OFFICE OF THE EXECUTIVE ENGINEER
WESTERN DIVISION-5, DDA,
1st Floor Vikas Minar, ITO, New Delhi.110002.

No: - F23(160) WD-5/ DDA/2017/4855 **Dated:** 19/9/2017

To,

Member sectary IA_III,
Ministry of Environment, Forest & Climate Change,
Indira ParyavaranBhawan,
Jorbagh, New Delhi- 110003.

F.No. -21-119/2017-IA-III& proposal No. IA/DL/NCP/63318/2017

Sub:- Submission of documents as per EDS published in the22 minutes of meeting ofEAC dated 11.09.2017 for Project Prefab 3BHK, 2BHK & EWS Housing for DelhiDevelopment Authority at Pocket 11, sector A1A4,Narela Delhi.

Dear Sir,

This is in Reference in Our Proposal No. IA/DL/NCP/63318/2017and subsequent presentation on 11.09.2017 the following issues were raised and reply is enclosed as annexure.

Hope you will find the things in order.

Kindly grant the EC

Encl: As Above

19/9/17

Executive Engineer
Western Division-5

Er. Chander Mani Garg
Executive Engineer
WD-5, D.D.A.
Vikas Minar, New Delhi

Annexure

i) Submit revised EIA Report including 3 months baseline data.
(Copy Enclosed in EIA Report.)

ii) Permission letter from Delhi Jal Board to provide 3887.5 KLD water as proposed. (Enclosed With the EIA Report)

iii) Air Quality data in terms of Air Quality Index. (Enclosed With the EIA Report)

iv) The EIA should also give a compliance plan to conditions stipulated in Annexure XIV of the amended EIA Notification vide S.O. 3999 (E) dated 09.12.2016. (Enclosed With the EIA Report)

v) Details energy conservation measures to be taken. All points mentioned in the proposal such as orientation to support reduced heat gain, use of ASHRAE 90.1, use of ECBC compliant envelope measures to be supported through drawings and details in the proposal.
(Enclosed With the EIA Report)

vi) An assessment of the cumulative impact of all development and increased inhabitation being carried out or proposed to be carried out by the project or other agencies in the core area, shall be made for traffic densities and parking capabilities in a 05 kms radius from the site. A detailed traffic management and a traffic decongestion plan drawn up through an organization of repute and specializing in Transport Planning shall be 15 submitted with the EIA.

Enclosed with the EIA Reportregarding grant of TORs for the above mentioned project& subsequent grant of the Standard TOR, we are hereby submitting the EIA report for the same.

We request you to Kindly accept our Baseline data which has been collected for the same sector (Pocket- 3,4,6,9,13 & 14, sector A1 to A4, Narela)during the month of 1st of November 2016 to 31st January 2017 on the basis of TORs issued by SEIAA, Delhi.

Kindly grant the Environmental Clearance

Encl: As Above

Er. Chand...
Executive Engineer
WD-5, D.D.A.
Vikas Minar, New Delhi

Point No.1

Submit revised EIA Report including 3 months baseline data

ENVIRONMENT IMPACT ASSESMENT (EIA) REPORT

OF

PREFAB 3BHK, 2BHK & EWS HOUSING

AT

Pocket 11, Sector – A1A4, Narela,

New Delhi

SUBMITTED BY:

DELHI DEVELOPMENT AUTHORITY

VIKAS MINAR, ITO, NEW DELHI – 110002

Consultant :

Shri Environmental Technology Institute

NEW DELHI

INDEX

CHAPTER – 1

INTRODUCTION

1.0 Background

Housing is a basic human requirement of any civilized society. With the growth of urbanization, cities have been expanding alarmingly in the last few decades, which has resulted in haphazard growth of urban areas as well as acute housing shortage. DDA a Housing & Urban Planning Department in Delhi working under MoUD caters the need of infrastructure development in Delhi. Expert Appraisal Committee (EAC) was established to ensure planned and Sustainable development of urban areas and create an enabling environment to provide affordable housing.

1.1 Introduction

As per the Master Plan of Delhi 2001 notified by the Central Govt. under the Delhi Development Act, 1957 on 1.8.1990, the National Capital Territory of Delhi is divided into 15 zones, out of which 8 zones (A-H) are in Urban Delhi, 6 zones (H-N & P) are in urban extn./rural areas. Zone–O is for River Yamuna (River Front Area). A zone could be divided into sub zones.

1.1 Narela subcity mainly comprises of parts or zone – M, N & P and forms part of the phase IIB & III of the urban extension plan approved by the Authority vide resolution No. 79 dated 30.6.1987 as part of Master Plan Delhi-2001.

1.2 This zonal plan for part of zones M, N & P (Narela subcity) is for the area envisaged for the development as per urban extension plan considered and approved by the Authority.

1.3 Hereinafter this zonal plan is referred to as Zonal Plan for Narela subcity**.**

1.4 Necessity of the Project

The built environment and urban infrastructure provide the core framework for most human activity. Therefore it is crucial to develop them with an effective measure of resilience so they can withstand, and adapt to the pressures of socio-economic challenges posed by increased urbanization, density, housing shortfall, employment, climate change etc. With nearly half of the country's population expected to be living in

or migrating to urban areas by the end of the decade, at the crux of this framework lie 'Cities'- which are engines of national productivity.

Since last decades in India, cities are growing at a rapid pace and Delhi is no exception. Apart from these, the population of the city is also growing on account of high birth rates. Delhi ultimately to become a self-contained industrial city with complementary business, trade and commerce, residential, recreational and institutional activities. In order to accommodate future growth of population land to capitalize on the areas high growth potential due to its proximity to the metropolitan city of Delhi and evolving transport linkages and to promote work opportunities and provide a conductive environment for people to earn livelihood and enjoy good quality of life so that they can contribute to the further development of the region and the country, it is imperative that they are provided office with and housing facilities along with adequate medical facilities, scope for entertainment, sports, uninterrupted water and power supply, sewage disposal system and solid waste management and so on. The proposed project fulfills all these parameters within the framework of planned urban development in the region.

People now want to live in localities in which majority of their daily needs are fulfilled in the same locality. Also the group housing concept is well accepted by people as they get all the facilities like housing, Banks, ATMs, Convenient shopping etc. The development rate in Delhi is taking place with a rapid rate and as a result, the direct impact on the environment is envisaged**.**

The proposed scheme strives to attain the same by providing cost-effective as well as luxurious housing in a Group Housing scheme that caters to the residential needs of the population. The project is especially significant in providing housing facilities in Delhi and NCR, as the economic opportunities in Delhi and NCR are increasing and people are facing a very busy schedule due to which their priority is to go for such group housing schemes where living and leisure facilities are provided under one roof especially for business/entrepreneur class of people.

Delhi Development Authority has fulfilled needs of people by constructing state-of-the art apartments with convenient shopping Centre and other community facilities and now it wants to fulfill needs of growing urban population in an absolute manner hence has proposed this residential project. The proposed project **"Prefab CAT-II& EWS Housing for DDA"** fulfills all these parameters within the framework of planned urban development in the region.

1.5 Purpose of the Study

The purpose of this report is to assess the impact due to proposed Group Housing project. The project falls under item No. 8(b) of Building and Large Construction Projects of Schedule of EIA Notification, 2006, thus requires Clearance from State Expert Appraisal Committee, Govt. of India

The sole purpose of Environmental Impact Assessment report is to assess the beneficial and adverse impacts of the proposed activity on the existing environmental systems and to propose appropriate pollution control measures.

1.6 Objectives

In order to ensure that development is sustainable it is essential to integrate environmental concerns into development activities. Environmental impact assessment and management have been recognized as effective tools for facilitating the inclusion of the principles of sustainable development in to development processes or projects. It is also universally accepted that natural resource development and environmental protection should go hand in hand. This is in- line with the national policy that the development of infrastructure as well as other developmental
activities has to follow the principle of development without destruction, and measures must be adopted to have a stress - free environment.

In order to avoid or reduce the possible ill effects, it is essential that all the development projects should be subjected to the requirement of an Environmental Impact Assessment (EIA). EIA will point out potential environmental impacts of the proposed project and to recommend appropriate mitigation measures for the possible adverse impacts. Recommendations are also made for an environmental management plan.

To achieve these objectives, some procedures have been adopted for the study like

- Environmental Monitoring & Generation of baseline data by using various monitoring techniques in respect of air, water, soil, noise, biological environment, micro-meteorology, traffic density including demographic and economic features.
- Implementation mechanism/ Strategy of EMP involving emergency preparedness Plan
- Pollution control especially for Noise & Air Pollution Control.
- Water and Waste water management in the project areas.
- Drainage pattern in the project area.

Landscaping of the project area.
Energy conservation etc.

1.7 Scope of Study

The scope of the study is:-

- Compilation of baseline environmental and social scenario of the study area within a radius of 10 km around the proposed project site based on field studies covering one season (except monsoon) and secondary data collection;
- Identification, prediction and evaluation of potential environmental impacts expected during the construction and operation phase of the project;
- Preparation of mitigation measures, Environmental Management Plan (EMP) and Monitoring Program for implementation of suggested mitigation measures.

1.8 Scoping/ EIA Methodology

The approach followed by Shri Environmental Technology Institute . in conducting the EIA study is according to the applicable regulatory framework. The main stages followed are described below:

Stage -I

Review of design and operational information of the proposed Project through Project Report/data/site visit/site assessment.

Stage -II

An initial review of the proposed project site and status of the physical environment around the project vicinity;

Understanding project design and operation as well as macro environmental aspects. The major issues needed to be addressed with due care were identified and monitoring plan for the environmental baseline was prepared;

Baseline environmental assessment was conducted within the study area of 10 km radius around the proposed project site;

Intensive monitoring and primary field data collection of environmental components viz. Micro-Meteorological Condition, Ambient Air Quality, Water (Surface and Ground water) use and its Quality, Soil Quality, Noise Level, Traffic Volume etc.;

Survey study was carried out in the study area to assess the status of flora & fauna and socio-economic profile of the study area; and

Information was also collected through Primary and Secondary sources like Department of Census, Local and City Offices, National Institutions (Survey of India, National Information Centre etc.), District Head Quarters and other Government Offices etc. as well relevant Published Literatures.

Stage –III

Compilation of the Environmental Baseline of the Study Area.

Stage -IV

Assessment of Environmental Impacts by predicting the scale and extent of changes associated with the project and their subsequent effects on the environment against the environmental baseline conditions, and evaluating the significance of such impacts against accepted criteria.

Stage -V

Identification and preparation of measures to mitigate significant impacts (evaluated from the impact prediction process) by proposing applicable alternatives and control measures; and

Finally, development of appropriate Environmental Management and Monitoring Plan to audit and ensure that the proposed mitigation measures are in place and effective.

1.9 Legal and Policy Context

The EIA conforms to the policy and legal requirements of new projects to meet the objectives of sustainable development. The legal and policy background for this EIA, are the provisions enshrined in the Environmental Impact Assessment Notification of September 2006, various infrastructure projects require Environmental Clearance from the State and Central Government levels..

As per the Notification vide S.O. 1533(E) dated 14th September, 2006 issued by the MoEF, Govt. of India which is as follows *(for Building and Construction projects & Townships and Area Development projects):*

8		***Building / Construction projects/Area Development projects and Township***	
8(a)	***Building & Construction projects***	***≥ 20,000 sqm and < 1,50,000 sqm of Built-up area#***	***# (Built-up area for covered construction; in case of facilities open to the sky, it will be the activity area)***
8(b)	***Townships and Area Development projects***	***Covering an area ≥ 50 ha and built-up area ≥1,50,000 sqm ++***	***++ All projects under Item 8(b) shall be appraised as Cat B1***

According to this Notification, environmental clearance from State Level Environmental Impact Assessment Authority is required as 8 (b) projects and all General Conditions are not applicable on Category 8 projects.

An Environmental Impact Assessment (EIA) study is a pre-requisite for getting Environmental Clearance from the said authorities of the state or central government. The purpose of EIA Report is to assist in the decision- making process and to ensure that the project options under consideration are environmentally sound and sustainable. EIA identifies ways of improving project environmentally by prevention and amelioration of the adverse impacts. The findings of the EIA study will be incorporated in the design. The approach adopted in the EIA study is to ensure that positive environmental impacts are maximized and the negative ones are minimized to the extent possible. The steps taken generally consist of incorporation of appropriate mitigation measures in engineering designs, construction schedules and techniques, as well as in operational and management practices outlined as a part of Environmental Management Plan (EMP).Generic structure of the EIA follows the structure as prescribed in Appendix-III of the EIA Notification 2006 of the MoEF, Government of India. During the study of Environmental Impact Assessment, following Government rules and policies have also been considered as having a bearing on the activities in the construction and operation phases of the project.

Legislation	**Areas / Activities Covered**
Environment (Protection) Act, 1986 with Rules.	• Overall Environment Protection • Compliance to environmental (Air, Water, Noise) Standards issued under EPR
EIA Notification, 1994, 2006 and 2009	• Prepare EIA / EMP report • Obtain Environmental Clearance from MoEF/SEIAA
Air (Prevention and Control of Pollution) Act, 1981 with Rules.	• Protection of Air Quality • Consent to Establish (NOC) for establishing and Consent to Operate (CTO) for activities causing air pollution from SPCB • Compliance to National Ambient Air Quality Standard
Water (Prevention and Control of Pollution) Act, 1974 with Rules.	• Protection of Water Quality • Discharge of sewage

	• Obtaining Consent to Establish for establishing and Consent to Operate for activities causing water pollution from SPCB and further • discharge of effluents
Water Cess Act, 1977	• Paying Water Cess to Pollution Control Board for consumption of water
Noise Pollution (Regulation and Control) Rules, 2000	• Compliance with Ambient Noise and emission Standards in accordance to use classification for the area
Hazardous Waste (Management, Handling and Transboundary Movement Rules, 2008 (as amended)	• Obtaining Authorization from SPCB for handling and storing of hazardous waste like waste oil and lubricants • Following guidelines for handling and storing of such hazardous waste
Manufacture, Storage and Import of Hazardous Chemicals Rules, 2000 (as amended)	• Notifying regulatory authority (in this case, the • State Factories Inspectorate) of storage of hazardous substances like LPG • Follow guidelines on such storage, maintain updated MSDS, submit annual Safety Report to authority • Prepare Onsite Emergency Plan
Wildlife Protection Act, MoEF 1972, amended 2010	• Lays down rules and regulations pertaining to Wildlife Sanctuaries, National Parks. • Obtain NBWL Clearance if site is within 10 km radius of WLS/NP/ Protected Areas
Motor Vehicles Act with Rules	• Lay down restriction for vehicles not having • Pollution Under Control Certificate (PUCC) or proper labeling to enter premises
Petroleum Act with Rules 2000	• Comply with guidance and safety measures for storage, and transportation of petroleum substances within premises
Municipal Solid Waste Rules, 2000	• Management (Collection, Handling, Intermediate Storage) of domestic waste from residences
State Town Planning Acts	• Obtain permits and sanction for land • Development of project in accordance with Landuse and Master plans
State Groundwater Regulation	• Conform to restriction for drawing of

	groundwater • Arrange for recharge through Rainwater Harvesting Schemes (as applicable)
Siting Guidance	• Follow siting guidance as far as practicable • Avoid sites which are environmentally sensitive
Corporate Environmental Policy, 2011	• To ensure that the promoters formulate and follow a well laid corporate Environment policy so that all PP integrate environmental concerns into their day-to-day functioning, especially the compliance with the conditions of the clearances.
Fly ash Notification, 2007	• Use of fly sh (wholly or partly) in building construction wherever it costs same or less than the clay, limestone, sand etc and is not technically infeasible, compliance of which shall be the duty of the person/ agencies undertaking construction
Corporate Social Responsibility	• Each business entity should formulate a CSR policy to guide its strategic planning and provide a roadmap for its CSR initiatives • 2% of total project cost shall be allocated for CSR activities.

1.10 Environmental Impact Assessment Report

The EIA for the project began with an adoption of an environmental and social screening procedure during the feasibility stage. The purpose of the screening was to identify at the outset, key environmental and social issues such as sensitive receptors, change of land use, eco systems, impacts on community facilities, impacts on flora and fauna etc. The important findings of the assessment gave important feedback to the design team, especially in terms of the sensitive receptor utility /facilities to be impacted. It helped to modify the designs at locations where impacts had to be avoided and incorporate mitigation measures wherever the impacts are unavoidable due to other constraints. The steps covered in the preparation of EIA has already been detailed in para 1.3, 1.4 and 1.6.

1.11 Structure of The EIA Report

This EIA report is presented as per the requirements of the EIA Notification of the Ministry of Environment and Forests (MoEF), Government of India.

Chapter-1: Introduction: This section deals with the EIA study, scope of work and the, methodology for EIA. It also provides information on the project proponent, location of the project and its importance to the country.

Chapter-2: Description of the Project: This chapter includes a description of the project including the general features, manmade features, design and planning etc. The information on need of the project is also provided.

Chapter-3: Description of the Environment: This section describes the existing Environmental Scenario (Baseline Data) in detail. The sections on Meteorological baseline, components of the biophysical and natural environments including Air and Water quality, cultural properties in the study area i.e. 10 km radius and quality of life add up to give a comprehensive picture of the existing environment at site in the study area of 15 km. radius.

Chapter-4: Anticipated Environmental Impacts and Mitigation Measures: This section details with environmental impacts and the mitigation, avoidance and environmental enhancement measures to be included in the Environmental Management Plans. In addition to the avoidance and mitigation measures for the biophysical and natural environmental components, this chapter also discusses various environmental enhancements suggested by the project including the enhancement of common property resources such as community water bodies and cultural resources.

Chapter-5: Specific Studies: Energy & Infrastructure requirements for the proposed project. The steps taken to integrate the needs of other stakeholders into the location and design of access infrastructure to reduce and manage overall environmental impacts from resource development.

Chapter-6: Environmental Monitoring Program

The Description of Frequency, location, parameters of monitoring and Compilation and analysis of data and reporting system.

Chapter-7: Additional Studies

Risk Assessment & Disaster Management Plan & Natural resource conservation

Chapter-8: Environmental Management Plan (EMP)

This section will suggest strengthening for ease of implementation of the environmental component of the project. It goes on to describe the set-up required, a reporting system and training needs to ensure that an environmental system for the effective implementation of EIA is put in place.

Chapter-9: Summary & Conclusion (Summary EIA)

The summary will describe each significant environmental issue and its resolution in sufficient detail so that its importance and scope, as well as the appropriateness of the approach taken to resolve it are well understood.

CHAPTER – 2

Description of the Project

2.1 LOCATION, BOUNDARIES AND AREA

Narela subcity is located on the west of G.T. Karnal Road (NH-1) and spreads over in 3 planning divisions i.e. part of Zone-M, Part of Zone-N and part of Zone-P.

Following are the Boundaries

North : NCTD Boundary

South : Boundaries of Sub Zones C-21 & H-19

East : G. T. Karnal Road & its Bypass (NH-I)

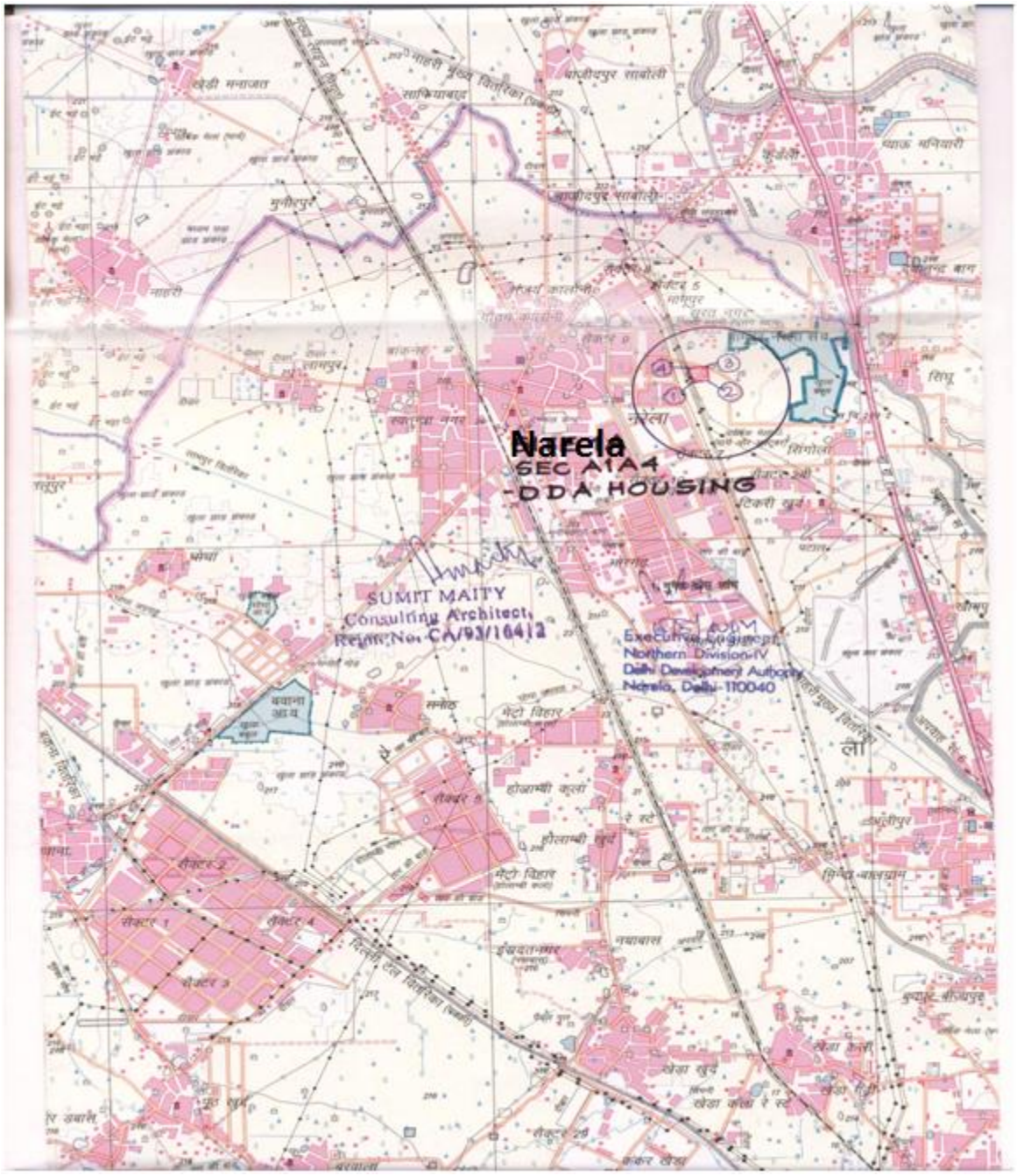
West : Western Yamuna Canal

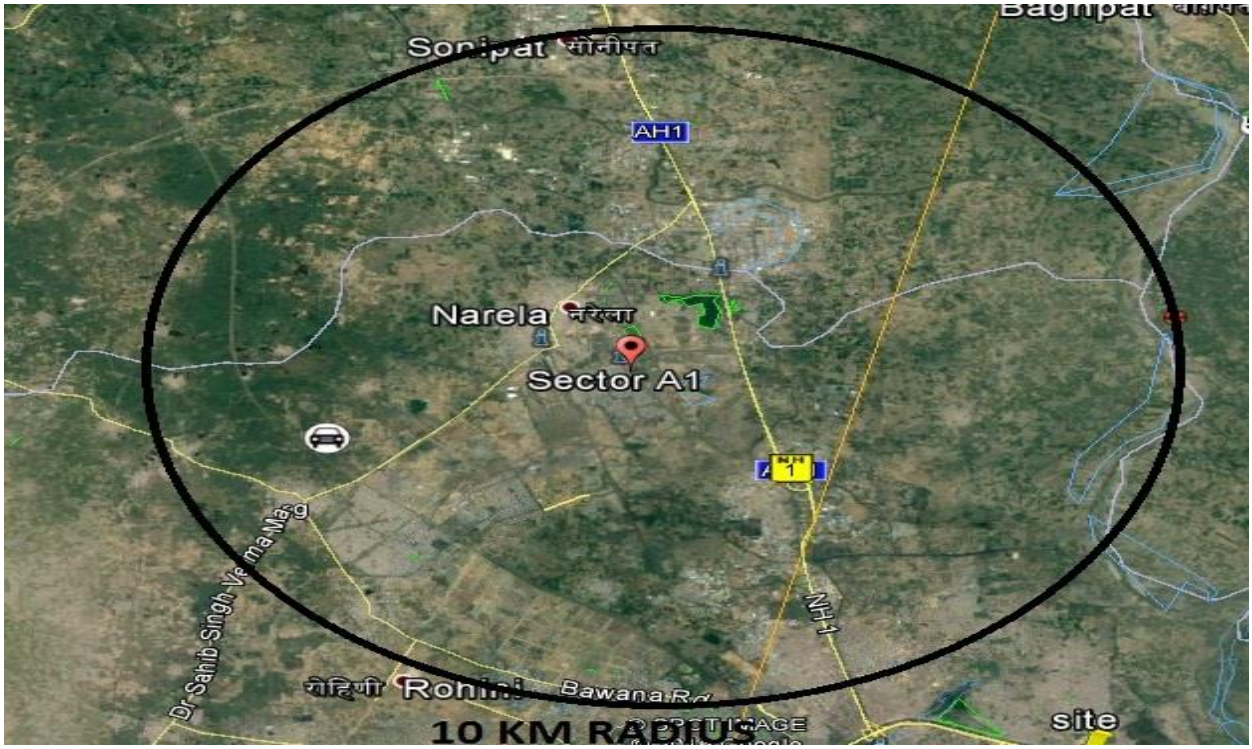
The total area of Narela subcity is about 9866 Hact. with the following breakup:

Area under part Zone M	:	2257 ha.
Area under part Zone N	:	2767 ha.
Area under part Zone P	:	4842 ha.

Connectivity:

The project site is located at Pocket 11 , Sector A1A4, Narela having a Latitude 28^{O} 34' 45" N and longitude 77^{O} 07' 30" E., adjacent to NH- 1, connecting Delhi with Faridabad .The site is within Narela, which is one of the best planned new township of Delhi and is located in the North West part of the State. Connected well with AIR, RAIL and ROAD to all major towns of India


Narela
SEC A1A4
-DDA HOUSING
SUMIT MAITY
Consulting Architect,
Regn. No. CA/93/10412
Executive Engineer
Northern Division-IV
Delhi Development Authority
Narela, Delhi-110040



Community Facilities:

In order to fulfill the daily basic needs of resident population as well as step in population, convenient shopping and community room-facility are planned for both categories.

For CAT II the community needs specifies the Senior Citizen Rm, Recreation crèches & reading rm. is total of 173.17 sqm.

For the EWS part the community needs specifies the Basti vikas Kendra, Health centre , the Religious Space, Police post, community hall etc provided for this category.

Chowkidar Hut of 10 SQM, reqd. nos. of ESS of 10 X 8MT each, 2 no. Pump House has been planned, and also, provision for facilities such as water supply, power lines, better road & green belts etc has been proposed within the project premises

2.2 The Company

DDA is a body working under Ministry of Urban Development for the infrastructural development of Delhi. It is founded in 1962.

2.3 The Project

The proposed project aims at development of a Group Housing scheme **"Prefab 3BHK, 2BHK & EWS Housing For DDA"** located at Pocket 11, Sector-A1A4,Narela, New Delhi. It offers mostly residential apartments that are pollution free and well connected to the outer city with a club for the residents to spend their leisure time and relax, School, Community facility, Nursing Home and Convenient shopping centers for the local needs of the residents. The proposed site is earmarked for the Residential purposes in the Delhi Development Master Plan, 2021 (refer **Fig. - 2.2**). So far no construction or development activities have been initiated at the site.

Basic Information

<table>
<tr><th>S. No.</th><th>Item</th><th>Details</th></tr>
<tr><td>1.</td><td>Name of the project/s</td><td>3BHK, 2BHK & EWS Housing For Delhi Development Authority At pocket-11,Sector A1,A4 Narela , Delhi</td></tr>
<tr><td>2.</td><td>S. No. in the schedule</td><td>8 (b)</td></tr>
<tr><td>3.</td><td>Proposed capacity/area/length/tonnage to be handled/ command area/ lease area/ number of wells to be drilled</td><td>Total Plot Area = 149173 SQM
Permissible Ground Coverage (SQM)= @33.30% i.e. 49674.61
Proposed ground Coverage (SQM)= @15.96 % i.e. 23814.20
Permissible FAR (SQM)= @200% i.e. 298346.00
Proposed FAR (SQM)= @ 199.91% i.e. 298214.05
FAR Break-up (SQM)
<table><tr><td>3BHK</td><td>123415.20</td></tr><tr><td>2BHK</td><td>173.17</td></tr><tr><td>SHOPS</td><td>174625.68</td></tr><tr><td>Total</td><td>298214.05</td></tr></table></td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>Proposed EWS Floor Area (SQM)= 46619.84

CONV. AREA (SQM)= 1574.35

STILT AREA (SQM)= 17751.797

BASEMENT AREA (SQM) = 225428.6

BUILT-UP AREA (SQM) FAR (area) +EWS + Convenient Area +stilt Area+ Basement Area = 589588.637

Additional for Stairs, Balcony etc. (Out of FAR)=

<table>
<tr><td>3BHK</td><td>36540.73</td></tr>
<tr><td>2BHK</td><td>61348.52</td></tr>
<tr><td>EWS</td><td>15907.28</td></tr>
<tr><td>Total</td><td>113796.53</td></tr>
</table>

Gross Built-up Area (SQM = 589588.637 + 113796.53 = 703385.167 sqm

Proposed Non FAR Area (SQM)=

PROP. EWS FL. Area+ CONV. Area+ Stilt Area+ Basement Area+ Balcony & Stairs Etc = 405171.117 SQM

Total Nos. of Units = 3 BHK 960, 2BHK 1808, EWS 1024 = 3792 Nos.

Green Area = 65065 SQM

Percolated Green area (SQM) = 27350 sqm

Population 3792 x 5= 18960</td>
</tr>
<tr>
<td>4.</td>
<td>New/Expansion/Modernization</td>
<td>NEW</td>
</tr>
<tr>
<td>5.</td>
<td>Existing Capacity/Area etc.</td>
<td>NA</td>
</tr>
</table>

6.	Category of Project. i.e.' A' or 'B'	'B'
7.	Does it attract the general condition? If yes, Please specify.	No
8.	Does it attract the specific condition? If yes, Please specify.	NA
9.	Location	Narela
	Plot/Survey/Khasra No.	Pocket 11, Sector A1A4
	Village	Narela
	Tehsil	Narela
	District	North West Delhi
	State	Delhi
10..	Nearest railway station/airport along with Distance in kms.	Khera kalan Railway Station about 10 km
11.	Nearest Town, city, District Headquarters Along with distance in kms.	Delhi
12.	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal Addresses with telephone nos. to be given)	Municipal Corporation,
13.	Name of the applicant	Delhi Development Authority.
14	Registered Address	Vikas Minar, ITO, IP Estate New Delhi - 110002
15.	Address for correspondence	Office of Executive Engineer Delhi Development Authority First Floor, Vikas Minar, ITO, New Delhi - 110002
	Name	Er. C.M. Garg
	Designation (Owner/Partner/CEO)	Executive Engineer (WD - 5) DDA
	Address	Office of Executive Engineer Delhi Development Authority First Floor, Vikas Minar, ITO,

		New Delhi
	Pin Code	110002
	E-mail	
	Telephone No.	
	Fax No.	
16.	Details of Alternative Sites examined, if any. Location of these sites should be shown on a toposheet.	Planned site

Land area and Built-up area:

The site is almost eve in topography and possesses in the area of 149000 SQM. The Housing Complex will be constructed as per the defined building by-laws of the Delhi Development Authority The proposed Housing Complex will have total built-up area of **703385.167** SQ M and the area statement for the proposed EWS & CAT-II Housing Complex is as follows;

Description	**Area in (SQM)**
Gross total Site Area	149000
EWS Part :15% of FAR i.e. 44751.90 sqm	
Proposed F.A.R.	46619.84
Built-up Area under Community permissible/proposed	1789.28/1574.35 sqm
Total proposed Built-up Area	**48194.19**
Nos. of Dwelling Units	1024
Nos. of Block	8
No of Floors	S+16
3BHK,2BHK & EWS . FAR 200%	
Max Permissible Ground Coverage@33.3%	49674.61
Proposed Ground Coverage@15.96%	23814.20
Permissible F.A.R.	298346.0 (200%).
Proposed F.A.R.	298040.88 (199.76%)
Proposed Built-up Area ,community needs (SHOPS)	173.17
Proposed Built-up Area	**298214.05**
Nos. of Dwelling Units	2768Nos
Nos. of Blocks	21 Nos.
N0.of Floors	MB (S+15,13,18)HB(S+18,15)
Stilt Area	**17472.04**
No of Basements and area	2, **225428.6 SQM**
Total built-up Area (3BHK,2BHK & EWS +STILT + Basements) + Additional for Stairs, Balcony etc. (Out of FAR)=	**589308.88+113796.53= 703385.167 SQM**

Total Nos. of Dwelling Units (3BHK,2BHK & EWS)	**3792 Nos.**
Proposed Green Area@43.62	65065 SQM
Proposed Vehicular Road Area	60120.8
Proposed pedestrian pathways Area	
Parking	
Parking Required@0.5ECS for 100 SQm for EWS	233 ECS
Parking Required@ 2 ECS for 100 SQm for **3BHK,2BHK**	5964 ECS
Parking Proposed	**6197**

CHAPTER – 3

DESCRIPTION OF ENVIRONMENT

3.1 Introduction

Previous chapters have highlighted scope of environmental assessment, existing features of the project and proposed improvement, methodology and regulations applicable to environmental assessment.

In this chapter an attempt has been made to prepare a baseline environmental setting so as applicability of Government of India (GOI) regulatory requirements as well as environmental management practices of Ministry of Environment and Forest (MoEF) could be envisioned. Based on the existing environmental scenario, potential impacts of site improvement will be identified and accordingly management plan will be proposed in forthcoming sections. The baseline environmental conditions will help in comparing and to monitor the predicted negative and positive impacts resulting from the project during construction and operation phases.

Data was collected from secondary sources for the macro-environmental setting like climate, physiography (Geology and slope), biological and socio-economic environment.

First hand information have been collected to record the micro-environmental features within and adjacent to the project site. Collection of first hand (Primary) information includes preparation of base maps, extrapolating environmental features on proposed site, tree inventories, location and measurement of socio-cultural features.

