

FINAL REPORT



ADB

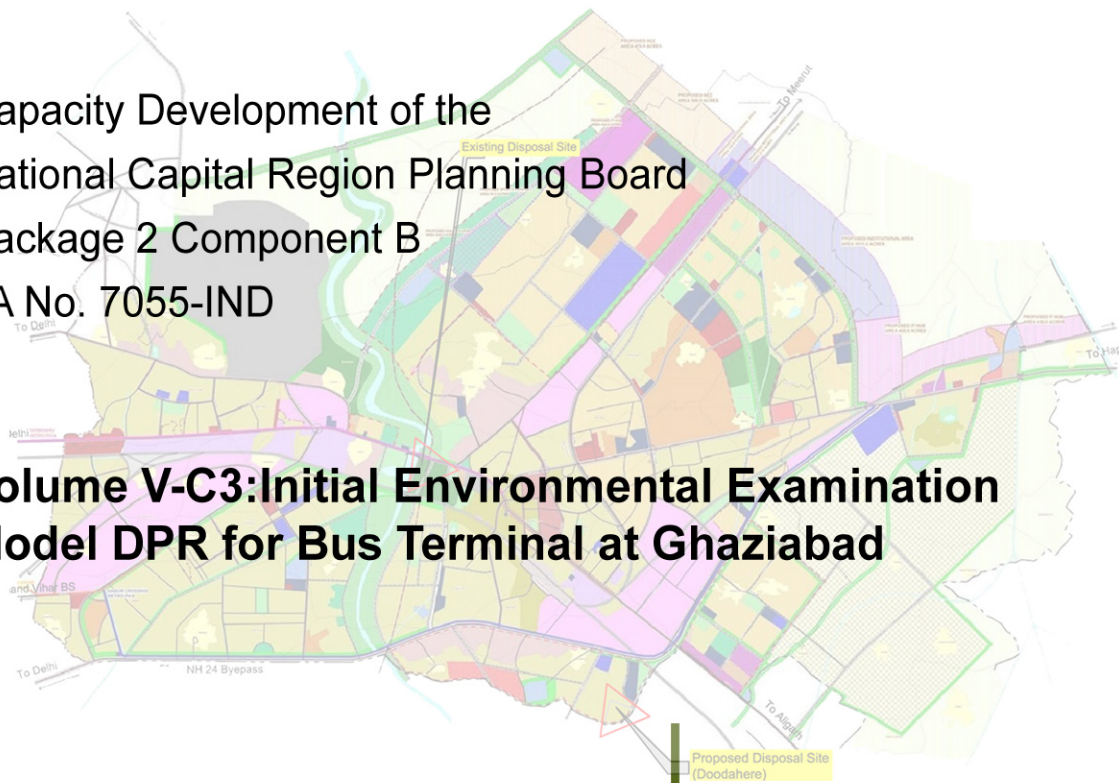
Asian Development Bank



National Capital Region Planning Board

Capacity Development of the
National Capital Region Planning Board
Package 2 Component B
TA No. 7055-IND

**Volume V-C3: Initial Environmental Examination
Model DPR for Bus Terminal at Ghaziabad**



WilburSmith
ASSOCIATES

July 2010

NCR Planning Board
Asian Development Bank

Capacity Development of the National Capital Region Planning Board (NCRPB) – Component B (TA No. 7055-IND)

FINAL REPORT

Volume V-C3: DPR for Construction of Bus Terminal in
Ghaziabad

Initial Environmental Examination Report

July 2010



Abbreviations

ADB	: Asian Development Bank
BOD	: Biochemical Oxygen Demand
CC	: Construction Contractor
CGWA	: Central Ground Water Authority
CGWB	: Central Ground Water Board
CMA	: Counter Magnet Areas
COD	: Chemical Oxygen Demand
DFR	: Draft Final Report
DPR	: Detailed Project Report
EAC	: Environmental Appraisal Committee
EC	: Environmental Clearance
EIA	: Environmental Impact Assessment
EMP	: Environmental Management Plan
ESMC	: Environmental & Social Management Cell of NCRPB
ESMS	: Environmental & Social Management System of NCRPB
FR	: Final Report
GDA	: Ghaziabad Development Authority
GNN	: Ghaziabad Nagar Nigam
GoI	: Government of India
GoUP	: Government of Uttar Pradesh
IA	: Implementing Agencies
IEE	: Initial Environmental Examination
IPT	: Intermediate Public Transport
Km	: Kilometer
KMPH	: Kilometer per Hour
LA	: Land Acquisition
LPCD	: Liters per capita per day
MLD	: Million Liters per Day
MoRTH	: Ministry of Road Transport and Highways
MoEF	: Ministry of Environment & Forests
NCR	: National Capital Region
NCRPB	: National Capital Region Planning Board
NCT	: National Capital Territory
NGO	: Non-governmental Organizations
NH	: National Highway
O & M	: Operation and Maintenance
RCC	: Reinforced Cement Concrete
SH	: State Highway
SPM	: Suspected Particulate Matter
TA	: Technical Assistance
UP	: Uttar Pradesh
UPJN	: Uttar Pradesh Jal Nigam
UPSIDC	: Uttar Pradesh State Industrial Development Corporation
UPSRTC	: Uttar Pradesh State Road Transport Corporation

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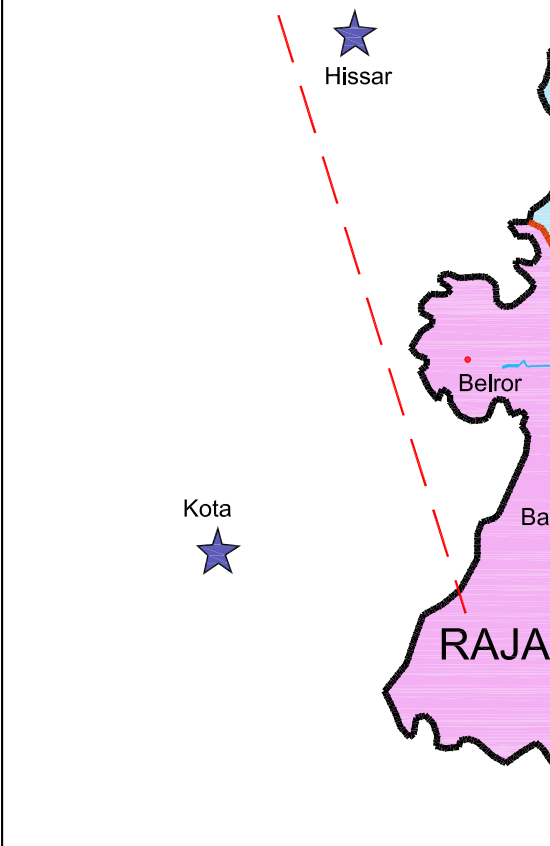
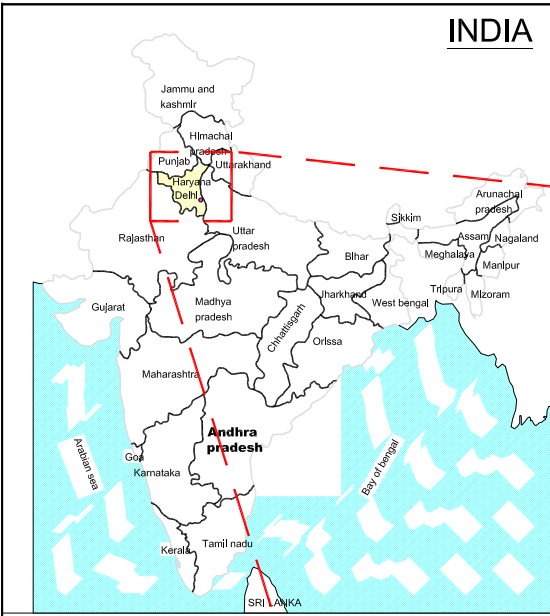
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1. INTRODUCTION

A. Background

1. Ghaziabad City is located in the western part of Uttar Pradesh State sharing the borders with the National Capital Territory Delhi. It is the district headquarter of Ghaziabad District. Owing to its location close to Delhi, and with good connectivity, it is one of the important and fast developing city in the State of Uttar Pradesh and as well as in the National Capital Region. The city is well connected with important cities of the state and the country; three National Highways (NH 58, NH 91 and NH 24 - Delhi-Lucknow-Muradabad Road) pass through the city connecting it with Delhi, Meerut, Lucknow, Sikandrabad, Kolkata etc. Besides, it is well connected with its hinterland and surrounding towns by regional and local road network. It is also well connected with railways. Location of Ghaziabad is depicted in **Figure 1-1**.
2. The rapid development of city has also put its infrastructure on tremendous pressure. The area surrounding the old Bus Stand at Navyug Chowk is a major centre and is the CBD of Ghaziabad. This centre is busy with various activities; besides bus stand, a number of commercial establishments, markets, and government offices are situated here. The Ghaziabad Master Plan 2021, recognizing the growing congestion of traffic and activities at Navyug Chowk, has identified an alternative site on Loni Road for development of bus terminal.
3. The subproject of construction of Bus Terminal at Ghaziabad is selected for preparation of a model Detailed Project Report under this ADB TA Component B. NCR Planning Board, a statutory body of Ministry of Urban Development, Government of India, is a likely source of funding for the subproject in Ghaziabad.
4. This Initial Environmental Examination (IEE) Report is prepared in accordance with NCRPB Environmental and Social Management System (ESMS) and Policy for project funding.



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

Regional Setting of Ghaziabad

Legend

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

Client:
**Asian Development Bank
 National Capital Region Planning Board**

Consultant:
Wilbur Smith Associates Pvt. Ltd.

Drawn: Roopa
 Date:
 Scale: Not to scale

Checked:
 Approved:

2. POLICY & LEGAL FRAMEWORK

A. Extent of IEE Study

5. The subproject implementation shall comply with the policies of Government of India (GoI), Government of Uttar Pradesh (GoUP) and procedures/policies of NCRPB. Government regulations and the NCRPB policy require that impacts of the development projects have to be identified at the beginning and mitigation measures be incorporated in the project to reduce those impacts to acceptable levels. This is generally done through the process of environmental impact assessment.

B. Government Law and Policies

6. The GoI EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.
7. Category A projects require EC from the national Ministry of Environment and Forests (MoEF). The proponent is required to provide preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MoEF prepares comprehensive Terms of Reference (ToR) for the EIA study. On completion of the study and review of the report by the EAC, MoEF considers the recommendation of the EAC and provides the EC if appropriate.
8. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares ToR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the EC based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.
9. With the total built up area of below 20,000 sq. m, this sub project does not fall under the ambit of the EIA Notification, and therefore do not require environmental clearance.

