92	0.96	1.00	1.05	1.09	1.14	1.19	1.24
	Sub Total E				**2.50**	**23.14**	**28.57**	**51.92**	**48.95**	**48.60**	**58.62**	**58.08**	**58.23**	**64.89**	**66.97**	**88.56**	**84.25**	**83.85**	**84.99**	**96.90**	**100.79**	**103.38**	**118.35**	**123.33**	**126.69**	**145.24**
Grand Total Revenue Receipts					**275.06**	**322.61**	**358.10**	**418.17**	**450.77**	**489.69**	**545.35**	**592.35**	**644.87**	**711.10**	**776.99**	**872.58**	**945.10**	**1,028.99**	**1,122.98**	**1,240.71**	**1,357.70**	**1,484.09**	**1,639.79**	**1,795.27**	**1,963.39**	**2,162.97**
Revenue Expenditure																										
A	**Establishment**																									
1	Pay and Allowance to Municipal Staff	43.93	10	%	26.47	29.11	32.02	35.22	38.75	42.62	46.88	51.57	56.73	62.40	68.64	75.51	83.06	91.36	100.50	110.55	121.61	133.77	147.14	161.86	178.04	195.85
2	Pension Benefits	42.25	10	%	16.00	17.60	19.36	21.30	23.43	25.77	28.34	31.18	34.30	37.73	41.50	45.65	50.21	55.24	60.76	66.84	73.52	80.87	88.96	97.85	107.64	118.40
	Sub Total A				**42.47**	**46.71**	**51.38**	**56.52**	**62.17**	**68.39**	**75.23**	**82.75**	**91.03**	**100.13**	**110.14**	**121.16**	**133.27**	**146.60**	**161.26**	**177.39**	**195.13**	**214.64**	**236.10**	**259.71**	**285.68**	**314.25**
B	**Operation & Maintenance -Municipal Services**																									
1	Roads	48.30	10	%	20.00	22.00	24.20	26.62	29.28	32.21	35.43	38.97	42.87	47.16	51.87	57.06	62.77	69.05	75.95	83.54	91.90	101.09	111.20	122.32	134.55	148.00
2	Drains	185.03	10	%	11.70	12.87	14.16	15.57	17.13	18.84	20.73	22.80	25.08	27.59	30.35	33.38	36.72	40.39	44.43	48.87	53.76	59.14	65.05	71.56	78.71	86.58
3	Buildings	17.26	10	%	0.10	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.24	0.26	0.29	0.31	0.35	0.38	0.42	0.46	0.51	0.56	0.61	0.67	0.74
5	Public Health- Solid Waste Management	380.61	10	%	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00	40.70
7	Miscellaneous	87.40	10	%	31.00	34.10	37.51	41.26	45.39	49.93	54.92	60.41	66.45	73.10	80.41	88.45	97.29	107.02	117.72	129.49	142.44	156.69	172.36	189.59	208.55	229.41
	Sub Total B				**68.30**	**75.13**	**82.64**	**90.91**	**100.00**	**110.00**	**121.00**	**133.10**	**146.41**	**161.05**	**177.15**	**194.87**	**214.35**	**235.79**	**259.37**	**285.31**	**313.84**	**345.22**	**379.74**	**417.72**	**459.49**	**505.44**
C	**Water Supply and Sewerage Establishment**																									
1	Water Supply	106.22	10	%	17.90	19.69	21.66	23.82	26.21	28.83	31.71	34.88	38.37	42.21	46.43	51.07	56.18	61.80	67.98	74.77	82.25	90.48	99.52	109.47	120.42	132.46
2	Sanitation	60.87	10	%	95.49	105.03	115.54	127.09	139.80	153.78	169.16	186.07	204.68	225.15	247.66	272.43	299.67	329.64	362.60	398.86	438.75	482.63	530.89	583.98	642.38	706.61
	Sub Total C				**113.39**	**124.72**	**137.20**	**150.92**	**166.01**	**182.61**	**200.87**	**220.96**	**243.05**	**267.36**	**294.09**	**323.50**	**355.85**	**391.44**	**430.58**	**473.64**	**521.00**	**573.10**	**630.41**	**693.45**	**762.80**	**839.08**
D	**Water Supply and Sewerage O & M**																									
1	Transportation - Water Purchase		10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Repair and Maintenance	(10.03)	10	%	2.50	2.75	17.09	17.09	17.09	17.09	17.09	17.09	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89	25.89
	Sub Total D				**2.50**	**2.75**	**17.09**	**17.09**	**17.09**	**17.09**	**17.09**	**17.09**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**	**25.89**
E	**Debt Servicing**																									
1	Loan Repayment	-	10	%	-	-	-	-	-	-	-	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	-	-	-	-	-
2	Advance	6,102.60	10	%	5.00	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00
	Sub Total E				**5.00**	**5.50**	**6.05**	**6.66**	**7.32**	**8.05**	**8.86**	**21.74**	**22.72**	**23.79**	**24.97**	**26.26**	**27.69**	**29.26**	**30.99**	**32.88**	**34.97**	**25.27**	**27.80**	**30.58**	**33.64**	**37.00**
Grand Total Revenue Expenditure					**231.65**	**254.82**	**294.37**	**322.09**	**352.59**	**386.14**	**423.05**	**475.64**	**529.10**	**578.22**	**632.25**	**691.68**	**757.06**	**828.98**	**908.09**	**995.11**	**1,090.83**	**1,184.13**	**1,299.95**	**1,427.35**	**1,567.50**	**1,721.66**
Revenue Account Status- Surplus/Deficit					**43.40**	**67.79**	**63.74**	**96.08**	**98.18**	**103.55**	**122.30**	**116.71**	**115.77**	**132.88**	**144.74**	**180.89**	**188.03**	**200.01**	**214.89**	**245.61**	**266.87**	**299.96**	**339.84**	**367.92**	**395.89**	**441.31**
Capital Account																										
Capital Receipts																										
A	**Loans and Grants**																									
1	Loans (Advance Payments / Deposits)	-	0	%	10.50	-	-	19.80	19.80	19.80	19.80	19.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Grant under Scheme I.D.S.S.M.T/U.I.D.S.S.M.T	(100.00)	10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Revolving fund	75.50	10	%	25.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Others		10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Grand Total Capital Income				**35.50**	**-**	**-**	**19.80**	**19.80**	**19.80**	**19.80**	**19.80**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Capital Expenditure																										
	Capital Works																									
1	Roads	118.91	10	%	# 47.00	51.70	56.87	62.56	68.81	75.69	83.26	91.59	100.75	110.82	121.91	134.10	147.51	162.26	178.48	196.33	215.96	237.56	261.32	287.45	316.19	347.81
4	Water Supply	55.68	10	%	10.00	11.00	12.10	13.31	14.64	16.11	17.72	19.49	21.44	23.58	25.94	28.53	31.38	34.52	37.97	41.77	45.95	50.54	55.60	61.16	67.27	74.00
5	Sanitation	52.65	10	%	6.00	6.60	7.26	7.99	8.78	9.66	10.63	11.69	12.86	14.15	15.56	17.12	18.83	20.71	22.78	25.06	27.57	30.33	33.36	36.70	40.36	44.40
6	Others	36.40	10	%	16.70	18.37	20.21	2.20	2.20	2.20	2.20	2.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Grand Total Capital Expenditure				**79.70**	**87.67**	**96.44**	**86.05**	**94.44**	**103.66**	**113.81**	**124.97**	**135.05**	**148.55**	**163.41**	**179.75**	**197.72**	**217.49**	**239.24**	**263.17**	**289.48**	**318.43**	**350.27**	**385.30**	**423.83**	**466.22**
Capital Account Status- Surplus/Deficit					**(44.20)**	**(87.67)**	**(96.44)**	**(66.25)**	**(74.64)**	**(83.86)**	**(94.01)**	**(105.17)**	**(135.05)**	**(148.55)**	**(163.41)**	**(179.75)**	**(197.72)**	**(217.49)**	**(239.24)**	**(263.17)**	**(289.48)**	**(318.43)**	**(350.27)**	**(385.30)**	**(423.83)**	**(466.22)**
Overall Account Status -Current Year					**(0.80)**	**(19.88)**	**(32.70)**	**29.82**	**23.54**	**19.69**	**28.29**	**11.54**	**(19.27)**	**(15.67)**	**(18.67)**	**1.15**	**(9.69)**	**(17.49)**	**(24.35)**	**(17.56)**	**(22.62)**	**(18.47)**	**(10.43)**	**(17.39)**	**(27.94)**	**(24.91)**
Closing Balance					**159.12**	**139.25**	**106.55**	**136.37**	**159.91**	**179.60**	**207.89**	**219.43**	**200.15**	**184.48**	**165.82**	**166.96**	**157.28**	**139.79**	**115.44**	**97.88**	**75.26**	**56.79**	**46.36**	**28.97**	**1.03**	**(23.88)**