Study Period & Study Area

The data collection and field monitoring started from November 2016 and the same continued for three month. The Rapid EIA Report presents the data collected during 1st November**, 2016 to** 30th January **2017 (12weeks / 3 Months)**. Apart from field monitoring, data was also recorded at site. Ambient Air, Noise, soil and water quality samples were collected at important locations in terms of environment quality to prepare a baseline database. Additional data was also collected from secondary sources like Irrigation Department, India Meteorological Department (IMD), Central Ground Water Board, Geological Survey of India, State Ground Water Department, State Pollution Control Board, Census of India and Local Forest Department, Non - Governmental Agencies etc.

The present report covers baseline environmental data generated in the study area (10 km radius all around the project site for land use and the sample selection for monitoring are done within 5 km radius of the project site).

Following section describes the nature, type and characteristics of the physical, biological, cultural and socioeconomic components of the project site.

3.1 Physical Resources

Accurate determination of baseline conditions of natural and physical environmental components at project site is vital for robust impact assessment. The components of the environment for which the information has been collected are described in the following subsections.

3.1.1 Geography, Land Use and Drainage

(a) Geography:

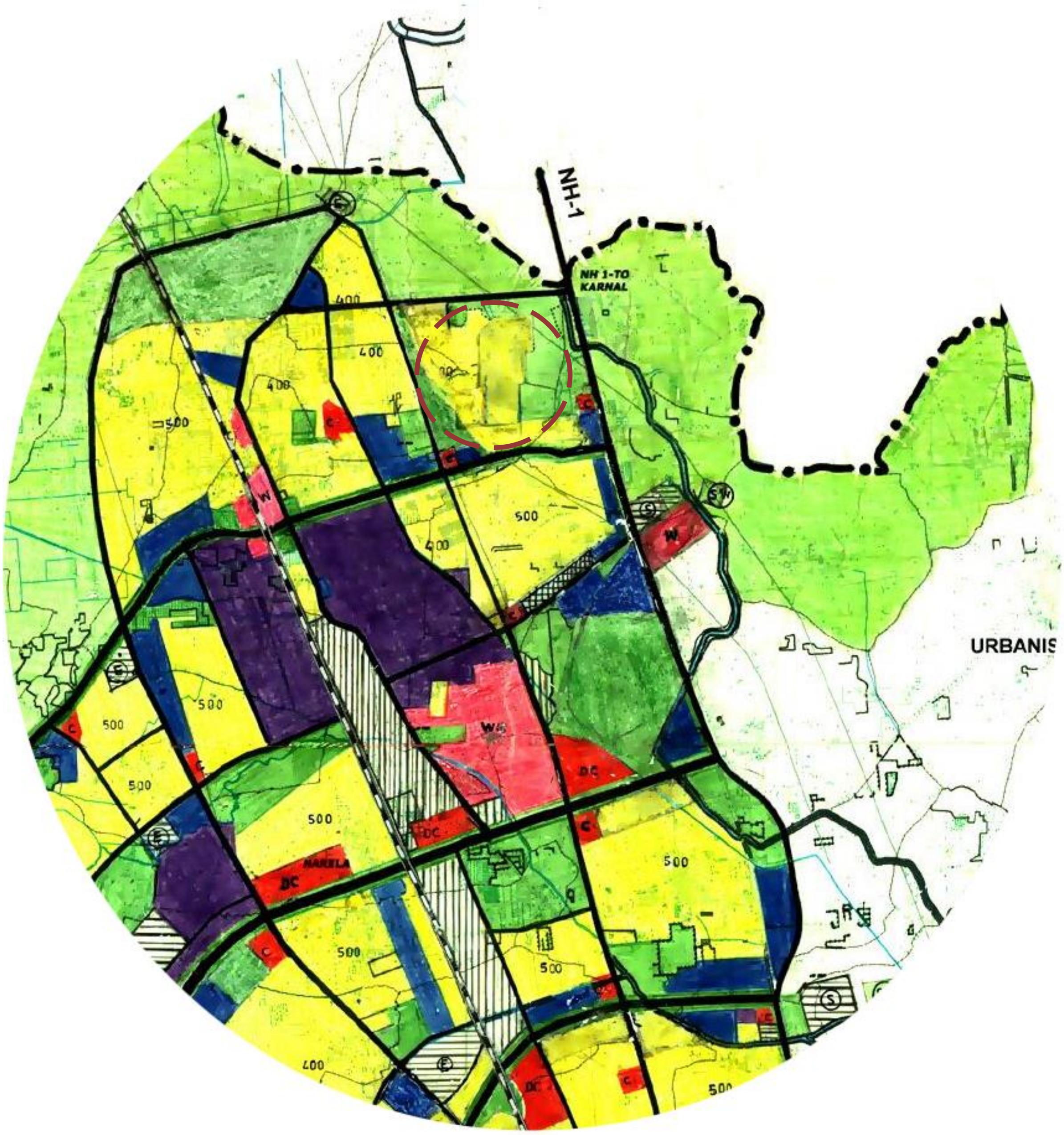
Land is the most vital resource for sustenance of life and degradations of land due to industrialization, urbanization and population growth is a matter of concern. Therefore, it is necessary to establish the existing land use pattern to optimize the land use as well as minimize degradation due to the developmental activities.

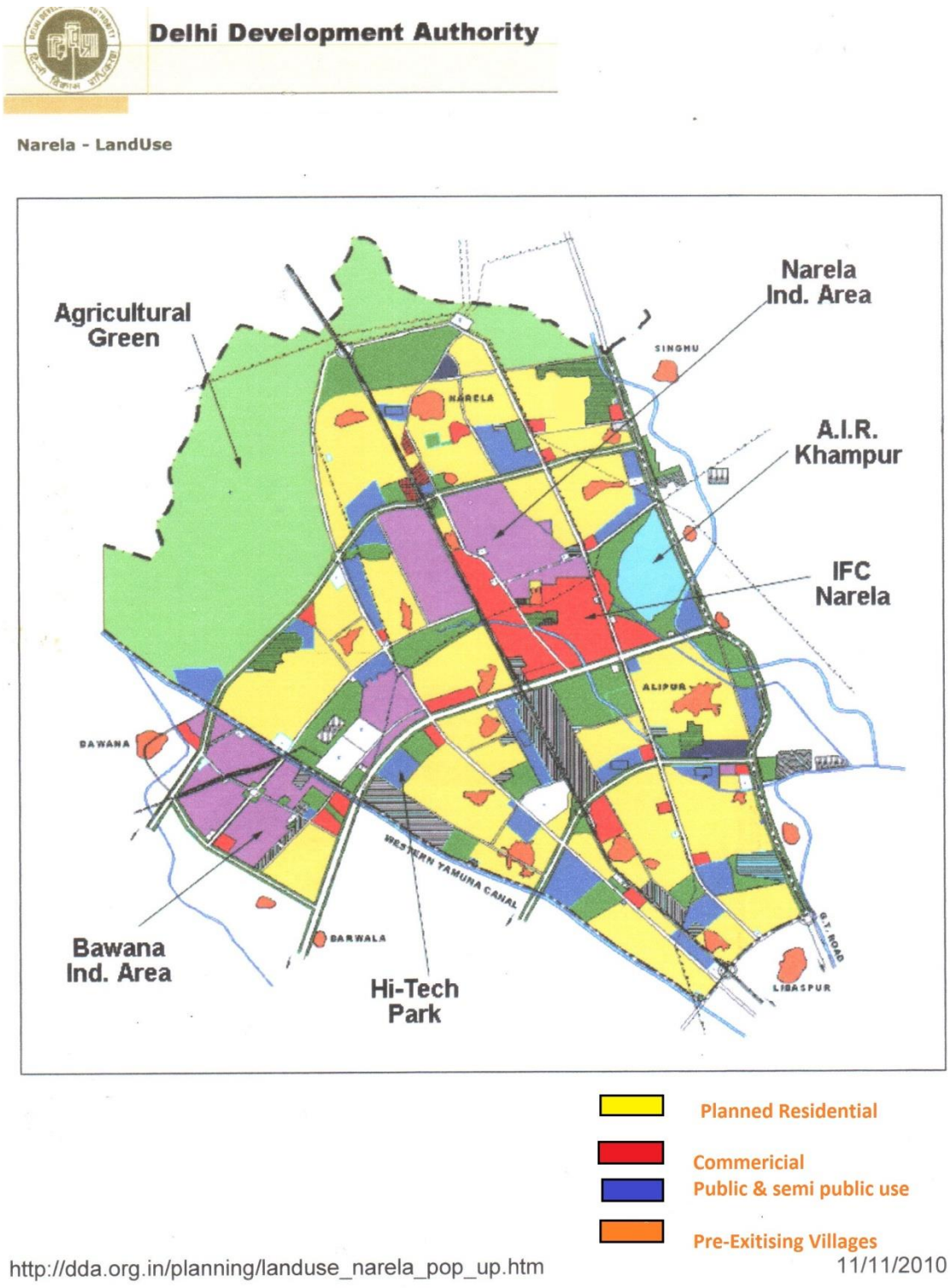
The proposed project site is located at Pocket 11, Sector A1A4, Narela,, New Delhi under the jurisdiction of Delhi Development Authority (DDA). Yamuna is as a narrow linear zone in their Older Flood Plain. It mainly comprises alternate sequence of fine to medium, grey micaceous sand and light khaki silt.

b) Land Use

The landuse has been defined in MPD as land for the housing in Narela Zoning Plan

Landuse	**Area (Ha)**	**%age**
Residential	3,165	42.9
Commercial	566	7.7
Public & Semi-Public	875	11.9
Manufacturing	308	4.1
Utility	327	4.5
Government	16	0.2
Recreational	1,029	14.0
Transportation	1,079	14.7
Total	**7,365**	**100.0**


NH-1
NH 1-TO
KARNAL
URBANIS
NARELA
DC
400
500



c) Drainage

District of Narela has planned drainage by MCD

3.1.2 Climate

Narela is in NW district of Delhi is and within the NCR in the northern region of India. It is a part of the great northern plains and is situated on the right bank of the river Yamuna. NCR's climate is sub-tropical and prone to extremes, temperatures reaching as high as 45°C

during the summer and as low as 2°C in the win ter. Summers in NCR are extremely hot while winters are cold and foggy. The rainy season is between June and September and the city receives annual rainfall of 758.5 millimeters. Heavy rains and high humidity mark the monsoon season.

Seismo-Tectonic Appraisal of the Area

According to Global Seismic Hazard Assessment Program (GSHAP) data, the area under study falls in Zone-IV. It is very important to take this fact in consideration during designing of the structural components of the project in the construction phase. The depth of the foundation, footing of the structural components, the bending moment calculations shall adhere to the criteria of seismic load. The seismological map of the project site is shown in **Fig. 3.4.**

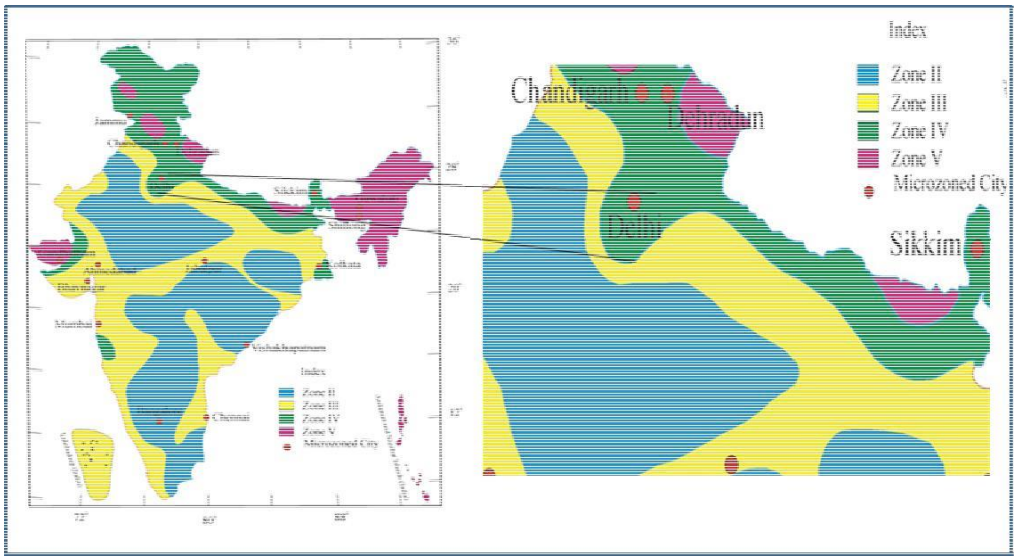


FIGURE 3.4: MAP SHOWING SEISMIC ZONES IN INDIA, 2002

Hydro geological Characteristics of Aquifer

The ground water structures constructed in the top shallow aquifer are minor irrigation structures like dug well, dug cum bore wells and shallow tube wells.

The village farmers has constructed various tube wells down to a depth of 80m to as much as 350 mbgl. The aquifer parameters have been determined at various places. The discharge of these structures generally ranges between 8 to 16 lps with moderate drawdown of 3 to 6m, however, a few wells have yielded exceptionally as high as 500 lps.

Summary of Meteorological Observations

3.2.1 Temperature

Delhi situated north of Tropic of Cancer experiences a fairly hot summer and cold winter. The Himalayas in the north and the desert in the west influence the climate of the area. The months of May and June are very hot and dry, while December and January are very cold. The mean monthly temperature varies from 7.3°C in January to 39.6°C in May. However, the temperature in summer shoots up to 46°C, and in winter drops below 3°C. T he average annual rainfall is approximately 797 mm, most of which (80%) falls during the monsoon months of July and August.

The monthly maximum, minimum and mean values of temperature for past decade (2010-2015) It is observed that from February, the ambient temperature gradually rise till June, which is the hottest month of the year with a mean maximum and minimum of45 ^{0}C and 24 ^{0}C, respectively.

Ambient Temperature

The maximum temperature during the period is found to be 32.20^{o}C. The minimum temperature for the same period is 7.30 ^{o} C and average temperature is 18.26^{o} C

Relative Humidity

During the study period, it was observed that the average maximum relative Humidity was 69.68% .The minimum value of humidity was found to be 25.40% and the maximum was 100% .

3.2.4.1 Rainfall

2-5 mm Rainfall were recorded for 3days during the study period.

3.2.4.2 Wind Speed

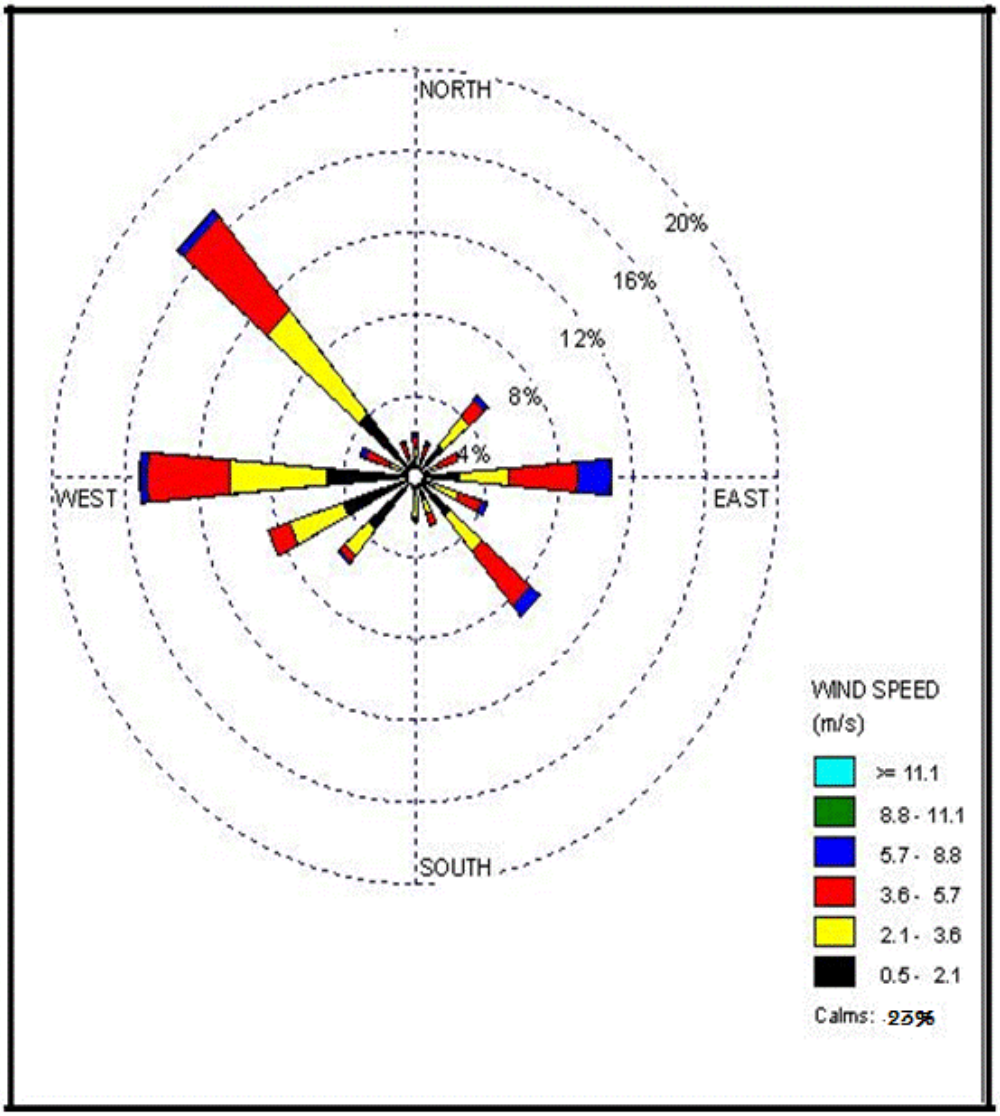
Analysis of hourly wind speed shows that the winds were generally higher in this area. During the Study period wind speed varies from 0.1 km/h to 10.70 km/h. The wind rose diagram reveals that wind was blowing predominantly from the Northwest with frequency of approximately 24.91 % .

3.2.4.3 Squall

The high winds were recorded at site during study period of December & January 2016.

3.2.4.4 Wind Pattern

The wind rose diagram for season has been drawn on the basis of wind speed and direction data.


NORTH
20%
16%
12%
8%
4%
WEST
EAST
SOUTH
WIND SPEED
(m/s)
>= 11.1
8.8 - 11.1
5.7 - 8.8
3.6 - 5.7
2.1 - 3.6
0.5 - 2.1
Calms: 25%

2.5 Baseline data on Ambient Air Quality

Ambient air quality is the most important parameter that is required to quantify the impact on the natural and biophysical environment.

The ambient air quality status of the study area is mainly dependent on the topographical features, background levels, concentration of specific air pollutants and local meteorological conditions. In addition it varies with respect to proximity and magnitude of traffic density, commercial and residential activities and industrial zones, which are likely sources of atmospheric emissions.

Three Stations were Selected within 2Km Radius of the Site Namely:

1. Kurenai Village approx. 1Km from the site in direction of WNW.
2. Singhola Village approx. 2 Km from the site in direction of ENE.
3. Tikri Khurd Village approx. 1.5 Km from the site in direction of SSE.

The baseline data collected from MIN MEC R&D Lab from 1st November , 2016 to 30 January2017 .The detailed interpretation is given below:

SO2 :-The Maximum Concentration of SO2 in Tikri Khurd is 32.3 µg/m3 and minimum concentration is 19.7 µg/m3 and average concentration is 26.5µg/m3 whereas the Maximum Concentration of SO2 in Singhola village is 40.2 µg/m3 and minimum concentration is 24.9 µg/m3 and average concentration is 34.2µg/m3 and in Kurnai Village the Maximum Concentration of SO2 is 28.8 µg/m3 and minimum concentration is 13.3 µg/m3 and average concentration is20.1 µg/m3

PM10 : The Maximum concentration of PM10 in Tikri Khurd is 278.7µg/m3 and minimum concentration is 150.3µg/m3 with average concentration is193.7 µg/m3 whereas the Maximum concentration of PM10 in singhola village is 305µg/m3 and minimum concentration is 171 µg/m3 with average concentration is 236.5µg/m3 and in Kurnai village the Maximum concentration of PM10 is 294.2 µg/m3 and minimum concentration is 107.6µg/m3 with average concentration is 224.4µg/m3

PM2.5: The Maximum concentration for PM2.5 in Tikri Khurd is 157µg/m3 and

minimum concentration is 87.1µg/m3 with average concentration is 110.9µg/m3 whereas the Maximum concentration for PM2.5 in Singola Village is 178.8µg/m3 and minimum concentration is 99.8µg/m3 with average concentration is 135µg/m3 and in Kurnai village the Maximum concentration for PM2.5 is 173.2µg/m3 and minimum concentration is 61.8µg/m3 with average concentration is 127.8µg/m3

Air Quality data(CPCB) during the period of May & June 2017

The Average Concentration of PM2.5 during the period is 62.50 µg/m3, which lower than the above recorded period from November 2016 to January 2017.
The Average Conc. of CO is 0.57 µg/m3 whereas the Average value of NO2 is 62.22 µg/m3.
The Average Conc. Of SO2 is 20.99 µg/m3, which is less than earlier Concentration recorded.

3.2.5.1 National Ambient Air Quality Standards (NAAQS)
The permissible air quality standards for particulate and gaseous pollutants as laid down by the CPCB are presented in **Annexure-ii.**

3.2.6 Water: Hydrology and Drainage

Water Quality

As a part of the EIA study, ground water samples from site location was collected in the month jan 15. The location of Ground water sampling

(i) Surface Water

Yamuna River is around 5 km from the project site. The area had network of irrigation canals and drains before urbanization. Besides these, it also has a large number of scattered, confined water bodies' viz. tanks, ponds; roadside borrows, etc. within the study area, most of which remain dry.

Ground Water Quality

Ground water conditions in the area are good and ground water is available at shallow depths. Excessive withdrawal of ground water for different uses, induced seepage from canals, low permeability of soils and lack of well-defined drainage has resulted in shallowing of water table. The unconfined aquifers in the study area occur near the surface. The ground water resources are also exploited for domestic and irrigation purposes through a number of open dug wells, hand pumps and tube-wells seen in the study area.

Major water bearing formation	Sand and Kankar
Pre-monsoon Depth to water level during May'2012	2.23 to 16.32 mbgl
	1.32 to 17.21 mbgl
Post-monsoon Depth to water level during Nov'2012	Pre monsoon : Fall (Range 0.11 – 3.51)
Long term water level trend in 10 years (2003-2012) in m/yr	Post monsoon : Fall (Range 0.02 – 3.70)

Depth to water level:

Ground water monitoring wells established in the district are being monitored four times in a year. Premonsoon and post-monsoon water level data are collected during May and November months

respectively. The pre monsoon water level in the district varies from 2.23 to 16.32 mbgl and post

monsoon water level varies from 1.32 to 17.21 mbgl. Water levels are in the range of 5-10 m in major part of the district. Deeper water levels are observed in the northern part of the district

Tehsil wise ground water resources of North West district (As on 2011)

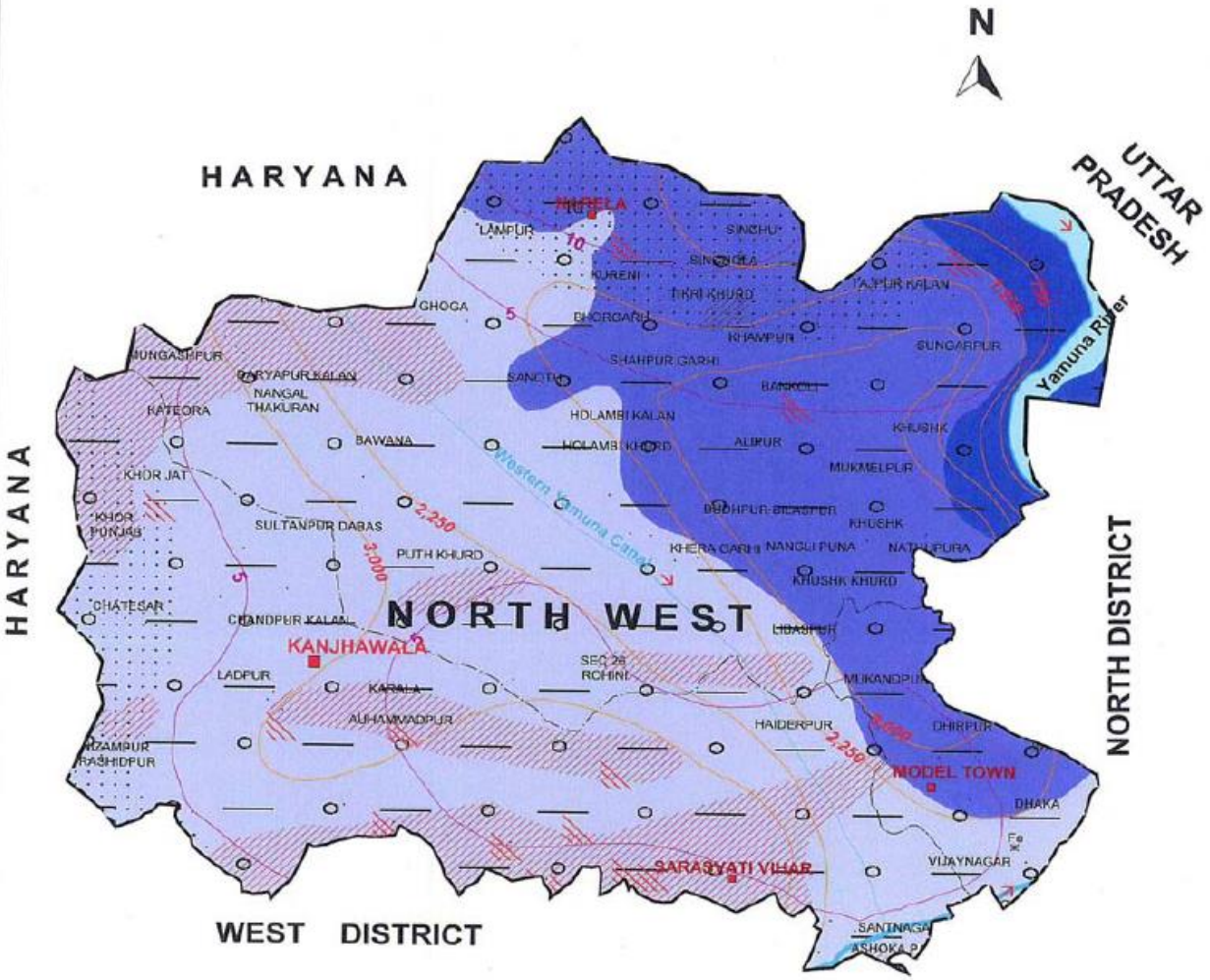
Tehsil	Annual ground water recharge (ham)	Net annual ground water availability (ham)	Existing annual gross ground water draft for irrigation (ham)	Existing annual gross ground water draft for domestic and industrial uses (ham	Existing annual gross ground water draft for all uses (ham)	Stage of ground water development (%)	Category
Model Town	528.63	475.767	70.45	777.47	847.92	178.22	Overexploited
Narela	5115.07	4859.3165	1972.67	1749.08	3721.75	76.59	Semi Critical
Saraswati Vihar	2987	2688.687	1238.76	3206.77	4445.53	165.34	Overexploited
Total	8630.7	8023.771	3281.88	5733.32	9015.2	112.36	Overexploited

Chemical Constituents Range

pH	7.3-9.47
EC (µS/cm at 25ºC)	225-13340
Bicarbonate (mg/l)	70.15-604.69
Chloride (mg/l)	28.43-3101.28
Nitrate (mg/l)	2.74-470
Sulphate (mg/l)	33-2120
Fluoride (mg/l)	0.08-15.3
Calcium (mg/l)	15.51-782.2
Magnesium (mg/l)	12.51-583.92
Total Hardness a (mg/l)	0-4212.55

DISTRICT HYDROGEOLOGICAL MAP
NORTH WEST DISTRICT

CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES



	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable Artificial Recharge Structures **
Soft Rock Aquifer	Tube Wells	Reverse / Direct Rotary	30-65*	1200-2400	Not Feasible
Soft Rock Aquifer	Tube wells	Reverse /Direct Rotary	25-45*	900-1500	Shaft/Trench with recharge well, Recharge Pit with/without bore
Soft Rock Aquifer	Tube Wells	Reverse / Direct Rotary	25-40*	240-600	Shaft/Trench with recharge well, Recharge Pit with/without bore
Depth to Water level in m (Pre-monsoon Decadal mean, 2003-2012) 5		Electrical Conductivity (Micro mhos/cm at 25° C) 3000		Major river / Drain	Faults/Lineaments
Fluoride > Permissible limit (1.5 ppm)		Nitrate > Permissible limit (100 ppm)		Iron > Permissible Limit (1.0 ppm) / * Fe	
State boundary		District boundary		Tehsil boundary	
Tehsil head quarter		Over exploited block		Area feasible for Artificial Recharge structures	
District head quarter					

The water samples has been collected from the Tikri Khurd , Singola Village and Kurnaie village,the borewell sample is collected from the Tikri Khurd Village whereas the supply Water samples were be collected from Singola as well as Kurnai Village. The hydro geological studies revealed that the district comprises of aquifers with primary inter granular porosity and fractures with a yield of less than 40 litres /second.

PARAMETER	DESIRABLE (Maximum)	PERMISSIBLE (Maximum)	PROTOCOL	TEST RESULTS		
				Tikri Khurd village (Borewell)	Kurnai village (Supply water)	Singola Village (Supply Water)
Colour (in hazen units)	05	15	IS : 3025 (P-4)	<5	<5	<5
Odour	Agreeable	Agreeable	IS : 3025 (P-5)	Agreeable	Agreeable	Agreeable
Turbidity,NTU	1	5	IS : 3025 (P-10)	1.17	0.09	0.01
pH	6.5-8.5	No Relaxation	IS : 3025 (P-11)	7.3	7.4	7.2
Specfic Conductance, umhos	-	-	IS : 3025 (P-14)	2690	1250	925
Total Dissolve Solids ,mg/l	500	2000	IS : 3025 (P-16)	1754	808	568
Total suspended Solids ,mg/l	-	-	IS : 3025 (P-17)	3	2	1
Total Hardness as $CaCO_3$,mg/l	200	600	IS : 3025 (P-21)	361	310	278
Alkalinity ,mg/l	200	600	IS : 3025 (P-23)	590	252	252
Sulphate ,mg/l	200	400	IS :3025(P-24)	176	81	76
Phosphorus as P,mg/l	-	-	IS : 3025 (P-31)	0.13	0.06	0.09
Chloride as Cl,mg/l	250	1000	IS :3025(P-32):	379	190	105
Nitrate as No_3,mg/l	45	No Relaxation	APHA (4500-NO$_3$-B)	28.7	21.8	0.9
Calcium as Ca,mg/l	75	200	IS : 3025 (P-40)	85	72	66
Sodium as Na,mg/l	-	-	IS : 3025 (P-45)	410	135	79.8
Potassium as K,mg/l	-	-	IS : 3025 (P-45)	3.5	5.9	5.2
Magnesium as Mg,mg/l	30	100	IS : 3025 (P-46)	36	31	27
Iron as Fe,mg/l	1.0	No Relaxation	IS : 3025 (P-53)	0.01	0.01	BDL
Fluoride as F,mg/l	1.0	1.5	APHA (4500-F$^-$-D)	1.13	0.52	0.86
Acidity ,mg/l	-	-	IS : 3025 (P-22)	Nil	Nil	Nil
Residual chlorine ,mg/l	0.2	1	IS : 3025 (P-26)	Nil	Nil	Nil

All Physical and Chemical Parameters are comparatively higher in Ground water in comparison to the Municipal water supply. The Ground Water sample may be taken as a fit for Drinking.

Soil

Parameter	Unit	SQ
Texture	-	Sandy clay loam
Sand	%	55.6
Silt	%	21.5
Clay	%	22.9
pH (1:2)	-	7.63
Electrical Conductivity (1:2)	µmhos/cm	498
CEC	meq/100 gm	18.7
Exchangeable Potassium	meq/100 gm	0.42
Exchangeable		
Sodium	meq/100 gm	0.92
Exchangeable		
Calcium	meq/100 gm	13.5
Exchangeable		
Magnesium	meq/100 gm	3.9
Sodium Absorption		
Ratio	-	0.99
Water Holding		
Capacity	%	27.6
Porosity	%	39.1
Permeability	cm/hrs	1.8
TKN	%	0.051
Phosphorus	mg/kg	16.3
Organic Matter	%	0.28
Bulk Density	gm/cc	1.32

3.3 Ecological Resources

The ecological survey has been done to establish the baseline ecological conditions of the study area (with in project area and 10 Km radius around the project site), to assess the potential ecological impacts of the proposed project upon ecology, to develop adequate and feasible mitigation measures (via inputs to project design and layout, working practices) to keep residual ecological impacts with acceptable limits, and also to develop ecological monitoring parameters. This section of report presents ecological baseline of the area and study was carried out in two separate headings for floral and faunal community respectively

Habitat Assessment

The information on prevailing baseline in proposed project site is important because project activities might lead to loss of the ecological resources, if existing. The information will further enable to evaluate the feasibility and efficacy of the mitigation options that are being proposed by environmentalist and conservationist to incorporate conservation concerns in mitigating the impacts of developmental project. The study area was divided into two zones as given below:

Floral Community

General Vegetation Pattern: The prevailing vegetation cover over the area is mainly of tropical dry deciduous forest.

Quadrate Study: Quadrates of 10x10 m were laid to assess the tree biodiversity, so that, vegetation could be estimated and enlisted species.

Survey among the locals: A general survey of the area and consulting the locals gave a fair idea of the floral and faunal biodiversity of the area.

i) Core Zone

There was no vegetation within the core zone. Only a few species of *Parthenium, Acacia nilotica* and *Cynodon dactylon* were seen. There is no presence of reserved or any forest in the proposed site.

ii) Buffer Zone

Areas at place are used for agriculture purposes. The main crops are wheat, Maize, cereals and vegetables. No threatened, rare, endangered or endemic species were observed during the survey in study area (10 km radius around the project area).