C. Environmental and Social Management System of NCRPB

10. Recognizing the importance of environmental and social issues that can arise in infrastructure projects, NCRPB has formulated an Environmental and Social Management Systems (ESMS) in line with Government and other multilateral agencies like ADB safeguard requirements for Financial Intermediaries (FIs). The ESMS provides an overall management system to NCRPB to identify, assess, and mitigate environmental and social issues that are likely to arise in projects funded by NCRPB. The ESMS outlines the policies, methods of assessments and procedures that will enable NCRPB to ensure that a project that it funds is developed in accordance with ESMS and is adequately protected from associated risks. Implementing Agencies (IAs) will have to comply with the ESMS and Policy.
1. *Environmental Policy*
11. *Policy Statement.* “National Capital Regional Planning Board (NCRPB) will continually strive to ensure and enhance effective environmental management practices in all its operations”. This is aimed to achieve through:
- Minimizing negative environmental (including health & safety) impacts in its operations and risks to the environment (particularly eco-sensitive areas and culturally important areas) and people who may be affected through formulating and implementing commensurate plans
 - Ensuring that environmental safeguards - defined as requirements of applicable Indian environmental legislation and multilateral / bilateral funding agencies - are being adequately integrated by the project proponent / IA in the planning, design, construction prior to its financing and in its implementation during the operational phase.
 - Ensuring that compliance to all applicable national and local environmental legislation.
 - Encouraging that public and stakeholder consultation be carried out by the project proponent / IA and disclosing the required information in all stages of the project cycle.
 - Integrating environmental risk into its overall internal risk management analysis.
 - Including environmental management considerations in all aspects of operations and interactions with the project proponent / IAs in all stages of the project cycle.
12. This policy statement emphasizes NCRPB's sensitivity, concern and commitment to environmental safeguards. NCRPB will strive to ensure that the projects that it supports meets government policies and as well as of the bilateral/multilateral agencies such as ADB.

2. *Environmental Assessment Requirements*

13. The nature of the assessment required for a project depends on the significance of its likely environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. According to NCRPB ESMS, the projects are screened for their expected environmental impacts and are assigned to one of the following categories: E1, E2 or E3.

Table 2-1: Environmental Category

Environmental Scenario	NCRPB's Categorization	MOEFs Categorization	ADB Categorization
Significant impacts or in eco-sensitive area	E1	A	A
Limited impacts	E2	B1 or B2 or No Category	B
No impacts	E3	No Category	C

- (i) Significant impacts or in eco-sensitive areas (Category E1): If the project has significant adverse environmental impacts that are irreversible, diverse, or unprecedented, then it is regarded to have environmental scenario. These impacts may affect an area larger than the sites or facilities subject to physical works. These impacts will be considered significant if these are in eco-sensitive areas.
- (ii) Limited environmental impacts (Category E2): If the project has impacts that are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed.
- (iii) No environmental impacts (Category E3): If the project is likely to have minimal or no adverse environmental impacts, then it is regarded to have this environmental scenario.
14. The proposed subproject of Construction of Bus Terminal in Ghaziabad is unlikely to have significant impacts. The project site is also not located in or near any eco-sensitive area. The subproject is however likely to have typical impacts associated with the construction activity in urban areas and therefore classified as Category E2.
15. According to ESMS, E2 projects require carrying out Initial Environmental Examination (IEE) and preparation of IEE Report. This IEE report is prepared accordingly.

3. DESCRIPTION OF PROJECT

A. Project Need

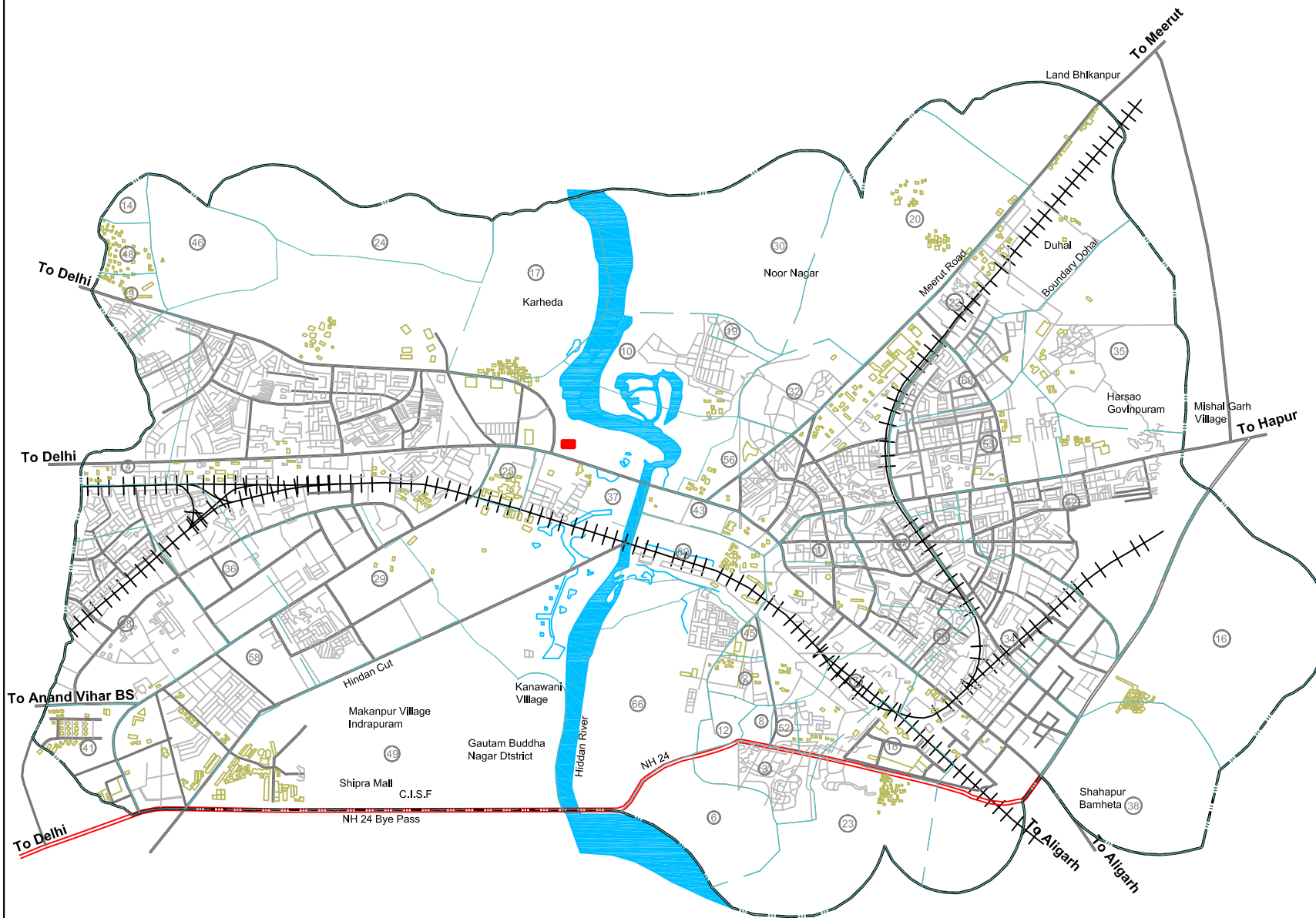
16. The existing bus stand in Ghaziabad is located in the centre of the city at Navyug Chowk. The is major centre and is CBD of Ghaziabad busy with various activities; in addition to the bus stand, a number of commercial establishments, markets, government offices (Ghaziabad Nagar Nigam and Ghaziabad Development Authority) situated here. Roads around the area are congested with vehicles, pedestrian, squatter, vendors and illegal and haphazard parking all along the roads.
17. Recognizing the importance of decongesting this area, Ghaziabad Master Plan -2021, has identified and earmarked a site near Loni Road and NH 24 junction for shifting the existing Bus Stand and constructing a new Bus Terminal.
18. The proposed site for the Bus Terminal as per the Ghaziabad Master Plan 2012 is located off Loni Road and behind the existing truck terminal that is located on G.T. Road. Location of proposed site is shown in **Figure 3-1**.

Figure 3-1: Proposed Bus Terminal Site



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

Location of Proposed Bus Terminal Site in Ghaziabad



Legend

- Municipal Boundary
- Ward Boundary
- Ward Number
- National Highway
- Other Roads
- Buildings
- River, Stream
- Location of Proposed Bus Terminal

Client

**Asian Development Bank
National Capital Region Planning Board**

Consultant

Wilbur Smith Associates

Drawn: SK
Date: August, 2009
Scale: NTS

Checked: SKG
Approved: NSS

Figure 3-2



B. Proposed Bus Terminal Facility

19. The site selected in Ghaziabad Master Plan for development of Bus Terminal is located off Loni Road near the junction of Loni Road and G T Road. This site is located adjacent to the existing Truck Terminal on GT Road. Detailed surveys were conducted to estimate the present and future demand of bus terminal. Based on this, the current demand for the bus terminal as estimated as 60 buses (at a point time) and ultimate demand of 2031 is projected as 75. The terminal will provided with parking space (for cars and two wheelers), auto rickshaw stand with pick up and drop off areas, bus parking space, passenger waiting areas, ticket booking offices, rest rooms and other basic amenities. Adequate provision is made in terms of reserving space for fire station, water service station, gas station, and store room etc. for future expansion. The main entrance is through the Loni Road which is a four lane two-way divided road. The G T Road on the other side is a National Highway (NH 24) which has the maximum traffic load.
20. The bus terminal is designed to provide all necessary passenger and commuter facilities for an enhanced user experience. The main aspect of the terminal is to provide proper bus circulation and well designed and comfortable passenger terminal facilities. The terminal building is designed to take the peak traffic. The passenger waiting areas are designed to facilitate clear and smooth movement of pedestrians without needing to cross over the bus movement areas.
21. The facilities in the passenger terminal area include: entrance lobby, administrative area, passenger utilities, commercial retail & office area, restaurants, passenger waiting area, and parking facility. The concept of the terminal building reflects the trends in development of public buildings in the country. The façade is treated with modern materials like aluminum composite panels and with stone cladding to achieve a modern and a low maintenance building. The front of the building is designed with ample landscape and paved area for commuter's movement and a good ambiance in the terminal. Glass is suggested as a material for the entrance lobby to allow ample light and to highlight the entrances.
22. The building is oriented to the west of the site to allow for shading of the passenger waiting area from the evening sun. Diffused natural light is used to light up the terminal building. Landscaping in the western side will allow for some passive cooling of the western façade. Punch windows are designed to the western façade of the terminal building in the first floor level (commercial office spaces). The building is designed as an open structure for ample air circulation and ventilation.
23. Typical floor plans are presented in **Figure 3-3** and **Figure 3-4**. Area statement of the proposed Bus Terminal is presented in the following **Table 3-1**.