Financial Operating Plan: Scenario 2																									
Nagar Palika Hapur (Gaziabad)																									
							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Head of Account	Current	Proposed Growth	Unit	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Summary of Financial Indicators																									
1 Operating Ratio				0.84	0.79	0.82	0.77	0.78	0.79	0.78	0.80	0.82	0.81	0.81	0.79	0.80	0.81	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.80
2 Capital Utilisation Ratio				0.45	-	-	0.23	0.21	0.19	0.17	0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Share of Estab.Cost including Terminal Benefits				67%	0.67	0.64	0.64	0.65	0.65	0.65	0.64	0.63	0.64	0.64	0.64	0.64	0.65	0.65	0.65	0.65	0.66	0.67	0.67	0.67	0.67
4 Share of Revenue Spent on Establishment				57%	0.53	0.53	0.50	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.51	0.52	0.52	0.53	0.52	0.53	0.53	0.53	0.53	0.53	0.53
5 Debt Servicing Cost as % of Revenue Income				2%	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02
6 Annual Status of Accounts																									
Water and Sewerage Account				(113.39)	(104.33)	(125.72)	(116.09)	(134.15)	(151.10)	(159.34)	(179.97)	(210.72)	(228.36)	(253.01)	(260.83)	(297.49)	(333.48)	(371.48)	(402.63)	(446.10)	(495.61)	(537.96)	(596.01)	(662.00)	(719.73)
General Account				43.40	67.79	63.74	96.08	98.18	103.55	122.30	116.71	115.77	132.88	144.74	180.89	188.03	200.01	214.89	245.61	266.87	299.96	339.84	367.92	395.89	441.31
Capital Deficit				(44.20)	(87.67)	(96.44)	(66.25)	(74.64)	(83.86)	(94.01)	(105.17)	(135.05)	(148.55)	(163.41)	(179.75)	(197.72)	(217.49)	(239.24)	(263.17)	(289.48)	(318.43)	(350.27)	(385.30)	(423.83)	(466.22)
7 Overal Municipal Account Status				(0.80)	(19.88)	(32.70)	29.82	23.54	19.69	28.29	11.54	(19.27)	(15.67)	(18.67)	1.15	(9.69)	(17.49)	(24.35)	(17.56)	(22.62)	(18.47)	(10.43)	(17.39)	(27.94)	(24.91)
8 Closing Balance				159.12	139.25	106.55	136.37	159.91	179.60	207.89	219.43	200.15	184.48	165.82	166.96	157.28	139.79	115.44	97.88	75.26	56.79	46.36	28.97	1.03	(23.88)

Financial Operating Plan: Base Case Scenario 3

Nagar Palika Hapur (Gaziabad)