In 10 km radius around the project site

The list of plants recorded is given in Table 3.17. There is no protected forest area in this zone. The vegetative community of the area is mainly under open scrub land and because of urbanization area is usually surrounded with planted varieties. The dominant species are Babool (Acacia *nilotica*), Vilayati Babool (*Acacia sp.),* Neem (*Azadirachta indica*), Gulmohar (*Cassia sp.),* Safeda *(Eucalyptus),* Carrot grass *(Parthenium sp*.), amaltas *(Cassia fistula),* Dhatura (*Datura sp.),* Arandi (*Ricinus communis*), Ber *(Zyziphus sp*.), *Bougainvellia,* Peepal (*Ficus religiosa*)**,** Shisham *(Dalbergia sissoo),* Bottle palm, bottle brush**,** etc. The prominent grass species is *Cynodon dactylon.*

Agricultural crops: Land at some places is used for agriculture purpose. The main crops are wheat, cereals and vegetables. No threatened, rare, endangered or endemic species were

Sr. No.	Local Names	*Botanical Names*
Trees		
1	Babool	*Acacia nilotica*
2	Vilayati babool	*Acacia sp*
3	Neem	*Azadirachta indica*
4	Safeda	*Eucalyptus*
5	Peepal	*Ficus religiosa*
6	Bougainvelia	*Bougainvelli*
7	Bottle palm	*Beaucarnea recurvata*
8	Amaltas	*Cassia fistula*
9	Shisham	*Dalbergia sissoo*
10	Bottle brush	*Callistemom sp.*
11	Gulmohar	*Cassia sp.*
12	Oak	*Quercus sp*
Shrubs		
13	Raat rani	*Cestrum Nocturnum*
14	Gurhal	*Hibiscus rosa sinensis*
15	Dhatura	*Datura sp.*
16	Arandi	*Ricinus communis*
17	Kanchon	*Bauhinia acuminata*
18	Bougainvelia	*Bougainvellia*
19	Candle Bush	*Cassia alata*
20	Nayantara	*Vinca rosea*
21	Paper chase tree	*Mussaenda clabrata*
22	Hennah	*Lawsonia inerme*
23	Calendula	*Calendula officinalis*
24	Juhi	*Jasmine auriculatum*
Herbs		
25	Ghrita kumari	*Aloe vera*
26	Tulsi	*Occimum sanctum*
27	Gurhal	*Hibiscus rosa sinensis*
28	Ixora	*Ixora*
29	Dhatura	*Datura sp.*

Faunal Community

Methodology

Detailed survey was conducted to evaluate faunal composition of the study area (core and buffer zone) within the project area. Primary data like faunal composition was recorded during site visit and secondary data was collected from the Forest department to

get the correct picture of the study area. The major portion of the study consists of agricultural field and human settlements which support wildlife habitat insignificantly.

The survey methods used for faunal assessment are:

1. Walkthrough Method
2. Direct Count Method- Birds, Mammals
3. Pugmark Method – Mammals

The major part of the study area lies under agriculture field and human settlements which restricted the wildlife habitat significantly. Most of the mammalian species reported in the study area are domesticated animals. There is neither any wildlife sensitive area nor any corridor for the movement of wildlife present in the study area. There are many small ponds present in the buffer zone of study area which are the major attraction sites for avifauna. Common Maina, Kingfisher, Spotted dove, Piltail and Pond Heron are some dominant bird species present in the study area. .

i. Core Zone

There was no unique faunal community within the core zone of the project area, except most of the faunal species are domesticated like toad, frog, crow, dog, sparrow and rats etc.

ii. Buffer Zone (10 km radius) 1) Amphibians

Among amphibians toad *(Bufo sp.)* and frog *(Rana tigrina)* were observed.

2) Reptiles

Among reptiles Indian garden Lizards *(Calotes vessicolor),* home lizard were observed, while locals claims to have seen some snakes also.

3) Mammals

Among mammals Indian palm squirrel *(Fumambulus pennanti),* cat, dog (*Cuon sp.),* cow, Buffalo, rat (*Rattus rattus*) and horse etc. were observed.

4) Aves

Among aves common birds like crow (Corves splendens), sparrow (Passer domesticus), parrot (Psittacula krameri), baya (Ploceus philippinus), peafowl (Pavo cristatus), pigeon (Columba livia), egretta sp. etc. were observed.

5) Butterflies

The common butterfly species recorded from the study area include; Common grass

yellow (*Eurema blanda*), Tawny coster (*Acraea violae*), Common tiger *(Danaus genutia*), Small orange tip (*Colotis etrida*) and pansy (*Precis almanac*).

S.I.	Local Names	Zoological Names
Amphibians		
1	Toad	*Bufo sp*
2	Frog	*Rana tigrina*
Reptiles		
3	Indian garden lizards	*Calotes versicolor*
4	House Lizards	*Hemidactylus sp.*
5	Cobra	*Naja naja*
6	Viper	*Vipera sp*
Mammals		
7	Indian palm squirrel	*Fumambulus pennanti*
8	Cat	*Felis sp.*
9	Dog	*Cuon sp.*
10	Cow	*Bos sp.*
11	Rat	*Rattus rattus*
12	Horse	*Equs sp.*
Aves		
12	Crow	*Corves splendens*
13	Sparrow	*Passer domesticus*
14	Baya	*Ploceus philippinus*
15	Parrot	*Psittacula Krameri*
19	Peafowl	*Pavo cristatus*
20	Pigeon	*Columba livia*
21	Egretta	*Egretta sp.*

Agricultural land

The Irrigation facility is not proper in the study area, rainwater is the main source of irrigation and thus paddy is the main crop grown in the area. Other crops, which are grown, are Moong, Cajanus, Til, etc. Where watering facility is available seasonal vegetables are also grown.

Waste land

Wasteland is commonly seen in the area, and is mostly covered with species like *Lantana spp, Ipomea spp, Calotropis procera, Cassia tora, Parthenium spp., Zizyphus spp., Argemone spp. etc.*

Grassland

Grassland in the study area is secondary in origin. The common species found in the area are Euphorbia spp. *Desmodium spp*., *Cynodon dactylon*, *Cyperus spp*., *Ipomoea spp*. etc.

Vegetation in and around human settlement

Near villages the vegetation pattern changes from rest of the area. The common species grown near villages are *Mangifera indica, Madhuca indica, Sizygium cumini, Bambusa sp., Azadirachta indica, Albezzia sp. Delonix regia, Tamarindus indica, Eucalyptus spp. Ficus religiosa*, etc.

Avenue trees and projection

The roadside along NH 1 and other roads in the study area are projected with trees in single to double rows. The common trees are *Azadirachta indica, Syzigium cumini. Mangifera indica,, Delonix regia, Albezia Spp. Eucalyptus spp., Leucaena leucocephala, Azadirachta indica, Saraca asoca* etc.

Agricultural crops

Land at some places is used for agriculture purpose. The main crops are maize, bajra, cotton, cereals and vegetables. No threatened, rare, endangered or endemic species were observed during the survey in Buffer Zone (10 km radius around the project area).

Protected Areas

There are no, Wildlife Sanctuary, National Park and/ or Biosphere Reserve within 10 km of the study area.. Child sex ratio of girls is 823 per 1000 boys.

Basic Infrastructure Facilities in Villages

All the villages lying in the study area are well connected by pitched roads. All the villages have at least a primary school, a primary health centre, post office and branches of nationalized bank. All the villages are connected by telephone and electricity grid.

- **Education**
  The Study Area has good educational facility. The urban part of the study Area has very good network of Schools, Colleges. There are several universities, technical colleges spread over the area.

- **Public Health & Drinking Water**
  Available medical facilities in the Study Area are hospitals, dispensaries, health centers, public health Sub centers; maternity homes etc. within a range of 5-10 kms, most of the villages in the Study Area have medical facility available in one or the

other.

The study Area has good drinking water facility. Drinking water is available in all villages. Major source of drinking water is tap water, hand pumps and well.

- **Post and Telegraph (P&T)**
  The study Area has very good post and Telegraph (P&T) network. Apart from P&T services, transport is the main communication linkage in the Study area. All most the entire Study Area has access to good transport system including bus services.

- **Road Network**
  The study Area has well-knit road network. All the villages are well connected to the road network.

- **Irrigation**
  The District is not drought prone. There are a large number of wells for irrigation. Even though the farmers have these facilities, yet they are largely dependent on the monsoons for a successful crop.

- **Cropping Pattern**
  Agro climatically, it is classified as rich Rice-Wheat zone. Major crop sequences followed in various crop zones are:

Paddy	-	Wheat
Paddy	-	Toor/camphor
Paddy	-	Fallow/sugar
Sugar/Fallow	-	wheat
Jowar	-	Lathyrus and Moong

Paddy is the major crop of the area during Kharif season, while Wheat, Gram, Barely, Camphor and Arhar crops follow in Rabi season or the fields are kept fallow for next season. During Rabi season a mixed cropping pattern is followed. Source of irrigation in area is mainly ground water and canal.

3.5 Resettlement Issues

There is no impacted properties, household, persons, families, commercial and residential structures etc in the project site. The project will be beneficial for the local communities, as it will generate employment by way of construction, tourism and reduction in pollution with better communication. The project will benefit all the population groups and consequently not differentially or adversely affect any groups.

3.6 Conclusion

Narela is a planned city as per the master plan of Delhi 2021 for the development of commercial , residential , industrial park. being the hub of development activities in the region is witnessing a rapid rise in population on account of natural growth and

immigration. The main occupation and hence the major sources of income for the people in the area are service and business. The status of urban amenities in the city and around NCR area has not kept pace and at present is not very satisfactory.In order to provide adequate amenities to existing population and adequate infrastructure to attract further investment to boost development and growth of the area, the area needs setting up of good residential, health care, educational, entertainment and commercial facilities. Also keeping in view the increasing population of the city, adequate, modern and well-planned Residential accommodation, which conforms to the City Master Plan, needs to be provided to the residents. It may be concluded that the proposed project shall contribute to the above.

CHAPTER – 4

IMPACT IDENTIFICATION AND ASSESSMENT

4.0 General

The identification and assessment of environmental impacts of a given project is complex because of the diversity of impacts caused by human interference to the environmental and social systems. Impact identification and assessment requires collection and collation of large amount of diverse data and communicating the final results to the decision makers (experts in various fields) and general public (laymen). Although there are a large number of EIA methodologies, their organizing principles are common. All methodologies are generic in nature and are adapted to specific type of project assessment.

Environmental Impact Assessment or EIA in short, is a formal study process used to predict the environmental consequences of a proposed major development project. An EIA concentrates on problems, conflicts or natural resource constraints that could affect the viability of a project. It also examines how the project might cause harm to people, their homeland or their livelihoods or to nearby developments. After predicting potential problems, the EIA identifies measures to minimize the problems and outlines ways to improve the project's suitability for its proposed environment.

The important steps in EIA are: Impact identification, prediction and evaluation. A number of techniques are available for identification, prediction and evaluation of impacts. Appropriate techniques have been applied for environmental impact assessment of the proposed project.

4.1 Introduction

This chapter discusses identification and appraisal of various environmental impacts due to the proposed project. Generally, the environmental impacts can be categorized as either primary or secondary. The development, construction and functional phase of the proposed project comprise various activities, each of which may have some impact on environmental parameters. Various impacts during the development & construction and operation phase on the environmental parameters have been studied to estimate the impact on environment

TABLE 4.1: POLLUTANT SOURCES AND CHARACTERISTICS

S.I.	Activity / Area	Pollutant	Pollutant Characteristics	Frequency
Development & Construction Phase				
1	Site Preparation	Air emission- PM_{10}, $PM_{2.5}$, SO_2 and NO_2	a. Dust from construction activities and excavation. b. Particulates matter, NO_2 and CO from Vehicle exhaust	a. Temporary during Construction phase only. b. Bulk of the emissions are expected from ground working and leveling activities.
		Earth / Solid waste	Solid waste from construction activity and excavation.	Periodic
		Noise	Noise generated from construction equipment machinery and vehicles	Temporary during initial construction phase
2	Labour welfare Camps	Sewage	Sewage generated from temporary labour camps on site	Temporary during the initial construction phase
		Solid Waste	Solid Waste generated from temporary labour camps on site	Temporary during the initial construction

4.3 Impact Identification

The areas of environmental concerns for which the impacts and their predictions are taken into consideration are mainly:

- Air Environment
- Water Environment
- Noise Environment
- Land Environment
- Biological Environment
- Socio economic Environment
- Aesthetics Environment

The impacts can be further categorized as positive impacts and negative impacts depending upon their nature, potential and magnitude.

4.3.1 Environmental Aspects of Development & Construction Operations

- Generation, storage, and disposal of construction wastes;
- Noise pollution due to plant, machinery, equipments and vehicle movement;
- Air pollution due to plant, machinery, equipments and vehicle movement;
- Generation and disposal of wastewater;
- Impact on ecology;
- Consumption of resources such as water, electricity, and diesel
- Physical change in landscape due to earth work excavation and related activities
- Soil erosion caused due to loss of vegetation and other construction activities
- Impact on socio-cultural environment.

4.3.2 Environmental Aspects of Building Planning and Use

Impacts identified during operation of the proposed project and its use includes major concerns such as:

- Disposal of domestic (sewage) effluent generated
- Increase in noise levels due to transport
- Consumption of water and impact on water resources
- Impact on traffic on the road
- Storm water during rains
- Management and maintenance of the project

Environmental aspects of present scheme are not just limited to impact of sources of pollution but also related to energy conservation, water conservation and other issues, which are mentioned in Table 4.2.

Table 4.2: Environment aspects of proposed scheme other than sources of pollution

S.I.	Area	Aspect
I.	Energy Conservation	Solar Heating, Day Lighting, Design Natural Ventilation, Thermal Transfer value of Building Material, Energy Efficient Building Services and Equipment, Public Area Lighting Exterior Lighting, use of sensors.
II.	Water Conservation	Use of Recycled Water Gardening Water sources Rainwater Harvesting Sprinkler will be used for curing and quenching during construction phase Constructed of STP during construction phase.
III.	Internal Roads and Accesses	Pedestrian Access Ramps for Disabled persons, Road painting and Signage Speed Breakers
IV.	Material Use	Construction Materials Selection Paint Selection Use of Recycled Materials Use of Timber, use of fly ash
V.	Aesthetics during functional Use	Clothes Drying Facilities Stilt Parking Visitors Parking Playground for children Service Roads for walking
		Flower bed water disposal Floor washing arrangements Air conditioning arrangements Standby Power Supply Maintenance Staff
VI.	Facilities for proposed project	Rest Rooms with toilets for Visitors and Security Persons.
VII	Use of mobile STP	The treated (upto tertiary treatment) water from STP may be used for construction purposes
VIII	Air Quality	Wheel wash arrangement will be made at exit point during construction phase Height of the stack will be 6 m higher than the tallest building. Landscape development

Functional Phase

1	Vehicular Movement	Air emissions and Noise	Vehicle exhaust emissions	Continuous / periodic
2	Diesel generators	Air emissions	SO2, NO_2, PM, CO from fuel burning	Occasional during power failure
		Noise	Noise due to running of equipment	Occasional during power failure
		Hazardous Waste	Used Oil Generation	Occasional during oil changes
3	LPG Cylinders/ PNG	Thermal / Blast Effect	Accidental Explosion due to LPG/PNG leaks and fire	Accidental
4	Maintenance /	Wastewater	Floor washing	Continuous

Housekeeping	Solid waste Hazardous waste	Used equipment parts and garden wastes	Continuous
Air Conditioners	Air emission	Ozone Depleting substance release	Continuous
Vehicle Parking Area	Oil spills	Minor oil leaks In parking space	Occasionally, Negligible quantities
Storm water drains	Waste water	Contamination discharge from site- mainly suspended solids	During rainy season

4.4 Assessment of Environmental Impacts During Development & Construction Phase

4.4.1 Topography

Impact

Topography around the proposed project is plain. Therefore, topography and physiography of the area will not be affected during the construction and post construction phase of the project. Hence, no significant impact is anticipated on the topography and physiography from proposed Group Housing project.

Mitigation measures

Since there is no significant impact on topography from the proposed project, no detailed mitigation measures are proposed. It is however proposed that apart from the proposed plantation greens, turfing with local species will be carried out extensively.

4.4.2 Land Use Pattern

Proposed project will be located on the area of 149173 SQM, which has been categorized for group housing development as per the Master plan of Narela,New Delhi 2021. Land use of the proposed project is entirely conforming to the Master Plan- 2021 of Narela approved by the DDA. Therefore, Land use pattern of the area will not be affected by the proposed project.

4.4.3 Land Environment

Impact

During construction phase, soil will be excavated in order to provide foundations and basement. It is estimated that approx. 901714.4 m^3 of earth material will be excavated during initial construction phase for foundations, basement etc.

Mitigation measures

- Excavated material will be properly stacked within the site under tarpaulin cover and 80-85% will be re-used for backfilling, road construction and filling low-lying areas.
- The top-soil will be preserved separately and will be used for landscaping, green turfing purpose only. Hence, no immediate adverse impacts on the land environment are envisaged.
- Balance 15-20% of excavated earth will be utilized elsewhere in filling through hired transporters after due permission.
- Proper drainage system shall be provided to deal with the storm water in case of

rain. The impact on soil during construction phase will be marginal and reversible in the nature.

- It is proposed to remove vegetative cover only from the specific site on which construction is to take place and allowing minimal disturbance to the vegetation in adjacent areas. Land clearing activities will only be confined to necessary areas. The number, frequency and area of movement of heavy machinery will also be restricted.

4.4.4 Water Environment

Surface Water Quality

Impact

The primary concerns relating to surface water quality associated with construction activities are pointed out below:

- Runoff related to unpaved and excavated areas during the rain shower.
- Sediments transported to runoff from the construction site.
- Run off related to area where lubricant, fuel other materials are stored, used and disposed, off.

Surface water quality may be affected with the discharge of the runoff from the project site. The impact to the surface water bodies could arise from the increased soil erosion from excavated site only causing increase in the suspended particles and turbidity of runoff water from the site. However, this impact will be temporary in the nature and would be observed in first rain only and as soon as rain is over excavated soil at site would be stabilized. Therefore, the surface water quality during rains will be impacted marginally for very short duration

Mitigation Measures

During the construction phase, surface water quality is likely to be affected due to soil erosion during first rain and generation of wastewater mainly from construction labour camp. However, this phenomenon will be temporary and restricted to close vicinity of construction site. The impact on surface water quality can be minimized by adopting following measures:

- Excavation during dry season and proper management of excavated soils,
- Clearing all debris from site as soon as construction is over.
- By providing proper hutment and toilet facilities for construction labour in the form of portable toilets and mobile STP
- Through the proper disposal of waste water generated at site with its final outfall to municipal sewers.

4.4.4.2 Groundwater Quality

Impact

No hazardous chemical and material will be used in the development and construction phase of proposed project. Debris and wastes generated during this phase will be collected and disposed suitably. Therefore, possibility of contamination of ground water will be negligible. Hence, no impact is anticipated on the ground water quality during the construction phase.

Mitigation Measures

Solid waste generation during construction phase will be negligible. However, a well planned solid waste management plan will be followed during the construction phase including timely collection, segregation and disposal as per legal requirements.

4.4.3 Surface and Ground Water Hydrology

4.4.3.1 Surface Water Hydrology

Impact

The project site area falls in the drainage basin of Yamuna Rivers but is outside any flood plain. Runoff during rains takes way to natural drain and in storm water drains laid in the area. During construction phase, there is no impact anticipated on the drainage pattern of the project area.

Mitigation Measures

Project proponent will ensure zero impact on water runoff flow direction and drainage pattern of the area throughout the construction of the proposed project by providing adequate water drainage.

4.4.3.2 Ground Water Hydrology

Impact

Water requirement during construction phase will vary depending upon construction activities and will be met by municipal supply along with private tankers or using recycled water from STP after tertiary treatment at the site. It is expected that construction of proposed project will spread over a period of 2 to 3 years.

Water will be required for site preparation activities dust settlement, consolidation, compaction and curing as well as building construction and drinking water purposes. The requirement of construction water will not put sudden pressure on the available ground water recourses of area.

Mitigation Measures

Although no significant impact is anticipated on the groundwater regime as, municipal supply will be used augmented with private tankers for construction purpose. Therefore, impact on ground water resources will be insignificant during construction of project.

It is proposed to carry out the following to further minimize the demand on freshwater resources:

- Curing water will be sprayed on concrete structures and free flow of water not allowed.
- After liberal curing on the first day, all concrete structures will be painted with curing chemical to save water to stop daily water curing hence save water.
- Concrete structures will be covered with thick cloth/gunny bags and then water sprayed on them to avoid water rebound and ensure sustained and complete curing.
- Water ponding will be done using sand ridges to avoid water flowing away from the flat surface while curing.
- Water ponding will be done on all sunken slabs. This will also highlight the importance of having an impervious formwork.

4.4.4 Soil

- At proposed project, if required, the soil excavated during construction will be first temporarily stored in an area earmarked and later will be used to fill up low lying area in and around the project as well as for landscaping of project site. Proper drainage system shall be provided to deal with the storm water in case of rain.
- Solid waste generated during the construction phase shall be properly collected and segregated as plastic, metal, and other and shall be disposed off as per the standard practice.
- During the development and construction phase, some amount of debris, cuttings of construction materials may be observed at construction site. However, the quantity of these waste materials would be very small and limited up to the construction site only. Contamination of these wastes would be minor and would be collected time to time during construction phase and it will be reused in different application and non usable items will be disposed accordingly.
- The impact on soil during construction phase will be marginal and reversible in nature.

4.4.5 Crops and Cropping Pattern

The proposed project will be located on the vacant plot of land, which is earmarked for residential purpose by Delhi Development Authority as per Master Plan 2021. This land was agricultural land prior to acquisition by DDA. Hence, no agriculture land is going to be affected by the proposed scheme.

4.4.6 Transport Linkage and Traffic

Impact

During development and construction phase, labour and construction materials bringing vehicles will approach to the project site. The proposed scheme is well connected to neighborhood, where public transport facility, like, buses and minibuses are easily available in the area as transport linkage. The project site is easily accessible.

The Project site is located at Pocket 11, Sector A1A4, Narela having Latitude 28^{O} 34' 45" N and longitude 77^{O} 07' 30" E. ., adjacent to NH- 1 Connecting Delhi with Faridabad .The site is within Narela, which is one of the best planned new township of Delhi and is located in the North West part of the State. Connected well with AIR, RAIL and ROAD to all major towns of India

Mitigation Measures

The vehicles from the project will increase car and two wheeler traffic load on roads during peak hour. However, since present load is lean, increase in traffic load may not lead to traffic congestion problem. Once construction work finishes, heavy traffic volume will decrease and that will further improve traffic condition in the area.

Additionally, the proposed construction site is well inside the road and there would not be sudden influx of vehicles on the road from the proposed project. The available width will provide sufficient merging space for the vehicles while meeting the road. Hence it can be concluded that traffic impact is not a significant adverse impact from the construction and operation of the proposed project.

4.4.7 Energy Resources

During the functional phase of proposed project, electric supply will be provided by TPDDL, which will be approx. 61750 KW. During construction phase, power requirement will be kept minimum and construction work will be done gradually in about 2 to 3 years. Therefore, energy resources will not be affected significantly.

4.4.8 Air Quality

A. Emission Sources during the Construction Phase

The potential sources of air emissions during the construction and development phase of the project will be as follows:

- Dust from earth works (during site preparation)
- Emissions from power generator at site
- Emissions from the operation of construction equipment and machines
- Fugitive emissions from vehicles running to site
- Fugitive emissions during the unloading of material at the site
- Fugitive emissions during mixing of cement with other building materials during development and construction activities
- Air emissions other than dust arise from combustion of hydrocarbons. The pollutants of concerns are NO_2, SO_2, CO, suspended particulate matter.

B. Potential Impacts

The likely impact on air environment during construction phase has been identified in the form of "Impact Matrix" in Table 4.. Ambient air qu ality effects are normally assessed in relation to their potential to cause.

- Health deterioration and nuisance in local communities
- Health deterioration amongst onsite workers

C. Assessment of the impacts due to Dust Emissions

During the excavation of channels, foundations, unloading of construction material, cement bags and mixing of cement with other building materials, fugitive dust emissions may be emitted at construction site. It may be noted that these emissions would be in the form of coarse particulate matter and will be settled down ultimately in the closed vicinity of construction site. Therefore, no significant impact is anticipated due to dust emission during development and construction phase.

The proposed mitigation measures for the above are:

- The soil management as discussed in EMP. The excavated soil shall be stored and used in landscaping.
- The dust emissions shall be controlled by regular sprinkling of water during earthwork and construction cement bags shall be placed in covered areas. Sand and bricks shall be covered with gunny bags to avoid dispersion of material in air.

- The approach roads to the proposed site are good metaled roads, therefore during material handling there shall be least spread of dust in the environment.
- It is mandatory for all automobiles vehicles to maintain the quality of exhaust emissions within permissible standards.
- The ambient air quality shall be monitored regularly to ensure that the activities at site are not polluting the ambient environment.
- Pollution under Check (PUC) certificate provision at entry gate.

D. Assessment of the impact due to Diesel Generators

Emissions from the DG sets during construction phase may cause some localized impact on ambient air quality for short duration, as these will be operated during power failure only. It may be noted that the DG set power will be used to operate construction equipment only if required. Adequate height of stacks will be provided to the DG sets as per guidelines of CPCB to facilitate the dispersion of flue gases into the atmosphere

Mitigation Measures

It is proposed to provide adequate dust control systems in the form of installation of batch plants, and loose material handling in covered sheds. Dust suppression system is also proposed to be provided where necessary. It is further proposed to cover scaffolding, hosing down road surfaces and cleaning of vehicles especially during the dry season. Avenue and curtain plantation on the internal roads and peripheral plantation around the site will also be developed.

4.4.9 Noise

Impact

During the construction phase of project, noise will be generated from the various sources. Some major sources of noise generation at project site are listed here under:

- Generation of noise during movement of vehicles carrying materials and loading & unloading activities.
- Generation of noise from excavation machines, concrete mixer and other construction machines.
- Generation of noise during the operation of DG set.
- Generation of noise during concreting, hammering, etc.

All the above-mentioned sources at proposed development and construction activities will be intermittent and would be experienced occasionally.

The expected noise levels from various activities are given hereunder:

From vehicles bringing materials to the site	70 dB (A)
DG set	85 dB (A)
Excavation	80 dB (A)
Concrete Mixtures	80 dB (A)
Hammering	80 dB (A)

Mitigation Measures

To minimize impacts of noise generation from construction activities, the workers will be provided with ear muffs and other protection devices. D.G. Sets with proper acoustic enclosure for controlling noise would be installed.

4.4.10 Economic Impacts

Relatively long-lived economic impacts of the development and construction phase are likely to be experienced in local area for the duration of construction phase of 2 to 3 years as workers make everyday purchases from local traders in nearby areas.

This is likely to give a short-lived stimulus to the traders that may disappear as soon as the construction is complete. Noticeable, flow-on economic impacts will be experienced in other sectors of economy as a result of purchase of construction materials and the payment of wages and salaries to the personnel engaged in the development and construction of Group Housing. Once the development and construction of proposed project will complete, there will be some long-term positive impact on the economic structure of the area. People in the area will get direct / indirect employment opportunities and other benefits from the residents of the proposed project. Therefore, overall positive impact is anticipated on economy of the area due to development and construction activity of the proposed project.

4.4.11 Socio-Economic

During the development and construction of proposed project, about 200 to 300 skilled, semiskilled and unskilled workers per day will get direct employment opportunity, which will have beneficial impact on the socio-economic conditions of the area.

4.4.12 Construction Camp

Impact

During the development and construction phase, most of the laborers will be from local areas as proposed project will develop gradually in the time span of 2 to 3 year, but temporary laborer camps will be constructed to accommodate the laborers at the project site.

Mitigation Measures

Suitable measures will be taken at the construction camps to mitigate anticipated impacts due to temporary accommodation of laborers such as provision of clean drinking water, adequate toilet facilities, medical aid, crèche facilities for the children of workers, water and solid waste disposal system.

Other safety precautions to be maintained at work site including provision of PPEs, guarding of dangerous machine parts, maintenance of equipments as hoists and lifts etc, and adequate provision of different types of fire extinguishers will be made. All applicable rules and regulations pertaining to workplace health and welfare of workers will be adhered to.

4.5 Assessment of the Environmental Impacts During Post Construction Phase

4.5.1 Land Environment Impact

During the operation phase of the project, the soil may get polluted/ contaminated from littering of various kinds of wastes generated within the site such as food items, paper, wood pieces, paints, pesticides, oil & grease etc. However, owing to the proposed solid waste management system, no significant impact is anticipated.

Mitigation Measures

To ensure against any chances of soil pollution, it is imperative to establish a well planned solid waste collection system covering all areas of the site apart from door to door for the residential units. An identified area shall be designated for storage and segregation of the wastes which will be treated/ disposed as per their characteristics.

4.5.2 Water environment

4.5.2.1 Surface water hydrology

Impact

During the post construction phase, no water will be taken from water bodies in the area. Further, adequate drainage will be provided at the project site to channelize the storm water for rainwater harvesting.

The sewage effluents generated from the present scheme will be treated in Sewage Treatment Plant (STP) located at the site to get required treated water for recycling. Required treated sewage will be used for cooling of DG sets, Flushing, HVAC and horticulture purpose and other low end uses. Surplus sewage will be discharged into Municipal sewers. Therefore; impact on the surface water hydrology will be insignificant during the post construction phase.

Mitigation Measures

It is proposed to provide rainwater harvesting across the project site. The roof tops of buildings will also be connected to the rainwater collection system. This will not only reduce the pressure of storm water management system of the city but also recharge groundwater.

4.5.2.2 Ground water hydrology Impact

During post construction phase, the total water requirement has been taken as 3887.5 KLD. 3044.1 KLD is wastewater generation from the project out of which 886.6 KLD will be recycled water received from STP after tertiary treatment shall be used for flushing, HVAC horticulture and DG set. The requirement of water will be met by Municipal supply. The developer shall make internal distribution network of water in the proposed project. Underground water tank of required capacity will be provided and over head tanks will provided for water storage.

Mitigation Measures

The proposed rainwater harvesting will recharge groundwater aquifers from the open areas as well as roof top of the buildings. Treated wastewater from the site will be recycled for landscaping, flushing, and D.G. Set cooling to further reduce demand on ground water resources.

As indicated in baseline environment conditions, plenty of ground water sources in the area are available. Further, rainwater harvesting will also recharge groundwater aquifers. Therefore, no significant impact is anticipated on ground water resources due to proposed project.

Water meters conforming to Indian standards should be installed at the inlet point of water uptake and at the discharge point to monitor the daily water consumption. To further lower the water consumption, options of Low flow flushing systems, sensor based fixtures, waterless urinals, tap aerators etc will be explored.

4.5.3 Surface Water Quality

Impact

The sewage effluents generated from the present scheme will be collected through the sewer line network provided in the proposed project site for treatment in the Sewage Treatment Plant (STP), to get required treated water for recycling. Required treated Sewage will be recycled from Sewage Treatment Plant and will be used for cooling of DG sets, HVAC, Flushing and horticulture purpose and other low end uses.

Surplus sewage will be discharged into Municipal sewers after secondary treatment.

However, in the event of excessive rainfalls the surplus runoff will be guided into natural drains flowing along the periphery of the colony.

Mitigation Measures
As no significant impact is anticipated on the water bodies of the region, no mitigation measures are suggested.

4.5.4 Ground Water Quality

Impact
The storm water from the site will be used for recharging groundwater resources after adequate treatment of the storm water through oil and grease traps and filtration. The wastewater from the site is proposed to be used for landscaping only after adequate treatment in Sewage Treatment plant. Hence, no adverse impact is anticipated on the groundwater quality form the proposed project.

Mitigation Measures
The proposed Project will be well maintained. Solid waste management practices will be adopted and followed to prevent groundwater pollution through leaching.

4.5.5 Impact Air Emissions Sources

The possible air emissions attribute to post construction phase of the proposed scheme may be classified as below.

Impact
During the post construction phase, cars, scooter/motorcycle will be owned by the residents/workers of proposed project and buses will be for the visitors to the Commercial area. Vehicular emissions will be major sources of air pollution on approach road, bypass road and will depend upon the traffic density on the road at particular time. Quantum and dispersion of pollution from vehicular emission will depend upon the following.

- Volume of traffic at the roads
- Meteorological conditions.
- Emission sources from automobiles engines (petrol/diesel)

From the vehicular emissions, NO_2 and SO_2 will be pollutant of primary concern. The dispersion of vehicular emissions would be confined within up to 100 m from the road and concentration will decrease with the increase in distance from road. It is anticipated that the contribution of vehicular emissions in ambient air quality will be marginal but

will be below the stipulated National Ambient Air Quality Standards for NO_2 (80 µg/m^3). At higher wind speeds the dispersion will be faster.

In the proposed integrated project, green belt will be developed in the form of Parks and along the internal roads, which will also works as barrier for the movement of pollutants.

Required capacity DG sets will be provided at the Commercial Area & Common facilities in case of power failure. Heights of stacks attached to DG set will be as per the stipulated guidelines of Central Pollution Control Board (CPCB) to facilitate natural dispersion to exhaust gases, discharged into the atmosphere form DG sets.

Mitigation Measures

In the proposed project, green belt will be developed on the periphery of project site and along the internal road, which will work as barrier for the movement of pollutants and help in pollution control.

Adequate height of stacks will be provided to the Generator sets as per guidelines of MoEF ***(as per the Gazette of India Part II, Section 3, Sub-section (I) No. 318, dated July 11, 2002, is given below, refer table no. 4.3)*** to facilitate the dispersion of flue gases into the atmosphere.

Table 4.3: Generator set Stack height Rule, as per MoEF

Capacity of Generator set (KVA)	**Stack Height Provided (m)**
Total 6032.5 KVA	6.0 m + Building Height

Stack Height (for generator sets commissioned after 1/7/2003)	Stack Height shall be maximum of the following in meter: (i) $14\ Q^{0.3}$, Q=Total SO_2 emission from the plant in Kg/hr (ii) Minimum 6 m above the building where generator set is installed. (iii) 30m

4.5.6 Impact on Noise

Impact

The main sources of noise from the project are running of D.G. Sets and vehicular traffic. D.G. Sets installed in the proposed scheme will provide emergency electricity supply during power failure. This will be intermittent and for short durations. The vehicles plying within the site will be mainly of the residents and workers and are hence not expected to cause unnecessary noise. Hence, during this phase, no major impact on noise environment is anticipated

Mitigation Measures

D.G. Sets will be fitted in acoustic enclosures to control the noise generated. Adequate personnel protective equipment (PPE) will be provided to the personnel engaged in D.G. Set room. The traffic noise will diminish within a short distance from the source of origin. Honking within the site will be discouraged. Proposed rows of plantation will further restrict the noise on either side of the plantation.