Table 3-1: Particulars of Proposed Bus Terminal

S. No.	Parameter	Unit	Value
	<i>Site</i>		
1	Site area	Sq. m	41,573
2	Built up area	Sq. m	15,492
	<i>Ground Floor</i>		
1	Commercial/Retail	Sq. m	1,033
2	Terminal	Sq. m	10,910
3	Driveway	Sq. m	17,808
4	Surface Auto/Car park	Sq. m	3,470
5	Service Station	Sq. m	1,799
	<i>First Floor</i>		
1	Commercial/Retail	Sq. m	1,750
	<i>Parking</i>		
1	Provision for commercial area	No. s	40
2	Provision for Bus Terminal (as per demand)	No. s	60
3	Auto parking	No. s	36
4	Bus bays	No. s	75

24. *Bus Terminal Operations:* The proposed bus terminal will cater to inter and intra-state bus transport. The operations at Bus Station would be passenger-centric with alighting and boarding facilities, ticketing, waiting lounges, parking space for cars, two wheelers, auto-stand, restaurants & dormitories, retail shopping areas etc for enhanced commuter experience. The facilities for buses at the terminal will be limited to parking of overnight bus services. There will not be any facilities for maintenance/repair works, including fuelling or washing, but will cater to very minor or compulsory maintenance for example for repairing deflated wheels. Based on the estimates the total number of buses plying from the terminal (both entry and exit) will be 792 bus trips per day (2010), which is likely to increase to 1,600 trips per day (2025); passenger handling will be 15,000 commuters per day (2010) and 36,000 commuters per day (2025).

Figure 3-3: Ground Floor Plan of the Proposed Bus Terminal

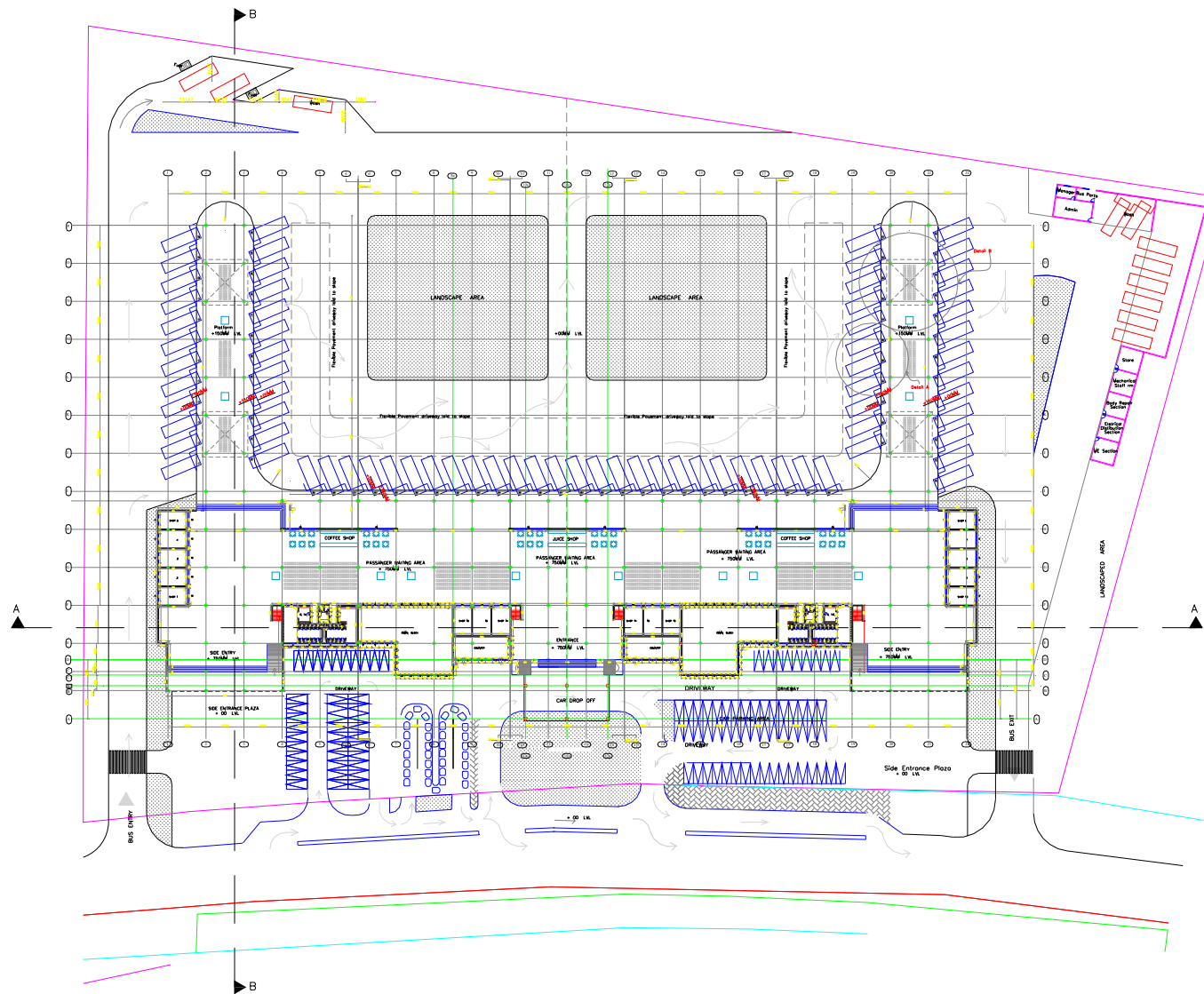
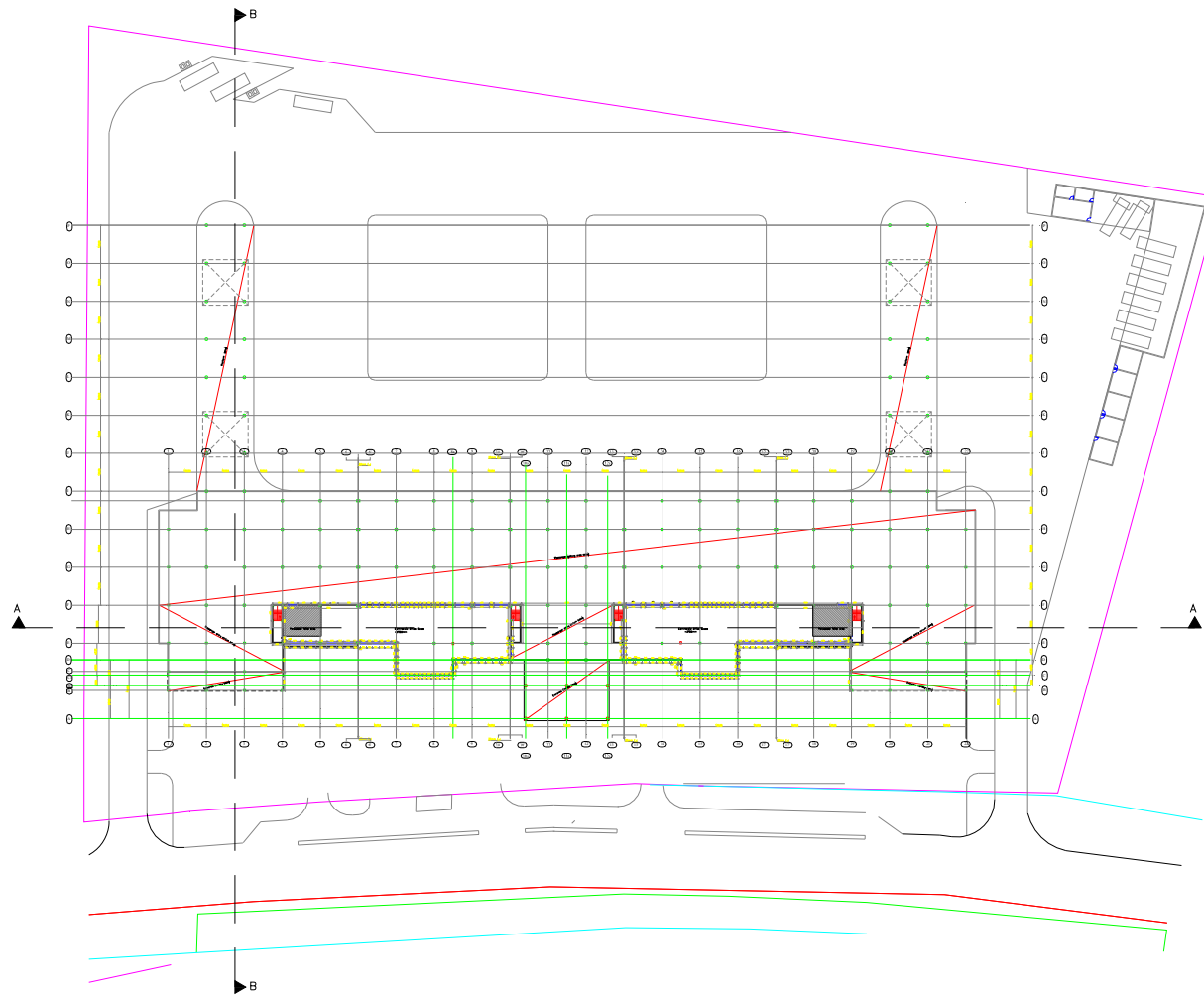


Figure 3-4: First Floor Plan of the Proposed Bus Terminal



4. DESCRIPTION OF ENVIRONMENT

A. Physical Resources

1. Location

25. Ghaziabad City is located in the western part of Uttar Pradesh State sharing the borders with the National Capital Territory Delhi. It is the district headquarter of Ghaziabad District. Owing to its location close to Delhi, and with good connectivity, it is one of the important and fast developing city in the State of Uttar Pradesh and as well as in the National Capital Region. Geographically, Ghaziabad is situated at 28° 40' N latitude and 77° 25' E Longitude. Ghaziabad is situated at about 20 Km east of Delhi, and 432 km west of the State Capital, Lucknow.

26. It is well connected with important cities of the state and the country; three National Highways (NH 58, NH 91 and NH 24 - Delhi-Lucknow-Muradabad Road) pass through the City connecting it with Delhi, Meerut, Lucknow, Sikandrabad, Kolkata etc. Besides, it is well connected with its hinterland and surrounding towns by regional and local road network. The Main railway line and the two branches of northern railway (Meerut Branch & Moradabad Branch) pass through the City. It is an important railway junction in the Northern Railway. Base map of Ghaziabad is at **Figure 4-1**.

2. Topography, soil and geology

27. Originally established on the eastern side of River Hindon, present sprawling development of Ghaziabad can be observed on both sides of the River. Hindon River is an important tributary of Yamuna River of the Ganges River System. Flowing north-south, Hindon River passes through middle of the City and meets Yamuna about 35 km south of Ghaziabad. The topography of the City is almost plain and the general slope is from north to south.








28. Geologically, Ghaziabad forms a part of the Indo-Gangetic alluvium. Soil is characterized mainly by silty sand and loamy soils. Geotechnical investigations conducted at the proposed flyover site indicates that there is no hard rock till 25 m below ground level.