							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Head of Account	**Current**	**Proposed Growth**	**Unit**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**
														Rs. in Lakhs											
Opening Balance					*159.12*	*139.25*	*106.55*	*214.77*	*316.71*	*414.80*	*521.49*	*623.42*	*576.95*	*534.08*	*488.21*	*462.15*	*425.27*	*380.58*	*329.02*	*284.26*	*234.44*	*176.77*	*127.14*	*70.56*	*3.41*
Revenue Account																									
Revenue Receipts																									
A Taxes																									
1 Property Tax	37.72	10	%	4.00	4.06	4.58	8.80	8.63	8.58	10.96	10.93	10.97	12.97	13.45	17.80	18.01	18.01	18.15	22.00	22.90	23.30	28.30	29.48	30.00	30.35
2 Water Tax	32.77	10	%	5.00	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00
3 Sewere Tax	42.02	10	%	0.15	0.17	0.18	0.20	0.22	0.24	0.27	0.29	0.32	0.35	0.39	0.43	0.47	0.52	0.57	0.63	0.69	0.76	0.83	0.92	1.01	1.11
Sub Total A				**9.15**	**9.72**	**10.81**	**15.66**	**16.17**	**16.87**	**20.08**	**20.97**	**22.01**	**25.12**	**26.81**	**32.49**	**34.17**	**35.79**	**37.71**	**43.51**	**46.57**	**49.33**	**56.93**	**60.98**	**64.64**	**68.46**
B Non Taxes																									
2 Theater Tax	5.57	10	%	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.24	0.26	0.28	0.31	0.34	0.38	0.42	0.46	0.50	0.56
3 Licensing Fee	24.65	10	%	0.70	0.77	0.85	0.93	1.02	1.13	1.24	1.36	1.50	1.65	1.82	2.00	2.20	2.42	2.66	2.92	3.22	3.54	3.89	4.28	4.71	5.18
4 Parking Fee	4.96	10	%	1.00	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.14	2.36	2.59	2.85	3.14	3.45	3.80	4.18	4.59	5.05	5.56	6.12	6.73	7.40
5 Slautory	(10.95)	10	%	1.25	1.38	1.51	1.66	1.83	2.01	2.21	2.44	2.68	2.95	3.24	3.57	3.92	4.32	4.75	5.22	5.74	6.32	6.95	7.64	8.41	9.25
6 Rent (Land, House, Shop, Rental vehicles)	5.35	10	%	1.20	1.32	1.45	1.60	1.76	1.93	2.13	2.34	2.57	2.83	3.11	3.42	3.77	4.14	4.56	5.01	5.51	6.07	6.67	7.34	8.07	8.88
7 Miscellaneous	2,575.22	10	%	0.92	1.01	1.11	1.22	1.35	1.48	1.63	1.79	1.97	2.17	2.39	2.62	2.89	3.18	3.49	3.84	4.23	4.65	5.12	5.63	6.19	6.81
Sub Total B				**5.15**	**5.66**	**6.23**	**6.85**	**7.53**	**8.29**	**9.11**	**10.03**	**11.03**	**12.13**	**13.34**	**14.68**	**16.15**	**17.76**	**19.54**	**21.49**	**23.64**	**26.01**	**28.61**	**31.47**	**34.61**	**38.07**
C Assigned Revenues																									
1 Kanji House		10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Property Transfer Tax	114.53	10	%	50.00	55.00	60.50	66.55	73.21	80.53	88.58	97.44	107.18	117.90	129.69	142.66	156.92	172.61	189.87	208.86	229.75	252.72	278.00	305.80	336.37	370.01
3 Others	72.56	10	%	3.26	3.59	3.94	4.34	4.77	5.25	5.78	6.35	6.99	7.69	8.46	9.30	10.23	11.25	12.38	13.62	14.98	16.48	18.13	19.94	21.93	24.12
Sub Total C				**53.26**	**58.59**	**64.44**	**70.89**	**77.98**	**85.78**	**94.35**	**103.79**	**114.17**	**125.58**	**138.14**	**151.96**	**167.15**	**183.87**	**202.25**	**222.48**	**244.73**	**269.20**	**296.12**	**325.73**	**358.31**	**394.14**
D Revenue Grants																									
1 State Grants (State Finance Commission)	46.32	10	%	205.00	225.50	248.05	272.86	300.14	330.15	363.17	399.49	439.44	483.38	531.72	584.89	643.38	707.72	778.49	856.34	941.97	1,036.17	1,139.78	1,253.76	1,379.14	1,517.05
Sub Total D				**205.00**	**225.50**	**248.05**	**272.86**	**300.14**	**330.15**	**363.17**	**399.49**	**439.44**	**483.38**	**531.72**	**584.89**	**643.38**	**707.72**	**778.49**	**856.34**	**941.97**	**1,036.17**	**1,139.78**	**1,253.76**	**1,379.14**	**1,517.05**
E Receipts from Water Tax and Sewerage Tax																									
1 Water Charges	27.19	10	%	2.50	22.74	26.36	49.61	48.32	47.96	57.95	57.38	57.50	64.13	66.19	87.74	83.40	82.96	84.07	95.93	99.79	102.34	117.25	122.19	125.50	144.00
2 Connection Fee		10	%	-	0.40	2.21	2.31	0.62	0.65	0.67	0.70	0.73	0.76	0.79	0.82	0.85	0.89	0.92	0.96	1.00	1.05	1.09	1.14	1.19	1.24
Sub Total E				**2.50**	**23.14**	**28.57**	**51.92**	**48.95**	**48.60**	**58.62**	**58.08**	**58.23**	**64.89**	**66.97**	**88.56**	**84.25**	**83.85**	**84.99**	**96.90**	**100.79**	**103.38**	**118.35**	**123.33**	**126.69**	**145.24**
Grand Total Revenue Receipts				**275.06**	**322.61**	**358.10**	**418.17**	**450.77**	**489.69**	**545.35**	**592.35**	**644.87**	**711.10**	**776.99**	**872.58**	**945.10**	**1,028.99**	**1,122.98**	**1,240.71**	**1,357.70**	**1,484.09**	**1,639.79**	**1,795.27**	**1,963.39**	**2,162.97**
Revenue Expenditure																									
A Establishment																									
1 Pay and Allowance to Municipal Staff	43.93	10	%	26.47	29.11	32.02	35.22	38.75	42.62	46.88	51.57	56.73	62.40	68.64	75.51	83.06	91.36	100.50	110.55	121.61	133.77	147.14	161.86	178.04	195.85
2 Pension Benefits	42.25	10	%	16.00	17.60	19.36	21.30	23.43	25.77	28.34	31.18	34.30	37.73	41.50	45.65	50.21	55.24	60.76	66.84	73.52	80.87	88.96	97.85	107.64	118.40
Sub Total A				**42.47**	**46.71**	**51.38**	**56.52**	**62.17**	**68.39**	**75.23**	**82.75**	**91.03**	**100.13**	**110.14**	**121.16**	**133.27**	**146.60**	**161.26**	**177.39**	**195.13**	**214.64**	**236.10**	**259.71**	**285.68**	**314.25**
B Operation & Maintenance -Municipal Services																									
1 Roads	48.30	10	%	20.00	22.00	24.20	26.62	29.28	32.21	35.43	38.97	42.87	47.16	51.87	57.06	62.77	69.05	75.95	83.54	91.90	101.09	111.20	122.32	134.55	148.00
2 Drains	185.03	10	%	11.70	12.87	14.16	15.57	17.13	18.84	20.73	22.80	25.08	27.59	30.35	33.38	36.72	40.39	44.43	48.87	53.76	59.14	65.05	71.56	78.71	86.58
3 Buildings	17.26	10	%	0.10	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.24	0.26	0.29	0.31	0.35	0.38	0.42	0.46	0.51	0.56	0.61	0.67	0.74
5 Public Health- Solid Waste Management	380.61	10	%	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00	40.70
7 Miscellaneous	87.40	10	%	31.00	34.10	37.51	41.26	45.39	49.93	54.92	60.41	66.45	73.10	80.41	88.45	97.29	107.02	117.72	129.49	142.44	156.69	172.36	189.59	208.55	229.41
Sub Total B				**68.30**	**75.13**	**82.64**	**90.91**	**100.00**	**110.00**	**121.00**	**133.10**	**146.41**	**161.05**	**177.15**	**194.87**	**214.35**	**235.79**	**259.37**	**285.31**	**313.84**	**345.22**	**379.74**	**417.72**	**459.49**	**505.44**
C Water Supply and Sewerage Establishment																									
1 Water Supply	106.22	10	%	17.90	19.69	21.66	23.82	26.21	28.83	31.71	34.88	38.37	42.21	46.43	51.07	56.18	61.80	67.98	74.77	82.25	90.48	99.52	109.47	120.42	132.46
2 Sanitation	60.87	10	%	95.49	105.03	115.54	127.09	139.80	153.78	169.16	186.07	204.68	225.15	247.66	272.43	299.67	329.64	362.60	398.86	438.75	482.63	530.89	583.98	642.38	706.61
Sub Total C				**113.39**	**124.72**	**137.20**	**150.92**	**166.01**	**182.61**	**200.87**	**220.96**	**243.05**	**267.36**	**294.09**	**323.50**	**355.85**	**391.44**	**430.58**	**473.64**	**521.00**	**573.10**	**630.41**	**693.45**	**762.80**	**839.08**
D Water Supply and Sewerage O & M																									
1 Transportation - Water Purchase		10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Repair and Maintenance	(10.03)	10	%	2.50	2.75	17.09	17.09	17.09	17.09	17.09	17.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09	65.09
Sub Total D				**2.50**	**2.75**	**17.09**	**17.09**	**17.09**	**17.09**	**17.09**	**17.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**	**65.09**
E Debt Servicing																									
1 Loan Repayment	-	10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Advance	6,102.60	10	%	5.00	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97	14.27	15.69	17.26	18.99	20.89	22.97	25.27	27.80	30.58	33.64	37.00
Sub Total E				**5.00**	**5.50**	**6.05**	**6.66**	**7.32**	**8.05**	**8.86**	**9.74**	**10.72**	**11.79**	**12.97**	**14.27**	**15.69**	**17.26**	**18.99**	**20.89**	**22.97**	**25.27**	**27.80**	**30.58**	**33.64**	**37.00**
Grand Total Revenue Expenditure				**231.65**	**254.82**	**294.37**	**322.09**	**352.59**	**386.14**	**423.05**	**463.64**	**556.30**	**605.42**	**659.45**	**718.89**	**784.26**	**856.18**	**935.29**	**1,022.31**	**1,118.03**	**1,223.33**	**1,339.15**	**1,466.55**	**1,606.70**	**1,760.86**
Revenue Account Status- Surplus/Deficit				**43.40**	**67.79**	**63.74**	**96.08**	**98.18**	**103.55**	**122.30**	**128.70**	**88.57**	**105.68**	**117.54**	**153.69**	**160.83**	**172.81**	**187.69**	**218.40**	**239.66**	**260.76**	**300.64**	**328.72**	**356.69**	**402.11**