4.5.7 Impact on Socio-economic Environment

Impact

The predominant potential impact on the socio-economic environment shall be loss of agricultural land as presently the core area is being utilized for cultivation activities. Adequate compensation has been provided to the landowners by the authorities and now the land use of the present area is residential as per Master Plan, 2021.

Project will provide adequate employment opportunities to the local people. During post construction of proposed project, more than 500 persons will get direct employment opportunity to be engaged in management, maintenance and security. As an estimate, during post construction phase, more than 500 persons will get marginal employment opportunities from the residents, shops and offices of proposed scheme. This will help in improving the quality of life of economically weaker sections of the local area.

Mitigation Measures

To further improve the socio-economic conditions of the area, it may be proposed to employ mainly local people as workers. Much of the maintenance arrangements may also be made with local companies and purchase of new parts from the local market. The EMC shall be responsible for implementation of the environment management plans and the pollution control measures to ensure that no disturbance is caused to the surrounding areas by the scheme activities.

4.5.8 Impact on Aesthetics

There is no scenic amenity or landscapes around the project site which will be deteriorate due to proposed project. The surrounding vicinity shall be aesthetically improved as far as possible.

4.5.9 Biological Environment Impact

Prediction of impacts on biological environment is comparatively difficult due to various reasons. For prediction of biological environment, adequate information about the structure and function of an ecosystem is required to be collected. Large amount of long time base line data is required from the secondary sources but such data is often limited with concerned authorities. In addition to that the ecosystem with varieties of interactions sometimes behaves in an unexpected way. Biological impacts on ecosystem are typically predicted in two ways.

- Professional judgment based upon knowledge of the biota and habitat, present knowledge of the impending impact resulting from similar studies and common sense.

- Similarity models based upon simplifying assumptions and knowledge of the biota & habitat within the study area, which is predominantly agricultural, these are no reserve forests and no endangered species in the core zone.

Mitigation Measures

The change in land use profile of core zone shall induce some impact on biological environment, though this impact will be limited to the maximum extent in the core zone alone & is inevitable. Although there would be some traffic increase in the buffer zone and increase in the fuel consumption in the core zone of the project area, but its impact is not envisaged to be significant on the biological environmental of the buffer zone.
In the core area these in no reserve forest to be cleared which could affect the normal functioning of food chain, food web, prey predator, relationships locally. Hence as such, no impact is predicted on the biological Environment in the core zone.

Various kinds of large and small tree will be planted all around the boundary of the project to minimize the spreading of dust and particulate matter during the construction and operation phase. More plantations such as curtain, avenue and ornamental plantation and lawns will be done during the construction phase itself and maintained during the operation phase. Open space and parks will be fancied through the grasses

and ornamental plants. Local and low water demanding plants that will also be effective as sinks for various pollutants and attract birds will be planted at the site that will contribute in positive to the local ecology.

Ecological Concerns Matrix

Any infrastructure development project is likely to involve some activities that may have negative impact on the ecology of the area. Table 4.4 below lists the possible ecological concerns and the impact of the project on the environment of the area.

Table 4.4: Ecological concerns along with their sources of threat and affected ecological parameters and impact of project

Ecological Concern	**Source of threat**	**Affected Ecological Parameters**	**Impact of Project**
Deforestation	Road Building	Loss of habitat Loss of soil Loss of species Impact on animal/ avifaunal route Variation in local climate	No impact as no large scale road building is proposed; only internal roads will be made, minimizing threat to habitat, soil or species.
		Habitat damage Loss of trees Change in land use Gradual encroachment in forest areas	No impact as no forest or tree is involved
Habitat destruction	Road Building and Construction of Building	Loss of species Reduced ecosystem productivity Reduced ecosystem resilience Biological invasions and	No negative impacts, as habitat destruction not involved. Project site does not support many species and biodiversity is poor. Surrounding area land use is commercial

		introduction of exotics	
Disposal of wastes in critical habitat	Wastes generated	Loss of species Reduction in groundwater recharge Pollution of water sources	No negative impacts as generated rubble and waste would not be disposed in critical habitats (floodplains)
Threat to Wildlife	Colonization	Disturbance to animals/ avifaunal routes Incidences of poaching and illegal trade Restricted movement of wild animals	Bird friendly diffused blue lights will be used to facilitate movement of avifauna.
Firewood extraction	Laborers and workers colony	Would result in reduced ecosystem productivity Rampant firewood extraction or lopping could permanently damage some trees and reduce their regeneration potential Wood cutting during flowering and fruiting will result in reduced number of prop gules for regeneration.	Not applicable

4.5.9.1 Impact on Bio-diversity

Impact of development of the project on ecology and available resources on site, example impact of building shade on open spaces, existing wind patterns on the site, impact on soil erosion, existing vegetation, habitat protection, water and air pollution and waste handling are assessed and mitigation options to reduce the negative impact on the resources are suggested.

Threat to Biodiversity

As such there will not be any threat to biodiversity at the project site as the whole area is totally denuded and does not have any water body also to support aquatic life. There is no existing vegetation as the area has been previously developed for such schemes and is totally denuded.

4.5.10 Transport Linkage and Traffic

Impact

The vehicle from the project will increase car and two wheeler traffic load along the road during peak hours. However, since present load is lean, increase in traffic load may not lead to traffic congestion problem.

Delhi Development Authority proposes to build 3 BHK and 2 BHK housing at Sector A1-A4, Narela. The project involves construction of internal roads, parking facilities within the project. Singhu border is located on the NE boundary of the project. Narela railway station is at a distance of about 2 km, W from the project site. To assess the impact on traffic due to the proposed project, road width measurement and traffic survey was carried out.The traffic survey was conducted as per IRC: 9-1972. The roads were studied at various sections. The traffic density was monitored in the up and down directions of the following locations:

- Census Point1- Gate No. 1
- Census Point2- Gate No. 2
- Census Point3- On 40 m road, Singhola Village side
- Census Point4- On 40 m road, Narela side
- Census Point 5- On 30 m road, Ch. Ramdev Marg side
- Census Point 6- On 30 m road, IGL CNG Station side

It was found from the study that most of the vehicles entering the road with 40 m ROW, from Narela side were destined for NH-1 as the road acts as a bypass. While vehicles entering the road with 40 m ROW, from Singhola village side were destined for Narela village and other nearby villages. The traffic entering the 30 m wide road from Ch. Ramdev Marg side were mostly destined for Singhola village and the project area.

At present the 40 m roads from Narela and from Singhola side have the maximum traffic contribution to the intersection junction during the peak hours. After addition of the proposed traffic from the project, it can be seen that the major traffic contributor would be the 30 m road, from Ch. Ramdev Marg side.

The current traffic volume plus the projected additional traffic volume on all Census Points within the project will be well within the Design Service Volumes (DSV) i.e. varying between 4.76% to 22.41% of the DSV. The Maximum capacity the roads can carry along with the future load will be between 3.34% to 15.69%. Thus, all the roads are capable of supporting the present as well as the additional traffic.

Traffic study was also carried out on the major road intersection within the project area to access the impact of the present and future traffic. The vehicles passing through the junction from the different directions, during the peak (08:00 AM to 10:00 AM & 05:00 to 08:00 PM)and normal hours were monitored for 24 hours. The summarized results are as given in table below

S. No.	**Location**	**Percentage of Traffic (%)**								
		Present			**Additional**			**Total**		
		Peak-1	**Peak-2**	**Normal**	**Peak-1**	**Peak-2**	**Normal**	**Peak-1**	**Peak-2**	**Normal**
1	**From 40 m road, Singhola side**	30.28	32.89	26.20	23.32	23.32	23.32	23.47	23.46	23.46
2	From 40 m road, Narela side	20.18	31.56	27.09	19.05	19.05	19.05	19.11	19.23	19.44
3	From 30 m road, Ch. Ramdev Marg side	22.48	22.67	28.64	48.07	48.07	48.07	47.82	47.71	47.13
4	From 30 m road, IGL CNG Station side	27.06	12.89	18.07	9.56	9.56	9.56	9.60	9.60	9.97

It is recommended to install traffic signals and channelization of intersection on the main roads within the project area, ensure that the vehicles are only parked in the designed locations for parking, to install CCTV cameras at the major roads and intersections, appointment of traffic guard, green belt along roadside, construction of speed breakerson all the roads and awareness to the residents through hoardings on roads regarding road safety, which would help to reduce chances of accidents.

4.5.11 Energy Resources Impact

During the operation phase of the project, electric supply will be provided from TPDDL. supplemented with DG sets. The proponents will make arrangements for meeting any electricity shortage for the project. Therefore, energy resources of the region will not be affected significantly.

Mitigation Measures

To promote energy conservation, it is proposed to provide the buildings with low energy consuming fixtures maximize availability of natural light and make plans in conformance to the sun's path. Use of Solar Power for lighting and water heating will be done.

4.5.12 Impact on sensitive targets

The sensitive targets include the following:

1. Religious and historical places.
2. Archaeological monuments
3. Scenic areas
4. Health resorts
5. Seismic Zone
6. Areas of scientific and geological interests
7. Defense Installations
8. Airports

There is no anthropological or archaeological site or artifacts nearby. There shall be no activity of the present scheme which would cause any impact to any sensitive target.

4.6 Impact Matrix

Various activities from the proposed scheme are likely to have some impacts on the environmental constituents during its construction as well as functional phase. The impact assessment matrix given in Table 4.3 reveals the impact associated with each activity of the project on various environmental parameters during construction and function phase respectively before any mitigation measures are implanted.

TABLE 4.5: IMPACT MATRIX

Environmental Parameters	Nature of Potential Impacts during Construction and Function							
	Local	Regional	Short Term	Long Term	Reversible	Irreversible	Adverse	Beneficial
Topography	√							
Drainage	√							
Soil	√							
Water Resources	√	√			√		√	
Water Quality	√							
Land Use	√					√		√
Air Quality	√	√			√		√	
Noise	√	√			√		√	
Flora	√					√	√	
Fauna	√					√	√	
Employment	√					√		√
Aesthetic	√					√		√

4.7 MODELING

4.7.1 AIR ENVIRONMENT

i) Introduction

Air pollution can cause significant effects on the ambient environment, and subsequently on humans, animals, vegetation and materials. It primarily affects the respiratory (e.g. by fine dust), circulatory (e.g. by carbon monoxide) and olfactory (e.g. by odors) systems in humans. In most cases, air pollution aggravates pre-existing diseases or degrades health status, making people more susceptible to other infections or the development of chronic respiratory and cardiovascular diseases. Environmental impacts from air pollution can include acidic deposition and reduction in visibility.

Potential Impacts on Air Environment

During operation phase DG-sets will be expected the main air pollution source. In order to assess the air quality impact on the ambient air environment due to DG-sets operation, it is assumed that the DG sets will be operated as on average four hours (1-2 Hrs) during daytime and four hours (1-2 Hrs) in the evening time per day.

In non-availability of power supply DG sets of capacity (6032.5) KVA at three different substations will be operated for back-up power supply. $PM_{2.5}$, PM_{10}, SO_2, NO_x and CO emissions due to diesel fuel combustion in generators are expected as major pollutants. The emission rate of NOx and CO pollutants are estimated as per CPCB/MoEF emission limit of the DG sets for the conservative assessment.

NOISE ENVIRONMENT

INTRODUCTION

Any unpleasant sound is classified as noise pollution. Sound possesses three definite properties: intensity, frequency and duration. Intensity is the loudness of a sound, or the pressure it exerts through the ear. It is measured in decibels (dB). In assessing noise, a special measurement empirical parameter called "dB (A)" is used to assess the impacts on the human ear. The higher the dB (A) number, the greater is the risk of damage to hearing.

Loud noise may adversely affect people in many ways. For example noise may interfere with sleep, speech, communication and can cause annoyance and other physiological problems. Occupational noise exposure, is also the most common cause of Noise-Induced Hearing Loss (NIHL), threatens the hearing loss among the individuals exposed to noise pollution for longer periods of time, at a less intense level.

Noise Impact Assessment

The assessment of the impacts of noise on the surrounding community depends upon:

- Characteristics of noise source (instantaneous, intermittent, or continuous in nature)
- Time of day at which noise occurs
- Location of noise source with respect to noise receptor

For an approximate estimation of propagation of noise in the ambient air from the area or point source, a standard mathematical model for sound wave propagation used is as follows:

Noise $_{(Receptor)}$ = Noise $_{(Source)}$ - 20 Log [distance $_{(Receptor)}$ / distance $_{(Source)}$]

For the modeling purposes, terrain is considered flat and there are no sound absorptive materials are present in the direction of the sound wave propagation so as to formulate the worst-case scenario.

For the modeling purposes, terrain is considered flat and there are no sound absorptive materials are present in the direction of the sound wave propagation so as to formulate the worst-case scenario. For predicting noise emissions impacts due to proposed project, the noise emission sources are examined during both construction and operational phases. The noise levels during both distinct phases are predicted using the CPCB approved noise model DHAWANI applicable for stationary point sources.

Construction Phase

The project is expected to have large scale construction activities. Sources of noise emissions are expected from various construction equipments. The major noise generating sources envisaged during construction phase and their typical noise level value are given in Table 2.1.

TABLE 4.9 : NOISE LEVELS GENERATED FROM CONSTRUCTION EQUIPMENT

Name of Source	Noise Level at 1 m from source (calculated) in dB (A)
Air Compressor	111
Back Hoe/Loader	105
Concrete Mixer Truck	109
Concrete Pumper	94
Concrete Vibrators	101
Cranes - mobile	105
Dump Truck	107
Generator	75
Hammering	110
Jackhammer	112
Pile Driver	124
Radial Arm Saw	104

As it can be seen from the above noise level isopleths, the maximum incremental noise level which is 75 dB (A) at 1m distance from the source is attenuated to 45 dB (A)) at a distance of about 50 m from the source location. Thus, there will be negligible contribution from operation of D.G. sets on the ambient noise level. Based on the model ing results it can be inferred that the resultant noise level will be expected well within the

prescribed limit of 90 dB (A) as prescribed by OSHA (Occupational Safety & Health Administration).

CHAPTER – 5

SPECIFIC STUDIES

5.1 Energy requirements

In arriving at the total demand of entire complex, diversity of demands within the building as well as diversity of demand at commercial level has been considered. The total electrical load demand of the entire project is 18700KW.

Source of Power

The power shall be made available from the **TPDDL as** per requirement. It is proposed to install Backup DG Sets at different locations near sub-station for emergency electric supply.

Backup power supply arrangement - Power back with (6032.5) KVA at three different substation

5.2 Infrastructure requirements

The proposed group housing project will have various infrastructure requirements like road, electrical work, Compound wall, Parking space etc.

Roads and open spaces: Standard roads with footpath, trees and drainage facility on either side of the road. Roads and open spaces consist of compound walls, grills, roads, sidewalks, parking lots, drains, curbs, landscaped areas, street furniture, tree covers, and flowerbeds.

In line with environment friendly design it is proposed to provide:

- **Permeable paving**- Permeable (porous) paving will be provided to control surface water runoff by allowing storm water to infiltrate the soil and return to the ground water. The traffic areas will however continue to be impermeable.
- **Gravel/crusher fines -** Loose aggregate materials from masonry wastes will be used to cover pedestrian surfaces.
- Use of grass pavers on the road, parking and pedestrian areas to reduce the heat island effect.
- Use of steel in fencing, grills, tree covers, and benches and even in streetlights will be replaced by bamboo in the parks and green landscaped areas.

Electrical Works: Electrical poles and light fittings will be as per Architectural design.

Compound Wall: Compound wall along the boundary with Architectural design.

Parking Space: For vehicles, adequate space for smooth movement and parking shall be provided at the proposed site to avoid any congestion and idling state emissions. The project will provide space for 233 ECS for EWS and 5964 ECS for CAT-II.

5.3 Infrastructure to reduce and manage overall environmental impacts

There are various infrastructures to reduce and manage the overall environmental impacts caused due to development of the project. Some of them are:

- Rain water harvesting system
- Use of Recycled Water for different purposes
- Architectural design
- Environment Management Cell

5.3.1 Rain water harvesting system

- Water harvesting pits have been proposed for augmentation of ground water. The rainwater collected from the rooftop, green & paved areas will be conveyed into the rainwater harvesting system consisting of Desilting-cum-filter chamber and borewells for recharge into the groundwater.
- Rain water from paved and green areas will percolate naturally through capillary action and augment the water table.
- RWH will be initially done only from the roof top. However the rain water pits have been proposed for the whole area.
- Runoff from green and other open areas will be done only after permission from CGWB.
- Total Rain Water Harvesting Pits will be 30.

5.3.2 Water Conservation Measures:

The water consumption comes out to be 86 lpcd for domestic and 30 lpcd for commercial after

installing the following water saving practices:

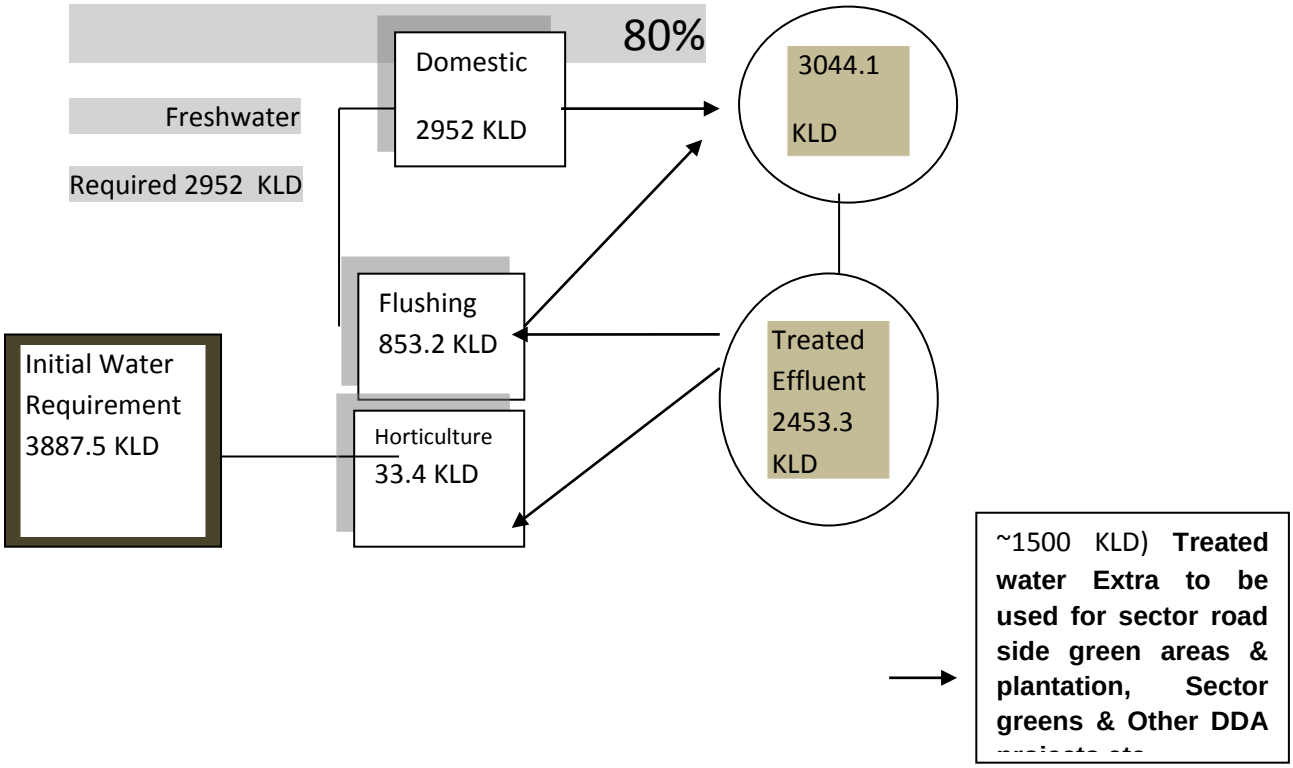
- Using low flushing systems- using efficient water saving toilets with dual flush systems thus saving about 50 % of water.
- Sensor based fixtures – this reduces about 0.4 lit per flush.
- Low flow faucets along with other water saving devices resulting in 25 – 50% water.

Low flow shower with rates at 7.5 lpm @ 80 psi

- Other pressure reducing devices to reduce from 80 psi to 65 and 50 psi thus reducing water consumption by 10 – 25%.

5.3.3 Use of Recycled Water

The waste water generated is 864 KLD which will be treated in STP of 900 KLD. Recycled water received from STP after tertiary treatment shall be used for flushing,



horticulture and DG set cooling .To reduce the total water requirement, to reduce the dependability on ground water sources, to follow the guidelines of MoEF and to protect the environment, it is recommended to adopt recycling of treated effluent from STP for the purpose of flushing, horticulture, HVAC, generator set cooling and any other low end uses.

The STP will include the following unit operations:

Primary treatment	Bar Screen, Oil & Grease Separator, Equalization Tank
Secondary treatment	Aeration Tank, Secondary Clarifier
Tertiary treatment	UV Sterilization Unit, Multigrade Filter, Activated Carbon Filter, Softener
Sludge conditioning	Aerobic Digester, Sludge Thickener / Filter Press.

Architectural design:

- Maximization of use of natural lighting through building design.
- Passive solar cooling, utilizing building shading through overhangs
- Public areas will be cooled by natural ventilation as opposed to air conditioning.
- Installing window tinting to reduce sun exposure.

Environmental Management Cell (EMC)

It is also necessary to organize a permanent set up to ensure its effective implementation. Hence, **M/s Delhi Development Authority** will create a team consisting of from various departments to co-ordinate the activities concerned with management and implementation of the environmental control measures. This team will undertake the following activities:

- Operation, maintenance and monitoring of the sewage system.
- Arrange periodical monitoring of air pollution, noise pollution.
- Maintenance of roads, gardens, roadside plantations and aesthetic development along roadsides and parks.
- Proper collection and disposal of solid wastes.
- Proper utilization of the recycled water.
- Proper functioning of water harvesting system.
- Proper maintenance of D.G. Sets.
- Checking of Fire fighting arrangements and first-aid boxes.
- Checking of security arrangements.
- Maintenance of records of power consumption for lifts, pump house, street lighting and for other common services.
- Keep records of expenditure on maintenance of lifts, parks, sub-station equipments including replacement of bulbs and tubes for street lighting and common area.
- Take immediate action in case of emergency arising due to accident, fire, gas
- leakage or any natural disaster.
- Updating of Emergency Action Plan & Disaster Management Plan
- Corporate Social Responsibility Scheme

Green Building Certification:

.

As a responsible real estate developer, it is proposed to design and construct the project in line with the requirements of IGBC/GRIHA for Green Building Rating. Without compromising on the safety and comfort of the occupants, care will be taken to achieve an energy efficient, water conscious project the benefits of which will be enjoyed in monetary terms by the residents and other intangible benefits will result for the society at large

CHAPTER – 6

ENVIRONMENTAL MONITORING PROGRAM

6.1 Environmental Monitoring Program Objectives

Monitoring program has the underlying objective to ensure that the intended environmental mitigations are realized and these results in desired benefits to the target population causing minimal deterioration to the environmental parameters. Such program targets proper implementation of the EMP. The broad objectives are:

- To evaluate the performance of mitigation measures proposed in the EMP.
- To evaluate the adequacy of Environmental Assessment.
- To suggest ongoing improvements in management plan based on the monitoring and to devise fresh monitoring on the basis of the improved EMP
- To enhance environmental quality through proper implementation of suggested mitigation measures.
- To meet the requirements of the existing environmental regulatory framework and community obligations.

The purpose of environmental monitoring is to evaluate the effectiveness of implantation of Environmental Management Plan (EMP) by periodically monitoring the important environmental parameters within impact area, so that any adverse affects are detected and timely action can be taken.

6.2 Performance Indicators

The significant physical, biological and social components affecting the environment at critical locations serve as wider/overall Performance Indicators. However, the following specific environmental parameters can be quantitatively measured and compared over a period of time, therefore selected as specific Performance Indicators (PIs) for monitoring because of their regulatory importance and the availability of standardized procedures and relevant expertise.

- Air Quality with respect to Particulate Matters (PM10, PM2.5), CO, NOx (as NO_2) and SOx (as SO_2).
- Water Quality for parameters defined in IS 10500: 1991 and amendments.
- Noise levels as per CPCB Guidelines and at selected locations.
- Soil Quality
- Survival rates of trees planted and Green area development.

6.3 Ambient Air Quality (AAQ) Monitoring

Ambient air quality parameters recommended for monitoring the project are Particulate Matters (PM10, PM2.5), Carbon Monoxide (CO), Oxides of Nitrogen (NOx) and Sulphur Dioxide (SO2). These are to be monitored, right from the commencement of construction activity at selected locations of plants and machinery, crushers on sites, excavation works, residential areas near the project site etc. Data should be generated once in a season excluding monsoon at the monitoring locations in accordance with the National Ambient Air Quality Standards formulated by MoEF through Notification on November 18, 2009.

6.4 Water Quality Monitoring

The physical and chemical parameters recommended for analysis of water quality relevant to project will be as mentioned in IS 10500: 1991. The location, duration and the pollution parameters to be monitored and the responsible institutional arrangements are given in the Environmental Monitoring Plan. The monitoring of the water quality is to be carried out at locations where monitoring has been carried out and at any other locations recommended by environment experts during construction and operation phase.

6.5 Noise Level Monitoring

The measurements for monitoring noise levels would be carried out at sensitive receptors and construction sites. Sound pressure levels would be monitored on twenty-four hour basis. Noise should be recorded at "A" weighted frequency using a "slow time response mode" of the measuring instrument.

6.6 Green Area Development

The green area development will be monitored during the construction and operation phase. The main indicator will be survival rate of grasses and plants.

6.7 Soil Quality

Soil quality will be monitored and compared with the Baseline soil quality generated before the start of construction.

6.8 Monitoring Plan

The monitoring plan covering various performance indicators, frequency and institutional arrangements of the project in the Pre-construction, Construction and Operation stages in Table 6.1.

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

(A) ENVIRONMENTAL MANAGEMENT PLAN:

The table is given below describes the generic measures that need to be undertaken during project construction and operation stage.

ENVIRONMENTAL MANAGEMENT PLAN

S. No.	Potential Impact	Action	Parameters for Monitoring	Timing
1. Construction Phase				
1.	Air Emissions	All equipments are operated within specified design parameters	Random checks of equipment logs/manuals	Construction activities
		Vehicle trip to be minimized to the extent possible	Vehicle logs	Site Clearance and construction activities
		Any dry, dusty materials stored in sealed containers or prevented from bowing.	Absence of stockpiles or open containers of dusty materials.	Construction activities
		Compaction of soil during various construction activities	Construction logs	Construction activities
		Ambient air quality within the premises of the proposed unit to be monitored.	The ambient air quality will conform to the standards for PM2.5, PM10, SO2 and NOX, CO	As per DPCC requirement
2.	Noise	List of all noise generating machinery onsite along with age to be prepared. Equipment to be maintained in good working order.	Equipment logs, noise reading	During construction phase.
		Night working is to be minimized.	Working hour records	Construction activities
		Generation of vehicular noise	Maintenance records of vehicles	During construction phase
		Implement good working practices (equipment selection and sitting) to minimize noise and reduce its-impacts on human heath (ear muffs, safe distances, and enclosures).	Site working practices records, noise reading	During construction phase
		No machinery running when not required		

		Acoustic mufflers / enclosures to be provided in large engines	Mufflers / enclosures in place.	Prior to use of equipment
S. No.	**Potential Impact**	**Action**	**Parameters for Monitoring**	**Timing**
2.	Noise	Noise to be monitored in ambient air within the plant premises.	Noise reading	As per DPCC requirement or on quarterly basis whichever is earlier.
		The noise level will not exceed the permissible limit both during day and night times.		
		All equipments operated within specified design parameters.	Random checks of equipment logs/ manuals	During construction phase
		Vehicles trips to be minimized to the extent possible	Vehicle logs	During construction phase
3.	Wastewater Discharge	No untreated discharge to be made to surface water, groundwater or soil.	No discharge hoses in vicinity of watercourses	During construction phase
		The discharge point should be selected properly and sampling and analysis should be undertaken prior to discharge	Discharge norms for effluents as given in consent to operate by DPCC	During construction phase
		Take care in disposal of wastewater generated such that soil and groundwater resources are protected		
4.	Soil Erosion	Minimize area extent of site clearance, by staying within the defined boundaries	Site boundaries not extended / breached as per plan document.	During construction phase
		Protect topsoil stockpile where possible at edge of site.	Effective cover in place.	During construction phase
5.	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Comprehensive Waste management Plan in place and available for inspection on-site. Compliance with MSW Rules, 1998	Prior to site clearance.
6.	Non-routine events and accidental releases	Plan to be drawn up, considering likely emergencies and steps required to prevent/limit consequences.	Mock drills and records of the same	During construction phase
7.	Environment Management Cell/Unit	The Environmental Management Cell/Unit is to be set up to ensure implementation and monitoring of environmental safeguards.	A formal letter from the management indicating formation of Environment Management Cell	During construction phase

II. Operational Phase				
8.	Wastewater Discharge	No untreated discharge to be made to surface water, groundwater or soil	No discharge hoses in vicinity of watercourses.	During operation phase
		Take care in disposal of wastewater generated such that soil and ground water	Discharge norms for effluents	During operation phase
9.	Emergency preparedness, such as fire fighting	Fire protection and safety measures to take care of fire hazards, to be assessed and steps taken for their prevention.	Mock drill records, on site emergency pan, evacuation plan	During operation phase

(B) ENVIRONMENTAL MONITORING PLAN

The environmental monitoring programme is a vital process in the Management Plan for any construction project. This helps in signaling the potential problems that would result from the proposed project and will allow for prompt implementation of effective corrective measures. The environmental monitoring will be required during construction & operational phases.

Water Quality and Pubic Health

Since water contamination leads to various water related disease, the project authorities shall establish a procedure for water quality surveillance and ensure safe water for the consumers. Detailed epidemiological study related water born disease shall be carried out and the data shall be compiled for every year in the project area. This data would help the authority in finding out the trends for incidence of water related diseases prevalent in the area, which would help them to take suitable remedial measures for reducing or eradicating the occurrence of these diseases in future.

Water quality parameters shall be monitored before and after the completion of the project. Monitoring shall be carried out on quarterly basis to cover seasonal variations. Water quality shall be analyzed by applying the standard techniques. The parameters recommended for monitoring are as follows:

MONITORING PROGRAMME DURING CONSTRUCTION STAGE

Ambient Air Quality Monitoring		
1	Parameters to be monitored	Particulate Matter (PM2.5) Particulate Matter (PM10) Sulphur Dioxide (SO2) Oxides of Nitrogen (NOX) Carbon Monoxide (CO)
2	Sampling Methodology	The air quality monitoring will be monitored as per DPCC/CPCB guidelines
3	No. of Locations	One location in vertical to downwind direction to be monitored.
4	Frequency of Measurements	Once a week
5	Compliance	The monitoring results will be compared with National Ambient Air-Quality Standards.
Noise Quality Monitoring		
1	Parameters to be monitored	Equivalent noise levels averaging for 24 hours
2	Sampling Methodology	The noise levels will be recorded using a portable hand held noise level meter.
3	No. of Locations	One locations at boundary
4	Frequency of Measurements	Once a week
5	Compliance	The monitoring results will be compared with the National Ambient Noise Quality Standards.

S. No.	**Parameter**
1	pH
2	Total. Hardness
3	Chlorides
4	Fluorides
5	TDS
6	Calcium
7	Magnesium
8	Sulphate
9	Nitrate
10	Total. Alkalinity
11	Arsenic
12	Iron
13	Zinc
14	Total Coliform,
15	E- Coli

Water and Waste Water Quality Monitoring

Water and Wastewater sample shall be analyzed to meet the drinking water standard and municipal sewer discharge standards respectively.

Water and Waste Water Quality Monitoring during Construction phase

Water Quality Monitoring:		
1	Parameters to be monitored	As per IS 10500:1991 and amendments as enacted
2	No. of locations	One locations each at intake and after treatment
3	Frequency of Measurements	At least once in a season
4	Compliance	The monitoring results will be compared with the preferable and permissible limits of IS 10500:1991
Wastewater Quality Monitoring:		
For construction work total anticipated labour to be employed will be around 260. All labour will come from nearby area and will for day time only. No labor camps exists for site, however moveable toilets will be provided for labours during the whole construction period.		

Water and Waste Water Quality Monitoring during Operation phase

Water Quality Monitoring:		
Water will be Municipal supply, supplied from DJB. If Delhi Jal Board permits for ground water use, water quality will be monitored as given below		
1	Parameters to be monitored	As per IS 10500:1991 and amendments as enacted
2	No. of locations	One locations each at intake and after treatment
3	Frequency of Measurements	At least once in a season
4	Compliance	The monitoring results will be compared with the preferable and permissible limits of IS 10500:1991

EMP Budget

Revised EMP budget during construction,

S. No.	Item	Amount
1	Air pollution ,suppression of dust, air monitoring	15 lacs
2	Water pollution Provision for Sewage Treatment Plant	1500 lacs
3	Provision of Storm Water Drainage System	Included in project cost*
4	Provision of solid Waste Management	20 lacs
5	Health and Safety measures and other ,safety facilities toilet s to construction workers	20 lacs
6	Environmental quality Monitoring and six monthly report submission	10 lacs
7	Green Area Development	40 lacs
	Total	1605 lacs

EMP budget during operation,

S. No.	Item	Amount per year, Rs. In lacs
1	Provision for Rain Water Harvesting	1.0
3	Provision of Storm Water Drainage System	2.0
4	Provision for Green Area Development	10.0
5	Provision of Waste Management	10.0
6	Health Environment and Safety measures and maintenance of STP	20.0
7	Environmental Monitoring	5.0
	Total	48

CHAPTER – 7

ADDITIONAL STUDIES

7.1 Introduction

Disaster has struck mankind from time immemorial. Disasters continue to strike unabated and without notice and are perceived to be on the increase in their magnitude complexity, frequency and economic impact. These hazards pose a threat to the people, structures or economic assets and assume disastrous proportions when they occur in areas of dense human habitations. This has compelled the need for a comprehensive approach to prevent and mitigate disasters.

7.2 Definition of Disaster

A Disaster is called when following one or the other or more incidents occur:

4.1 Risk of loss of human lives-ten or more in one single situation

4.2 A situation which goes beyond the control of available resource of the plant

4.3 Loss of property as a consequence of the incident is over Rs. 1 Crore and/or bears a potential to the above

4.4 A situation apparently may not have much loss but its long-term severity can affect loss of life, production and property.