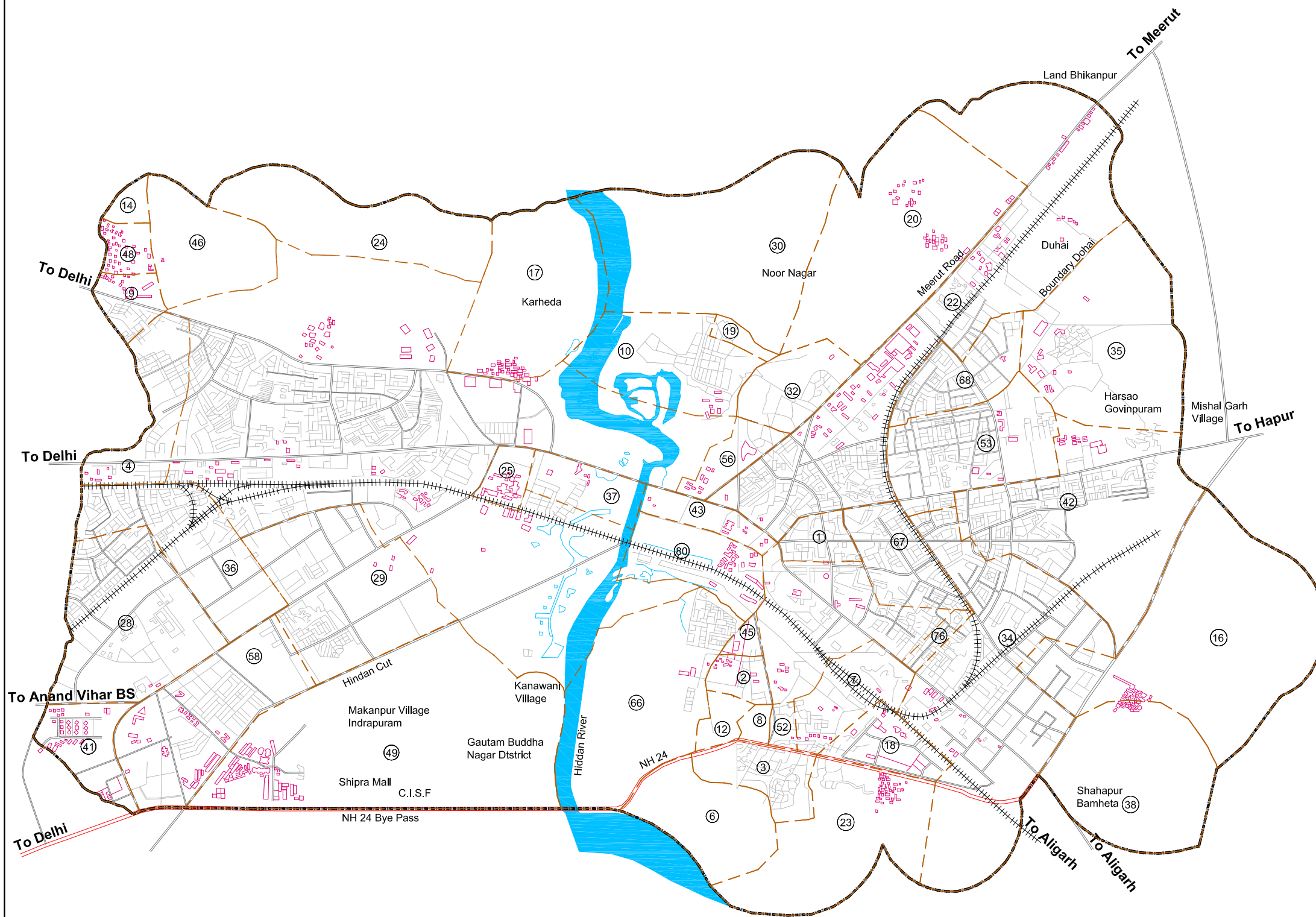
29. As per the seismic zoning map of India, Ghaziabad falls in sever intensity zone (Zone IV). However, there were no major earthquakes occurred in Ghaziabad till date.

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

**Ghaziabad
Base Map**

Legend

-  Municipal Boundary
-  Ward Boundary
-  Ward Number
-  National Highway
-  Other Roads
-  Buildings
-  River, Stream



Client
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National Capital Region Planning Board**

Consultant
Wilbur Smith Associates

Drawn:SK
Date: August, 2009
Scale: NTS

Checked: SKG
Approved: NSS

Figure 4-1



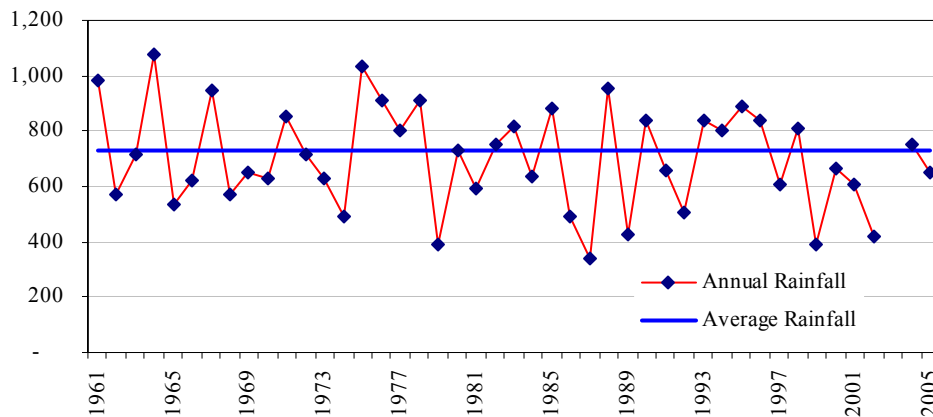
3. *Climate*

30. Typical humid subtropical climate of north India prevails in Ghaziabad, with high variation between summer and winter temperatures and precipitation. There are three distinct seasons – first of which is the monsoon season - hot and humid season from mid-June to September. Second season, winter, is the cool and dry season from October to March. The third phase, summer, is characterized by hot and dry weather which prevails from April to mid-June.
31. Rains in the region are concentrated in the monsoon season. The region receives rainfall mainly under the influence of southwest monsoon from July to September. Over 75 percent of the total rainfall is received during the monsoon months and the remaining rainfall is received during December to February. The annual average rainfall is 732 mm. Dust and thunderstorms occur in summer season while fog occurs in the winter.

Table 4-1: Rainfall Pattern in Ghaziabad (2004-2008)

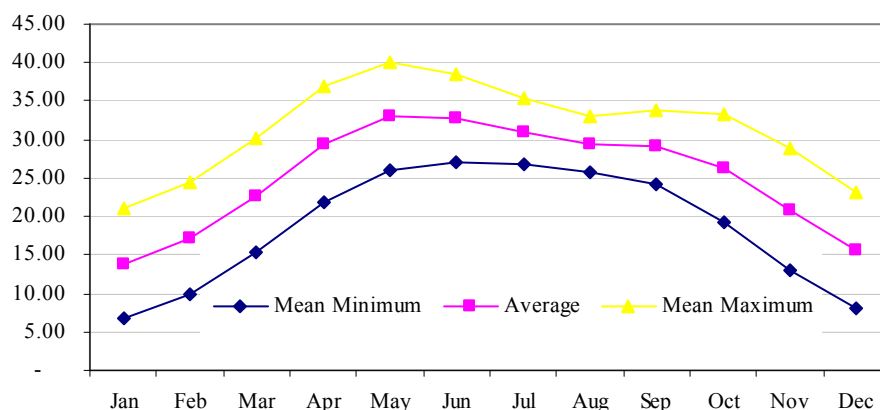
Month	Rainfall (mm)					
	Normal	2004	2005	2006	2007	2008
January	20.5	7.8	0	0	0	NA
February	20.6	0	23.9	0	45	NA
March	17.4	0	19	NA	64	NA
April	5.8	30.4	0	0	0	NA
May	12.8	75	0	0	0	NA
June	43.8	20.6	80.5	34.2	64.1	16.4
July	216.5	36.8	185.7	250.5	84.1	124.4
August	234.5	520.6	57.9	20.4	99.8	58.1
September	129.2	50.4	284.2	114	4.7	8.7
October	34.1	12.6	0	16	0	0
November	4.3	0	0	0	NA	2
December	6.1	0	0	0	0	NA
Total	745.6	754.2	651.2	-	-	-

Figure 4-2: Long-term Annual Rainfall Pattern of Ghaziabad (in millimeter)



32. Owing to its sub-tropical continental monsoon climate with hot summers and cold winters, Ghaziabad experiences large variations in temperature across the year. May and June experiences high temperatures and the lowest is recorded in the months of December and January. **Figure 4-3** depicts the monthly averages of minimum, mean and maximum temperature. Winds predominantly blows from north, north-west and west direction, followed by from east and south-east direction.

Figure 4-3: Average Monthly Temperature (in Degrees Centigrade)



4. Air Quality

33. Ambient Air Quality in Ghaziabad is monitored by Uttar Pradesh Pollution Control Board (UPPCB). Due to dry weather coupled with dusty roads, particulate matter is high while levels of oxides of sulphur and nitrogen are well within the National Ambient Air Quality Standards (NAAQS). According to UPPCB, air pollution status in Ghaziabad has been termed as “low”.

Table 4-2: Air Pollution Status in Ghaziabad (2008)

Land use	Sulphur Dioxide (SO ₂)	Nitrogen Dioxide (NO _x)	SPM
Residential	L	L	C
Industrial	L	L	H

C – Critical; L – Low; H – High (see below Table for values); NA: Data not available

Table 4-3: Air Pollution Classification based on Annual Mean Concentration Range (µg/m³)

Air Pollution Status	Industrial Area		Residential Areas	
	SO ₂ & NO _x	SPM	SO ₂ & NO _x	SPM
Low (L)	0 – 40	0 - 180	0 – 30	0 – 70
Moderate (M)	40 – 80	180 - 360	30 – 60	70 - 140
High (H)	80 – 120	360 - 540	60 – 90	140 - 210
Critical (C)	>120	>540	>90	>210

Source: UPPCB

Table 4-4: NAAQ Standard – Annual Average Concentration in µg/m³

Land use	RSPM	SPM	SO _x	NO _x
Residential	60	140	60	60
Industrial	120	360	80	80

Source: CPCB

5. *Surface Water*

34. Hindon River is an important tributary of Yamuna River of the Ganges River System. Hindon meets Yamuna about 35 km south of Ghaziabad. The confluence is located about 40 Km downstream of Okhla barrage. A short cut canal called the Hindon Cut joins River Yamuna at Okhla barrage from where the Agra canal takes off. The Hindon Cut thus serves to make the Hindon river water, including the supplemental discharge from the upper Ganga Canal, available for diversion to the Agra canal for irrigational use. The river stretch remains dry, except during rains. During winter and summer seasons, river flow is mainly limited to industrial effluents discharged from various industries located in Ghaziabad and as well as upstream areas.
35. Due to illegal entry of industrial and domestic wastewater, Hindon River water is polluted. As per the CPCB, the dissolved oxygen content in the river is low and BOD is presence in notable quantities. Illegal disposal of untreated/partially treated effluent from textile dying and printing industries located in Shahid Nagar and Janakpuri in the trans-Hindon area are said to be one of the main reasons for pollution of Hindon River stretch in Ghaziabad.