Financial Operating Plan: Base Case Scenario 3

Nagar Palika Hapur (Gaziabad)

	Head of Account	Current	Proposed Growth	Unit	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
	Capital Account																									
	Capital Receipts																									
A	**Loans and Grants**																									
1	Loans (Advance Payments / Deposits)	-	0	%	10.50	-	-	108.00	108.00	108.00	108.00	108.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Grant under Scheme I.D.S.S.M.T/U.I.D.S.S.M.	(100.00)	10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Revolving fund	75.50	10	%	25.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Others		10	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Grand Total Capital Income				**35.50**	**-**	**-**	**108.00**	**108.00**	**108.00**	**108.00**	**108.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Capital Expenditure																									
	Capital Works																									
1	Roads	118.91	10	%	47.00	51.70	56.87	62.56	68.81	75.69	83.26	91.59	100.75	110.82	121.91	134.10	147.51	162.26	178.48	196.33	215.96	237.56	261.32	287.45	316.19	347.81
4	Water Supply	55.68	10	%	10.00	11.00	12.10	13.31	14.64	16.11	17.72	19.49	21.44	23.58	25.94	28.53	31.38	34.52	37.97	41.77	45.95	50.54	55.60	61.16	67.27	74.00
5	Sanitation	52.65	10	%	6.00	6.60	7.26	7.99	8.78	9.66	10.63	11.69	12.86	14.15	15.56	17.12	18.83	20.71	22.78	25.06	27.57	30.33	33.36	36.70	40.36	44.40
6	Others	36.40	10	%	16.70	18.37	20.21	12.00	12.00	12.00	12.00	12.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Grand Total Capital Expenditure				**79.70**	**87.67**	**96.44**	**95.85**	**104.24**	**113.46**	**123.61**	**134.77**	**135.05**	**148.55**	**163.41**	**179.75**	**197.72**	**217.49**	**239.24**	**263.17**	**289.48**	**318.43**	**350.27**	**385.30**	**423.83**	**466.22**
	Capital Account Status- Surplus/Deficit				**(44.20)**	**(87.67)**	**(96.44)**	**12.15**	**3.76**	**(5.46)**	**(15.61)**	**(26.77)**	**(135.05)**	**(148.55)**	**(163.41)**	**(179.75)**	**(197.72)**	**(217.49)**	**(239.24)**	**(263.17)**	**(289.48)**	**(318.43)**	**(350.27)**	**(385.30)**	**(423.83)**	**(466.22)**
	Overall Account Status -Current Year				**(0.80)**	**(19.88)**	**(32.70)**	**108.22**	**101.94**	**98.09**	**106.69**	**101.93**	**(46.48)**	**(42.87)**	**(45.87)**	**(26.05)**	**(36.89)**	**(44.69)**	**(51.55)**	**(44.76)**	**(49.82)**	**(57.67)**	**(49.63)**	**(56.59)**	**(67.14)**	**(64.11)**
	Closing Balance				**159.12**	**139.25**	**106.55**	**214.77**	**316.71**	**414.80**	**521.49**	**623.42**	**576.95**	**534.08**	**488.21**	**462.15**	**425.27**	**380.58**	**329.02**	**284.26**	**234.44**	**176.77**	**127.14**	**70.56**	**3.41**	**(60.69)**
	Summary of Financial Indicators																									
1	Operating Ratio				0.84	0.79	0.82	0.77	0.78	0.79	0.78	0.78	0.86	0.85	0.85	0.82	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.81
2	Capital Utilisation Ratio				0.45	-	-	1.13	1.04	0.95	0.87	0.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Share of Estab.Cost including Terminal Benefits				67%	0.67	0.64	0.64	0.65	0.65	0.65	0.66	0.60	0.61	0.61	0.62	0.62	0.63	0.63	0.64	0.64	0.64	0.65	0.65	0.65	0.65
4	Share of Revenue Spent on Establishment				57%	0.53	0.53	0.50	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.51	0.52	0.52	0.53	0.52	0.53	0.53	0.53	0.53	0.53	0.53
5	Debt Servicing Cost as % of Revenue Income				2%	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
6	Annual Status of Accounts																									
	Water and Sewerage Account				(113.39)	(104.33)	(125.72)	(116.09)	(134.15)	(151.10)	(159.34)	(179.97)	(249.92)	(267.56)	(292.21)	(300.03)	(336.69)	(372.68)	(410.68)	(441.83)	(485.30)	(534.81)	(577.16)	(635.21)	(701.20)	(758.93)
	General Account				43.40	67.79	63.74	96.08	98.18	103.55	122.30	128.70	88.57	105.68	117.54	153.69	160.83	172.81	187.69	218.40	239.66	260.76	300.64	328.72	356.69	402.11
	Capital Deficit				(44.20)	(87.67)	(96.44)	12.15	3.76	(5.46)	(15.61)	(26.77)	(135.05)	(148.55)	(163.41)	(179.75)	(197.72)	(217.49)	(239.24)	(263.17)	(289.48)	(318.43)	(350.27)	(385.30)	(423.83)	(466.22)
7	Overal Municipal Account Status				(0.80)	(19.88)	(32.70)	108.22	101.94	98.09	106.69	101.93	(46.48)	(42.87)	(45.87)	(26.05)	(36.89)	(44.69)	(51.55)	(44.76)	(49.82)	(57.67)	(49.63)	(56.59)	(67.14)	(64.11)
8	Closing Balance				159.12	139.25	106.55	214.77	316.71	414.80	521.49	623.42	576.95	534.08	488.21	462.15	425.27	380.58	329.02	284.26	234.44	176.77	127.14	70.56	3.41	(60.69)

Item	2011	2015	2021
	Rs. Million		
Revenue Account			
Opening Balance	106.55	521.49	#####
Revenue Income	418.17	592.35	#####
Revenue Expenditure	322.09	463.64	#####
Closing Balance	214.77	623.42	#####
Capital Account			
Capital Income	108.00	108.00	-
Capital Expenditure	95.85	134.77	#####
Capital Status	12.15	(26.77)	#####