Disaster occur due to

Emergencies on account of:

5.1 Fire

5.2 Explosion

5.3 Electrocution

Natural calamity on account of:

Earthquake

Lightning

Storm

Epidemics

6.2 Need and Objectives of Disaster Management Plan

The Disaster Management Plan is designed to:

- Anticipate the types of disasters that are most likely to occur;
- Identify the possible effects of any disaster that may occur;
- Identify the preventative and mitigating strategies to deal with any possible disaster;
- Involve all role players in a coordinated manner to respond to the challenges posed in disaster situations;
- Procure essential goods and services for disaster management;
- Identify the weaknesses in respect of capacity and skills to deal effectively with disaster situations;
- Provide essential training in skills and to promote awareness and preparedness in respect of the occurrence of disasters; and
- Plan in advance the relief operations that may be required or to be exercised in disaster situations.

7.4 Identification and Assessment of Hazards

This stage is crucial to both on site and off site emergency planning and requires to systematically identifying what emergencies could arise. These should range from small events, which can be dealt with by plant personnel without outside help to the largest event for which it is practical to have a plan. Experience has shown that for every occasion that the full potential of an accident is realized, there are many occasions when some freak event occurs or when a developing incident is made safe before reaching full potential.

- The assessment of possible incidents should produce a report indicating
- The worst events considered
- The route to those worst events
- The time scale to lesser events along the way
- The size of lesser events if their development is halted
- The relative likelihood of events
- The consequences of each events.

7.4.1 Disaster Preventive Measures

Prevention and Mitigation are the things we do to prevent an emergency from happening and, if it does, to reduce or eliminate the impact. This includes structural *(e.g. building reinforcement, infrastructure renewal)* and non-structural measures *(e.g. legislation, by-*

laws, and codes).

It is not easy to control any disaster if contingency plans are not available. For effective control of disaster adequate manpower, technical know- how, alertness and internal help are the prime requirements. It is always better to take preventive measures to avoid any disaster. In the proposed project following prevention measures will be taken to prevent disaster:

Design, manufacture and construction of the building will be as per national and international codes as applicable in specific cases and laid down by the appropriate statutory authorities.

Routes for escape during disaster are provided.

(iii)Legislation: Guideline for High Rise Building *(MoEF dated 07th Feb, 2012)*

All necessary fire fighting equipments shall be in place before the occupancy of building for more than 15 m heights.

II. Minimum width of the road (right of way) shall be:

S.No.	**Height of Building**	**Width of Roads (right of way)**	
		Minimum	**Desirable**
1	Between 15 m – 30 m	15 m	18 m
2	Between 30 m – 45 m	18 m	24 m
3	Between 45 m – 60 m	24 m	30 m
4	Above 60 m	30 m	45 m

III. Location of fire station:

S.No.	**Height of Building**	**Location of Fire Station**	
		Minimum	**Desirable**
1	Between 30 m – 45 m	Within 10 km	Within 05 km
2	Between 45 m – 60 m	Within 05 km	Within 02 km
3	Above 60 m	Within 02 km	Within 10 minutes driving distance

Nearest Fire station is within 10 minutes driving distance from proposed project site.

IV. Mock Drills of potential emergencies shall be carried out once in year in concern with Fire deptt.

Guidelines for Disaster Management Plan

A Disaster Management Plan (DMP) is formulated for better and safe management. The DMP will include the following elements:

- Assessment of the size and nature of the events foreseen and the probability of their occurrence.
- Formulation of the plan and liaison with authorities, including the emergency services.
- Appointment of key personnel and their duties and responsibilities
- Action on-site
- Action off-site
- Declaration of emergency collection point at site
- Display emergency contact number at all prominent places of site like main gate, building blocks, Store area and Canteen etc.

Format of emergency contact numbers

Coordinator	Phone No.
Police control room	100
Fire Station	111
Ambulance	102
Nearest Police Station	
Nearest Hospital	
District Hospital	

7.6 Appointment of Personnel and Definition of Duties

Effective emergency plans require that, in the event of an accident, nominated individuals be given specific responsibilities, often separate from their day-to-day activities. The two principal people are the site incident controller and the site main controller. A Senior Management Personnel will be appointed to act as site main controller and a personnel Junior to him as site incident controller. The site incident controller will take control the incident. He or she will often be the person in charge at the time of the incident.

The responsibilities of the site incident controller include the following:

- To assess the scale of the incident (both for internal and external emergency Services);
- To initiate the emergency procedures to secure the safety of persons and minimize loss of material;
- To direct rescue and fire-fighting operations until (if necessary) the fire

brigade arrives;

- To search for casualties;
- To arrange evacuation of the building
- To assume the responsibilities of the site main controller pending his or her arrival;
- To provide advice and information as requested to the emergency services.

The site main controller will be chosen from the senior management of the works with general responsibility of directing operations from the emergency control center after relieving the site incident controller of the responsibility for overall control.
The specific responsibilities of the site main controller include:

- To decide (if not decided already) whether a major emergency exists or is likely, requiring the emergency services and the off-site emergency plan;
- Continually to review and assess possible developments to determine the most probable course of events;
- To ensure that casualties are receiving adequate attention;
- To liaise with Chief Officers of the fire and Police services.
- To arrange for a log of the emergency to be maintained;
- To issue authorized statements to the news media;
- To control rehabilitation of affected areas after the emergency.

7.7 Disaster Management Cycle

The Disaster management cycle illustrates the ongoing process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. The complete disaster management cycle includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.
Often phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster.

Response – Response actions are taken before, during, or after a disaster /disaster to save lives, minimize damages and enhance recovery operations. Such measures include activation of Emergency operation centers/ control room, plans and procedures, arrangements and agreements, the emergency alert system, public warning, notification of public officials, provision of mass care, shelter, search and rescue, and security. The aim of emergency response is to provide immediate assistance to maintain life, improve health and support the morale of

the affected population. Humanitarian organizations are often strongly present in this phase of the disaster management cycle.

Recovery – As the emergency is brought under control, the affected population is capable of undertaking a growing number of activities aimed at
restoring their lives and the infrastructure that supports them. There is no distinct point at which immediate relief changes into recovery and then into long-term sustainable development.

Recovery activities continue until all systems return to normal or better. Recovery measures, both short and long term, include returning vital life-support systems to minimum operating standards; temporary housing; public information; health and safety education; reconstruction; counseling programs; and economic impact studies.

Mitigation – Mitigation activities actually eliminate or reduce the probability of disaster occurrence, or reduce the effects of unavoidable disasters. Mitigation measures include building codes; hazard and vulnerability analyses updates; zoning and land use management; building use regulations and safety codes; preventive health care; and public education.

Mitigation will depend on the incorporation of appropriate measures in national and regional development planning. The mitigation phase, and indeed the whole disaster management cycle, includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.

Prevention – Preventive actions are taken to avoid an incident or to intervene to stop an incident from occurring.

Preparedness –The goal of emergency preparedness programs is to achieve a satisfactory level of readiness to respond to any emergency situation through programs that strengthen the technical and managerial capacity of governments, organizations, and communities.

During the preparedness phase, governments, organizations, and individuals develop plans to save lives, minimize disaster damage, and enhance disaster response operations.

7.7.1 Risk associated with the proposed project

Main hazards identified for the project include.

- Fire due to LPG/PNG leakage
- Hazard pertaining to Fire in Building
- Fire in diesel storage area/ Garbage storage area
- Electrical accidents
- Earthquake
- Flood

Objective of Emergency Response Plan (ERP)

The overall objective of an emergency response plan (ERP) is to make use of the combined resources at the site and outside services to achieve the following:

- To localize the emergency and if possible eliminates it
- To minimize the effects of the accident on people and property
- Effect the rescue and medical treatment of casualties
- Safeguard other people
- Evacuate people to safe areas
- Informing and collaborating with statutory authorities
- Initially contain and ultimately bring the incident control
- Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency
- Investigate and take steps to prevent reoccurrence

The ERP has therefore to be related to the identification of sources from which hazards can arise and the maximum credible loss scenario that can take place in the concerned area. The plan takes into account:

- The maximum credible loss scenario
- Actions that can successfully mitigate the effects of losses / emergency need for good planning so that with minimum effort resources, the emergency can be controlled.

2.1 Piped Natural Gas (PNG)

2.2 Risk Assessment-Methodology

Risk assessment involves identification of a list or "Range of representative incidents" and assessing the consequences of the same and estimating the probabilities.

A. Range of Representative Incidents

Typically, a spectrum of events exists ranging from the high probability-low consequence events to the low probability-higher consequence events. Total avoidance of risk (zero risk) is an unattainable goal; however, risks can be managed and minimized through engineering design, good management practices, and the implementation of response measures.

B. Estimated Probabilities: The releases from pipelines can be from a number of sources and can vary in leak size. The risk assessment typically does not include very small continuous release or short duration limited releases as the past experience shows that such release do not contribute to the overall risk levels. The categories that are usually considered are small leaks and large or catastrophic leaks.

7.8.1.1 Safeguards Taken in Design Stage

All Critical PNG piping would be confirming to IS: 1239 with piping designed in accordance with ASTM, ANSI and equivalent codes and standards within built margin of safety.

7.8.1.2 How Safe is "PIPED NATURAL GAS"

- No LPG storage in cylinders at customer's premises required and hence safe.
- Kitchen has more space.
- Gas is available on tap all the time, Gas supplied to homes at very low pressure (21 milli bar) and hence very safe to handle when compared with pressure of about 7-9 kg per sq. cm (g) in LPG cylinders.
- Piped connection has built-in safety system that ensures tripping of regulator in case of leakage more than specified range already set.
- No leaking cylinders and hence absolutely no chance of a LPG cylinder explosion at a domestic customer premises.
- No safety hazards due to storage of additional cylinders.
- PNG can be safely used for hot water geysers, room heaters in winter and high altitude areas thus saving on electric energy.
- Savings for customers on account of underweight, leaking and partially consumed cylinders.
- Customer pays for amount of gas used as per flow meter and no advance payment. No inventory costs.

7.8.1.3 Emergency Response for PNG

2.4.1 Basic Actions

- Immediate action is the most important factor in the emergency control because the first few seconds count.
- Take immediate steps to stop Gas leakage / fire and raise alarm simultaneously.
- Stop all operations and ensure closure of all isolation valves.
- As PNG fires develop and spread quickly, so all out efforts should be made to contain the spread of leakage/fire.
- Plant personnel without any specific duties should assemble at the nominated place.
- Electrical system except the lighting and fire fighting system should be isolated. If the feed to the fire cannot be cut off, the fire must be controlled and not extinguished.
- Start water spray systems in the areas involved in or exposed to fire risks.
- In case of leakage of gas without fire and inability to stop the flow, take all precautions to avoid source of ignition.
- Block all roads in the adjacent area and enlist police support for the purpose, if warranted.

2.4.2 Actions in the Event of Fire

Basic actions as detailed above.

Extinguishing fires: A small fire at a point of leakage should be extinguished by enveloping with a water spray or a suitable smothering agent such as CO_2 or DCP. Fog nozzles should be used. A portable fire extinguishers also play a very important role .These extinguisher are light weight, easy to use and maintain and are effective in all types of fires such as fire from gas, electrical circuits, flammable liquids, oil, solid combustibles etc. They require zero maintenance and are very portable.

- Fire fighting personnel working in or close to un-ignited vapor clouds or close to fire, must be protected continuously by water sprays. Fire fighters should advance towards the fire downwind if possible.
- In case the only valve that can be used to stop the leakage is surrounded by fire, it may be possible to close it manually. The person attempting the closure should be continuously protected by water sprays, fire entry suit, water jet blanket etc. The person must be equipped with a safety belt and manned lifeline. In case of rapid increase in decibel level or lifting sound from a relief valve, evacuate the

area as there would have been over pressurization.

7.8.1.4 Response sequence for Natural Gas in dangerous situations

1. Person noticing the fire should attempt to isolate and extinguish the fire with the available equipment and inform or arrange to inform the leader/senior representative regarding the following.
    - Location of the fire
    - What is burning
    - The extent of fire
    - Callers name and number

    Do not disconnect unless the person on the other side repeats the message or acknowledges it.

2. Security on duty coordinators will
    - Respond to the scene of the incident
    - Arrange to send the necessary firefighting equipment to the scene of the incident
    - Extinguish the fire with the available equipment

3. Security officer will
    - Sound the siren as per the siren code
    - Inform the site main/incident controller and act as per his instructions
    - To ensure closure of gates immediately to regulate traffic in such a way that free movement of outside assistance like fire tenders, ambulance etc is available
    - Ensure that under no circumstance do any pumping operations involving gas is to continue. Restrict entry of unauthorized persons.
4. Security should cordon off the area and local city fire fighting staff should be notified. The project will have the fire fighting water system but may not be equipped with staff to operate it. Local fire fighters will need to be notified.

5. All other Management / Asst./Labor staff on hearing the siren, should STOP their operations / work, switch off lights, fans engines, air conditioners etc. close all doors, pipeline valves and line up in front of their working places and meet at a pre-arranged location. These people will assist in evacuating the residents if necessary.

7.8.1.5 Post Emergency Follow Up

- All cases of fire occurrence, no matter how small, must be reported promptly to the coordinator for follow up.
- Under no circumstances should fire-extinguishing equipment once used be

returned to its fixed location before it is recharged/certified fit by the fire chief/Safety Manager.

- Used fire extinguishers must be laid horizontally to indicate that they have been expended.

7.8.1.6 Early Warning/Alarm System

An audible electric alarm (siren) should be located in the main gate. The different sounds that should be generated by the alarm are.

Small Fire	**:**	**No siren**
Major Fire	**:**	A wailing siren for two minutes. Sirens will be sounded three times for thirty seconds with an interval of 15 seconds in between
Emergency	**:**	Same type of siren as in case of major fire but the same will be sounded for three times at the interval of two minutes
All clear (For-Fire)	**:**	Straight Run Siren for two minutes
Mock	**:**	Straight Run Siren for two minutes

Fire detection and protection system should be install like smoke detector and gas detector etc. and upgrade them from time to time to ensure they are in running condition.

1. Instructions for Residents (During Fire/Smoke in Apartments)

1. Get out of buildings as quickly and as safely as possible.
2. Use the stairs to escape. When evacuating stay low to the ground.

If possible, cover mouth with a cloth to avoid inhaling smoke and gases

1. Close doors in each room after escaping to delay the spread of the fire.
2. If in a room with a closed door.
3. If smoke is pouring in around the bottom of the door or if it feels hot, keep the door closed.
4. Open a window to escape or for fresh air while awaiting rescue.
5. If there is no smoke at the bottom or top and the door is not hot, then open the door slowly.
6. If there is too much smoke or fire in the hall, slam the door shut.
7. Stay out of damaged buildings.
8. Check that all wiring and utilities are safe.

Earthquake Management

The proposed project falls in earthquake sensitive zone IV on the MSK Scale (IS 1893: 2002) which indicates the area to be prone to moderate intensity of earthquake as shown in **Figure** Likewise, the structures of the present scheme will be designed in accordance to the following guidelines:

- IS: 1893-2002 "Criteria for Earthquake Resistant De sign of Structures (Fifth Revision)
- IS:13920-1993 "Ductile Detailing of Reinforced Conc rete Structures subjected to Seismic Forces - Code of Practice"
- IS:4326-1993 "Earthquake Resistant Design and Const ruction of Buildings - Code of Practice (Second Revision)"
- IS:13828-1993 "Improving Earthquake Resistance of L ow Strength Masonry Buildings - Guidelines"
- IS:13827-1993 "Improving Earthquake Resistance of E arthen Buildings - Guidelines"

  IS:13935-1993 "Repair and Seismic Strengthening of Buildings - Guidelines"

Response in Case of Earthquake

7.8.4.1 Response Procedure for Residents

If Indoors

- Take cover under a piece of heavy furniture or against an inside wall and hold on.
- Stay inside: The most dangerous thing to do during the shaking of an earthquake is to try to leave the building because objects can fall on you.

If outdoors

Move into the open, away from buildings, streetlights, and utility wires. Once in the open, stay there until the shaking stops.

If in a Moving Vehicle

Stop quickly and stay in the vehicle. Move to a clear area away from buildings, trees, overpasses, or utility wires. Once the shaking has stopped, proceed with caution. Avoid bridges or ramps that might have been damaged by the quake.

After The Quake

1. After the quake be prepared for aftershocks.
2. Although smaller than the main shock, aftershocks cause additional damage and may bring weakened structures, down. Aftershocks can occur in the first hours, days, weeks, or even months after the quake.

Help Injured or Trapped Persons

- Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help.
- Remember to help those who may require special assistance-infants, the elderly, and people with disabilities.
- Stay out of damaged buildings.
- Use the telephone only for emergency calls.

7.8.4.2 Response Procedure for Emergency Team

1. Formulate an Emergency Response Team for earthquake response. Using the public address system, inform residents of response procedures discussed above.
2. Inform the necessary authorities for aid.
3. Ensure no residents are stuck beneath any debris, in case of a structural failure.
4. Ensure that all residents standing outside near the buildings are taken to open area.
5. Ensure that the first aid ambulance and fire tender vehicles are summoned if necessary.
6. Inform the nearby hospitals if there are any injuries.
7. Check the utilities and storage tanks for any damage.

7.9 Emergency Action Plan

In order to combat emergencies an organizational chart assigning different responsibilities to be carried out during emergency shall be prepared by EMC. The chart shall be periodically reviewed and updated. Following coordinators shall be identified to coordinate various activities during emergency. Each coordinator shall identify a Disaster Response Team, which shall step into action in the event of a disaster.

S. No.	Coordinator	Name	Phone No.		Address
			Office	Residence	
1	Chief Coordinator				
2	Fire Fighting Coordinator				
3	Safety Coordinator				
4	Security Coordinator				
5	Communication Coordinator				
6	Medical Coordinator				
7	Transport coordinator				
8	Public Relation Coordinator (for providing relief and rehabilitation)				
9	Provisioning Coordinator				

The responsibilities of the Safety Officer/Coordinator are as follows:

- To arrange mock drills and periodical fire fighting exercises periodically.
- To inspect periodically all fire fighting equipments, sprinklers, fires detectors along with respective alarms, water pumps, if these remain in working state and ready to use.
- To convene meetings of coordinators periodically, to discuss various aspects such as in house maintenance, safety, health services, availability of emergency materials, emergency training, external services etc. to be required in case of an emergency.
- To maintain upto date information of local, district, sate and central organization and voluntary bodies whose are likely to be required during emergency as highlighted in the following table.

S. No.	Coordinator	Name	Phone No.		Address
			Office	Residence	
1	D.M				
3	S.P. /D.S.P.				
4	Emergency Contact No./Ambulance				
5	Police control room				
6	Nearest Police Station				
7	Fire Brigade				
8	C.M.O				
9	District Hospital				
11	Meteorological Department				

7.10 Procedure for Treatment

On getting a signal of an emergency, the site incident controller officer will take control of the situation. First aid parties will render first aid to casualties at the place of occurrence and those requiring further treatment would be transported to the nearest hospital by ambulance. The following phone numbers will be prominently displayed in the proposed academic block:

- Fire Office
- Police Station
- Nearest Hospital
- District Administration

First Aid

It is necessary to give first aid to the persons injures in the disaster. Doctor and paramedical staff will be made ready during emergency. There will be adequate first aid facility available to meet the workload.

Repair Services

Repair of damaged parts of the buildings will be taken up. Essential public utility services viz. water, electricity and sewerage system will be maintained in the case of a disaster.

Fire Fighting Services

Required fire fighting arrangements will be provided in the proposed residential Complex. All regulations for prevention of fire will be enforced. The following provisions will be made like Automatic Fire Alarm and detection system, Manual fire Alarm, Sprinkler System, Wet riser and Hose reel. Following three teams will be created

- Fire Fighting Team
- Rescue / Salvage Team
- Picket / Cordon Party

In case of Emergency following will be the duty of the different teams

Duties of fire fighting team

- On hearing the fire alarm rush to the scene of Fire.
- Try to rush the fire with the help of fire extinguishers, Hose reels and Hydrants (Internal / External)
- Act as per the directions of Fire Officers at sit e
- The members of fire fighting teams shall enter the building in pairs
- The exit routes shall be marked.
- Do not open the doors / windows, it will fan the fire.
- Direct the jet of water at the seat of fire

- If the room is full with smoke, Do Not walks. Tie a wet cloth on mouth and crawl towards the exit.
- Help in fire fighting to the Fire Brigade Personnel.

Duties of rescue / salvage plan

- On hearing the fire alarm rush to the scene of Fire
- Rescue the trapped person if any inside the building
- Salvage the important documents / materials and keep them away at a safer place.
- Always enter in pairs
- Mark the Exit points
- Help the fire fighting team after work of Rescue / Salvage is over.

Duties of Picket / Cordon Party

On hearing the fire alarm reach the site of accident

- Cordon the area of Fire (Building involved in Fire) as some miscreants tries to Steal the material.
- Do not allow to crowd the persons who are not the members of Fire Fighting /Salvage / Rescue party
- Keep vigil on all persons assembled at the site.

Traffic Control

The free movement of the fire vehicle and ambulance at the scene of fire / emergency is very important and therefore, the security personnel on the duty ensures that all the roads at the scene of fire /emergency are kept clear and free from obstruction. Persons arriving by motor transport at the scene of fire / emergency will not be allowed to park their vehicle within 100 meters of fire.

7.11 Responsibilities

7.11.1 Responsibilities of Chief Coordinator

The responsibilities of the chief coordinator are as follows.

(a) To maintain a list of different coordinators and updating it periodically.

(b) To assign responsibilities to different coordinators.

(c) To convene meetings of coordinators periodically, to discuss various aspects such as in house maintenance, safety, health services, availability of emergency materials, emergency training, external services etc. to be required in case of an emergency.

Display emergency contact numbers at all prominent places of site

7.11.2 Responsibilities of Fire Fighting Coordinator

- To arrange mock drills and periodical fire fighting exercises periodically.
- To inspect periodically all fire fighting equipments, sprinklers, fires detectors along with respective alarms, water pumps, if these remain in working state and ready to use.
- On receiving formations of emergency to ensure if all the in-house fire fighting and safety materials are adequate or some additional fire tenders are needed to combat the emergency.
- To inform the chief coordinator, the information regarding time and place of occurrence, casualties, loss of property, methods adopted to combat the fire, if fire effectively controlled, what external help required etc.
- To contact the outside agencies for necessary additional help to control the fire

hazards.

- To inform the medical office about the tentative assessment of casualties happened and likely to be happen, who in turn will inform the medical coordinator for provision of external or in house medical help, ambulance, etc. if any loss of life or injury to occupants is apprehended.
- To supervise the control and rescue operation as directed by the chief coordinator.
- To ensure that no information is passed on to outside agencies without the clearance of the chief coordinator.

7.11.3 Responsibilities of Safety Coordinator

- Systematic search for and recognition of damagers and their origin.
- Compliance of statutory requirement.
- Training of personnel.
- To-arrange audio-visual programs and safety awareness among occupants through their involvement and participation.
- To ensure that all accidents and incidents occurring in the township are duly investigated, reported and corrective measures implemented.
- To identify needs for suitable safety programs to bridge up the gap on information concerning safety.
- To review effectiveness of personal protective appliances and their use.
- Conducting mock drills in order to keep the equipments and personnel in readiness to face the crisis.
- Arrange display safety posters and efficient communications of the safety awareness through display of posters and slogans.
- On hearing the information of emergency he will reach immediately to the emergency site and coordinate safety of personnel in consultation with fire fighting and medical coordinators.
- To ensure that the danger is completely eliminated before allowing all clear signal for resumption of activity.
- To ensure that the concerned authorities are kept informed about progress of the situation.

7.11.4 Responsibility of Security Coordinator

On hearing / receiving emergency signal/message he shall immediately proceed to the emergency site and perform the following duties.

- To instruct all security personnel to help in maintaining the law and order.
- To find out the circumstances which have been responsible for the emergency

and ensure whether correct methods have been employed.

- To ensure that the man engaged in combating the hazard has taken proper safety precautions.
- To ensure that efforts launched are systematic an effective and those engaged do not create "free for all" situation.
- To arrange for additional emergency fighting aids. If it is apparent, that the situation would go, out of control and greater danger is imminent, to take immediate action to move out all the men involved to safety as far as he can.
- To close all visitors' gate control traffic and allow only authorized persons to enter.
- To inform Plant Medical Coordinator for first-aid.
- To send out all those who are not involved in emergency operations.
- To pool departmental transport with the help of transport coordinator and keep vehicles ready for use.
- To cordon off the area of accident and coordinate with external security coordinators if additional security measures required.
- To direct the external help/authorities to respective coordinators.
- Visit by media men to the spot of accident to be only arranged through public relation coordinator if it is safe and permitted by chief coordinator.

7.11.5 Responsibility of communication Coordinator

On hearing/receiving emergency signal/message he shall immediately report at emergency control room (where message can be imparted to outside organizations/departments on telephone, telex, radio etc) to perform the following duties.

a) To keep contact with the chief coordinator to act on his instructions based on the level of emergency.
b) In case of major emergency to inform all the local authorities from whom help is required specifying the requirement and the place of requirement.
c) To inform the security superintendent at emergency gate about arrival of nay external help of outside personnel/VIP/consultants, etc. for assisting in the emergency, if prior information is received.
d) To attend the local calls and impart suitable reply regarding persons who are inside the disaster zone.
e) The following points may be kept in mind.

- If possible, communication should take place in privacy so that it is not interrupted

and distorted by others. Information impacted should be factual and prompt.

- The calling person should be ensured that additional information will be supplied as and when available.
- Media should be advised to ignore any information other than from the official spokesman. Newsmen may be permitted to use telephone, telex etc. if requested.
- Reasons for any restrictions imposed on the media persons may be explained.
- The safety achievement may be pointed out to the media so that they may project a balanced image.
- Do not give wrong information or cover up facts since the correct picture will in any case emerge.
- Do not release estimates of damage.

7.11.6 Medical Coordinator and Emergency Services

(a) The responsibility of providing medical care should be invested in first aid central first aid facility to be set up within the campus. Medical aspects can be planned for minor disasters. In case of major disaster, where whole campus is involved, extraneous help from all sources has to be taken.

(b) The medical coordinator has to identify in the city, the full-fledged emergency services with facilities to look after emergent cases. Proper liaison shall be maintained with these and they will have communication links with the medical services at the site.

(c) During normal/non emergency days, to organize suitably trained first-aiders force to handle such emergency situations. Mack drill shall be carried out from time to time so that the system is kept toned up at all times.

(d) On getting information of the disaster and its level, he will inform the in-house first-aid facility to report at incident site immediately. For major emergency he will request for necessary external aid for medical services.

(e) He will arrange hospitalization of the injured persons and post mortem of fatal casualties and keep count of persons injured sent to hospitals from time to time.

(f) He will inform authorities of major hospitals for treatment of serious cases, if any.

(g) He will communicate to the transport coordinator for requirement of vehicles.

(h) To remain at his place of duty until clearance is given by chief coordinator.

7.11.7 Role of Transport Coordinator

(a) On hearing or getting information of the emergency he will keep all the vehicles and drivers in readiness and will send vehicles as per the requirement of different coordinators and officials.

(b) The permission of chief coordinator is to be – soug ht under following condition:

- To provide vehicle for transporting casualties.
- To provide vehicles to necessary non-supervisory staff.

(c) To keep a list of local transport agencies and be in touch with them.

(d) If there is any additional requirement of vehicles, he will requisite vehicles from outside agencies on telephone or through some volunteer.

7.11.8 Responsibility of Public Relation Coordinator

(For Providing Relief and Rehabilitation)

On hearing or receiving emergency he will proceed to the site and take following action:

- To assist in in-house evacuation operation and neighboring people, necessary.
- To make known the latest situation to communication coordinator and chief coordinator.
- To receive media people and government officials and other outside VIP/consultant and impart information keeping in mind the points discussed in para-6.5.5(e) above.
- To provide relief and rehabilitation to the affected persons in coordination with provisioning coordinator.
- To call insurance people to assess the damage.
- To arrange rebuilding damaged property estimating the damages, payment of compensation, etc.
- To remain in touch, continuously, with concerned authorities (in-house or external) to provide relief and rehabilitation to the affected persons (this activity may be coordinated with provisioning coordinator.

7.11.9 Responsibility of Provisioning Coordinator

- To Provide financial/material help for the victims.
- To provide essential items such as eatables, drinking water, etc during emergency.
- To provide immediate finance for the purchase of fine fighting and safety material, for hiring transports and labour and keep provision for unforeseen financial assistance.
- To estimate and sought approval of the annual budget for incurring expenditure on Environment Management Plan and likely on Disaster Management Plan.

7.11.10 Disaster Response Team

Responsibilities of Disaster Response Team are:

1. Conduct initial damage assessment and take preliminary actions.

- Enter the damage zone.
- Use extreme caution when entering the area where disaster has occurred. It may be necessary to wait until safety officials have determined that fire has been completely

extinguished, the building is structurally sound, and there is no danger of electric shock in wet areas.

- If entry is delayed, use this time to begin contacting based on the question below – Begin keeping a detailed visual record (photographs video) of the damage and the recovery process.

I. What types of materials has been damage?

II. What is the nature of the damage? Fire damage is the most common forms. How extensive and severe is the damage? While it is not appropriate to inspect every item at this point, select precious materials that can be salvaged with rapid action.

2. Inform insurance and legal representatives of the nature and extent and damage.
3. Investigate financial resources for recovery efforts.
4. Determine what commercial recovery services and supplies are needed and contact vendors.
5. Organize, trained, and supervise recovery volunteers.
6. Coordinate communications among staff and with the public and news media.
7. Keep records of all decisions made and activities undertaken.

• The most important variables influencing the extent of damage in a disaster are the rapidness and the rapidness and appropriateness of first response. In an emergency the persons at the place of incidence must know whom to contact, and those contacted must know what to do. The Environment Management Cell (EMC) shall frame a Disaster Response Team and outlines its membership and responsibilities.

Once an emergency has been brought under, the Disaster Response Team will gather information and form an action plan. Depending on the nature of the emergency, certain measures can be taken immediately to minimize further damage.

In a major disaster multiple areas of the proposed activities may sustain damage. If there are insufficient resources to salvage everything, following established priorities will ensure that the most significant materials receive attention first.

7.11.11 Salvage Procedures

In the event of a major disaster, recovery activities may be turned over to a commercial firm, but in case the decision is made to perform recovery work in house, the salvage instruction of the chief coordinator shall be followed.

7.11.12 Supplies and Services

The EMC shall establish a disaster supply system to contain the materials most needed for the initial response and for setting up a salvage operation. Depending on the magnitude and nature of the disaster, the EMC may also need to arrange for outside services and expert advice.

7.11.13 Termination of Salvage Operation

1. Based on the initial damage assessment, it shall be decided whether to withdraw or attempt salvage of damaged materials. Severe fire damage is generally irreversible, salvage is not possible.
2. It shall be decided whether the building or any party of it should be closed and whether hours and services should be curtailed. While it is important to maintain services if possible, the success of any salvage effort will depend on the availability of adequate numbers of staff and their ability to work without distraction. The damage area shall be cordon off and discourage disaster sightseers.
3. It shall be checked frequently to make sure that measures taken to stabilize the emergency are still working.

7.12 Natural Resource Conservation

Resource conservation is the planned management of natural resources to optimise their utility, efficient usage in their original application, reuse, and recycling. The aim is to minimise the energy consumed and wastes generated in all stages, from production through the life of the product right up to final disposal.

Resources are features of environment that are important and value of to human in one form or the other. However, the advancement of modern civilization has had a great impact on our planet's natural resources. So, conserving natural resources is very essential today.

There are many natural resources which are used during the construction of the project like:

- Soil, Water, Wood & Metals

There are many ways that one can conserve natural resources.

Soil Conservation

- Trees, shrubs and groundcovers are effective perimeter treatment for soil erosion prevention.
- Excavated top soil can be used for landscaping of project site
- Use of a grass way that both channels and dissipates runoff through surface friction, impeding surface runoff, and encouraging infiltration.
- Solid waste management by proper collection and disposal to mitigate soil pollution

Water Conservation

The wastage of water shall be minimized by a combination of water saving devices and

other domestic water conservation measures. Many water-saving devices those are useful

- Low-flush toilets, Waterless urinals, Waterless car washes, Using low flow taps in wash basins
- Waste water recycling (3044.1 KLD will be treated up to tertiary treatment, to get 2435.3 KLD recycled water for various uses including Flushing, Horticulture, and DG set cooling)

Domestic water conservation measures

- When washing dishes by hand, don't let the water run while rinsing.
- Water the lawn and garden in the morning or evening when temperatures are cooler to minimize evaporation.
- Teach children to turn off faucets tightly after each use.

Rain Water Harvesting

Rainwater harvesting system is proposed to recharge ground water and attain sustainability. The rainwater shall be diverted from the rooftop using rain water pipes to the surface/under ground drainage network. The entire area shall be sub divided for recharging structures.

Domestic and Commercial Usage

- Use of water efficient plumbing fixtures
- Leak detection and repair techniques.
- Awareness Campaign for reduced water use by residents.
- Metered water consumption.

Horticulture

- Use drip irrigation for shrubs and trees to apply water directly to the roots where it's needed.
- Grouping of plants with similar water requirement.
- Use of low volume and low angle sprinklers for greens.

Wood and Timber

Minimum wood and timber will be used during construction of project.

Other alternatives to conserve natural resources

Biogas

Biogas typically refers to a gas produced by the breakdown of organic matter in the absence of oxygen. It is a renewable energy source, like solar and wind energy. Furthermore, biogas can be produced from regionally available raw materials and recycled waste and is environmentally friendly.

Biogas is produced by the anaerobic digestion or fermentation of biodegradable materials such as manure, sewage, municipal waste, green waste, plant material, and crops. 10-12 kg of waste generates 1.0 cubic meter of biogas and the waste computed from the present scheme is 9468 cubic meters @ 10 kg per cubic meter of biomass.

Biogas can be used as a fuel for heating purpose, such as cooking. It can also be used in anaerobic digesters where it is typically used in a gas engine to convert the energy in the gas into electricity and heat. Biogas can be compressed, much like natural gas, and used to power motor vehicles.

Solar power: Solar power is the conversion of sunlight into electricity, either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam and Photovoltaics convert light into electric current using the photoelectric effect. There will be provision of 20% lighting in the landscape and common areas are powered by solar lighting. Solar water heaters will be used to provide 20% hot water supply.20% street lighting will be powered by solar lighting.