6. *Groundwater*

36. Due to its location in Gangetic Plains, the underlain aquifers have good groundwater potential. However, the rapid development and increase in demand for water has put tremendous stress on groundwater reserves, both in terms of quantity and as well as quality. The groundwater decline is at much rapid phase and considering this alarming situation the Central Ground Water Authority (CGWA) has notified the area under GMC limits for regulation and control of groundwater extraction. No groundwater extraction is allowed without prior permission of Central Ground Water Board (CGWB).
37. General groundwater quality in Ghaziabad is good except in certain industrial and residential pockets where there is concentration of nitrates, fluorides and heavy metals beyond permissible limits. Indiscriminate disposal of untreated industrial and domestic wastewater is said to be the main reason for pollution of groundwater.

B. Ecological Resources

38. There are no forests or any other environmental sensitive locations in or near project site. Ghaziabad City is an urban area surrounded by land that was converted for agricultural use many years ago. There is no remaining natural habitat in the city, and the flora is limited to artificially planted trees and shrubs, and the fauna comprises domesticated animals plus

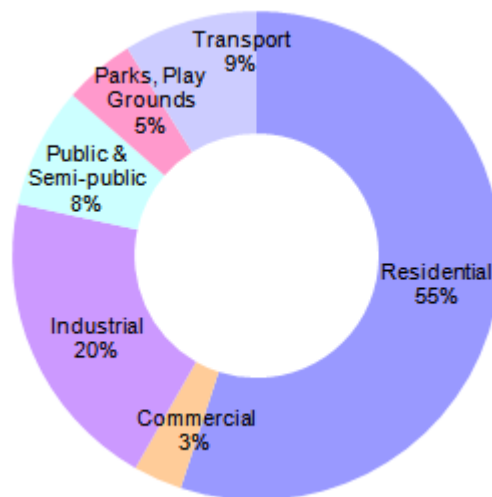
other species able to live close to man. Tree cover along few main corridors is considerable; main tree species include Keekar (*Acacia karoo*); Neem (*Azadirachta indica*); Peepal (*Ficus religiosa*); Honge (*Pongamia Pinnata*); and eucalyptus.

C. Economic Development

1. Land Use

39. Owing to its location, adjacent to the National Capital, Delhi, over the years, Ghaziabad City has experienced a very rapid development and urbanization. Originally established on the eastern side of River Hindon, present sprawling development of Ghaziabad can be observed on both sides of the River. The City is almost merged with Delhi - City's development stretching towards Delhi on west side and vis-à-vis Delhi expanding to east towards Ghaziabad.
40. Ghaziabad Master Plan 2001 was formulated for an area of 100.4 sq. km, of which by 2001, about 84.8 sq. km was developed. As depicted in the following figure, the existing land use of Ghaziabad development area (84.8 sq km) shows that 60 percent of the land is under residential use followed by industrial areas. There are no agricultural areas within this development area. The gross density of the population is 130 persons per hectare. Anticipating a big growth in the near future, the Ghaziabad Master Plan 2021 has been formulated to an area of 155.54 sq. km.

Figure 4-4: Existing Land Use



2. Industry & Agriculture

41. The City of Ghaziabad is known for medium and large scale industries. During 1970-80 decade a number of prestigious and large scale industries are established along Meerut Road, Bulandshahar Road, Link Road, Sahibabad and Loni Road in Ghaziabad City. In addition to UPSIDC developed industrial areas, there are a number of industries located in

Mohan Nagar and Mohan Industrial Area. Ghaziabad houses a variety of industries including distilleries, chemical, engineering, steel, and textile and dyeing units etc.

42. Industrial sector is a major employment generator in Ghaziabad. Industrial development in Ghaziabad however declined in the decade of 1991-2001 and no new industries were established during that decade.
43. Within the city limits, there are no agricultural areas left. Almost all of the land is converted for residential or for other development.

3. *Infrastructure*

44. *Water Supply.* Two agencies are involved in provision of water supply service in Ghaziabad; while the state line agency Uttar Pradesh Jal Nigam (UPJN) is responsible for development of new infrastructure and all capital works, the Ghaziabad Nagar Nigam (GNN) is responsible for its day-to-day operation and maintenance. Water supply system in Ghaziabad is groundwater based. Water is extracted from 186 bore wells and a total of 160 MLD of water is supplied everyday at a rate of 145 LPCD (gross supply). In industrial areas, water is supplied by UPSIDC.
45. *Sewerage System.* UPJN carries out all new and capital works while the GNN operates and maintains the sewerage system in the City. Around 70 – 75 percent of the city population is covered with underground sewerage system. At present an estimated 128 MLD of sewage is generated in the City. There are 17 sewage pumping stations in the City to pump the sewage to two sewage treatment plant for treatment and further disposal. The total treatment capacity available is 126 MLD however present usage is only about 71 percent. Industrial waste water treatment and disposal is managed by individual industries and UPSIDC.
46. *Solid Waste Management.* Municipal solid waste management is the responsibility of Ghaziabad Nagar Nigam. At present about 750 tons of solid waste is generated daily in Ghaziabad at a rate of 550 gm per capita per day. City is divided into five zones for better management of solid waste collection and disposal. There is no door-to-door collection system in the City. The solid waste is collected through bins located at various places in the neighborhood. Sanitary workers collect waste from bins and transport to disposal site at Sai Upvan on the banks of Hindon River. There is no proper disposal facility; the waste is disposed by crude open dumping method.

4. *Transportation*

47. Ghaziabad City is well connected with important cities of the state and the country; three National Highways (NH 58, NH 91 and NH 24 - Delhi-Lucknow-Muradabad Road) pass through the City connecting it with Delhi, Meerut, Lucknow, Sikandrabad, Kolkata etc. Besides, it is well connected with its hinterland and surrounding towns by regional and local road network. The Main railway line and the two branches of northern railway (Meerut Branch & Moradabad Branch) pass through the City. It is an important railway

junction in the Northern Railway.

48. It is 20 km east of Delhi and 46 km southwest of Meerut. Other roads lead northwest to Loni and Baghpat and east to Hapur and Garhmukteshwar. Buses run at frequent intervals to Delhi, Meerut, Aligarh, Bulandshahar, Moradabad, Lucknow and other cities. The City acts as the main entrance of Uttar Pradesh and is also called the “Gateway of Uttar Pradesh”.
49. Internal road network within the town is well developed. Most of the roads however are congested with traffic, pedestrians and activities such as parking of trucks/other vehicles and presence of informal business activities (squatters and vendors) within the ROW.
50. According to available 2003 data, over 70 percent of the vehicles in the town are two wheelers followed by cars. Internal travel in the city is mainly through public transport (buses and mini buses) and intermediate public transport system consisting of Auto Rickshaws.

D. Social and Cultural Resources

1. Demography

51. According to the national census the population of Ghaziabad was 968,521 in 2001, increased from 511,759 in 1991, recording an unprecedented growth rate of 89.3 percent over the decade. The population of overall GDA area in 2001 was 1,327,330, which was increased from 732,957 in 1991, with a growth rate of 81 percent.

Table 4-5: Population Growth of Ghaziabad City

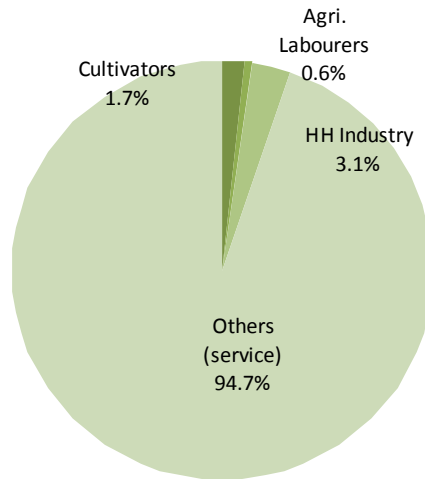
Year	Population	Decadal Growth Rate (%)
1971	128,036	
1981	287,170	124.3%
1991	511,759	78.2%
2001	968,521	89.3%

Source: Census of India

52. Overall literacy is 80 percent, reported at 87 percent for males and 72 percent for females, which is considerably better than literacy in the state, which is 60.4 percent overall, and 75.7 percent for males and 44.0 percent for females. Sex ratio is however significantly below the natural 1:1 ratio, being 858 females per 1000 males, lower than both the state and national averages (879 and 929 respectively).
53. According to the census 2001, workforce participation rate (WPR) in Ghaziabad was 28 percent. As shown in the following figure, nearly 95 percent of the total workforce was engaged in service sector (formal, informal, trade, commerce and industrial and other service sectors). Contribution of other sectors is very minimal – about 3.1 percent are

engaged in household industries the remaining 2.3 percent of population are engaged in primary sector activities.

Figure 4-5: Occupational Structure



54. Majority of people in Ghaziabad are Hindus and the remainder are mainly Muslims, Sikhs, Jains, Christians and Bhudhists. Hindi is the main language of the area. Around 16% of the population belongs to scheduled castes (SC) category. Population belonging to Scheduled Tribe (ST) category in Ghaziabad are negligible and are part of the mainstream population.

2. *Health & Education Facilities*

55. Ghaziabad is a main centre for educational and health facilities in the region. There are a number of schools, colleges, professional education institutions, general and special health care facilities in the City, serving a large number of population from the City and the other near and far areas.

3. *History, Culture and Tourism*

56. The City was founded in 1740 by the Emperor, Ghazi-ud-din, who called it Ghaziuddin Nagar after himself and built a spacious structure consisting of 120 rooms of masonry with pointed arches. Only the gate, a few portions of the boundary wall and a massive pillar about fourteen feet high remain now, the precincts now being inhabited. His mausoleum still stands in the city but is in a bad state. Ghaziabad played active role in the Indian freedom struggle, the revolt of 1857. An encounter took place between the freedom fighters and British force in Ghaziabad during that time. This was regarded as the first war of independence and it brought Ghaziabad much of its glory. On 14th November 1976, Ghaziabad became a separate district. Then on, Ghaziabad has developed in all fronts and it is now one of the biggest and fast developing centers in NCR.