Appendix 3

For all villages In master plan area for ultimate population implementing in Phase-II (2014-18)

S. No	Item	Oty	Unit	Rate in Rs.	Amount
1	Construction of Tubewell	11	each	900,000	9,900,000
2	Pumping Main(150 m per tubewell)	1,650	m		
3	i) 150 mm - 50m (per meter)	495	m	1,395	690,525
4	ii) 100 mm - 100 m (per meter)	1,155	m	918	1,060,290
5	Bulk meter for each TW	11	each	100,000	1,100,000
6	Distribution network per capita	85,661	Persons	370	31,694,570
7	Establishment of Pumping plant 25 m Head & 20 HP	11	each	283,500	3,118,500
				Total	**47,563,885**

Estimated Investment Requirements for Water Supply for the period 2011-2041

S. No	Description	Unit	Rate	Phase 1: 2011-2015		Phase 2 : 2016-2020		Phase 3: 2021-2025		Phase 4 : 2026-2030		Phase 5 : 2031-2035		Total	
				Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount
1	Construction of Tube wells	No	900,000	1	900,000	3	2,700,000	24	21,600,000	8	7,200,000	33	29,700,000	69	62,100,000
2	Construction of Pump House civil	No	200,000	1	200,000	3	600,000	24	4,800,000	8	1,600,000	33	6,600,000	69	13,800,000
3	Pump set with electrical & mechanical	No	25,000	2	50,000	5	125,000	36	900,000	12	300,000	50	1,250,000	105	2,625,000
4	Construction of CWRs	Litre	3	0	0	4,000,000	12,000,000	14000000	42,000,000	0	0	0	0	18,000,000	54,000,000
5	Construction of OHSRs	Litre	8	0	0	4,000,000	32,000,000	14000000	112,000,000	0	0	0	0	18,000,000	144,000,000
6	Clear Water Pumping Station	KW	25,000	0	0	148	3,700,000	518	12,950,000	0	0	0	0	666	16,650,000
7	Rising Main DI Pipe K7, Dia in mm														
8	250 mm	m	3,007	300	902,100	900	2,706,300	7200	21,650,400	2,400	7,216,800	9900	29,769,300	20700	62,244,900
9	300 mm	m	3,814	100	381,400	300	1,144,200	2400	9,153,600	800	3,051,200	3300	12,586,200	6900	26,316,600
10	Distribution system	m	1,500	0	0	0	0	133140	199,710,000	133140	199,710,000	133140	199,710,000	399420	599,130,000
11	Domestic Meters			0	0	5000	10,000,000	8445	16,890,000	0	0	0	0	13445	26,890,000
12	Bulk Consumer Meters	No	3,000	1000	3,000,000									1000	3,000,000
13	Bulk System Meters for Tube wells	No	50,000	36	1,800,000	3	150,000	24	1,200,000	8	400,000	33	1,650,000	104	5,200,000
14	Bulk System Meters for OHSRs	No	300,000	15	4,500,000	2	600,000	7	2,100,000	0	0	0	0	24	7,200,000
15	Bulk System Meters for CWPS	No	200,000	4	800,000	2	400,000	7	1,400,000	0	0	0	0	13	2,600,000
16	Chlorinaters and tonners		150,000	15	2,250,000	2	300,000	7	1,050,000	0	0	0	0	24	3,600,000

17	Reduction of NRW & Replace Service Line	No	2,000	2000	4,000,000	3,000	6,000,000	4000	8,000,000	5454	10,908,000	0	0	14454	28,908,000
18	Electric Connection on Tube Wells	No	75,000	1	75,000	3	225,000	24	1,800,000	8	600,000	33	2,475,000	69	5,175,000
19	Electric Connection on CWPS	No	150,000	0	0	2	300,000	7	1,050,000	0	0	0	0	9	1,350,000
20	Water supply in Villages						47,563,885								47,563,885
21	**Sub Total**				**18,858,500**		**120,514,385**		**458,254,000**		**230,986,000**		**283,740,500**		**1,112,353,385**
22	Physical Contingency, at 10 %				1,885,850		12,051,438		45,825,400		23,098,600		28,374,050		111,235,339
23	Design and supervision services at 5%				942,925		6,025,719		22,912,700		11,549,300		14,187,025		55,617,669
24	Environmental mitigation at 1%				188,585		1,205,144		4,582,540		2,309,860		2,837,405		11,123,534
25	Social Interventions at 1%				188,585		1,205,144		4,582,540		2,309,860		2,837,405		11,123,534
26	Institutional Development Interventions at 1%				188,585		1,205,144		4,582,540		2,309,860		2,837,405		11,123,534
27	**Grand Total**				**22,253,030**		**142,206,974**		**540,739,720**		**272,563,480**		**334,813,790**		**1,312,576,994**

Appendix 4

Low Cost Sanitation & Community facilities in Villages

S. No	Name of the Village	Households with Toilets	Total Households in year 2010	Households without toilets	Low Cost Sanitation Scheme for 100% Households
1	Abdullapur Basantpur Urf Farid	200	400	200	200
2	Achhaija	675	750	75	75
3	Asodha	2,040	2,400	360	360
4	Doymi	225	450	225	225
5	Jarauthi	50	100	50	50
6	Mansoorpur	21	126	105	105
7	Muradnagar	200	1,200	1,000	1,000
8	Shyam Nagar	208	260	52	52
9	Sabli	300	700	400	400

Low Cost Sanitation & Community facilities in Municipal area of Hapur

S.No	Name of the Town	Households with Toilets	Total Households in year 2011	Households without toilets	Low Cost Sanitation Scheme for 90% Households	Community Toilets for remaining 10 % of Households
1	Hapur	36813	40903	4090	3681	409

Estimation and Costing for providing Low Cost Sanitation for villages

S. No	Name of the Village	Low Cost Sanitation Scheme for 100% Households in Phase -I	Total Cost for providing LSS(Rs. 3000 per household) in Phase -I
1	Abdullapur Basantpur Urf Farid	200	600,000
2	Achhaija	75	225,000
3	Asodha	360	1,080,000
4	Doymi	225	675,000
5	Jarauthi	50	150,000
6	Mansoorpur	105	315,000
7	Muradnagar	1,000	3,000,000
8	Shyam Nagar	52	156,000
9	Sabli	400	1,200,000
		Total	**7,401,000**

Estimation and Costing for providing Low Cost Sanitation and Community Toilets for Town

S. No	Name of the Town	Low Cost Sanitation Scheme for 90% Households in Phase -I	Total Cost for providing LSS(Rs. 3000 per household) in Phase -I	No.of Community Toilets of 10 seats for 500 persons	Total Cost for constructing of Community Toilets for municipal area , Rs. 20 lacs per CT (in RS.)
1	Hapur	3,681	11,043,810	6	12,000,000
		Total	**11,043,810**		**12,000,000**

Note :1) Govt will give subsidy by providing 50% of Toilet cost and remaining cost will be taken up by household owner only.
2) Community Toilets will be constructed by government but will be maintained by community toilet users only
3) Considering cost of each community toilet as Rs. 20 lacs having 10 seats including rest room and borewell etc