Recycling: Recycling waste not only save our natural resources but also help to save energy. By simply recycling an item or making a basic fix to it, all the energy can be saved that would have been consumed in the process of making it. To recycle waste is to simply reduce pollution. Recycling waste in a way helps reduce pollution. Many products such as paper, cardboards, and cups come from trees and trees are our natural assets, recycling the paper products can minimize the number of trees cut down a year. This is one form of waste recycling.

One simple benefit of recycling is it saves our resources. It will be wise to reuse metal item as metal reserves may be depleting. Recycling of waste papers can save our forests. Inert waste will be either used for making bricks/tiles.

CHAPTER 8

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1 Introduction

Identification and prediction of impacts further needs to suggest the mitigative measures which would play a vital role in prevention of environmental degradation during construction and operational phase of the proposed project. This leads to preparation of Environmental Management Plan (EMP). Environmental Management Plan therefore forms an essential part of EIA process. The Environmental Management plan is a site specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all stakeholders including the project proponents, contractors, subcontractors and consultant understand the potential environmental risks arising from the proposed project and take appropriate actions to minimize those risks. The primary purpose of the EMP is to provide information to the Authority on a proposed/existing activity within the local and regional framework. The plan emphasizes how the proposed/existing activity may impact on the relevant environmental factors and how those impacts may be mitigated and managed to be environmentally acceptable.

The proposed project will create certain inevitable impacts, both during construction and operation phase, although within permissible limits as mentioned in Chapter 4 and can be reduced significantly with the help of effective implementation of a well designed EMP.

To ensure better environment in & around the project site, effective EMP is developed separately for construction and operational phase.

8.2 EMP during Construction Phase

Control of pollution during construction phase is of considerable importance. Waste generated from construction activities includes construction debris, waste from the labor tents, and hazardous waste. Besides waste generation, management of topsoil, traffic movement, operation of construction equipments and diesel generating sets, site security and aesthetical development of green area and roadside plantation are some areas for which management measures are required.

Strategy for environmental management in construction work should be based on three-pronged approach comprising of:

- Pollution prevention

- Pollution control
- Protection of pollution recipients

The following aspects of construction activity require control measures during the construction phase of the present scheme.

Topography and Physiography

During the development, construction and post construction phase of the proposed project, no significant impact is anticipated on local or regional topography and physiography, hence exhaustive management plan is not required. It is however proposed to carry out extensive turfing with local species apart from proposed plantations and greens.

Soil Excavation & Site Preparation

Development & Construction Phase

- It is estimated that approximately 901714.4 m^3 of earth material will be excavated during initial construction phase for foundations and basement.
- Top soil (fertile) will be stored separately and reutilize for landscaping, Green turfing, Play Ground and horticultural development.
- Maximum percentage (80-99%) of excavated earth material will be reutilized into backfilling, leveling, landscaping & road construction within premises and fill up low lying areas around the project site.

Vegetation and top soil management

- Remove vegetative cover only from the specific site on which construction will take place.
- Plantation as proposed shall be started at the earliest.
- Promote use of organic fertilizers.
- Construction of erosion prevention troughs, as deemed necessary.
- To prevent the erosion of excavated loose soil produced as a result of excavation, site preparation activities and excavation work would be undertaken during dry season after monsoon is over.

Other measures, which would be followed to prevent soil erosion and contamination include:

- Maximize use of topsoil for landscaping.
- Avoid excavation during monsoon season
- Care should be taken to avoid soil erosion.
- To prevent soil contamination by oil/grease, leak proof containers shall be used for storage and transportation of oil/grease and wash off from the oil/grease handling area shall be drained through impervious drains and treated appropriately before disposal.
- Removal of as little vegetation as possible during the development, and re-vegetation of

bare areas after the project.

- Working in a small area at a point of time (phase wise construction).

Construction Debris

Construction debris is bulky and heavy and re-utilization and recycling is an important strategy for management of such waste. As concrete and masonry constitute the majority of waste generated, recycling of this waste by conversion to aggregate can offer benefits of reduced landfill space and reduced extraction of raw material for new construction activity. This is particularly applicable to the proposed project site as the construction is to be completed in a phased manner. The management of major construction debris includes:

B Fuel and oil would be stored in cement lined storage yard and handled carefully to prevent soil contamination through leakage or spillage.

X All metal, paper, plastic wastes, debris and cuttings would be collected from site as soon as particular construction activity is over and will be resold to vendors for recycling or reused in construction.

Δ During construction of flexible pavement, bitumen wastes will be collected (if any) and disposed in environmentally sound manner. Mixed debris with high gypsum, plaster, shall not be used as fill, as they are highly susceptible to contamination, and will be given to recyclers.

E The number, frequency and area of movement of heavy machinery will also be restricted.

Φ Recycling of construction wastes into aggregates for use in the project site.

Γ Spent oil from DG Sets should be stored in HDPE drums in isolated covered facility and disposed off as per the Hazardous Wastes (Handling & Management) Rules, 2003.

H Wastes from the labour camps will be collected and disposed as per the existing practices in the site.

Hazardous Waste

Construction sites are sources of many toxic substances, such as paints, solvents, wood preservatives, pesticides, adhesives and sealants. Hazardous waste generated during construction phase shall be stored-in sealed containers, labeled, and disposed of as required by the Hazardous Wastes Management and Handling Act Amendment Rules (MoEF, 2003). Some management practices to be developed are:

- Maximize use of organic fertilizer for landscaping and greenbelt development
- Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses, or drainage systems.
- Preference of low VOC and water-based paints.

- Provide adequate hazardous waste storage facilities, hazardous waste collection containers are conveniently located, and designate hazardous waste storage areas away from storm drains or watercourses.
- Potentially hazardous waste shall be segregated from non-hazardous construction site debris.
- All hazardous waste shall be clearly labeled.

Waste from Labor Settlements and Biomass

Construction activity involves some workforce to stay at site. Local labour shall be employed to the maximum possible extent so that resident labor is not required or minimum. The latter will require basic infrastructure welfare facilities like housing, sanitation and other essential services. The proposed site shall be provided with suitable sanitation facilities like supply of potable water and sanitary latrines to allow proper standards of hygiene. Solid waste generated would mainly comprise of household domestic waste, which shall be collected and disposed off at the nearest municipal waste collection site.

Handling of Construction Equipment

Vehicles deployed for construction work, transportation of debris and other machinery at site shall be properly handled to minimize emissions of particulates and gaseous pollutants. The vehicle's maintenance shall be monitored regularly so as to avoid noise pollution and accidental spillage of oils and greasy matters. Loading and unloading operations and movement of trucks shall be properly regulated to minimize the impact of noise on the persons engaged in civil, mechanical and erection works.

Management of Environmental Parameters

A. Water Environment

The vehicle maintenance area shall be located in such a manner so as to prevent contamination of ground water by accidental spillage of oil. Unauthorized dumping of waste oil shall be prohibited. Fire hydrant and fire extinguishers shall be provided at places vulnerable to fire and explosion. Sites of deposition of building material wastes shall be cordoned. The open drains carrying waste water shall be covered with concrete slabs to prevent the dust fall due to wind erosion and shall be collected in cemented trenches for reutilization to a greater extent

B. Air Environment

Erosion of soil due to winds cause dust nuisance in the area. The dust nuisance created by the excavations, leveling and transportation activities shall be properly controlled by sprinkling of water, providing dust arresting panels, regular removing of construction waste material, proper storage of building material and keeping strict vigilance on trucks not to create any air

pollution. Pollution Under Check certificate (PUC) shall be collected at the entry gate of complex.

C. Land Environment

The newly formed land shall be brought to normal formation merging with the surrounding environment. Proper slope and stabilization of the ground shall be maintained to drain the surface run-off during monsoon. Necessary action shall be taken on draining system to arrest erosion of soil during severe monsoon and dry summer. Also, tree plantation work along the internal roads and boundaries of the site shall be carried out side-by-side the construction work. Plantation will improve the quality of soil and enhance the aesthetics.

D. Noise Environment

Noise resulting from operation of construction machinery may constitute and additional environmental stress. Arrangement shall be made to provide noise pollution status of the proposed site during construction phase. In case a source is found making significantly higher noise, immediate action shall be taken to bring down its noise to a tolerable limit. Workers employed in high noise areas will be rotated. Earplugs/muffs, or other hearing protective wear will be provided to those working very close to the noise generating machinery. Proper maintenance of construction equipments shall be done at regular interval.

Site Security

A construction site is a potentially hazardous environment. To ensure that the local inhabitants are not exposed to these hazards, the site shall be secured by fencing and manned entry points.

8.3 Post Construction Environmental Management Plan

(a) Air Quality Management

To mitigate the impact of pollutants from diesel generator sets and vehicular traffic during the operational phase of the site the following measures are recommended for implementation:

- D.G set air pollution control measures
  - Proper maintenance and tuning of engines
  - Catalytic converters and exhaust filters (if available)
  - Correct fuel specification
- Vehicle emission controls and alternatives
- Greenbelt development.

As regards D.G. Sets emission are concerned, the most important pollutant requiring further control is NO_X as impact of SO_2 emission is minimal because of the use of very less (~0.025%) sulphur in diesel as fuel.

(b) Traffic Management

For vehicles, adequate space for smooth movement and parking shall be provided at the proposed site to avoid any congestion and idling state emissions.

- Proposed project shall have parking as per norms in the basement and open, as the case may be.
- The project complex will have one traffic entry/exit from 45 m wide roads on NW. Bell shape Entry/Exit and all the internals roads are proposed minimum 9m wide (ROW).
- Bell shape Entry/Exit and all the internals roads are proposed minimum 9m wide (ROW).
- Internal Drive Way 09-12 m. wide for one way traffic circulation.
- Separate entries and exits for smooth movement of traffic through adequate traffic signage.
- Carpooling shall be encouraged to minimize the use of private cars and pick up and drop system from running metro.
- Plantation shall be provided at roadsides and open spaces with the specific species to attenuate dust and cyclonic winds.
- The ambient air quality shall be monitored regularly to ensure that the activities at the site are not polluting the ambient environment.
- Dust suppression using water-based surfactants is more effective than suppression using water alone. The surfactant causes agglomeration of fine particles, making it more difficult for the resultant larger particles to become windborne when the water evaporates.
- Washing vehicles' wheels before they leave the premises can also help to control dust.

(c) Noise Management

No noisy sources except DG sets and traffic movement are envisaged at the proposed site. Following activities shall be taken to control the noise pollution:

- D.G. sets shall be acoustically treated to attenuate the noise.
- Noise barriers in the form of tree envelope and greenbelt to attenuate noise pollution shall be planted around the site, both sides of the roads and open places.
- Good metalled and wide roads shall be provided at the site and shall be well maintained for smooth flow of traffic.
- Monitoring of noise levels shall be carried out regularly to ensure that noise level does not exceed permissible standards.

Greenbelt Development: The following species can be used in a greenbelt to serve as noise breakers:

- *Tectona grandis* (Teak), *Butea monosperma* (Palash)
- *Leucana leucocephala* (Subabual), *Mangifera indica* (Aam) and
- *Dalbergia Sissoo* (Shisham), *Saraca Indica* (Asoka)

(d) Management of Water Environment

To reduce the total water requirement, reduce the dependability on municipal and ground water sources, to follow the guidelines of EIA and to protect the environment, it is proposed to adopt recycling of some of the treated effluent from Sewage Treatment Plant for the purpose of irrigation, street washing, flushing and any other low end uses.

An estimated 2435.3 KLD treated effluent received from the STP will be recycled and reused within the scheme for the purpose of recycling the water for HVAC, DG set cooling, flushing & horticulture use of the project.

The wastage of water shall be minimized by a combination of water saving devices and other domestic water conservation measures. Some of the measures are given below:

- An estimated 2435.3 KLD treated effluent received from the STP will be recycled and reused within the scheme for the purpose of recycling the water for, DG set cooling, flushing & horticulture use of the project.
- Use of water efficient plumbing fixtures (ultra flow toilets & urinals, low flow sinks, water efficient dish washers and washing machines).
- Leak detection and repair techniques.
- Re-circulation of swimming pool over spill after treatment.
- Awareness Campaign for reduced water use by residents.
- Metered water consumption & Piezometer Installation
- Use drip irrigation for shrubs and trees to apply water directly to the roots where it's needed.
- Grouping of plants with similar water requirement.
- Use of low volume and low angle sprinklers for greens.
- Provide controllers with adjustable watering schedules.
- Overhead irrigation.

Rain Water Harvesting

The rainwater shall be diverted from the rooftop using rain water pipes to the surface/underground drainage network. The entire area shall be sub divided for recharging structures.

The rainwater collected from the rooftop, green & paved areas will be conveyed into the rainwater harvesting system consisting of Desilting-cum-filter chamber and borewells for recharge into the groundwater. Rain water from paved and green areas will percolate naturally through capillary action and augment the water table. RWH will be initially done only from the roof top. However the rain water pits have been proposed for the whole area. Runoff from green and other open areas will be done only after permission from CGWB.

30 number of pits in different areas shall be made at the project site.

(e) Solid and Hazardous Wastes Management

The philosophy of solid waste management will be to encourage the four R's of waste i.e. waste reduction, reuse, recycling, and recovery (materials & energy). This will result in lesser reliance on land filling. Regular public awareness meetings will be conducted to involve the residents in the proper solid waste management plan, options and techniques. Total anticipated solid waste is given in Chapter-2:

The management of municipal solid waste shall comprise of following main activities:

Collection and Segregation of waste

- A Door to Door and floor to floor system through service lift or garbage chute shall be provided for collection of solid waste generated.
- Adequate number of colored bins (green and Blue - separate for Bio-degradable and Non Bio-degradable) are proposed to be provided
- Provision of temporary storage of solid waste shall be done for 48 hours at site.

Recyclable waste will be sold to authorized agencies.

Hazardous waste (Spent Oil) & e-waste will be stored at separate place. Used oil will be sold off to authorized recyclers while there will be buy-back arrangements with the supplier for DG Set batteries.

Litter bin will also be provided in open areas like commercial spaces, parks & play grounds etc.

Transportation, Treatment & Disposal

Generated Solid waste shall be segregated & collected on common solid waste collection center at site, from where it will be transported to the nearest landfill site by the hired waste management/DDA for their treatment and disposal.

Narela has incorporated the MSW management as an integral part of development of the township. DDA has already identified a site at village Astoli for MSW treatment and disposal. Following steps have been proposed to DDA for collection, treatment and disposal of MSW:

- Step 1: Segregation of MSW at source and collection from the households
- Step 2: Transportation of MSW at facility
- Step 3: Segregation of MSW at facility for processing
- Step 4: Shredding of the compostable waste to desired particle size
- Step 5: Treatment of biodegradable waste through composting/Biogas generation.
- Step 6: Disposal of non biodegradable waste into sanitary landfill facility.

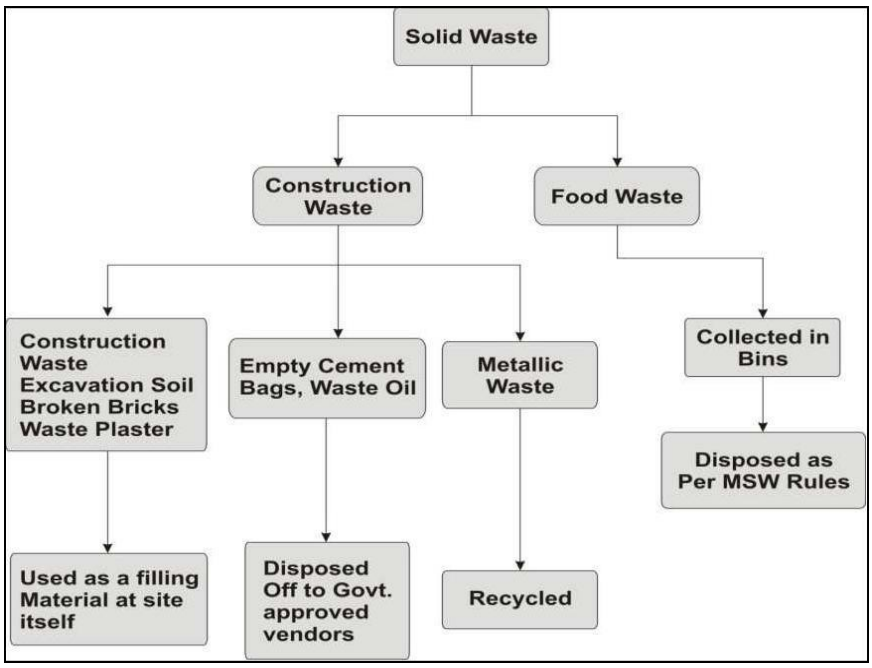


Figure 8.1: Waste Management Flow Diagram (Construction Phase)

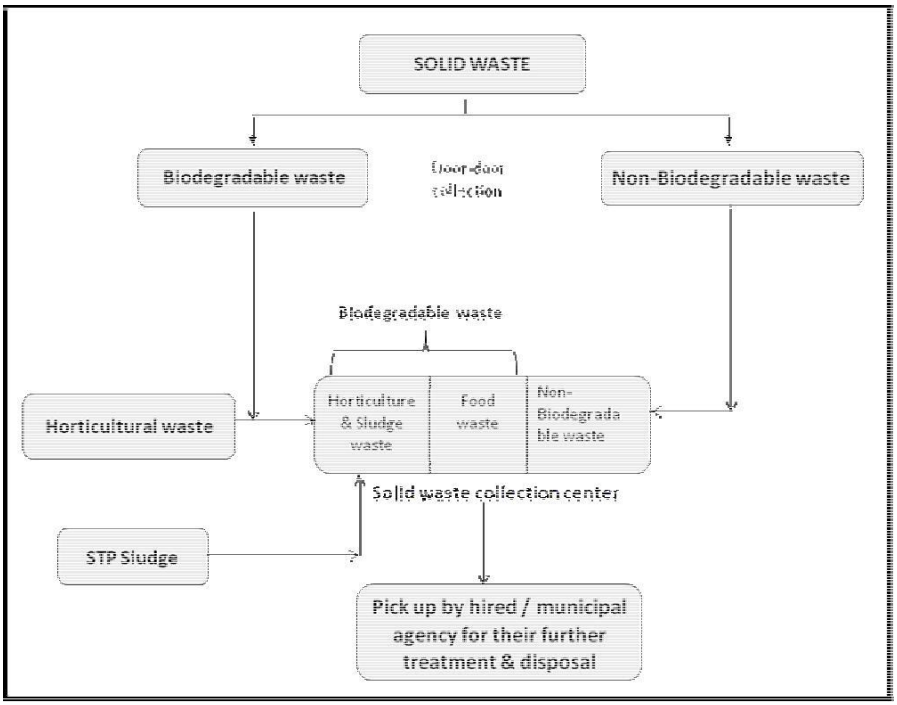


Figure 8.2: Waste Management Flow Diagram (Operational Phase)

E-Waste:

E-waste shall constitute of wastes appliances, monitors, computer and and several other items. such as: Tube lights, LED's, bulbs, electric its components, printers, cartridges, televisions

- **Collection and storage**

  Various types of electrical and electronic wastes will be collected separately for transportation to the authorized recyclers approved by the State/ CPCB.

  There would also be provision for storage of these wastes in the building before transportation.

Separate bin for e-waste will be provided at the common waste disposal point.

- **Reduce-Reuse-Recycle**

  Reduce – less generation of e-waste by maintaining of the equipment – life span increased.

  Reuse – if functional, donate or sell it to the user

  Recycle – Components that can't be repaired

- **Management of LEDs, bulb and tube light**

  LEDs garbage or any other mercury-containing products would never be thrown in the general.

  For safe disposal, e-waste shall be collected separately and handover to authorized vendors by CPCB.

(e) EMP for Energy Conservation

Power requirement	61750 KW
Source of power and supply	TPDDL
Backup power supply arrangement	Total: 6032.5 KVA
Location of Gensets	Dispersed

- DG set chamber shall be acoustically treated
- All D.G. sets shall be provided chimney of adequate height above the highest building height as per norms of CPCB for controlling air emissions:
- Moreover, D.G sets are only for stand by purpose and shall be operated only for short duration during power failure.

Energy Conservation in Building

Energy conservation program will be implemented through measures taken both on energy demand and supply sides. Energy conservation will be one of the focuses
during the project planning and operation stages. The conservation efforts would consist of the following.

- Provisions of 50% lighting in the landscape and common areas are powered by solar lighting
- Applicability of usage of wind energy is not feasible as wind harnessing industries are not working in the nearby region
- 20% hot water supply will be managed through solar heating.
- Energy conservation will be the prime idea and proponents will take care for the same as listed below:

Architectural Design

- Public areas will be cooled by natural ventilation as opposed to air conditioning.
- Maximization of use of natural lighting through building design.
- Passive solar cooling, utilizing building shading through overhangs.
- Installing window tinting to reduce sun exposure.
- To minimize environmental impacts of operations as by strict adherence to the EMP.
- To initiate environmental monitoring as per approved schedule.
- Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.
- Maintain documentation of good environmental practices and applicable environmental laws as ready reference.
- Maintain environmental related records.
- Coordination with regulatory agencies, external consultants, monitoring laboratories.
- Maintain of log of public complaints and the action taken.

Energy Saving Practices

- Promoting use of Solar Water Heating.
- Use of energy efficient appliances.
- Constant monitoring of energy consumption and defining targets for energy conservation.
- Adjusting the settings and illumination levels to ensure minimum energy used for desired comfort levels.
- Use of LEDs and low voltage lighting.
- Sunscreen films on windows to reduce heating inside buildings.
- Promoting residents awareness on energy consumption.
- Training staff on methods of energy conservation and to be vigilant to such opportunities.

Energy Conservation Measures & Management Plan:

In the Operational Phase, appropriate energy conservation measures & management plan will be adopted in order to minimize the consumptions of non-renewable fuel. The following practices will be adopted.

- **Common area, Indoor area & outdoor need to be LED.**
- **Minimize energy consumption by building design i.e. orientation, appropriate fenestration, day light design, thermal mass.**
- **Wall & window u-value as per ECBC.**
- **20 % of hot water Should be through solar Heater.**
- **1% of total energy demand shall be of renewable (Solar).**
- **20% of total construction material i.e. fly ash ,bricks, compressed earth blocks**

etc.

- **Fly ash use as per notification September 1999.**
- **DG set shall be 3 star rating.**
- **All motors shall be IE-2 Type.**
- **All Transformers losses will be maintained as per ECBC Guidelines.**

(f) Management of Street and Landscape Lighting

Basis requirement of road lighting

a) Adequate level of illuminations for heavy vehicles/light vehicles/cyclist.

b) Uniform illumination level over the carriage way with minimum glare.

c) Minimum disturbance during fog conditions/dust conditions.

d) Use of high efficiency lighting fixtures with high lumen output and low power consumption.

e) The proposal of street and landscape lighting shall be based on the design parameters and the same shall be provided in the scheme.

(h) Green Belt & Landscape Management Plan

The green Landscape area is 65065 m^2 (43.62 %). Green parks in the form of community green will also be developed for residents to relax and spend time. Jogging tracks are also proposed separately so that green parks and areas are not disturbed.

Avenue Plantation

To combine aesthetic beauty and pollution abatement needs, two parallel rows of trees (inner and outer row) would be planted on the either side of the roads.

The following trees proposed to be planted in the proposed project.

- Trees with colonial canopy with attractive flowering.
- Trees with branching at 10 feet and above.
- Trees with medium spreading branches to avoid obstruction to the traffic, fruit trees to be avoided because children may obstruct traffic and general movement of public.
- The tree species for the purpose, as given below, should be planted 1.5 m apart

Selection of Plant species for Green belt development

The selection of plant species for the development depends on various factors such as climate,

elevation and soil. The list of plant species, which can be suitably planted, and having significant importance are provided in Table 9.3 The plants should exhibit the following desirable characteristic in order to be selected for plantation.

1. The species should be fast growing and providing optimum penetrability.
2. The species should be wind-firm and deep rooted.
3. The species should form a dense canopy.
4. As far as possible, the species should be indigenous and locally available
5. Species tolerance to air pollutants like SPM, SO_2 and NO_x should be preferred.
6. The species should be permeable to help create air turbulence and mixing within the belt.
7. There should be no large gaps for the air to spill through.
8. Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
9. Ability to withstand conditions like inundation and drought.
10. Soil improving plants (Nitrogen fixing, rapidly decomposable leaf litter).
11. Attractive appearance with good flowering and fruit bearing.
12. Bird and insect attracting tree species.
13. Sustainable green cover with minimal maintenance
14. Act as noise barrier

8.4 Environment Management System and Monitoring Plan

Environment Management System

For the effective and consistent functioning of the proposed housing complex an Environmental Management System (EMS) shall be established at the site. The EMS shall include the following:

- An Environmental Management Cell (EMC)
- Environmental Monitoring – Personnel Training
- Regular Environmental Audits and Corrective Action
- Documentation
- Standard Operating Procedures, Environmental Plans and other records.

Environmental Management Cell (EMC)

In addition to preparing an EMP, it is also necessary to have a permanent organizational set up to ensure its effective implementation. Hence, a team will create consisting of persons from various departments to co-ordinate the activities concerned with management and implementation of the environmental control measures. This team will undertake the following activities:

- Operation, maintenance and monitoring of the sewage system.
- Arrange periodical monitoring of air pollution, noise pollution.

- Maintenance of roads, gardens, roadside plantations and aesthetic development along roadsides and parks.
- Proper collection and disposal of solid wastes.
- Proper utilization of the recycled water.
- Proper functioning of water harvesting system.
- Proper maintenance of D.G. Sets.
- Checking of Fire fighting arrangements and first-aid boxes.
- Checking of security arrangements.
- Maintenance of records of power consumption for lifts, pump house, street lighting and for other common services.
- Keep records of expenditure on maintenance of lifts, parks, sub-station equipments including replacement of bulbs and tubes for street lighting and common area.
- Take immediate action in case of emergency arising due to accident, fire, gas leakage or any natural disaster.
- Updating of Emergency Action Plan.
- Disaster Management Plan
- Corporate Social Responsibility Scheme

Awareness and Training: Training and human resource development is an important link to achieve sustainable operation of the facility and environmental management. For successful functioning of the project, relevant EMP shall be communicated to the following groups of people.

Residents and Contractors: Residents & contractor shall be made aware of the importance of waste segregation and disposal, water and energy conservation. This awareness can be provided through leaflets and periodic housing society meetings. They shall be informed of their responsibilities for Successful operation of various environmental management schemes inside the premises.

Site Staff

Relevant personnel at site shall be trained for the following.

- Collection, transport treatment and disposal of solid and hazardous waste.
- Requirements of the Disaster Management Plan in case of an emergency.
- Techniques for waste minimization, water conservation and energy conservation.
- Applicable environmental health and safety regulation and compliance requirements for the same.
- Environmental Management System including environmental monitoring, reporting and documentation needs.

Record Keeping and Reporting

Record Keeping and reporting of performance is an important management tool for ensuring sustainable operation of the present scheme. Records shall be maintained for regulatory,

monitoring and operational issues.

Environmental Audits and Corrective Action Plans

To assess whether the implemented EMP is adequate, periodic environmental audits will be conducted by the Environmental Division of M/s SJP Limited. These audits will be followed by corrective action plans (CAP) to correct various issues identified during the audits.

Table 9.5 Proposed Matrix of Environmental Mitigation Measures

Water Quality	• Mobile Toilets with portable STP and drinking water facilities for construction workers will be provided by the contractor at the construction site to avoid unhygienic condition at site.
Air Quality	• Dust suppression measures will be undertaken such as regular sprinkling of water around vulnerable areas of the construction site by suitable methods to control fugitive dust during earthwork and construction material handling / over hauling. • Properly tuned construction machinery and vehicles in good working condition with low noise and emission will be used and engines will be turned off when not in use.
Noise level	• Protective gears of such as ear mufflers etc. will be provided to construction personnel exposed to high noise levels. • All the construction machineries/equipments shall be maintained regularly to avoid noise generation. • Construction activity will be limited to day-time hours only.
	• Back up DG sets will be used only during power failure. • Regular monitoring of emissions from DG sets and ambient air quality will be carried out as per norms. • Ventilation for the basement to evacuate the stale air. • Dense plantation along with boundary to attenuate air pollutants.
Noise level	• DG sets will be installed in the basement to minimize the vibration and impact on ambient noise. • DG room will be treated acoustically as per norms to control the noise from DG sets. • Pumps, Compressors, DG sets etc. will be properly maintained for fuel efficiency and noise control. • Personal protective equipment will be provided to the maintenance staff working in high noise areas.
Solid wastes	• Solid wastes will be segregated into organic and inorganic components. • The recyclable inorganic wastes will be sold to prospective buyers.

	• The bio-degradable wastes will be transferred into a designated collection point for disposal by municipal authority.
Hazardous wastes	• Used / spent oil from DG sets will be sold to registered recyclers.
Rainwater harvesting	• Adequate rainwater harvesting will be provided by means of recharge into the groundwater.
Fire protection	• Adequate fire protection facilities will be installed including fire detectors, fire alarm and fire fighting system as per National Building Code of India.
Landscape	• Suitable green belt will be developed as per landscaping plan in and around the site using local flora, which will enhance the ecology. • Proper maintenance of landscape round the year including replacement of the decayed plants.
Safety	• Adequate safety measures complying with the occupational safety manuals to prevent accidents / hazards to the maintenance workers.
Others	• The building will be provided energy efficient lighting & ventilation and control of indoor environment. • Undertaking all necessary pollution control measures to maintain the emissions to maintain and discharges within the prescribed / stipulated limits. • Recreation facilities for the employees
Solid wastes	• Waste construction materials will be reuse in backfilling and road leveling and excess construction debris will be disposed at designated places in tune with the local norms.
Landscape	• Appropriate landscape including plantation of evergreen and ornamental flowering trees, palms, shrubs and ground covers at open spaces within the scheme will be done, which would serve the dual purpose of controlling fugitive dust and improving the aesthetics of the area.
Safety	• Adequate safety measures complying with the occupational safety manuals will be adopted to prevent accidents / hazards to the construction workers.
Welfare/Misc.	• Recreation & First Aid facilities for the workers • Crèche for the children of workers • Provision of clean fuel for workers • Sanitary facilities for workers
	• **Operation Stage**
Water quality	• The required Sewage shall be treated in the STP of adequate capacity inside the proposed project. • Treated Sewage effluent from STP shall be recycled & reused for horticulture, flushing purposes as per requirement.

Air quality	• Back up DG sets will comply with the applicable emissions norms. • Adequate stack height for DG sets will be provided as per norms.

CHAPTER – 9

SUMMARY AND CONCLUSION

DDA proposed project site earmarked for development of Prefab 3BHK,2 BHK & EWS Housing is located at Pocket 11, Sector A1A4, Narela, New Delhi. Hence no land use change is anticipated as per MPD

The project falls under activity 8 (b), Category B. Since the built-up area of the present project is **703385.167** m^2 thus detailed EIA has been called for.

The site is almost eve in topography and possesses in the area of 149173 SQM. The Housing Complex will be constructed as per the defined building by-laws of the Delhi Development Authority The proposed Housing Complex will have total built-up area of **703385.167** SQM and the area statement for the proposed EWS & CAT-II Housing Complex

Proposed scheme has:

The Site area i.e., 149173 SQM with dwelling units 3792 (1024 EWS,2768 CAT II), along with School, Club, Commercial area, Community facility and Nursing Home. The total water requirement for the project is envisaged as3887.5 KLD. (2952 KLD fresh & 886.6 KLD recycled water). The waste water generated is 3044.1 KLD which will be treated in STP and after tertiary treatment will be used for flushing, horticulture. The power requirement for the proposed project is envisaged to be 61750 KW. Total (6032.5) KVA at three different substation of Total capacity DG sets are proposed for Power back-up for the project. Also use of solar lights & other energy efficient features will be adopted for energy saving. The project will provide space for **233** ECS for EWS parking & 5964 ECS for CAT-II

Existing Environment Scenario:

Ambient Temperature

The maximum temperature during the period is found to be 32.20^{o}C. The minimum temperature for the same period is 7.30 ^{o} C and average temperature is 18.26^{o} C

Relative Humidity

During the study period, it was observed that the average maximum relative Humidity was 69.68% .The minimum value of humidity was found to be 25.40% and the maximum was 100% .

Wind Speed

Analysis of hourly wind speed shows that the winds were generally higher in this area. During the Study period wind speed varies from 0.1 km/h to 10.70 km/h. The wind rose

diagram reveals that wind was blowing predominantly from the Northwest with frequency of approximately 24.91 % .