57. There are no notified or protected monuments or sites of archeological and historical

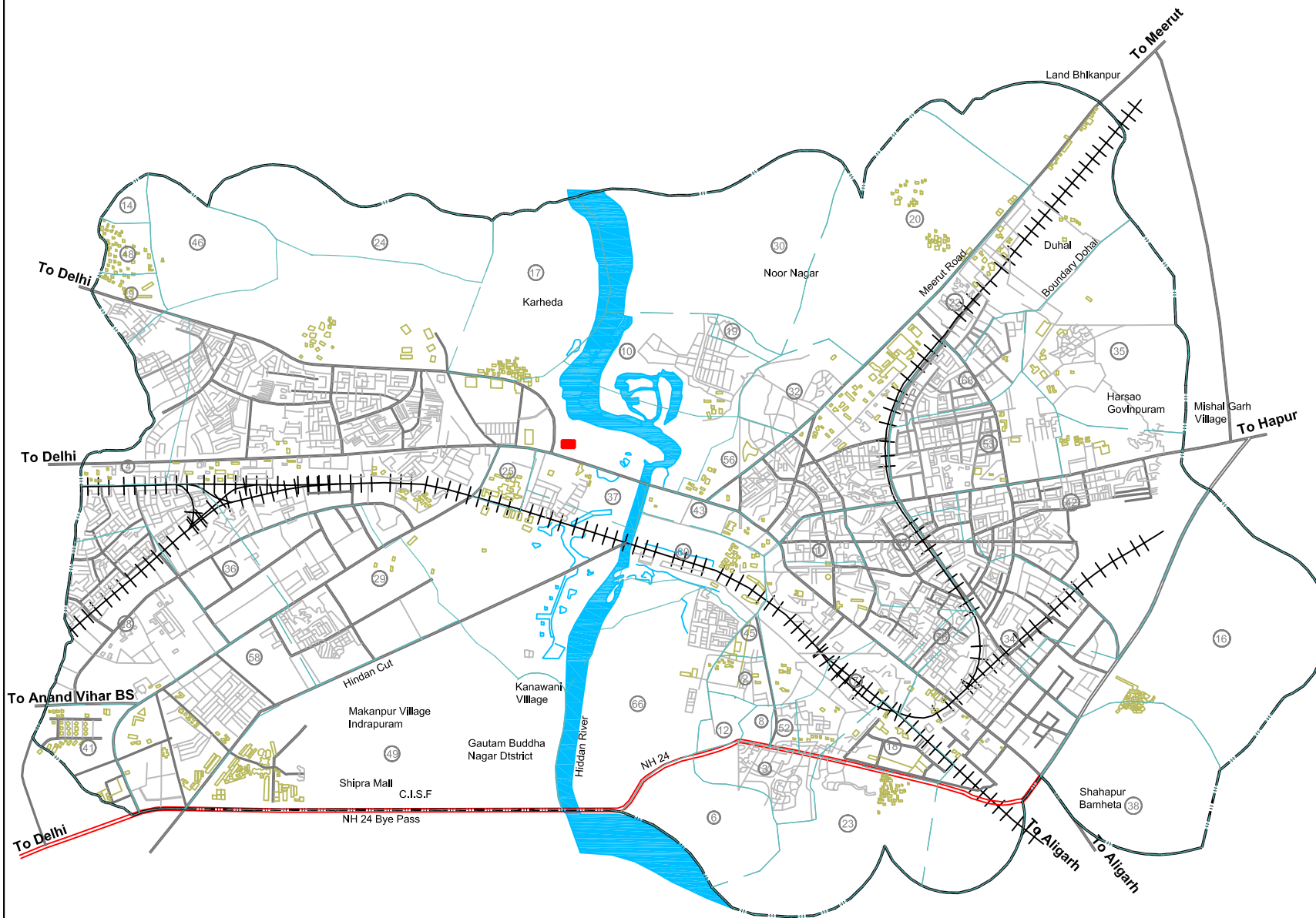
importance in the City. The tourism potential of is minimal.

E. Profile of Proposed Bus Terminal Site









58. The proposed site is located in the geographically central part of the city (**Figure 4-6**) near River Hindon. Site is located off Loni Road and adjacent to the truck terminal. This site was identified in the Ghaziabad Master Plan 2021 for development of transport facility (Bus Terminal).
59. Presently the site is agricultural land partly cultivated and partly lying barren. There are industrial sheds (small scale units) in the strip of land between Loni Road and the site. These need to be removed for development of Bus Terminal – mainly at the location of entry and exit points. Ghaziabad Development Authority is of the view that this site off Loni Road adjacent to Truck Terminal is selected for Bus Terminal and the industrial development is not in conformity with the Master Plan, and therefore needs to be removed.
60. Hindon River flows at a distance of 250 m north of the site. The topography of the site is plain and gently slopes towards the river. Soil of the site is characterized by silty sand and clay. Groundwater depth is 25 m below ground level. Geotechnical investigations conducted at the site indicated that the soil mainly consists of silty sand and clay. Fine sand is observed between 17 m and 25 m below ground level.
61. Part of the site is presently cultivated; wheat is predominant crop. There is no major vegetation or trees in the site; vegetation on site is limited to local shrubs and bushes and few eucalyptus trees. The site is bounded one side by Truck terminal, one side by Loni and other two sides by agricultural lands. There are no residential or sensitive areas within the vicinity.

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

Location of Proposed Bus Terminal
Site in Ghaziabad



Legend

-  Municipal Boundary
-  Ward Boundary
-  Ward Number
-  National Highway
-  Other Roads
-  Buildings
-  River, Stream
-  Location of Proposed Bus Terminal

Client

**Asian Development Bank
National Capital Region Planning Board**

Consultant

Wilbur Smith Associates

Drawn:SK
Date: August, 2009
Scale: NTS

Checked: SKG
Approved: NSS

Figure 3-2



Photographs of the Site:



5. ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

A. Overview

62. As a general practice, an IEE should evaluate impacts due to the location, design, construction and operation of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. In assessing the effects of these processes therefore, all potential impacts of the project should be identified, and mitigation is devised for any negative impacts. Following sections evaluate the impacts of the proposed Bus Terminal subproject in Ghaziabad.

B. Construction Impacts

63. This subproject will involve construction of the following elements:
- Construction of terminal building with 2 levels (ground + first floor) bus bays, circulation and parking facilities
 - Provision of basic facilities such as water, sewer, etc.

Table 5-1: Construction Method & Materials of Bus Terminal

Element	Construction Details	Construction Activities
Bus Terminal Facility	Construction of 2 level structure (Ground floor + first floors) Total site area: 41, 573 sq. m Total Build-up area: 15,492 sq. m <ul style="list-style-type: none"> • Ground floor: 13,742 sq. m • First floor: 1,750 sq. m 	<ul style="list-style-type: none"> • Site clearance • Excavation for foundations • Casting of foundations, columns, and ramp in reinforced cement concrete • Construction of brick walls • Providing door and windows and fixtures • Building finishes • Water supply & sewerage facilities - internal plumbing works, water & sewer connection with main city network

64. Total quantity of earthwork excavation has been estimated as 4,300 m³. In addition, waste rubble will be generated from dismantling of existing structures. All reusable/recyclable material like wooden, steel, glass, roof sheets etc will be retrieved. The waste material will mostly be cement concrete and brick rubble.
65. Ready mix concrete, procured and brought to site on truck from nearest plant, will be utilized in construction. The other construction material that is required in bulk will be

sand, aggregate, cement, cement concrete blocks/clay bricks, etc. Construction materials like sand and aggregate will be sourced from quarries approved by the respective Mines & Geology Departments. Yamuna Nagar in Haryana about 200 km away is a known source for stone aggregates, Ghaghar, 180 km away and Haridwar, 160 km away are sources for sand. It is estimated that about 13,000 m³ of sand/soil will be required for filling up plinth.

1. *Impacts on Physical Resources*

66. Construction will involve excavation for foundations, site clearance, dismantling of structures, and disposal of the waste material which could have physical impacts.
67. In earthwork most of the impacts are related to disposal of surplus soil/construction waste. Therefore the rubble and surplus soil needs to be disposed without any major impacts. The contractor shall therefore implement the following measures:
- Utilize the waste/surplus soil within the site as far as possible, for example, for raising the ground-level of the site
 - Salvage the recyclable and reusable material as much as possible and reduce the quantity that needs to be disposed off
 - Estimates the quantity of rubble and prepare a rubble management plan
 - Dispose rubble only in solid waste dumping sites or filling up abandoned quarries or as recommended by UPPCB
 - Utilize excavated soil in construction – to raise the ground-level or road construction
68. Dismantling and excavation activities could cause physical impacts, including creation of the dust during dry weather and silt-laden runoff during rainfall, both of which would affect people who live and work near the site and reduce the quality of adjacent land. Earthwork will not mostly be conducted in rainy season, so this will avoid any problems from runoff. In Ghaziabad, dry weather prevails in most part of the year, and therefore generation of dust may be significant. The site is surrounded by areas like agricultural lands, truck terminal, industries, etc, and therefore the impact of dust may be limited. However, should follow and implement the following measures to reduce the dust:
- Wrap the site/construction area with geo-textile fabric or install dust barriers to a necessary height
 - Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization
 - Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process;
 - Use tarpaulins to cover loose material/soil that is transported to and from the site by truck
 - Control dust generation while unloading the loose material (particularly aggregate) at the site by sprinkling water and unloading inside the barricaded area
 - Clean wheels and undercarriage of haul trucks prior to leaving construction site

- Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition where loaders, support equipment and vehicles will operate
 - Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing
69. Due to confined construction activity within the site and the location of site and its surrounding land use the disturbance and nuisance due to construction work is likely to be minimal. Also there will be no significant noise generating activities like blasting. However, the following noise control measures shall be put in place by the contractor:
- During construction work ambient noise level should not exceed more than 65 dB(A).
 - Do not cut materials (like floor tiles) without proper dust control/noise control facility
 - Proper planning of work programme so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times;
 - Utilising modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensuring that these are maintained to manufacturers' specifications at all times.
70. As the shallow excavations (maximum depth 3.5 m) will be made for foundations, there is no possibility of groundwater collecting in voids. The groundwater table depth at the site is about 25 m below ground level. River Hindon flows at a distance of 250 m from the north of the site. Silt-laden runoff from the construction site can pollute the river water. Since the excavation is not expected to be conducted in rainy season, the chances of silt-laden runoff generating from the site is minimal. Nevertheless, the Contractor shall implement the following measures:
- Provide temporary retention ponds in the site for storage of silt laden runoff temporarily; dispose clarified water into nearest drains and finally to River Hindon
71. Large quantities of construction material like sand, gravel and aggregate will be required for road construction work. There could be impacts due to mining of materials if the mining activities are not conducted properly. Therefore to ensure that there are no impacts due to mining, the Contractor should procure construction materials only from quarries licensed by Department of Mines and Geology. In addition, the contractor shall ensure the following:
- Utilizing the waste soil generated from this construction work and other ongoing projects like construction of multi-level parking facility, wherever feasible in the construction work, such as raising the ground-level of the site.
2. *Ecological Resources*
72. There are no protected areas in or around the site and no known areas of ecological interest. There are few eucalyptus trees in the site, which need to be cut off.