Population and Sewage Flow Generation for Zone –I

S.No.	Ward No.	Area in Ha	Projected Population Density				Projected Population				Projected Sewage Generation in MLD			
			2011	2021	2031	2041	2011	2021	2031	2041	2011	2021	2031	2041
1	4	37.53	88.76	106.51	127.81	153.37	3,331	3,998	4,797	5,756	0.36	0.43	0.52	0.62
2	6	256.36	60.87	73.04	87.65	105.18	15,604	18,725	22,470	26,964	1.69	2.02	2.43	2.91
3	11	21.82	190.94	225.31	265.87	313.72	4,167	4,917	5,802	6,846	0.45	0.53	0.63	0.74
4	14	8.12	736.06	750.78	765.79	781.11	5,980	6,100	6,222	6,346	0.65	0.66	0.67	0.69
5	15	37.31	270.69	311.29	357.99	411.68	10,100	11,615	13,358	15,361	1.09	1.25	1.44	1.66
6	20	2.11	800	800	800	800	1,690	1,690	1,690	1,690	0.18	0.18	0.18	0.18
7	27	2.72	432.19	484.05	542.14	607.2	1,175	1,316	1,474	1,651	0.13	0.14	0.16	0.18
8	Sector 1	53.9	8.76	22.74	40.86	66	472	1,226	2,202	3,557	0.05	0.13	0.24	0.38
9	Sector 2	33.95	8.76	22.74	40.86	66	298	772	1,387	2,241	0.03	0.08	0.15	0.24
10	Sector 3	13.99	8.76	22.74	40.86	66	123	318	572	923	0.01	0.03	0.06	0.1
11	Sector 4	34.28	8.76	22.74	40.86	66	300	780	1,401	2,262	0.03	0.08	0.15	0.24
12	Sector 5	32.63	8.76	22.74	40.86	66	286	742	1,333	2,154	0.03	0.08	0.14	0.23
13	Sector 6	112.77	8.76	22.74	40.86	66	988	2,564	4,608	7,443	0.11	0.28	0.5	0.8
14	Sector 7	94	8.76	22.74	40.86	66	824	2,138	3,841	6,204	0.09	0.23	0.41	0.67
15	Sector 8	217.63	8.76	22.74	40.86	66	1,908	4,949	8,892	14,364	0.21	0.53	0.96	1.55
16	Sector 9	182.91	8.76	22.74	40.86	66	1,603	4,159	7,474	12,072	0.17	0.45	0.81	1.3
	Total	**1,142.05**					**48,850**	**66,008**	**87,522**	**115,835**	**5.28**	**7.13**	**9.45**	**12.51**

Population and Sewage Flow Generation for Zone –II

S.No.	Ward No.	Area in Ha	Projected Population Density				Projected population				Projected SewageGeneration in MLD			
			2011	2021	2031	2041	2011	2021	2031	2041	2011	2021	2031	2041
1	1	9.46	55.55	66.66	80	96	526	631	757	908	0.06	0.07	0.08	0.1
2	3	9.71	662.12	688.6	716.15	744.79	6,432	6,690	6,957	7,236	0.69	0.72	0.75	0.78
3	5	22.78	279.13	321	369.15	424.52	6,357	7,311	8,407	9,669	0.69	0.79	0.91	1.04
4	8	26.32	337.65	388.29	446.54	513.52	8,888	10,222	11,755	13,518	0.96	1.1	1.27	1.46
5	9	13.37	473.79	516.43	562.91	613.57	6,336	6,906	7,528	8,206	0.68	0.75	0.81	0.89
6	10	5.91	356.44	399.22	447.12	500.78	2,106	2,359	2,642	2,959	0.23	0.25	0.29	0.32
7	12	7.42	597.79	633.66	671.68	711.98	4,433	4,699	4,981	5,279	0.48	0.51	0.54	0.57
8	15	28.81	270.69	311.29	357.99	411.68	7,797	8,967	10,312	11,859	0.84	0.97	1.11	1.28
9	17	0.51	435.63	487.91	546.46	612.03	220	247	277	310	0.02	0.03	0.03	0.03
10	20	6.77	800	800	800	800	5,418	5,418	5,418	5,418	0.59	0.59	0.59	0.59
11	21	4.13	800	800	800	800	3,301	3,301	3,301	3,301	0.36	0.36	0.36	0.36
12	22	1.65	179.18	211.43	249.49	294.4	295	348	411	485	0.03	0.04	0.04	0.05
13	23	13.74	168.28	198.57	234.31	276.49	1,592	1,879	2,217	2,616	0.17	0.2	0.24	0.28
14	24	14.46	194.91	229.99	271.39	320.24	2,818	3,325	3,924	4,630	0.3	0.36	0.42	0.5
15	25	13.95	263.7	303.25	348.74	401.05	3,679	4,231	4,866	5,596	0.4	0.46	0.53	0.6
16	27	2.86	432.19	484.05	542.14	607.2	1,238	1,387	1,553	1,739	0.13	0.15	0.17	0.19
	Total	**181.85**					**61,439**	**67,921**	**75,307**	**83,730**	**6.64**	**7.34**	**8.13**	**9.04**

Population and Sewage Flow Generation for Zone –III

S.No.	Ward No.	Area in Hectare	Projected PopulationDensity				Projected Population				Projected Sewage Generation in MLD			
			2011	2021	2031	2041	2011	2021	2031	2041	2011	2021	2031	2041
1	2	62.67	188.26	222.15	262.13	309.32	11,799	13,923	16,429	19,386	1.27	1.5	1.77	2.09
2	4	71.68	88.76	106.51	127.81	153.37	6,362	7,635	9,162	10,994	0.69	0.82	0.99	1.19
3	6	37.03	60.87	73.04	87.65	105.18	2,254	2,705	3,246	3,895	0.24	0.29	0.35	0.42
4	7	150.69	156.65	184.84	218.11	257.37	23,606	27,855	32,868	38,785	2.55	3.01	3.55	4.19
5	11	46.53	190.94	225.31	265.87	313.72	8,885	10,484	12,372	14,598	0.96	1.13	1.34	1.58
6	12	2.96	597.79	633.66	671.68	711.98	1,770	1,877	1,989	2,109	0.19	0.2	0.21	0.23
7	13	25.33	227.09	261.16	300.33	345.38	673	773	889	1,023	0.07	0.08	0.1	0.11
8	14	1.93	736.06	750.78	765.79	781.11	1,418	1,446	1,475	1,505	0.15	0.16	0.16	0.16
9	16	6.08	800	801	802	803	4,866	4,872	4,878	4,885	0.53	0.53	0.53	0.53
10	17	8.33	435.63	487.91	546.46	612.03	3,630	4,066	4,554	5,100	0.39	0.44	0.49	0.55
11	18	16.34	334.04	384.14	441.76	508.03	5,457	6,275	7,217	8,299	0.59	0.68	0.78	0.9
12	19	19.72	330.7	380.3	437.35	502.95	6,522	7,500	8,625	9,919	0.7	0.81	0.93	1.07
13	20	0.29	800	800	800	800	233	233	233	233	0.03	0.03	0.03	0.03
14	22	21.51	179.18	211.43	249.49	294.4	11,230	13,251	15,636	18,451	1.21	1.43	1.69	1.99
15	24	5.5	194.91	229.99	271.39	320.24	1,072	1,265	1,492	1,761	0.12	0.14	0.16	0.19
16	26	7.92	744.84	759.74	774.93	790.43	5,896	6,014	6,134	6,256	0.64	0.65	0.66	0.68
17	27	8.81	432.19	484.05	542.14	607.2	3,807	4,264	4,776	5,349	0.41	0.46	0.52	0.58
	Total	**493.33**					**99,479**	**114,437**	**131,975**	**152,547**	**10.74**	**12.36**	**14.25**	**16.48**