Ambient air quality

The baseline data collected from MIN MEC R&D Lab from 1st November , 2016 to 30 January2017 .The detailed interpretation is given below:

SO2 :-The Maximum Concentration of SO2 in Tikri Khurd is 32.3 µg/m3 and minimum concentration is 19.7 µg/m3 and average concentration is 26.5µg/m3 whereas the Maximum Concentration of SO2 in Singhola village is 40.2 µg/m3 and minimum concentration is 24.9 µg/m3 and average concentration is 34.2µg/m3 and in Kurnai Village the Maximum Concentration of SO2 is 28.8 µg/m3 and minimum concentration is 13.3 µg/m3 and average concentration is20.1 µg/m3

PM10 : The Maximum concentration of PM10 in Tikri Khurd is 278.7µg/m3 and minimum concentration is 150.3µg/m3 with average concentration is193.7 µg/m3 whereas the Maximum concentration of PM10 in singhola village is 305µg/m3 and minimum concentration is 171 µg/m3 with average concentration is 236.5µg/m3 and in Kurnai village the Maximum concentration of PM10 is 294.2 µg/m3 and minimum concentration is 107.6µg/m3 with average concentration is 224.4µg/m3

PM2.5 : The Maximum concentration for PM2.5 in Tikri Khurd is 157µg/m3 and minimum concentration is 87.1µg/m3 with average concentration is 110.9µg/m3 whereas the Maximum concentration for PM2.5 in Singola Village is 178.8µg/m3 and minimum concentration is 99.8µg/m3 with average concentration is 135µg/m3 and in Kurnai village the Maximum concentration for PM2.5 is 173.2µg/m3 and minimum concentration is 61.8µg/m3 with average concentration is 127.8µg/m3

Land Use

The landuse has been defined in MPD as land for the housing in Narela Zoning Plan

Landuse	**Area (Ha)**	**%age**
Residential	3,165	42.9
Commercial	566	7.7
Public & Semi-Public	875	11.9
Manufacturing	308	4.1
Utility	327	4.5
Government	16	0.2
Recreational	1,029	14.0
Transportation	1,079	14.7
Total	**7,365**	**100.0**

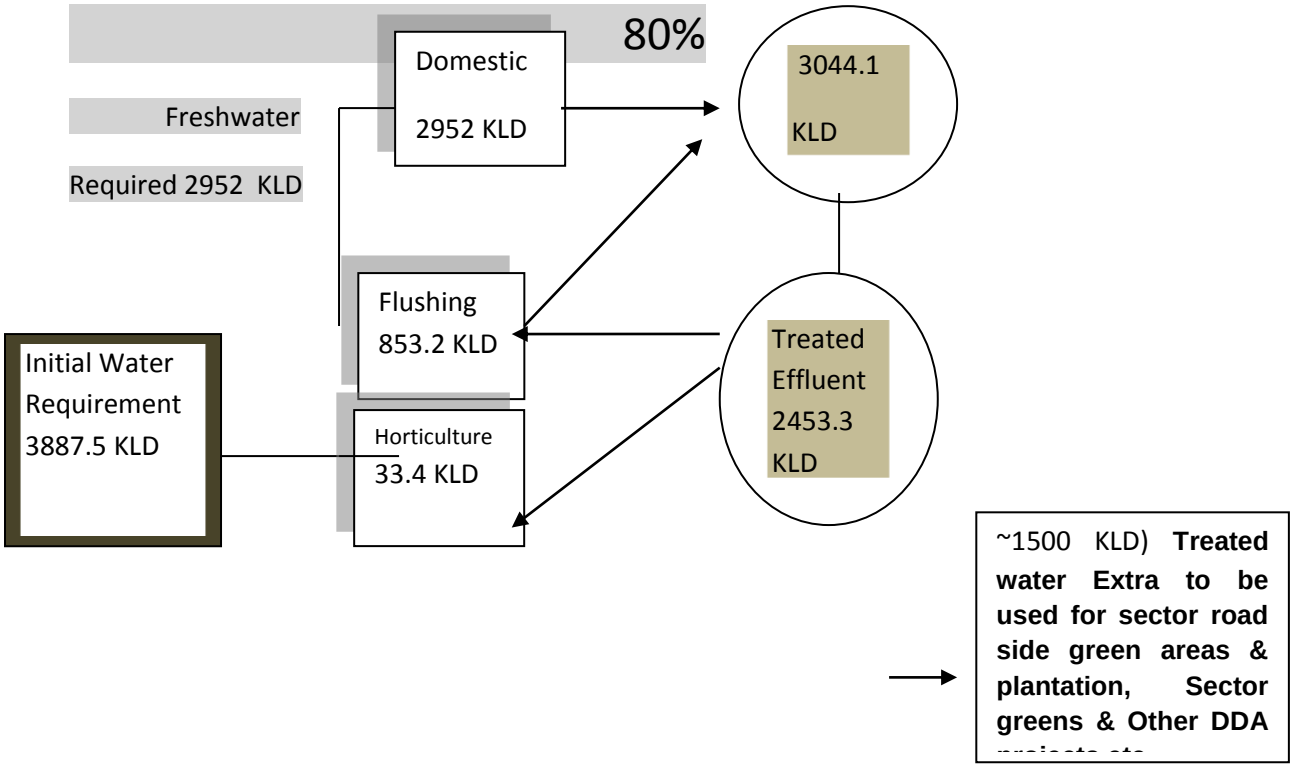
Drainage

District of Narela has planned drainage by MCD

Rainwater harvesting sumps shall be provided at ground level as per standard design specified by Central Ground Water Board. The storm water disposal system for the premises shall be self-sufficient to avoid any collection/ stagnation and flooding of water. 30 RWH pits have been provided as required.

The solid waste generated from the project after full occupancy will be approx 11376 Kg/ day which will be managed properly as per Municipal Solid Waste (Management and Handling) Rules, 2000. Waste collection and disposal systems will be scientifically implemented. There will be no generation of Hazardous Waste except of the spent oil generated from DG sets.

The waste water generated is 3044.1 KLD which will be treated in STP of 3100 KLD to be installed by DDA . Recycled water received from STP after tertiary treatment shall be used for flushing, horticulture and DG set cooling.



Based on the environmental assessment, the associated potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the measures as stated in the EIA and the EMP with following provisions.

a Use of solar energy for street lighting, water heating and signages.
b Provision of green walls and green terraces
c Use of Flyash bricks.
d Use of Plastic and plastics bags in road constructions.
e Provide permeable paving to control surface water runoff
f Rainwater harvesting
g Provision of energy efficient fixtures and construction materials
h Meet all requirements for buildings in moderate earthquake prone areas.
i Provision of fire alarms and water sprinklers
j Provision of welfare schemes to workers
k Extending educational and healthcare facilities to the local people
l Provision of Medical Facilities
m Commitment to engaging local people and businessmen for maintenance and repair work

Based on the proposed project study, no adverse impacts envisaged on Ambient Air, Ground Water, and Land & Soil. Marginally noise level will increase but it can't exceed above desirable limits due to mitigation & management plan and tree plantation on periphery of boundary. Due to proposed rain water harvesting system, quality & quantity of ground water will improve. There will be socio-economic benefits in terms of literacy and generation of direct/ in direct employment.

Thus it can be concluded on a positive note that after the implementation of the mitigation measures and Environmental Management Plan, there shall be negligible impact on environment and beneficial to the nearby areas.

Proposed Matrix of Environmental Mitigation Measures

Water Quality	• Mobile Toilets with portable STP and drinking water facilities for construction workers will be provided by the contractor at the construction site to avoid unhygienic condition at site.
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Others	• The building will be provided energy efficient lighting & ventilation and control of indoor environment. • Undertaking all necessary pollution control measures to maintain the emissions to maintain and

	discharges within the prescribed / stipulated limits. • Recreation facilities for the employees
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Annexures

Ambient Noise Standards

Ministry of Environment & Forests (MoEF) has notified the noise standards vide gazette notification dated February 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in **Table.**

Table Ambient Quality Standards in respect of Noise

Area Code	Category of Area	Noise dB (A) L_{eq}	
		Daytime*	Night time*
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note: Daytime is from 6.00am to 10.00 pm and Nighttime is from 10.00 pm to 6.00 am.

Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle hours, loud speakers and bursting of crackers are banned in these zones

Ref.: MOEF Notification *vide S.O. 123(E), dated 14.2.2000* and amendments made after.

The noise monitoring was conducted at 6 locations within the study area. Normally, for selection of noise monitoring stations, sensitivity of sites is also considered. As per the CPCB standards, sensitive locations are covered under Silence Zone, which includes an area up to 100 m around premises as hospitals, educational institutions and courts.

The "A weighted" sound level was continuously measu red using Noise meter at 60 minutes interval for one day in each survey locations as per the CPCB procedures. The parameters monitored are given as below:

Leq value 15 hourly (6 am - 9pm) at 60 minutes interval
Leq value 9 hourly (9 p.m. – 6 am) at 60 minutes in terval

DRINKING WATER SPECIFICATION: IS: 10500, 1992
(Reaffirmed 1993)

TOLERANCE LIMITS

S.No	Parameter	IS: 10500 Requirement (Desirable limit)	Undesirable effect outside the desirable limit	IS: 10500 Permissible limit in the absence of alternate source
		Essential Characteristics		
1.	pH	6.5 – 8.5	Beyond this range the water will effect the mucous membrane and / or water supply system	No relaxation
2.	Colour (Hazen Units), Maximum	5	Above 5, consumer acceptance decreases	25
3.	Odour	Unobjectionable	–	–
4.	Taste	Agreeable	–	–
5.	Turbidity, NTU, Max	5	Above 5, consumer acceptance decreases	10
Following Results are expressed in mg/1 :				
6.	Total hardness as $CaCO_3$, Max	300	Encrustation in water supply structure and adverse effects on domestic use	600
7.	Iron as Fe, Max	0.30	Beyond this limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria.	1.0
8.	Chlorides as Cl, Max	250	Beyond this limit tast, corrosion and palatability are effected	1000
9.	Residual, Free Chlorine, Min	0.20	–	–
		Desirable Characteristics		
10.	Dissolved solids, Max	500	Beyond this palatability decreases and may cause gastro intentional irritation	2000
11.	Calcium as Ca, Max	75	Encrustation in water supply structure and adverse effects on domestic use	200

12.	Magnesium as Mg, Max	30	–	100
13.	Copper as Cu, Max	0.05	Astringent taste, discoloration and corrosion of pipes, fitting and utensils will be caused beyond this	1.5
14.	Manganese as Mn, Max	0.1	Beyond this limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures	0.3
15.	Sulphate as SO_4 Max	200	Beyond this causes gastro intentional irritation when magnesium or sodium are present	400
16.	Nitrates as NO_3	45	Beyond this methanemoglobinemia takes place	100
17.	Fluoride, Max	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1.5
18.	Phenolic compounds as C_6H_5OH, Max	0.001	Beyond this, it may cause objectionable taste and odour	0.002
19.	Mercury as Hg, Max	0.001	Beyond this, the water becomes toxic	No relaxation
20.	Cadmium as Cd, Max	0.01	Beyond this, the water becomes toxic	No relaxation
21.	Selenium as Se, Max	0.01	Beyond this, the water becomes toxic	No relaxation
22.	Arsenic as As, Max	0.05	Beyond this, the water becomes toxic	No relaxation
23.	Cyanide as CN, Max	0.05	Beyond this, the water becomes toxic	No relaxation
24.	Lead as Pb, Max	0.05	Beyond this, the water becomes toxic	No relaxation
25.	Zinc as Zn, Max	5	Beyond this limit it can cause astringent taste and an opalescence in water	15
26.	Anionic detergents as MBAS, Max	0.2	Beyond this limit it can cause a light froth in water	1.0
27.	Chromium as Cr^{6+}, Max	0.05	May be carcinogenic above this limit	No relaxation
28.	Ploynuclear aromatic hydrocarbons as PAH, Max	–	May be carcinogenic	–

29.	Mineral Oil, Max	0.01	Beyond this limit undesirable taste and odour after chlorination take place	0.03
30.	Pesticides, Max	Absent	Toxic	0.001
31.	Radioactive materials a) α emitters Bq/1, Max b) β emitters Pci/1, Max	– –	– –	0.1 1
32.	Alkalinity, Max	200	Beyond this limit taste becomes unpleasant	600
33.	Aluminum as Al, Max	0.03	Cumulative effect is reported to cause dementia	0.2
34.	Boron, Max	1	–	5

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION

New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-L—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), µg/m³	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), µg/m³	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} µg/m³	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ µg/m³	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) µg/m³	8 hours**	100	100	- UV photometric - Chemilminescence
		1 hour**	180	180	- Chemical Method
6	Lead (Pb) µg/m³	Annual*	0.50	0.50	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m³	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) µg/m³	Annual*	100	100	-Chemiluminescence -Indophenol blue method
		24 hours**	400	400	

Environmental Data

An ISO 9001:2008 Certified Company

Min Mec R&D Laboratory

(A DIVISION OF MIN MEC CONSULTANCY PVT. LTD.)

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Phone :29534777, 29532236, 29535891; Fax : 91-11-29532568
Email : lab.minmec@gmail.com ; Visit us at :http://www.minmec.co.in

Recognised by MOEF&CC (Sl.No.97 of S.O.1150(E) dated 22/05/2012)

NAME AND ADDRESS OF CUSTOMER	SAMPLE PARTICULARS		
Shri Environmental Institute of Technology 203,M M Plaza, Mini Market, Janak Puri East, New Delhi	Type of Sample	:	Air
	Work Order No.	:	MMRDL/Monitoring dated 24.10.2016
	Sampling Location	:	Near D.D.A Vikash Nagar, Delhi
	Sampling Procedure	:	IS 5182 (Part 2) 2001 for SO_2, CPCB guidelines NAAQMS 25/2003-04 for RPM (PM_{10}), NO_2 and Lab SOP/09 for $PM_{2.5}$
Contact Person : Dr. A.K. Gupta Phone : 9810166815	Sample Duration	:	24 hours
	Sampling Team	:	MMRDL (Nitesh Dalal)
	Sample Reg. No	:	MMA/1617W417/L1, L2, L3, /01-24
	Date of Sampling	:	02/11/2016 to 26/01/2017
	Date of Receipt	:	04/11/2016 to 27/01/2017
	Date of Report	:	02/02/2017
	Test Report No.	:	MMA/02-17/2
	Page	:	1 of 2

TEST REPORT

24 hourly concentrations (in µg/m^3)

Sl. No.	Date of sampling↓	PM_{10}	$PM_{2.5}$	SO_2	NO_2	Date of sampling↓	PM_{10}	$PM_{2.5}$	SO_2	NO_2
	LOCATION: →	Singhola				LOCATION: →	Kurnai			
1	2 - 3/11/2016	237.5	137.7	38.0	87.9	3 - 4/11/2016	107.6	61.8	14.1	40.1
2	5 - 6/11/2016	172.6	99.8	31.5	70.3	6 - 7/11/2016	263.9	155.9	24.1	49.6
3	9 - 10/11/2016	213.5	128.3	39.6	81.7	10 - 11/11/2016	162.5	99.3	25.6	52.1
4	12 - 13/11/2016	302.2	167.6	39.9	61.9	13 - 14/11/2016	237.6	129.0	13.3	43.8
5	16 - 17/11/2016	232.8	127.9	40.1	56.4	17 - 18/11/2016	276.2	155.1	15.4	33.5
6	19 - 20/11/2016	296.4	167.2	24.9	53.8	20 - 21/11/2016	180.0	103.8	16.4	50.5
7	23 - 24/11/2016	218.0	128.4	31.0	56.8	24 - 25/11/2016	223.1	136.9	25.0	60.6
8	26 - 27/11/2016	184.3	103.4	32.5	78.2	27 - 28/11/2016	233.5	133.7	13.3	42.9
9	1 - 2/12/2016	200.7	110.6	28.3	66.5	2 - 3/12/2016	215.0	118.1	26.2	54.5
10	4 - 5/12/2016	181.2	102.8	31.0	78.3	5 - 6/12/2016	235.8	138.0	19.7	35.3
11	8 - 9/12/2016	271.6	156.3	26.7	52.0	9 - 10/12/2016	275.7	158.4	21.3	55.9
12	11 - 12/12/2016	280.8	164.9	30.9	67.6	12 - 13/12/2016	176.6	101.7	24.5	64.3
13	15 - 16/12/2016	281.1	156.9	37.4	54.8	16 - 17/12/2016	219.4	122.9	13.5	45.5
14	18 - 19/12/2016	208.9	121.7	32.9	82.1	19 - 20/12/2016	230.6	124.9	17.0	57.5
15	22 - 23/12/2016	305.0	177.9	36.1	92.5	23 - 24/12/2016	291.2	170.8	18.8	48.5
16	25 - 26/12/2016	244.2	142.4	26.5	72.9	26 - 27/12/2016	277.1	149.9	24.3	49.5
17	1 - 2/1/2017	219.4	126.5	37.0	85.8	2 - 3/1/2017	290.5	166.9	21.4	59.5
18	4 - 5/1/2017	263.8	142.4	34.4	59.4	5 - 61/1/2017	184.2	102.5	22.9	40.8
19	8 - 9/1/2017	290.5	178.8	37.2	83.5	9 - 10/1/2017	155.6	89.7	23.0	63.5
20	11 - 12/1/2017	171.0	100.6	38.9	64.4	12 - 13/1/2017	292.6	161.0	28.1	61.9
21	15 - 16/1/2017	199.6	111.2	30.8	71.2	16 - 17/1/2017	294.2	173.2	26.3	56.2
22	18 - 19/1/2017	234.4	129.2	40.2	55.4	19 - 20/1/2017	168.1	96.6	18.2	63.5
23	22 - 23/1/2017	242.6	137.3	35.6	90.5	23 - 24/1/2017	253.4	139.0	14.9	39.9
24	25 - 26/1/2017	223.8	120.9	39.6	68.0	26 - 27/1/2017	141.0	77.5	15.4	40.0
Minimum		171.0	99.8	24.9	52.0	Minimum	107.6	61.8	13.3	33.5
Maximum		305.0	178.8	40.2	92.5	Maximum	294.2	173.2	28.1	64.3
Average		236.5	135.0	34.2	70.5	Average	224.4	127.8	20.1	50.4
98 percentile		303.7	178.4	40.1	91.6	98 percentile	293.5	172.1	27.3	63.9

NOTES:

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Min Mec R&D Laboratory

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Recognised by MOEF&CC (Sl.No.97 of S.O.1150(E) dated 22/05/2012)

Test Report No. : MMA/02-17/2
Page : 2 of 2

TEST REPORT

24 hourly concentrations (in µg/m^3)

Sl. No.	Date of sampling↓	PM_{10}	$PM_{2.5}$	SO_2	NO_2
	LOCATION: →	Tikri Khurd			
1	4 - 5/11/2016	157.0	88.3	26.5	62.7
2	7 - 8/11/2016	261.6	152.5	21.5	43.0
3	11 - 12/11/2016	249.7	146.7	26.6	65.1
4	14 - 15/11/2016	176.9	102.9	30.7	65.0
5	18 - 19/11/2016	191.0	109.0	30.3	39.0
6	21 - 22/11/2016	245.3	139.1	29.3	51.2
7	25 - 26/11/2016	240.3	139.1	20.7	58.4
8	28 - 29/11/2016	169.7	94.9	22.5	55.0
9	3 - 4/12/2016	156.4	87.1	32.3	58.8
10	6 - 7/12/2016	154.4	90.7	26.5	61.1
11	10 - 11/12/2016	212.5	117.1	19.7	42.4
12	13 - 14/12/2016	165.5	97.5	26.5	51.0
13	17 - 18/12/2016	175.9	95.9	23.1	62.1
14	20 - 21/12/2016	150.3	89.1	20.1	50.2
15	24 - 25/12/2016	180.1	105.0	20.2	42.0
16	27 - 28/12/2016	183.9	107.3	23.7	58.3
17	3 - 4/1/2017	209.5	112.1	32.2	42.6
18	6 - 7/1/2017	278.7	157.0	28.1	58.5
19	10 - 11/1/2017	162.8	90.8	22.1	45.2
20	13 - 14/1/2017	153.7	91.3	31.5	55.9
21	17 - 18/1/2017	158.1	89.2	31.5	43.2
22	20 - 21/1/2017	222.1	132.3	28.6	33.1
23	24 - 25/1/2017	186.5	105.8	30.9	54.8
24	27 - 28/1/2017	207.6	121.2	31.5	56.3
Minimum		**150.3**	**87.1**	**19.7**	**33.1**
Maximum		**278.7**	**157.0**	**32.3**	**65.1**
Average		**193.7**	**110.9**	**26.5**	**52.3**
98 percentile		**270.8**	**154.9**	**32.3**	**65.0**

Parameter	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)
Protocol	IS:5182 (Part 23)	Lab SOP/09	IS:5182 (Part 2)	IS:5182 (Part 6)
National Ambient Air Quality Standards 24 hours (2009)				
Industrial, Residential, Rural & Other areas	100	60	80	80

Checked by

Rashmi Gupta
Authorised Signatory

-end of report-

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TEST REPORT

NAME AND ADDRESS OF CUSTOMER	SAMPLE PARTICULARS		
Shri Environmental Institute of Technology 203,M M Plaza, Mini Market, Janak Puri East, New Delhi	Type of Sample	:	Noise
	Work Order No.	:	MMRDL/Monitoring dated 24.10.2016
	Sampling Location	:	Near D.D.A Vikash Nagar, Delhi
	Sampling Procedure	:	Protocol for Ambient Level Noise Monitoring, CPCB
	Sample Duration	:	24 h.
	Sampling Team	:	MMRDL (Manoj Kumar)
	Sample Reg. No.	:	MMN/1-17/1.1-1.3
Contact Person : Dr. A.K. Gupta Phone : 9810166815	Date of Monitoring	:	17/01/2017 to 19/01/2017
	Date of Receipt	:	19/01/2017
	Date of Report	:	20/01/2017
	Test Report No.	:	MMN/01-17/22
	Page	:	1 of 1

Hours↓	Tikri Khurd village	Kurnai village	Singhola village
Date of monitoring→	**17-18/01/2017**	**18-19/01/2017**	**17-18/01/2017**
10-11	52.84	53.96	63.48
11-12	48.02	54.16	60.78
12-13	44.79	55.3	59.72
13-14	56.75	54.11	64.17
14-15	50.66	54.75	62.5
15-16	64.26	54.04	56.21
16-17	52.87	53.7	57.59
17-18	58.81	54.14	57.89
18-19	59.33	54.79	51.26
19-20	58	55.47	48.48
20-21	50.35	55.05	44.06
21-22	49.79	47.05	42.93
22-23	48.21	47.68	42.54
23-00	47.29	43.74	42.06
00-01	47.8	43.7	41.79
01-02	46.31	43.59	41.66
02-03	46.63	43.38	41.75
03-04	45.88	43.73	41.43
04-05	50.44	44.12	42.78
05-06	57.37	54.1	48.24
06-07	56.29	55.99	51.03
07-08	60.01	54.41	51.94
08-09	57.62	53.82	60.45
09-10	53.43	54.97	62.74
Day time Leq.	**57.42**	**54.6**	**59.39**
Night time Leq.	**48.07**	**44.96**	**42.15**
24 hour Avg. Leq.	**55.94**	**53.07**	**57.67**

Checked by

Rashmi Gupta
Authorised Signatory

- end of report -

PARAMETER	DESIRABLE (Maximum)	PERMISSIBLE (Maximum)	PROTOCOL	TEST RESULTS		
				Tikri Khurd village (Borewell)	Kurnai village (Supply water)	Singola Village (Supply Water)
Colour (in hazen units)	05	15	IS : 3025 (P-4)	<5	<5	<5
Odour	Agreeable	Agreeable	IS : 3025 (P-5)	Agreeable	Agreeable	Agreeable
Turbidity,NTU	1	5	IS : 3025 (P-10)	1.17	0.09	0.01
pH	6.5-8.5	No Relaxation	IS : 3025 (P-11)	7.3	7.4	7.2
Specfic Conductance, umhos	-	-	IS : 3025 (P-14)	2690	1250	925
Total Dissolve Solids ,mg/l	500	2000	IS : 3025 (P-16)	1754	808	568
Total suspended Solids ,mg/l	-	-	IS : 3025 (P-17)	3	2	1
Total Hardness as $CaCO_3$**,mg/l**	200	600	IS : 3025 (P-21)	361	310	278
Alkalinity ,mg/l	200	600	IS : 3025 (P-23)	590	252	252
Sulphate ,mg/l	200	400	IS :3025(P-24)	176	81	76
Phosphorus as P,mg/l	-	-	IS : 3025 (P-31)	0.13	0.06	0.09
Chloride as Cl,mg/l	250	1000	IS :3025(P-32):	379	190	105
Nitrate as No_3**,mg/l**	45	No Relaxation	APHA (4500-NO.-B)	28.7	21.8	0.9
Calcium as Ca,mg/l	75	200	IS : 3025 (P-40)	85	72	66
Sodium as Na,mg/l	-	-	IS : 3025 (P-45)	410	135	79.8
Potassium as K,mg/l	-	-	IS : 3025 (P-45)	3.5	5.9	5.2
Magnesium as Mg,mg/l	30	100	IS : 3025 (P-46)	36	31	27
Iron as Fe,mg/l	1.0	No Relaxation	IS : 3025 (P-53)	0.01	0.01	BDL
Fluoride as F,mg/l	1.0	1.5	APHA (4500-F.-D)	1.13	0.52	0.86
Acidity ,mg/l	-	-	IS : 3025 (P-22)	Nil	Nil	Nil
Residual chlorine ,mg/l	0.2	1	IS : 3025 (P-26)	Nil	Nil	Nil

Air Quality Index

Sl.No	Date of sampling	PM10	PM2.5	S02	NO2	AQI
	LOCATION	**Singhola**				
1	2-3/11/2016	237.5	137.7	38	87.9	314
2	5-6/11/2016	172.6	99.8	31.5	70.3	233
3	9-10/11/2016	213.5	128.3	39.6	81.7	306
4	12-13/11/2016	302.2	167.6	39.9	61.9	337
5	16-17/11/2016	232.8	127.9	40.1	56.4	306
6	19-20/11/2016	296.4	167.2	24.9	53.8	336
7	23-24/11/2016	218	128.4	31	56.8	306
8	26-27/11/2016	184.3	103.4	32.5	78.2	245
9	1-2/12/2016	200.7	110.6	28.3	66.5	269
10	4-5/12/2016	181.2	102.8	31	78.3	243
11	8-9/12/2016	271.6	156.3	26.7	52	328
12	11-12/12/2016	280.8	164.9	30.9	67.6	335
13	15-16/12/2016	281.1	156.9	37.4	54.8	328
14	18-19/12/2016	208.9	121.7	32.9	82.1	301
15	22-23/12/2016	305	177.9	36.1	92.5	345
16	25-26/12/2016	244.2	142.4	26.5	72.9	317
17	1-2/1/2017	219.4	126.5	37	85.8	305
18	4-5/1/2017	263.8	142.4	34.4	59.4	317
19	8-9/1/2017	290.5	178.8	37.2	83.5	345
20	11-12/1/2017	171	100.6	38.9	64.4	235
21	15-16/1/2017	199.6	111.2	30.8	71.2	271
22	18-19/1/2017	234.4	129.2	40.2	55.4	307
23	22-23/1/2017	242.6	137.3	35.6	90.5	313
24	25-26/1/2017	223.8	120.9	39.6	68	301
Minimum		**171**	**99.8**	**24.9**	**52**	**233**
Maximum		**305**	**178.8**	**40.2**	**92.5**	**345**
Average		**236.4958**	**135.0292**	**34.20833**	**70.49583**	**301.7917**
98 Percentile		**303.7**	**178.4**	**40.1**	**91.6**	

Sl.No	Date of sampling	PM10	PM2.5	S02	NO2	AQI
	LOCATION	**KURNAI**				
1	3-4/11/2016	107.6	61.8	14.1	40.1	106
2	6-7/11/2016	263.9	155.9	24.1	49.6	328
3	10-11/11/2016	162.5	99.3	25.6	52.1	231
4	13-14/11/2016	237.6	129	13.3	43.8	307
5	17-18/11/2016	276.2	155.1	15.4	33.5	327
6	20-21/11/2016	180	103.8	16.4	50.5	246
7	24-25/11/2016	223.1	136.9	25	60.6	313
8	27-28/11/2016	233.5	133.7	13.3	42.9	311
9	2-3/12/2016	215	118.1	26.2	54.5	294
10	5-6/12/2016	235.8	138	19.7	35.3	314
11	9-10/12/2016	275.7	158.4	21.3	55.9	330
12	12-13/12/2016	176.6	101.7	24.5	64.3	239
13	16-17/12/2016	219.4	122.9	13.5	45.5	302
14	19-20/12/2016	230.6	124.9	17	57.5	304
15	23-24/12/2016	291.2	170.8	18.8	48.5	339
16	26-27/12/2016	277.1	149.9	24.3	49.5	323
17	2-3/1/2017	290.5	166.9	21.4	59.5	336
18	5-6/1/2017	184.2	102.5	22.9	40.8	242
19	9-10/1/2017	155.6	89.7	23	63.5	199
20	12-13/1/2017	292.6	161	28.1	61.9	332
21	16-17/1/2017	294.2	173.2	26.3	56.2	341
22	19-20/1/2017	168.1	96.6	18.2	63.5	222
23	23-24/1/2017	253.4	139	14.9	39.9	315
24	26-27/1/2017	141	77.5	15.4	40	158
Minimum		**107.6**	**61.8**	**13.3**	**33.5**	**106**
Maximum		**294.2**	**173.2**	**28.1**	**64.3**	**341**
Average		**224.3917**	**127.775**	**20.1125**	**50.39167**	**281.625**
98 Percentile		**293.5**	**172.1**	**27.3**	**63.9**	

Sl.No	Date of sampling	PM10	PM2.5	S02	NO2	AQI
	LOCATION	**TIKRI KHURD**				
1	4-5/11/2016	157	88.3	26.5	62.7	194
2	7-8/11/2016	261.6	152.5	21.5	43	325
3	11-12/11/2016	249.7	146.7	26.6	65.1	321
4	14-15/11/2016	176.9	102.9	30.7	65	243
5	18-19/11/2016	191	109	30.3	39	263
6	21-22/11/2016	245.3	139.1	29.3	51.2	315
7	25-26/11/2016	240.3	139.1	20.7	58.4	315
8	28-29/11/2016	169.7	94.9	22.5	55	216
9	3-4/12/2016	156.4	87.1	32.3	58.8	190
10	6-7/12/2016	154.4	90.7	26.5	61.1	202
11	10-11/12/2016	212.5	117.1	19.7	42.4	290
12	13-14/12/2016	165.5	97.5	26.5	51	225
13	17-18/12/2016	175.9	95.9	23.1	62.1	220
14	20-21/12/2016	150.3	89.1	20.1	50.2	197
15	24-25/12/2016	180.1	105	20.2	42	250
16	27-28/12/2016	183.9	107.3	23.7	58.3	258
17	3-4/1/2017	209.5	112.1	32.2	42.6	274
18	6-7/1/2017	278.7	157	28.1	58.5	328
19	10-11/1/2017	162.8	90.8	22.1	45.2	203
20	13-14/1/2017	153.7	91.3	31.5	55.2	204
21	17-18/1/2017	158.1	89.2	31.5	43.2	197
22	20-21/1/2017	222.1	132.3	28.6	33.1	309
23	24-25/1/2017	186.5	105.8	30.9	54.8	253
24	27-28/1/2017	207.6	121.2	31.5	56.3	301
Minimum		**150.3**	**87.1**	**19.7**	**33.1**	**190**
Maximum		**278.7**	**157**	**32.3**	**65.1**	**328**
Average		**193.7292**	**110.9125**	**26.525**	**52.25833**	**253.875**
98 Percentile		**270.8**	**154.9**	**32.3**	**65**	

Good (0–50)	Minimal Impact	**Poor (201–300)**	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	**Very Poor (301–400)**	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children and older adults	**Severe (>401)**	Respiratory effects even on healthy people

CO All Sites (ppb)

Date	Tikri Khurd	Date	Singhola	Date	Kurnai
2/11/2016	762	3/11/2016	1107	4/11/2016	696
6/11/2016	451	7/11/2016	2124	8/11/2016	572
10/11/2016	809.6	11/11/2016	3024	12/11/2016	662
14/11/2016	1694	15/11/2016	1971	16/11/2016	1782
18/11/2016	549	19/11/2016	1547	20/11/2016	886
22/11/2016	809	23/11/2016	2047	24/11/2016	812
25/11/2016	637	26/11/2016	1800	27/11/2016	712
28/11/2016	450	29/11/2016	2368	30/11/2016	611
1/12/2016	847	2/12/2016	1230	3/12/2016	633
5/12/2016	410	6/12/2016	1931	7/12/2016	520
9/12/2016	736	10/12/2016	3360	11/12/2016	736
13/12/2016	1540	14/12/2016	1792	15/12/2016	1620
17/12/2016	611	18/12/2016	1719	19/12/2016	806
21/12/2016	736	22/12/2016	1861	23/12/2016	903
24/12/2016	708	26/12/2016	2000	27/12/2016	792
29/12/2016	500	30/12/2016	2153	31/12/2016	556
1/1/2017	838	2/1/2017	1245	3/1/2017	652
5/1/2017	496	6/1/2017	2024	7/1/2017	568
9/1/2017	728	10/1/2017	2930	11/1/2017	706
13/1/2017	1550	14/1/2017	2110	15/1/2017	1689
17/1/2017	765	18/1/2017	1626	19/1/2017	867
21/1/2017	650	22/1/2017	1964	23/1/2017	921
26/1/2017	728	27/1/2017	2015	28/1/2017	784
29/1/2017	573	30/1/2017	2326	31/1/2017	654

MET DATA (November 2016 to January 2017)

MICROMETEOROLOGICAL MEASUREMENTS DURING THE AMBIENT AIR QUALITY MONITORING - NAR-1617.DBF

Hour	Temperature	Relative	Wind	Cloud	Hour	Temperature	Relative	Wind	Cloud
	Dry (øC)	Hum.(%)	Spd (km/hr)	Dir (octas)		Dry (øC)	Hum.(%)	Spd (km/hr)	Dir (octas)
14.00	15.70	72.1	6.70	SW 0	15.00	16.00	67.8	9.90	SW 0
16.00	15.30	55.1	5.00	NW 0	17.00	13.40	62.3	4.00	NW 0
18.00	12.10	67.3	3.00	WNW 0	19.00	11.20	73.0	3.00	WNW 0
20.00	10.50	77.0	2.00	NW 0	21.00	9.80	80.8	3.00	NW 0
22.00	9.50	85.5	3.00	NW 0	23.00	9.50	84.3	2.00	NNW 0
Date : 29/01/2017									
0.00	9.30	85.1	2.00	NNW 0	1.00	9.10	86.9	1.00	N 0
2.00	8.80	90.0	2.00	NNE 0	3.00	8.50	92.1	1.00	N 0
4.00	8.40	92.7	4.00	WNW 0	5.00	8.00	93.2	5.00	WNW 0
6.00	7.80	93.6	4.00	WNW 0	7.00	8.50	89.6	4.00	WNW 0
8.00	10.60	78.7	5.00	W 0	9.00	13.30	63.0	5.00	WNW 0
10.00	15.30	52.5	5.00	NW 0	11.00	15.80	50.7	4.00	NW 0
12.00	16.60	42.5	5.00	NNW 0	13.00	17.00	38.5	5.00	NW 0
14.00	17.70	39.4	6.00	NW 0	15.00	18.20	38.0	5.00	NNW 0
16.00	18.10	37.4	4.00	NNW 0	17.00	17.10	41.3	3.00	NNW 0
18.00	15.30	50.9	3.00	NW 0	19.00	13.80	62.3	2.00	WNW 0
20.00	13.10	67.5	1.00	WNW 0	21.00	13.00	68.0	1.00	WNW 0
22.00	12.40	71.6	3.00	WNW 0	23.00	12.00	73.4	4.00	W 0
Date : 30/01/2017									
0.00	11.70	75.0	3.00	WNW 0	1.00	11.40	76.4	1.00	WNW 0
2.00	11.10	76.6	5.00	W 0	3.00	10.70	78.3	5.00	WNW 0
4.00	10.20	81.1	5.00	W 0	5.00	10.00	82.8	4.00	WNW 0
6.00	10.20	84.9	3.00	NNW 0	7.00	9.90	86.0	3.00	WNW 0
8.00	11.60	88.6	4.00	W 0	9.00	13.40	82.6	3.00	WNW 0
10.00	16.00	70.8	4.00	NNW 0	11.00	18.80	56.9	4.00	N 0
12.00	20.50	47.2	6.00	N 0	13.00	21.50	43.0	6.00	NNW 0
14.00	21.50	42.8	7.00	NNW 0	15.00	19.70	39.8	7.00	NNW 0
16.00	19.80	42.6	6.00	NNW 0	17.00	18.70	46.7	5.00	NW 0
18.00	16.80	55.0	4.00	WNW 0	19.00	15.70	61.3	5.00	WNW 0
20.00	15.30	63.5	5.00	WNW 0	21.00	14.90	66.8	5.00	NW 0
22.00	14.60	67.9	6.00	NW 0	23.00	14.30	69.6	7.00	NNW 0
Date : 31/01/2017									
0.00	13.90	71.0	7.00	NNW 0	1.00	13.40	72.9	6.00	NNW 0
2.00	13.00	74.9	6.00	NNW 0	3.00	12.80	76.1	6.00	NW 0
4.00	12.60	77.6	6.00	NW 0	5.00	12.40	79.9	6.00	NW 0
6.00	12.00	82.2	6.00	NW 0	7.00	11.80	84.8	7.00	NW 0
8.00	11.80	85.3	7.00	NW 0	9.00	12.80	79.7	8.00	NNW 0
10.00	14.40	70.9	7.00	NW 0	11.00	16.20	63.4	7.00	NNW 0
12.00	20.10	54.8	8.00	NNW 0	13.00	21.30	48.9	9.00	NNW 0
14.00	22.20	44.8	9.00	NW 0	15.00	22.50	42.8	9.00	NW 0
16.00	20.10	42.3	10.00	NW 0	17.00	18.90	46.4	8.00	NW 0
18.00	17.80	52.9	6.00	NW 0	19.00	16.20	60.0	6.00	NW 0
20.00	16.20	59.4	8.00	NW 0	21.00	16.00	58.2	9.00	NNW 0
22.00	15.60	59.5	10.00	NW 0	23.00	15.20	61.2	9.00	NNW 0