73. Necessary approvals from competent authority (Forest Department/Ghaziabad Nagar Nigam) shall be obtained and the guidelines for compensatory measures, if any of the competent authority, must be adhered to. In any case, as a compensatory measure, three trees will be planted and maintained for each tree felled.

3. *Economic Development*

74. The proposed Bus Terminal will be constructed in a site admeasuring 10.27 acres (4.16 ha), of which 9.17 acres is under private ownership and the remaining 1.1 acres is government land. The private land is partly under agricultural use. This site is earmarked in the Ghaziabad Master Plan for development of a transport facility.

75. The resettlement issues related to Involuntary Resettlement were assessed by a parallel process of resettlement planning and will be compensated by measures set out in detail in the Resettlement Framework. Therefore it is necessary that:

- Resettlement Plan prepared for the subproject is implemented in full and all its recommendations are complied with.

76. Transport is another activity, which is likely to be affected by the construction work. The traffic on the surrounding roads will be increased due to movement of construction vehicles transporting material to the site. Following measures shall be followed by the Contractor:

- Plan work to avoid peak traffic hours
- Plan routes to avoid narrow streets, congested roads, etc

4. *Social and Cultural Resources*

77. There are no historical or cultural heritage sites in Ghaziabad in general or at the project site in particular. Therefore there are no likely impacts.

78. The site is located in the outskirts and there are no sensitive land uses in the vicinity of the site. Therefore no major disturbance or nuisance is envisaged due to the construction work. Further, the construction work will be confined to the actual site, which will be appropriately barricaded.

79. Considering just two level construction (ground floor + first floor), limited excavation for foundation and confined construction activity within the site, safety risk will be minimal. However, the following precautionary measures shall be implemented by the Contractor:

- Following standard, safe and quality construction practices;
- Excluding the public from the site – enclosing/barricading the construction area;

providing warning boards and sign boards

- Ensuring that all workers are provided with and use appropriate Personal Protective Equipment (helmet, hand gloves, boots, masks, safety hoists, etc);
- Report accidents to the authorities promptly, and maintain records

80. There could be some short-term socio-economic benefits from the construction work if local people gain employment in the workforce. To ensure that these benefits are directed to local people, the Contractor should be required to employ as much of his labour force as possible from the local communities. Drawing of majority of workforce from local communities will avoid problems that can occur if workers are imported, including social conflicts and issues of health and sanitation due to labour camps. If temporary labour camps are to be provided; Contractor should ensure that they are maintained well with proper water supply and sanitation facilities.

C. Operation Stage Impacts

81. The parking facility would operate without the need for major maintenance or repair, therefore there are no major impacts envisaged. During operation, the impacts are mainly due to resource consumption (water and electricity), generation of wastewater (from toilet and bath facilities) and solid waste, and noise and air emissions due to movement of buses and other vehicles. The bus operations will be limited to passenger boarding and alighting and parking for overnight bus services.
82. Since no bus repairs, maintenance or fuelling activities would be conducted at the terminal, no related waste is generated.
83. The water demand of bus terminal is estimated 0.6 MLD in 2010 and 1.6 MLD in 2025. This water will be sourced from city water supply system of Ghaziabad. At the existing Bus Stand at Navyug Market too, water is supplied from the same source. As this development is as per the Master Plan of Ghaziabad, this demand is already considered in the city demand.
84. Of the total water utilized, 80 percent will generate as wastewater – mainly from washrooms, toilets, restaurant kitchen etc. So the wastewater generation will be about 0.48 MLD in 2010 to 1.28 MLD in 2025. This wastewater will be let into the main sewer running along GT Road for treatment and further disposal. The contribution of this sewage to the total sewage generation of the city (about 128 MLD) will be about 1 percent. The sewage treatment plants in the city are at present underutilized at 71 percent and therefore the additional sewage generation will not have any impact on the existing facilities. Similarly solid waste will be generated from Bus Terminal, which needs to be disposed properly. This solid waste will be disposed through city solid waste management system.
85. Electricity consumption will be limited by designing environmental friendly building that requires less power. The building is designed as an open structure for ample air circulation and ventilation. The building is oriented to the west of the site to allow for shading of the

passenger waiting area from the evening sun.

86. The facility will be designed as per the local guidelines and meeting approved fire and hazard safety norms.
87. Emissions from bus and other vehicles will raise the concentration of air pollutants locally. Ambient noise levels will also rise locally due to operations of bus terminal. This impact will be minimal as there are no sensitive land uses in the immediate vicinity. Green areas (of fast and tall growing tree species) will be developed within the terminal as natural sinks for air pollutants and noise.
88. There could be a positive impact as it is proposed to develop a rainwater harvesting system for the terminal. The use of recycled grey water for non-potable purposes within the terminal will also be considered during implementation.
89. To sum up the above, the following measures are included in the design and development of the proposed Bus Terminal facility to minimize the operation stage impact.
 - Water supply shall be sourced from water supply network of Ghaziabad Nagar Nigam;
 - Develop rainwater harvesting system; minimize water usage
 - Connect the wastewater outlet to nearest sewer of GNN
 - Dispose solid waste through city solid waste management system
 - Design the structure utilizing more natural light to reduce artificial lighting requirement;
 - Minimize use of air conditioners in the commercial area by good orientation and appropriate construction materials
 - Design the building in compliance with fire safety norms
 - Provide green buffer areas in the facility

D. Location and Design Impacts

90. In many environmental assessments there are certain effects that, although they will occur during either the construction or operation stage, should be considered as impacts primarily of the location or design of the project, as they would not occur if an alternative location or design was chosen.
91. However in case of this subproject, except the private land acquisition, it is not considered that there are any major impacts that are a result of the design or location. This is because:
 - The project involves straightforward construction and low-maintenance operation, in an environment that is not especially sensitive, so it is unlikely that there will be major impacts;

- Most of the predicted impacts are associated with the construction process, and are produced because that process involves quite extensive construction work. However the routine nature of the impacts means that most can be easily mitigated, and
 - The operation stage impact are duly considered in the design and necessary measures and included in the project.
92. Land acquisition could not be avoided as this site is earmarked for development of a transport facility (Bus Terminal) in the Ghaziabad Master Plan. It is recognized that due to lack of government land, the GDA has proposed this site for development of Bus Terminal. The Land acquisition and involuntary resettlement issues are considered in the parallel process of resettlement planning and compensatory measures will be implemented accordingly.

6. INSTITUTIONAL ARRANGEMENTS

A. Institutions Involved

93. Following agencies will be involved in implementing this Bus Terminal subproject in Ghaziabad:
- (i) NCRPB: National Capital Region Planning Board is the funding agency for the project.
 - (ii) Implementing Agency (IA): Implementing Agency of the Project will be Ghaziabad Development Authority or Uttar Pradesh State Road Transport Corporation (UPSRTC). IA will be responsible for the project implementation and operation. It is also possible that this project would be implemented on Public-Private-Partnership (PPP) basis. In which case the Executing Agency will be the GDA/UPSRTC, and PPP operator would be the implementation agency.
 - (iii) Design and Supervision Consultants: Implementing Agency will be assisted by Design and Supervision Consultants (DSC) in tendering, and reviewing and revising designs during the construction, if required, and supervising the construction to ensure quality.
 - (iv) Construction Contractors: IA will appoint Construction Contractors (CC) to build the infrastructure elements.
94. Implementing the project according to and in compliance with the policies the funding agency, NCRPB, will be the responsibility of the Implementing Agency (IA). The Environmental and Social Management Cell (ESMC) of NCRPB will deal with environmental and social safeguard issues. ESMC would guide and monitor IA in complying with its ESMS and Policy.
95. *ESMC*. The ESMC will be housed inside the appraisal function of NCRPB and will have two distinct sub-functions, i.e. managing environmental safeguards and social safeguards. ESMC will be provided with one full-time staff - safeguards officer, who will look after the day-to-day activities related to the safeguard compliance. Safeguard Officer will be responsible for both environmental and social safeguard functions. Based on the necessity, the Safeguards Officer will source expertise from outside on a case-to-case basis.
96. ESMC will review and approve IEE, oversee disclosure and consultations, and will monitor the implementation of environmental monitoring plan and environmental management plan where required. The Construction Contractor (CC) will implement mitigation measures in construction. IA or DSC will monitor the implementation of mitigation measures by the CC. ESMC will oversee the implementation of EMP. Implementation of mitigation and monitoring measures during the operation and maintenance (O&M) stage will be the responsibility of the implementing agency.

7. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

97. The proposed subproject and its components, the baseline environmental profile of the subproject area, the anticipated environmental impacts and appropriate mitigation measures to avoid/ reduce/ mitigate/compensate for the identified impacts have been discussed in detailed in earlier sections.
98. This Environmental Management Plan is developed for implementation listing the impacts, appropriate mitigation measures, delegating the responsibility of implementation to concerned agencies. This is shown in the following **Table 7-1**.

B. Environmental Monitoring Plan

99. A program of monitoring will be conducted to ensure that all the parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. Regular monitoring of implementation of mitigations measures by Construction Contractor will be conducted by the Implementing Agency. Periodic monitoring and overseeing of implementation of mitigation measures will be conducted by the ESMC of NCRPB. Monitoring during operation stage will be conducted by the Operating Agency.
100. Most of the mitigation measures are fairly standard methods of minimizing disturbance from building in urban areas (public inconvenience and traffic disruptions). Monitoring of such measures normally involves making observations in the course of site visits, although some require more formal checking of records and other aspects.
106. **Table 7-2** shows the proposed Environmental Monitoring Plan (EMP) for this Project, which specifies the various monitoring activities to be conducted during different phases of the project. The EMP describes: (i) mitigation measures, (ii) location, (iii) measurement method, (iv) frequency of monitoring and (v) responsibility (for both mitigation and monitoring).