Population and Sewage Flow Generation for Zone –IV

S.No.	Ward No.	Area in Hectare	Projected Population Density				Projected Population				Projected SewageGeneration in MLD			
			2011	2021	2031	2041	2011	2021	2031	2041	2011	2021	2031	2041
1	1	266.29	55.55	66.66	80	96	14,794	17,752	21,303	25,563	1.6	1.92	2.3	2.76
2	7	6.42	156.65	184.84	218.11	257.37	1,006	1,187	1,400	1,652	0.11	0.13	0.15	0.18
3	10	16.47	356.44	399.22	447.12	500.78	5,870	6,575	7,364	8,247	0.63	0.71	0.8	0.89
4	22	6.15	179.18	211.43	249.49	294.4	1,102	1,300	1,534	1,810	0.12	0.14	0.17	0.2
5	23	34.59	168.28	198.57	234.31	276.49	5,821	6,869	8,105	9,564	0.63	0.74	0.88	1.03
6	24	13.5	194.91	229.99	271.39	320.24	2,632	3,106	3,665	4,325	0.28	0.34	0.4	0.47
7	25	19.36	263.7	303.25	348.74	401.05	5,104	5,870	6,751	7,763	0.55	0.63	0.73	0.84
	Total	**362.78**					**36,329**	**42,659**	**50,122**	**58,925**	**3.9**	**4.6**	**5.4**	**6.4**

Population and Sewage Flow Generation for Zone -V, VI, VII and VIII

S.No.	Zone No.	Area in Hectare	Projected Population Density				Projected Population				Projected Sewage Generation in MLD			
			2011	2021	2031	2041	2011	2021	2031	2041	2011	2021	2031	2041
1	V	910	8.76	22.74	40.9	66	7,976	20,693	37,219	60,060	0.86	2.23	4.02	6.49
2	VI	1,090.00	8.76	22.74	40.9	66	9,554	24,787	44,581	71,940	1.03	2.68	4.81	7.77
3	VII	640	8.76	22.74	40.9	66	5,610	14,554	26,176	42,240	0.61	1.57	2.83	4.56
4	VIII	560	8.76	22.74	40.86	66	4,908	12,734	22,882	36,960	0.53	1.38	2.47	3.99
	Total	**3,200.00**					**28,048**	**72,768**	**130,858**	**211,200**	**3.03**	**7.86**	**14.13**	**22.81**

Design Calculation for STPCapacity and Pump KW for Sewage Pump Station

	STP South					STP East					Combined STP flow in MLD for Ultimate design year of 2041
	Total Requirement										
	Zone No.	Flow in MLD				Zone No.	Flow in MLD				
S. No		2011	2021	2031	2041		2011	2021	2031	2041	
1		5.3	7.1	9.5	12.5	4	3.9	4.6	5.4	6.4	
2	2	6.6	7.3	8.1	9	6	1	2.7	4.8	7.8	
3	3	10.7	12.4	14.3	16.5	7	0.6	1.6	2.8	4.6	
4	5	0.9	2.2	4	6.5						
	8	0.5	1.4	2.5	4						
Total		**24**	**30.4**	**38.4**	**48.5**		**5.6**	**8.9**	**13.1**	**18.7**	**67.17**

	Phase-I									
		Flow in MLD for STP South					Flow in MLD for STP East			
S. No	Zone No.	2011	2021	2031	2041	Zone No.	2011	2021	2031	2041
1		5.3	7.1	9.5	12.5	4	3.9	4.6	5.4	6.4
2	2	6.6	7.3	8.1	9					
3	3	10.7	12.4	14.3	16.5					
Total		**22.6**	**26.8**	**31.9**	**38**		**3.9**	**4.6**	**5.4**	**6.4**

Calculation for Pump KW for SPS

S. No	SPS	Year	Flow in MLD	Head in Mts	KW required at Average Flow	KW required at Peak Flow	KW required with 25% Standby
1	South	2026	29.4	15	71	161	201
2	East		5	15	12	27	34
3	South	2041	48.5	15	118	265	332
4	East		18.7	15	45	102	128

Abstract Estimate

S No	Item	Phase 1: 2009-2013	Phase 2: 2014-2018	Phase 3: 2019-2023	Phase 4: 2024-2028	Phase 5: 2029-2033	Grand Total
		Amount in Rupees Million					
1	Rehabilitation of existing system	19.8					**19.8**
2	Laterals New	375.94	170.63	204.38	120	105	**975.94**
3	Trunk Mains New	125.31	56.88	68.13	40	35	**325.31**
4	Sewage Pump House	4.7	-	4.55	-	-	**9.25**
5	STP	90	72	42	-	-	**204**
6	Land Acquisition	340					**340**
7	Low Cost Sanitation, Mtc Eqp	20					**20**
8	Total	975.75	299.5	319.05	160	140	**1,894.30**
9	With Contingencies	1,151.39	353.41	376.48	188.8	165.2	**2,235.27**

Operation and Maintenance Cost in Million Rs per year

	in Phase 1		Addl in Phase 2		Addl in Phase 3		Addl in Phase 4		Addl in Phase 5	
Item	**C**	**O&M**	**C**	**O&M**	**C**	**O&M**	**C**	**O&M**	**C**	**O&M**
Rehabilitation	19.8	0.10								
Sewers	1153	2.88	523.3	1.31	626.8	1.57	368	0.92	322	0.805
M & E	4.7	0.14			4.55	0.14				
Staff		2.9								
SPS Energy old		1.87								
SPS Energy East		0.33			0.93					
SPS Energy South		1.87			1.24					
Civil SPS	3	0.05								
STP	150	0.75	120	0.6	70	0.35				
STP Energy		6		4.8		2.8				
Total		**16.89**		**6.71**		**4.85**		**0.92**		**0.81**

Appendix 5: Detailed Cost Estimates – Solid Waste Management

Table 4-1: Projected Population & Waste Generation

Year	Population	Decadal Growth Rate	Households	Waste Generation
	No,s		*No,s*	*Tons*
2001	211,983	49.19%	31,774	
2011	316,247	31.18%	47,402	99
2016	362,216		54,292	122
2021	414,867	31.18%	62,184	150
2026	475,172		71,223	184
2031	544,243	31.18%	81,576	226
2036	623,353		93,434	278
2041	713,963		107,015	341

Table 4-2: SWM Collection & Transportation Vehicles/Equipment Requirement (2011-2041)