Table 7-1: Environmental Management Plan

Potential Negative Impacts	Sig	Dur	Mitigation measures	Responsibility	Location	Cost
Preconstruction						
Land acquisition and involuntary resettlement <i>Description:</i> Acquisition of private land to the tune 9.17 ha	L	P	<ul style="list-style-type: none"> Implement compensatory measures as recommended by the Resettlement Plan prepared in accordance with NCRPB ESMS 	GDA	Bus Terminal (BT) Site	Part of RP Cost
Construction						
Tree Cutting <i>Description:</i> The proposed work requires cutting of few eucalyptus trees	L	P	<ul style="list-style-type: none"> Obtain necessary approvals from Forest Department/Ghaziabad Nagar Nigam for tree cutting Plant and maintain three trees for each tree felled as a compensatory measure 	CC	BT Site	Part of project cost
Waste soil/rubble will be produced in considerable quantities which needs proper disposal.	L	P	<ul style="list-style-type: none"> Utilize the waste/surplus soil within the site as far as possible, for example, for raising the ground-level of the site Salvage the recyclable and reusable material as much as possible and reduce the quantity that needs to be disposed off Estimates the quantity of rubble and prepare a rubble management plan Dispose rubble in only in solid waste dumping sites or filling up abandoned quarries or as recommended by UPPCB Utilize excavated soil in construction – to raise the ground-level or road construction 	CC	BT Site and Disposal Site	Part of standard contract
Silting of natural drains/rivers due to silt-laden runoff from excavated areas	L	T	<ul style="list-style-type: none"> Provide temporary retention ponds in the site for storage of silt laden runoff temporarily; dispose clarified water into nearest drains and finally to River Hindon 	CC	BT Site	Part of standard contract

Potential Negative Impacts	Sig	Dur	Mitigation measures	Responsibility	Location	Cost
<p>Dust nuisance due to construction</p> <p><i>Description.</i> Dismantling, earthwork excavation, refilling, handling and transportation of construction materials (like sand and aggregate), and handling, and transportation produce large volumes of dust if it is not done properly.</p>	L	T	<ul style="list-style-type: none"> • Wrap the site/construction area with geo-textile fabric or install dust barriers to the necessary height • Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization • Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process; • Use tarpaulins to cover loose material/soil that is transported to and from the site by truck • Control dust generation while unloading the loose material (particularly aggregate) at the site by sprinkling water and unloading inside the barricaded area • Clean wheels and undercarriage of haul trucks prior to leaving construction site • Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition where loaders, support equipment and vehicles will operate • Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing 	CC	BT Site	Part of standard contract
<p>Impacts due to improper mining for construction materials</p>	L	P	<ul style="list-style-type: none"> • Ensure that construction materials (sand, aggregate and gravel) are obtained from quarries licensed by Geology and Mining Departments of respective state governments (Haryana/ Uttar Pradesh /Uttarakhand) 	CC	NA	Part of standard contract

Potential Negative Impacts	Sig	Dur	Mitigation measures	Responsibility	Location	Cost
Increase in traffic due to trucks carrying construction material and heavy equipment	L	T	<ul style="list-style-type: none"> Plan work to avoid peak traffic hours Plan routes to avoid narrow streets, congested roads, and places of religious importance 	CC	NA	Part of standard contract
Nuisance due to noise from construction activity	L	T	<ul style="list-style-type: none"> During construction work ambient noise level should not exceed more than 65 dB(A). Do not cut materials (like floor tiles) without proper dust control/noise control facility Proper planning of work programme so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times; Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensuring that these are maintained to manufacturers' specifications 	CC	BT Site	Part of standard contract
Safety risk due to construction activity	L	T	<ul style="list-style-type: none"> Following standard, safe and quality construction practices; Excluding the public from the site – enclosing/barricading the construction area; providing warning boards and sign boards and posting of security guards throughout the day and night Ensuring that all workers are provided with and use appropriate Personal Protective Equipment (helmet, hand gloves, boots, masks, safety hoists etc); Report accidents to the authorities promptly, and maintain records 	CC	BT Site	Part of standard contract
Economic benefits for people employed in workforce	L	T	<ul style="list-style-type: none"> Ensure that most of the unskilled workforce is from local communities 	CC	BT Site	NA
Operation Impacts						

Potential Negative Impacts	Sig	Dur	Mitigation measures	Responsibility	Location	Cost
Impact on water resources; water supply and sewerage infrastructure	M	P	<ul style="list-style-type: none"> Water supply shall be sourced from water supply network of Ghaziabad Nagar Nigam Develop rainwater harvesting system; minimize water usage Connect the wastewater outlet to nearest sewer of GNN 	GDA/UPSRTC/ developer	BT Site	
Power consumption	L	P	<ul style="list-style-type: none"> Design the structure utilizing more natural light to reduce artificial lighting requirement; Minimize use of air conditioners in the commercial area by good orientation and appropriate construction materials 	GDA/UPSRTC/ developer	BT Site	
Safety & fire risk	L	P	<ul style="list-style-type: none"> Design the building in compliance with fire safety norms and provide necessary equipment 	GDA/UPSRTC/ developer	BT Site	

Table 7-2: Environmental Monitoring Plan

Mitigation measures	Responsible for Mitigation	Monitoring Method & Parameters	Monitoring Frequency	Responsible for monitoring	Cost
Pre-Construction					
<ul style="list-style-type: none"> Implement measures as recommended by RP 	GDA	Records review; interview with APs	As needed	ESMC	Part of project management cost
<ul style="list-style-type: none"> Obtain necessary approvals for tree cutting Plant and maintain three tree for each tree felled 	CC	Records review; on site-observation	As needed	GDA / UPSRTC	Part of construction supervision cost
<ul style="list-style-type: none"> Water supply shall be sourced from local network No bore wells or groundwater extraction structures Develop rainwater harvesting system Connect the wastewater outlet to nearest sewer of GNN Design the structure to reduce power consumption Design the building in compliance with fire safety norms 	GDA	Design review and site observations	As needed	ESMC	Part of project management cost
Construction					
<ul style="list-style-type: none"> Salvage the recyclable material as much as possible Prepare a rubble management plan Dispose rubble only in solid waste dumping sites or filling up abandoned quarries Utilize excavated soil in construction Provide retention ponds for temporary silt runoff storage Dispose only clarified water into drains Wrap the site/construction area with geo-textile fabric or install dust barriers to the necessary height Apply water and maintain soils in a visible damp Apply water prior to leveling or any earth moving activity Use tarpaulins to cover loose material/soil in transport Control dust generation in unloading the loose material Clean wheels and undercarriage of haul trucks 	CC	Observations on-site/off-site; CC records	Weekly	GDA / UPSRTC	Part of construction supervision cost

Mitigation measures	Responsible for Mitigation	Monitoring Method & Parameters	Monitoring Frequency	Responsible for monitoring	Cost
<ul style="list-style-type: none"> • Stabilize surface soils in work place 					
<ul style="list-style-type: none"> • Don't allow access in the work area except workers • Obtain construction materials from approved mines • Plan routes to avoid narrow streets/congested roads • Plan work to avoid peak traffic hours • Ambient noise level not to exceed 65 dB(A) • Utilize modern vehicles and machinery • Follow standard, safe and quality construction practices • Ensure that all workers are provided with and use PPE • Report accidents and maintain records • Draw unskilled workforce is from local communities 	CC	Observations on-site/off-site; CC records	Weekly	GDA / UPSRTC	Part of construction supervision cost

8. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project Stakeholders

101. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders are:

- People near the proposed site;
- Public representatives and prominent citizens;
- Ghaziabad Nagar Nigam;
- Uttar Pradesh State Road Transport Corporation
- Ghaziabad Development Authority

102. Secondary stakeholders are:

- Other concerned government institutions (utilities, regulators, etc)
- NGOs and CBOs working in the local area;
- Other community representatives (prominent citizens, religious leaders, elders, women's groups);
- The beneficiary community in general
- NCRPB as the Funding Agency

B. Consultation and Disclosure

103. A series of public consultation meetings were conducted during project preparation. Various forms of public consultations (consultation through household surveys, ad hoc discussions on site) have been used to discuss the project and involve the community in planning the project and mitigation measures.

9. RECOMMENDATION AND CONCLUSION

A. Recommendation

104. The process described in this document has assessed the environmental impacts of the proposed construction of Bus Terminal in Ghaziabad. Potential negative impacts were identified in relation to design, location, construction and operation of the proposed flyover. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and measures have been included in the designs. This means that the number of impacts and their significance has already been reduced by amending the design.
- Design as per seismic zone to eliminate risk
 - Compensatory tree plantation – 3 trees for each tree felled
 - Sourcing water supply from city network and avoiding groundwater extraction
 - Disposal of waste and wastewater through city level systems
 - Provision of rainwater harvesting system
 - Design and orientation of building to utilize natural light and wind as much as possible
105. Regardless of these and various other actions taken during the IEE process and in developing the project, there will still be impacts on the environment when the infrastructure is built. This is mainly because of land acquisition of 9.17 acres and related involuntary resentment. Following are some of the important mitigation measures suggested:
- Implementation of compensatory measures for clearance of encroachments as recommended by the Resettlement Plan prepared in compliance with NCRPB policies
 - Condition that the all compensatory/resettlement measures must be implemented before the signing of contract for civil works
106. During the construction phase, impacts mainly arise from generation of waste and dust, and risk to worker and public safety etc. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Important measures suggested include:
- Salvaging the recyclable and reusable material as much as possible and reduce the quantity that needs to be disposed off
 - Preparation of a rubble management plan
 - Wrap the site/construction area with geo-textile fabric or install dust barriers
 - Apply water and maintain soils in a visible damp or crusted condition Use

- tarpaulins to cover loose material/soil that is transported to and from the
- Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing
 - Noise control measures; during construction work ambient noise level should not exceed more than 65 dB (A).
 - Following standard, safe and quality construction practices;
 - Ensuring that all workers are provided with and use appropriate Personal Protective Equipment
107. During the operation, the impacts are mainly due to consumption of resource like water and electricity, stress of existing infrastructure and disposal of solid and liquid waste generated from toilet and bath facilities. Fire safety is another impact aspect. The following measures are included in the design:
- Water supply shall be sourced from water supply network of Ghaziabad Nagar Nigam;
 - Develop rainwater harvesting system; minimize water usage
 - Connect the wastewater outlet to nearest sewer of GNN and dispose solid waste through city solid waste management system
 - Design the structure utilizing more natural light and air to reduce the power consumption
 - Design the building in compliance with fire safety norms
108. The main beneficiaries of the facility will be the citizens of Ghaziabad and Bus Terminal users in general.
109. Mitigation will be assured by a program of environmental monitoring conducted to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the NCRPB.
110. Stakeholders were involved in developing the IEE through both face-to-face discussions on site and a large public meeting will be held in the town, after which views expressed will be incorporated into the IEE and the planning and development of the project.
111. There are two essential recommendations that need to be followed to ensure that the environmental impacts of the project are successfully mitigated. The IA shall ensure that:
- All mitigation, compensation and enhancement measures proposed in this IEE report and in the Resettlement Plan (RP) of the subproject are implemented in full, as described in these two documents;
 - The Environmental Monitoring Plan proposed in this report and monitoring proposed in the Resettlement Plan are also implemented in full.

B. Conclusion

112. The environmental impacts of the proposed Bus Terminal in Ghaziabad have been assessed by the Initial Environmental Examination reported in this document, conducted according to the NCRPB ESMS. Issues related to Involuntary Resettlement were assessed by a parallel process of resettlement planning and will be compensated by measures set out in detail in the Resettlement Framework for the subproject.
113. The overall conclusion of both processes is that providing the mitigation, compensation and enhancement measures are implemented in full, there should be no significant negative environmental impacts as a result of location, design, construction or operation of the subproject.
114. There are no uncertainties in the analysis, and no additional work is required to comply with NCRPB procedure or national law. There is thus no need for further study or Environmental Assessment.

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