Vehicles/Equipment			2011-16	2016-21	2021-26	2026-31	2031-36	2036-41
Containerized Push Carts for D2D Collection								
	Gross Requirement	no,s	188	215	247	283	324	370
	To be Procured	no,s	188	215	247	283	324	370
Auto Tippers for D2D Collection								
	Gross Requirement	no,s	3	3	3	4	5	5
	To be Procured	no,s	3	-	-	4	1	-
Push Carts for Street sweeping								
	Gross Requirement	no,s	141	145	149	154	160	167
	To be Procured	no,s	141	145	149	154	160	167
Litter Bins								
	Gross Requirement	no,s	250	257	265	274	285	297
	To be Procured	no,s	250	257	265	274	285	297
Closed Containers (3 m3 capacity)								
	Gross Requirement	no,s	67	82	100	123	151	186
	To be Procured	no,s	67	15	85	38	113	73
Dumper Placers (twin containers of 3 m3)								
	Gross Requirement	no,s	5	6	7	8	10	12
	To be Procured	no,s	5	1	1	6	3	3
Closed Containers (4.5 m3 capacity)								
	Gross Requirement	no,s	30	37	45	55	68	83
	To be Procured	no,s	30	7	38	17	51	32
Dumper Placers (twin containers of 4.5 m3)								
	Gross Requirement	no,s	2	3	3	4	5	6
	To be Procured	no,s	2	1	-	3	2	1

Table 4-3: Details of Processing and Disposal Facility

Particulars								
A. Compost Plant								
Design Life (Years)	20	30						
Waste Fraction Composted (%)	56%	56%						
Ultimate Design Capacity (ton/d)	127	191						
Land Required for compost (ha)	2.0	2.9						
Equipment required	Backhoe Loader-1, Tipper Truck-2, Tipper Tractor -2, Water Tanker (3000 lt)-1, Weight Bridge (20 MT)-1, Plant & Machinery-1							
B. Landfill Facility			2011-16	2016-21	2021-26	2026-31	2031-36	2036-41
Design Life (years)	20	30						
Waste Fraction Land filled (%)	35%	35%						
Design Capacity (tons)	411,143	834,837						
Land required for landfill (ha)	7.3	14.9						
Landfill cell area required (sq. m)	46,254	93,919	8,273	10,162	12,484	15,335	21,046	26,620
Equipment required	Backhoe Loader-1, Bull Dozer-1							
Total Land Requirement (20 Years)		9.3	ha (Compost + Landfill)					
Total Land Requirement (30 Years)		17.8	ha (Compost + Landfill)					

Table 4-4: Requirement of Sanitary Workers (D-to-D Collection & Sweeping)

Particulars	2011-16	2016-21	2021-26	2026-31	2031-36	2036-41
For Sweeping & Drain Cleaning	132	136	140	145	150	156
For D-2-D collection (Auto Tipper)	7	8	9	10	11	13
For D-2-D collection (Push Carts)	200	229	262	300	344	394
Total (collection & street sweeping)	339	373	411	455	505	563

Table 4-5: Capital Cost Estimates

Particulars	Total (2011-2041)	2011-16	2016-21	2021-26	2026-31	2031-36	2036-41
		Rs. Lakhs					
Equipment & Vehicles (Collection & Transportation)							
Containerized Push Carts for D2D Collection	162.70	18.80	21.50	24.70	28.30	32.40	37.00
Auto Tippers for D2D Collection	20.00	7.50	-	-	10.00	2.50	-
Push Carts for Street sweeping	91.60	14.10	14.50	14.90	15.40	16.00	16.70
Litter Bins	81.40	12.50	12.85	13.25	13.70	14.25	14.85
Closed Containers (3 m3 capacity)	195.50	33.50	7.50	42.50	19.00	56.50	36.50
Dumper Placers (twin containers of 3 m3)	114.00	30.00	6.00	6.00	36.00	18.00	18.00
Closed Containers (4.5 m3 capacity)	113.75	19.50	4.55	24.70	11.05	33.15	20.80
Dumper Placers (twin containers of 4.5 m3)	81.00	18.00	9.00	-	27.00	18.00	9.00
Total - Collection & Transportation	*859.95*	*153.90*	*75.90*	*126.05*	*160.45*	*190.80*	*152.85*
Landfill Facility							
Equipment							
Backhoe Loader	40.00	20.00				20.00	
Bull Dozer	120.00	60.00				60.00	
Sub-total	160.00	*80.00*	-	-	-	*80.00*	
Civil Works							
Landfill Cell Development	939.19	82.73	101.62	124.84	153.35	210.46	266.20
Other infrastructure (roads, drains, fencing, building, etc	102.72	50.59				52.13	
Sub-total	1,041.92	*133.32*	*101.62*	*124.84*	*153.35*	*262.59*	266.20
Total - Landfill Facility	*1,201.92*	*213.32*	*101.62*	*124.84*	*153.35*	*342.59*	*266.20*
Compost Plant							
Equipment							
Backhoe Loader	40.00	20.00				20.00	
Tipper Truck	48.00	24.00				24.00	
Tipper Tractor	16.00	16.00					
Water Tanker (3000 lt)	6.00	3.00				3.00	
Weight Bridge (20 MT)	20.00	10.00				10.00	
Plant & Machinery	200.00	100.00				100.00	
Sub-total	330.00	*173.00*	-	-	-	*157.00*	
Civil Works							
Interal roads, drains, tipping floor, office building, store, e	146.48	99.23				47.3	
Total - Compost Plant	*476.48*	*272.23*	-	-	-	*204.25*	-
Total	2,538.34	639.44	177.52	250.89	313.80	737.64	419.05

Appendix 6

Storm water Drains in master plan area Phase wise for urban area alone

S.No	Phase	Total Population for the year 2041	Proposed length of Storm water drains (in km) for the year 2041	Cost for constructing the proposed storm water drains (in Rs)
1	Phase - II	60,060.00	227.50	227,500,000
2	Phase -III	71,940.00	272.50	272,500,000
3	Phase -IV	42,240.00	160.00	160,000,000
4	Phase - V	36,960.00	140.00	140,000,000
				800,000,000

Storm water Drains in master plan area Villages

S. No	Name of the Village	Total No.of Households in 2021	Total Length of Drains in year 2021 (in km)	Cost for construction of drains per km (in Rs)	Total Cost of construction of SWD for 2021(in Rs)
1	Abdullapur Basantpur Urf Farid	820.00	8.00	1,000,000.00	8,199,525.80
2	Achhaija	1,281	13	1,000,000	12,808,970.40
3	Asodha	4,248	42	1,000,000	42,476,907.20
4	Doymi	658	7	1,000,000	6,576,095.20
5	Jarauthi	178	2	1,000,000	1,777,879.60
6	Mansoorpur	210	2	1,000,000	2,097,074.20
7	Muradnagar	777	8	1,000,000	7,767,068.60
8	Shyam Nagar	612	6	1,000,000	6,116,180.40
9	Sabli	1,201	12	1,000,000	12,012,700.00
				Total	**99,832,401.40**

Note:

1. Considering household size as 5
2. Providing drains on either side of the roads

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WilburSmith
ASSOCIATES
#8, Second Floor, 80 Feet Road,
RT Nagar Bangalore Karnataka - 560 032. India
w +91.80. 3918.7500 f +91.80. 2363.4097