SUMMARY OF MONITORED DATA (NAR-1617.DBF)

	Maximum	Minimum	Average
Temperature (°C) (Dry bulb)	32.20	7.30	18.26
Relative humidity (%)	100.00	25.40	69.68
Wind speed (km/hr)	10.70	0.00	3.95

Predominant wind direction NW (24.91% Readings)

TOR COMPLIANCE

S.No	TOR CONDITIONS	Compliance
1	Examine details of land use according to Master Plan and land use around 10 Km radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images. Check Flood plain of any river	Chapter 3 page 21-24
2	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/villages and present status of such activities.	The land is already acquired by DDA under Master Plan Of Narela and notified for different uses as per Master Plan P1 Chapter 2 page 13-20
3	Examine baseline environmental quality along with projected incremental load due to the project.	The data is collected Min Mec R&D Lab, New Delhi A NABL Accredited Lab ,Chapter 3 page 24-41 and Annexures
4	Environmental data to be considered in relation to the project development would be (a) land, (b) groundwater (c) surface water, (d) air, (e) bio-diversity, (f) noise and vibrations, (g) socio economic and health.	The secondary data is collected from the CPCB website
5	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area	Plane site and approved drainage plan by MCD
6	Submit the details of the trees to be felled for the project.	Nil
7	Submit the present land use and permission required for any conversion such as forest, agriculture etc.	Housing as per MPD 2021
8	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of Environmental	DDA will maintain compliance

	(Protection) Act.	
9	Ground water classification according to the Central Ground Water Authority.	No Ground water extraction ,DJB has approved the plan
10	Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart.	Chapter 5 page No.71 to 72
11	Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximum recycling of water and utilization of rain water. Examine details.	Approved by DJB and covered in Form1a (8,nos)
12	Examine soil characteristics and depth of ground water table for rainwater harvesting.	Chapter 3 page 29-30, 2.23-16.32 m
13	Examine details of solid waste generation treatment and its disposal.	Chapter 8 Page 113-115 (kg/day
14	Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption.	As per DDA PLAN
15	DG sets are likely to be used during construction and operational phase of the project. Emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details.	(4)DG for essential services 1632.5 KVA
16	Examine road/rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.	Chapter 2 page 13,14 and Chapter 3,Page 40 Chapter 4, 51
17	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	Chapter 4, 51

18	Examine the details of transport of materials for construction which should include source and availability.	Available from ,Delhi,Haryana and UP
19	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.	Chapter 6 Page 70-77and chapter 8
20	Submit details of a Comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.	Chapter 7, 78-101

Point No.2

Permission letter from Delhi Jal Board to provide 3887.5 KLD water as proposed

OFFICE OF THE EXECUTIVE ENGINEER
DELHI JAL BOARD: GOVT OF NCT OF DELHI
VARUNALAYA PH-I KAROL BAGH: NEW DELHI

No. 85(7) EE(P)W-I/07/1714

Dated 18/4/07

TO

Executive Engineer
ND-4 DDA

1352
21/4/07

Subject:- Water supply /water connection for Modification in already approved water supply scheme for A-1 to A-4

Water supply scheme for above mentioned subject received vide your letter no. F1(161)/SD-II/ND-4/27 dt 29/3/07 has been scrutinized in this office and is approved subjected to the compliance of special and general conditions added with it.

Encl:- (I) One copy of the approved plan and conditions.
(II) Original G-8 receipt no. .... dt......

Dalbir Singh

Executive Engineer (P) W-1

Copy to:- (1) SE(P)W for kind information pl.
(2)Executive Engineer............................zone.

Executive Engineer (P) W-1

8.	31-30	639000
9.	30-29	315900
10.	29-14	
11.	27-28	633600
12.	28-35	285300
13.	35-32	499872
14.	28-29	521700
15.	34-35	418008
TOTAL		5129824 gallons per day

(B) **HYDRAULIC CALCULATION**

Hydraulic calculations has been done for the previous supply of 5129824 gallons per day as peripheral lines has already been lain around this area and pressure at node no. 24, 27,14,25 has been kept as previous..

LOOP RESULT : narelaph.LOP

TITLE : NARELA REVISED
NO. OF PIPES : 18
NO. OF NODES : 14
PEAK FACTOR : 3
MAX HEADLOSS/Km : 10
MAX UNBAL(LPS) : .0069

Point No.3

Air Quality Data in terms of Air Quality Index

Air Quality Index

Sl.No	Date of sampling	PM10	PM2.5	S02	NO2	AQI
	LOCATION	**Singhola**				
1	2-3/11/2016	237.5	137.7	38	87.9	314
2	5-6/11/2016	172.6	99.8	31.5	70.3	233
3	9-10/11/2016	213.5	128.3	39.6	81.7	306
4	12-13/11/2016	302.2	167.6	39.9	61.9	337
5	16-17/11/2016	232.8	127.9	40.1	56.4	306
6	19-20/11/2016	296.4	167.2	24.9	53.8	336
7	23-24/11/2016	218	128.4	31	56.8	306
8	26-27/11/2016	184.3	103.4	32.5	78.2	245
9	1-2/12/2016	200.7	110.6	28.3	66.5	269
10	4-5/12/2016	181.2	102.8	31	78.3	243
11	8-9/12/2016	271.6	156.3	26.7	52	328
12	11-12/12/2016	280.8	164.9	30.9	67.6	335
13	15-16/12/2016	281.1	156.9	37.4	54.8	328
14	18-19/12/2016	208.9	121.7	32.9	82.1	301
15	22-23/12/2016	305	177.9	36.1	92.5	345
16	25-26/12/2016	244.2	142.4	26.5	72.9	317
17	1-2/1/2017	219.4	126.5	37	85.8	305
18	4-5/1/2017	263.8	142.4	34.4	59.4	317
19	8-9/1/2017	290.5	178.8	37.2	83.5	345
20	11-12/1/2017	171	100.6	38.9	64.4	235
21	15-16/1/2017	199.6	111.2	30.8	71.2	271
22	18-19/1/2017	234.4	129.2	40.2	55.4	307
23	22-23/1/2017	242.6	137.3	35.6	90.5	313
24	25-26/1/2017	223.8	120.9	39.6	68	301
Minimum		**171**	**99.8**	**24.9**	**52**	**233**
Maximum		**305**	**178.8**	**40.2**	**92.5**	**345**
Average		**236.4958**	**135.0292**	**34.20833**	**70.49583**	**301.7917**
98 Percentile		**303.7**	**178.4**	**40.1**	**91.6**	

Sl.No	Date of sampling	PM10	PM2.5	S02	NO2	AQI
	LOCATION	**KURNAI**				
1	3-4/11/2016	107.6	61.8	14.1	40.1	106
2	6-7/11/2016	263.9	155.9	24.1	49.6	328
3	10-11/11/2016	162.5	99.3	25.6	52.1	231
4	13-14/11/2016	237.6	129	13.3	43.8	307
5	17-18/11/2016	276.2	155.1	15.4	33.5	327
6	20-21/11/2016	180	103.8	16.4	50.5	246
7	24-25/11/2016	223.1	136.9	25	60.6	313
8	27-28/11/2016	233.5	133.7	13.3	42.9	311
9	2-3/12/2016	215	118.1	26.2	54.5	294
10	5-6/12/2016	235.8	138	19.7	35.3	314
11	9-10/12/2016	275.7	158.4	21.3	55.9	330
12	12-13/12/2016	176.6	101.7	24.5	64.3	239
13	16-17/12/2016	219.4	122.9	13.5	45.5	302
14	19-20/12/2016	230.6	124.9	17	57.5	304
15	23-24/12/2016	291.2	170.8	18.8	48.5	339
16	26-27/12/2016	277.1	149.9	24.3	49.5	323
17	2-3/1/2017	290.5	166.9	21.4	59.5	336
18	5-6/1/2017	184.2	102.5	22.9	40.8	242
19	9-10/1/2017	155.6	89.7	23	63.5	199
20	12-13/1/2017	292.6	161	28.1	61.9	332
21	16-17/1/2017	294.2	173.2	26.3	56.2	341
22	19-20/1/2017	168.1	96.6	18.2	63.5	222
23	23-24/1/2017	253.4	139	14.9	39.9	315
24	26-27/1/2017	141	77.5	15.4	40	158
Minimum		**107.6**	**61.8**	**13.3**	**33.5**	**106**
Maximum		**294.2**	**173.2**	**28.1**	**64.3**	**341**
Average		**224.3917**	**127.775**	**20.1125**	**50.39167**	**281.625**
98 Percentile		**293.5**	**172.1**	**27.3**	**63.9**	

Sl.No	Date of sampling	PM10	PM2.5	S02	NO2	AQI
	LOCATION	**TIKRI KHURD**				
1	4-5/11/2016	157	88.3	26.5	62.7	194
2	7-8/11/2016	261.6	152.5	21.5	43	325
3	11-12/11/2016	249.7	146.7	26.6	65.1	321
4	14-15/11/2016	176.9	102.9	30.7	65	243
5	18-19/11/2016	191	109	30.3	39	263
6	21-22/11/2016	245.3	139.1	29.3	51.2	315
7	25-26/11/2016	240.3	139.1	20.7	58.4	315
8	28-29/11/2016	169.7	94.9	22.5	55	216
9	3-4/12/2016	156.4	87.1	32.3	58.8	190
10	6-7/12/2016	154.4	90.7	26.5	61.1	202
11	10-11/12/2016	212.5	117.1	19.7	42.4	290
12	13-14/12/2016	165.5	97.5	26.5	51	225
13	17-18/12/2016	175.9	95.9	23.1	62.1	220
14	20-21/12/2016	150.3	89.1	20.1	50.2	197
15	24-25/12/2016	180.1	105	20.2	42	250
16	27-28/12/2016	183.9	107.3	23.7	58.3	258
17	3-4/1/2017	209.5	112.1	32.2	42.6	274
18	6-7/1/2017	278.7	157	28.1	58.5	328
19	10-11/1/2017	162.8	90.8	22.1	45.2	203
20	13-14/1/2017	153.7	91.3	31.5	55.2	204
21	17-18/1/2017	158.1	89.2	31.5	43.2	197
22	20-21/1/2017	222.1	132.3	28.6	33.1	309
23	24-25/1/2017	186.5	105.8	30.9	54.8	253
24	27-28/1/2017	207.6	121.2	31.5	56.3	301
Minimum		**150.3**	**87.1**	**19.7**	**33.1**	**190**
Maximum		**278.7**	**157**	**32.3**	**65.1**	**328**
Average		**193.7292**	**110.9125**	**26.525**	**52.25833**	**253.875**
98 Percentile		**270.8**	**154.9**	**32.3**	**65**	

Good (0–50)	Minimal Impact	**Poor (201–300)**	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	**Very Poor (301–400)**	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children and older adults	**Severe (>401)**	Respiratory effects even on healthy people

CO All Sites (ppb)

Date	Tikri Khurd	Date	Singhola	Date	Kurnai
2/11/2016	762	3/11/2016	1107	4/11/2016	696
6/11/2016	451	7/11/2016	2124	8/11/2016	572
10/11/2016	809.6	11/11/2016	3024	12/11/2016	662
14/11/2016	1694	15/11/2016	1971	16/11/2016	1782
18/11/2016	549	19/11/2016	1547	20/11/2016	886
22/11/2016	809	23/11/2016	2047	24/11/2016	812
25/11/2016	637	26/11/2016	1800	27/11/2016	712
28/11/2016	450	29/11/2016	2368	30/11/2016	611
1/12/2016	847	2/12/2016	1230	3/12/2016	633
5/12/2016	410	6/12/2016	1931	7/12/2016	520
9/12/2016	736	10/12/2016	3360	11/12/2016	736
13/12/2016	1540	14/12/2016	1792	15/12/2016	1620
17/12/2016	611	18/12/2016	1719	19/12/2016	806
21/12/2016	736	22/12/2016	1861	23/12/2016	903
24/12/2016	708	26/12/2016	2000	27/12/2016	792
29/12/2016	500	30/12/2016	2153	31/12/2016	556
1/1/2017	838	2/1/2017	1245	3/1/2017	652
5/1/2017	496	6/1/2017	2024	7/1/2017	568
9/1/2017	728	10/1/2017	2930	11/1/2017	706
13/1/2017	1550	14/1/2017	2110	15/1/2017	1689
17/1/2017	765	18/1/2017	1626	19/1/2017	867
21/1/2017	650	22/1/2017	1964	23/1/2017	921
26/1/2017	728	27/1/2017	2015	28/1/2017	784
29/1/2017	573	30/1/2017	2326	31/1/2017	654

Point No.4

The EIA should also give a compliance plan to conditions stipulated in Annexure XIV of the amended EIA Notification vide S.O. 3999 (E) dated 09.12.2016

Compliance plan to conditions stipulated in Annexure XIV of the amended EIA Notification vide S.O. 3999 (E) dated 09.12.2016

S.No	TOR CONDITIONS	Compliance
1	Examine details of land use according to Master Plan and land use around 10 Km radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images. Check Flood plain of any river	Chapter 3 page 21-24
2	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/villages and present status of such activities.	The land is already acquired by DDA under Master Plan Of Narela and notified for different uses as per Master Plan P1 Chapter 2 page 13-20
3	Examine baseline environmental quality along with projected incremental load due to the project.	The data is collected Min Mec R&D Lab, New Delhi A NABL Accredited Lab ,Chapter 3 page 24-41 and Annexures
4	Environmental data to be considered in relation to the project development would be (a) land, (b) groundwater (c) surface water, (d) air, (e) bio-diversity, (f) noise and vibrations, (g) socio economic and health.	The secondary data is collected from the CPCB website
5	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area	Plane site and approved drainage plan by MCD
6	Submit the details of the trees to be felled for the project.	Nil
7	Submit the present land use and permission required for any conversion such as forest, agriculture etc.	Housing as per MPD 2021
8	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of Environmental (Protection) Act.	DDA will maintain compliance
9	Ground water classification according to the Central Ground Water Authority.	No Ground water extraction ,DJB has approved the plan

10	Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart.	Chapter 5 page No.71 to 72
11	Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximum recycling of water and utilization of rain water. Examine details.	Approved by DJB and covered in Form1a (8,nos)
12	Examine soil characteristics and depth of ground water table for rainwater harvesting.	Chapter 3 page 29-30, 2.23-16.32 m
13	Examine details of solid waste generation treatment and its disposal.	Chapter 8 Page 113-115 (kg/day
14	Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption.	As per DDA PLAN
15	DG sets are likely to be used during construction and operational phase of the project. Emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details.	(4)DG for essential services 1632.5 KVA
16	Examine road/rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.	Chapter 2 page 13,14 and Chapter 3,Page 40 Chapter 4, 51
17	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	Chapter 4, 51
18	Examine the details of transport of materials for construction which should include source and availability.	Available from ,Delhi,Haryana and UP
19	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.	Chapter 6 Page 70-77and chapter 8
20	Submit details of a Comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.	Chapter 7, 78-101

Point No.5

Details energy conservation measures to be taken. All points mentioned in the proposal such as orientation to support reduced heat gain, use of ASHRAE 90.1, use of ECBC compliant envelope measures to be supported through drawings and details in the proposal.

ENERGY CONSERVATION MEASURES as per ECBC

1. Common area, Indoor area & outdoor need to be LED.
2. Minimize energy consumption by building design i.e. orientation, appropriate fenestration, day light design, thermal mass.
3. Wall & window u-value as per ECBC.
4. 20 % of hot water should be through solar Heater.
5. 1% of total energy demand shall be of renewable (Solar).
6. 20% of total construction material i.e. fly ash ,bricks, compressed earth blocks etc.
7. Fly ash shall be used as per the Fly Ash Notification, 2016.
8. DG set shall be 3 star rating.
9. All motors shall be IE-2 Type.
10. All Transformers losses will be maintained as per ECBC Guidelines.

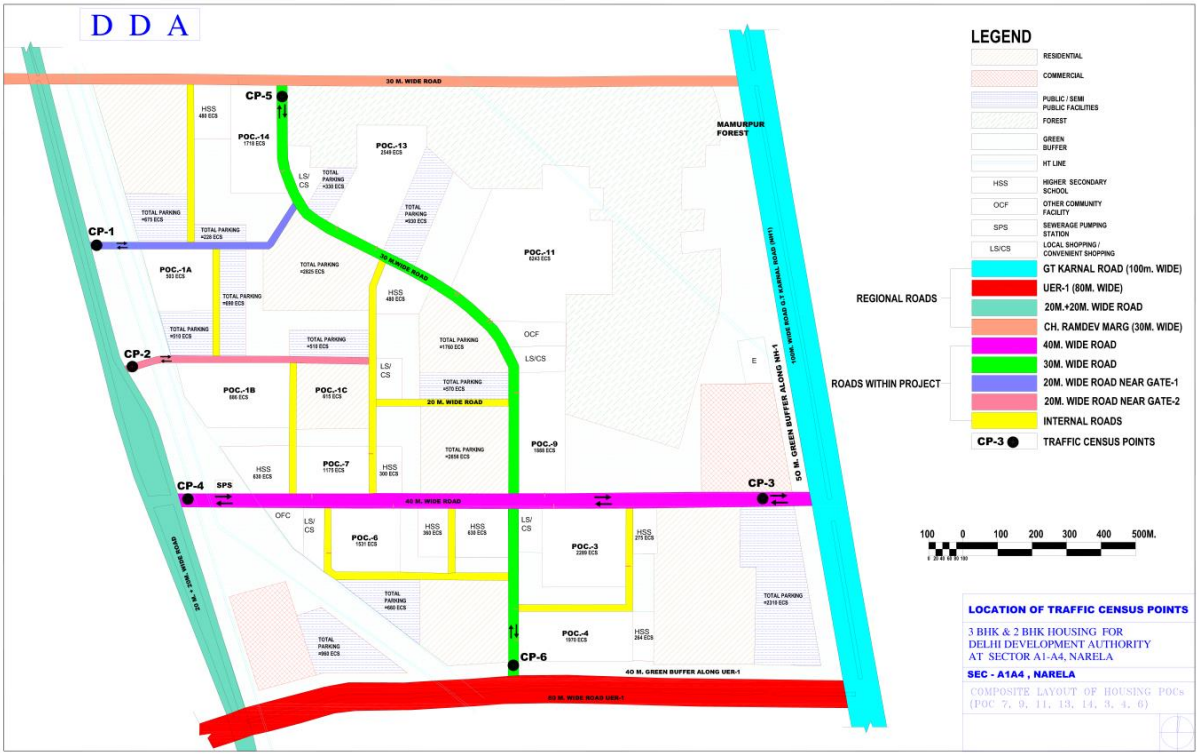
Point No.6

An assessment of the cumulative impact of all development and increased inhabitation being carried out or proposed to be carried out by the project or other agencies in the core area, shall be made for traffic densities and parking capabilities in a 05 kms radius from the site. A detailed traffic management and a traffic decongestion plan drawn up through an organization of repute and specializing in Transport Planning shall be submitted with the EIA. The Plan to be implemented to the satisfaction of the State Urban Development and Transport Departments shall also include the consent of all the concerned implementing agencies.

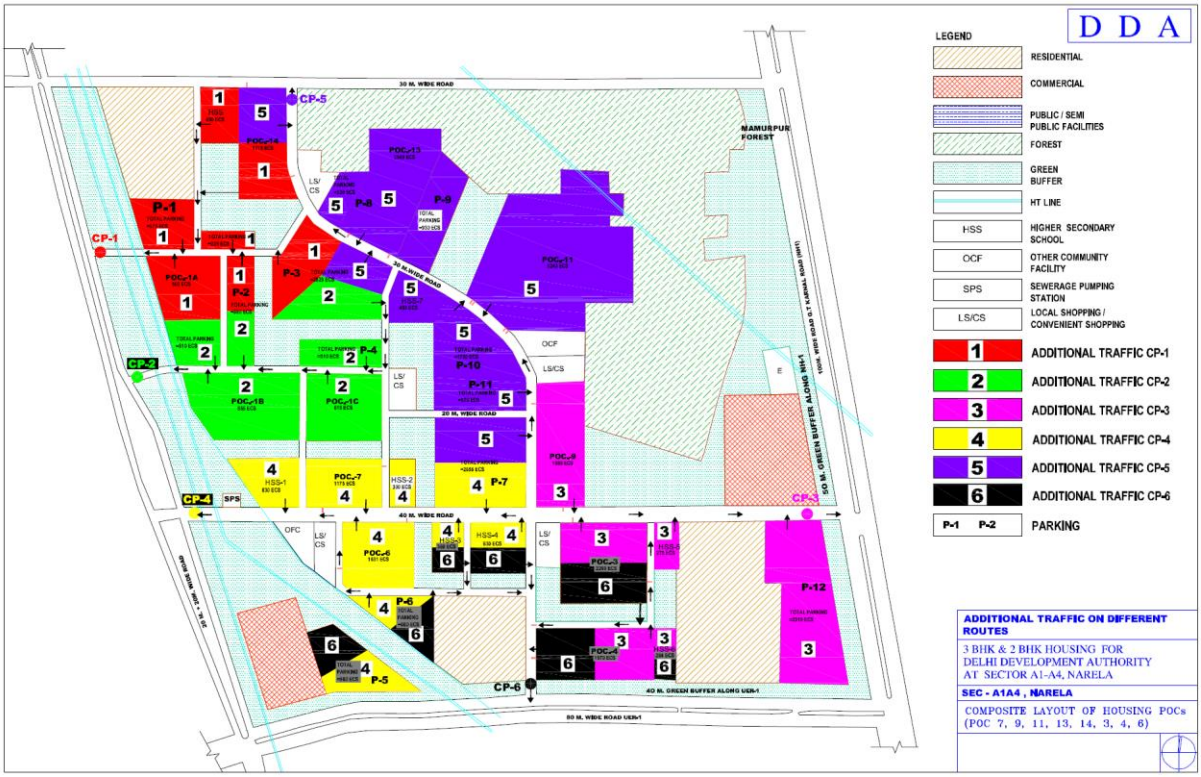
Cumulative Traffic Load Study

- A study titled “Traffic Assessment for “Proposed DDA Flats at Narela, Delhi” on the existing and the proposed traffic within the project as per Point No… of TOR has been conducted
- The Project area is enclosed by 4 regional level roads with a 30m and a 40m road serving as the main roads for the sector A1-A4.
- The various group housings will exit their traffic onto internal roads, sector level roads and main road.
- Existing traffic has been measured on 6 Census Points.
- The anticipated traffic at full occupancy of the project has been calculated for Peak, Normal and whole day.
- The percentage utilisation of the Design Service Volume and the Maximum Capacity has been calculated including at the main intersection of 30m and 40 m roads.

LOCATION OF ROADS AND TRAFFIC CENSUS POINTS



ADDITIONAL TRAFFIC ON THE DIFFERENT ROUTES FROM THE PROJECT



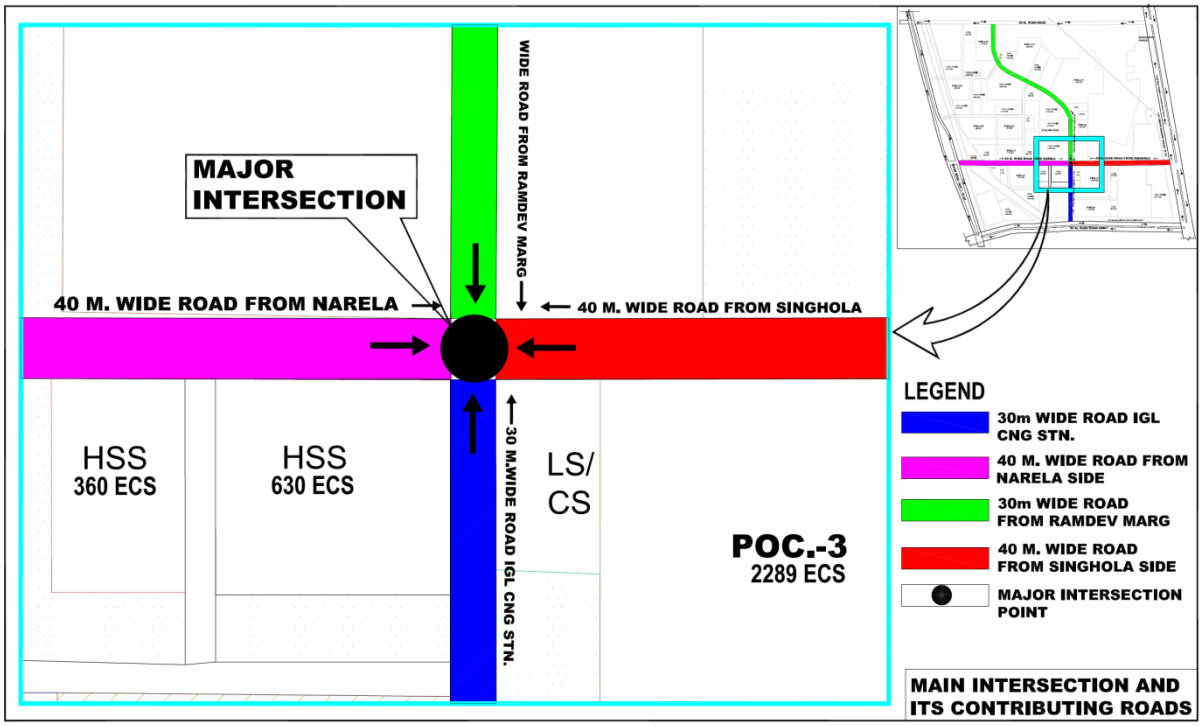
Future Traffic load

The existing traffic count and the anticipated increase in traffic volume on the different routes due to the project along with the carrying capacity (Design service volume and maximum capacity) is given below:

CARRYING CAPACITY OF THE ROADS

Census Point No.	Location	Total (Year 2017), PCU	Additional proposed Traffic, PCU	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:106-1990, Table 2,		Maximum capacity (MC) as per IRC 106-1990, section 8.1 = DSV/0.7	
						Capacity	% utilised	Capacity	%utilised
1	Near Gate No. 1 (Up & Down)	236	4302	4538	20	28800	15.76	41140	11.03
2	Near Gate No. 2 (Up & Down)	528	3808	4336	20	28800	15.06	41140	10.54
3	On 40 m road, Singhola side (Up & Down)	591	7307	7898	40	69600	11.35	99400	7.95
4	On 40 m road, Narela side (Up & Down)	548	6269	6817	40	69600	9.79	99400	6.86
5	On 30 m road, Ch. Ramdev Marg side (Up & Down)	537	15991	16528	30	69600	23.75	99400	16.63
6	On 30 m road, IGL CNG Station side (Up & Down)	322	2994	3316	30	69600	4.76	99400	3.34

FIGURE SHOWING MAIN INTERSECTION AND ITS CONTRIBUTING ROADS



Traffic at Major Intersection

A summary of the hourly traffic on the major intersection during Peak hours from the different roads is given below:

SUMMARY OF HOURLY TRAFFIC AT INTERSECTION DURING PEAK HOURS

Census Point No.	Location	Hourly Total (Year 2017), PCU	Additional proposed Traffic, PCU	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/hr as per IRC:106-1990, Table 2,		Maximum capacity (MC) as per IRC 106-1990, section 8.1 = DSV/0.7	
						Capacity	% utilised	Capacity	% utilised
1	On 40 m road, Singhola side	34	1827	1861	40	2900	64.2	4143	44.9
2	On 40 m road, Narela side	26	1493	1519	40	2900	52.4	4143	36.7
3	On 30 m road, Ch. Ramdev Marg side	24	2527	2551	30	2900	88.0	4143	61.6
4	On 30 m road, IGL CNG Station side	13	761	773	30	2900	26.7	4143	18.7

From above table it is seen, that the 40 m and 30 m roads have sufficient carrying capacity for the existing and the proposed additional traffic.

TABLE 5
VEHICLES PASSING THROUGH INTERSECTION DURING PEAK HOURS FROM DIFFERENT ROADS

			Existing Traffic (2017) PCU/hr*								Additional proposed Traffic PCU/hr*	Total resultant traffic in future, PCU/ hr	Design Service Volume (DSV) in PCU/hr as per IRC:106-1990, Table 2	Maximum capacity (MC) as per IRC 106-1990, section 8.1 = DSV/0.7	Volume/ capacity ratio**	Auto-mobile LOS**
Sl. No.	Location/ Direction ↓		LMV	Buses	Trucks	Motor Cycles & Scooters	Animal drawn vehicles	Cycles	Others	Total						
	Equivalency factor →		1.0	3.0	3.0	0.5	8.0	0.5	1.5							
1	From 40 m road, Singhola side	Hourly Observed count	18	1	1	16	0	2	1							
		Equivalent PCU	18	3	3	8	0	1	2	34	1827	1861	2900	4143	0.40	C
2	From 40 m road, Narela side	Observed count	14	1	0	16	0	2	0					(44.9% utilised)		
		Equivalent PCU	14	3	0	8	0	1	0	26	1493	1519	2900	4143	0.33	C
3	From 30 m road, Ch. Ramdev Marg side	Observed count	10	1	1	11	0	2	1					(36.7% utilised)		
		Equivalent PCU	10	3	3	6	0	1	2	24	2527	2551	2900	4143	0.66	C
4	From 30 m road, IGL CNG Station side	Observed count	4	0	2	4	0	1	0					(61.6% utilised)		
		Equivalent PCU	4	0	6	2	0	1	0	13	761	773	2900	4143	0.21	C
														(18.7% utilised)		

**The peak hour traffic has been considered as 50% of the total volume of the day as per "Development of Integrated Public Transport System by A.H. Shah, 2010". As there are two peaks, the volume that exits from the group housing during morning peak will return to the group housings during evening peaks. Since the morning peak is 2 hours while evening peak is 3 hours, the hourly calculation has been done assuming 25% of the total volume of the day will transit during one hour of the morning peak.*

*** calculation done as per Auto LOS Method consistent with the NHCRP Project 3-70Multi modal LOS for urban streets Methodology using model LOS+, part of the ASAP Platform*

Table 5 shows that at present i.e. in 2017, the 40 m roads from Narela and from Singhola side have more traffic contribution to the intersection as compared to the 30 m roads, during the peak hours. It is also evident that even after the increase in traffic from the proposed project the 40 m road will have sufficient Design Service Volume and Maximum Capacity to accommodate the total traffic in future. The Volume /capacity (v/c) ratio is well within the 0.85 stipulated on HCM 2000 and Level of Service (LOS) is "C".

TABLE 6
SUMMARY OF HOURLY TRAFFIC AT INTERSECTION DURING PEAK HOURS

Census Point No.	Location	Hourly Total (Year 2017), PCU	Additional proposed Traffic, PCU	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/hr as per IRC:106-1990, Table 2		Maximum capacity (MC) as per IRC 106-1990, section 8.1 = DSV/0.7		Volume/ capacity ratio	Auto-mobile LOS
						Capacity	% utilised	Capacity	% utilised		
1	On 40 m road, Singhola side	34	1827	1861	40	2900	64.2	4143	44.9	0.40	C
2	On 40 m road, Narela side	26	1493	1519	40	2900	52.4	4143	36.7	0.33	C
3	On 30 m road, Ch. Ramdev Marg side	24	2527	2551	30	2900	88.0	4143	61.6	0.66	C
4	On 30 m road, IGL CNG Station side	13	761	773	30	2900	26.7	4143	18.7	0.21	C

The 40 m and 30 m roads have sufficient carrying capacity for the existing and the proposed additional traffic.

TABLE 7
PERCENTAGE CONTRIBUTION OF TRAFFIC FROM DIFFERENT ROADS TO THE INTERSECTION

S. No.	Location	Percentage of Traffic (%)								
		Present			Additional			Total		
		Peak-1	Peak-2	Normal	Peak-1	Peak-2	Normal	Peak-1	Peak-2	Normal
1	From 40 m road, Singhola side	30.28	32.89	26.20	23.32	23.32	23.32	23.47	23.46	23.46
2	From 40 m road, Narela side	20.18	31.56	27.09	19.05	19.05	19.05	19.11	19.23	19.44
3	From 30 m road, Ch. Ramdev Marg side	22.48	22.67	28.64	48.07	48.07	48.07	47.82	47.71	47.13
4	From 30 m road, IGL CNG Station side	27.06	12.89	18.07	9.56	9.56	9.56	9.60	9.60	9.97

Affidavit regarding the total built up area of the project is more than 3,00,000 sqm and no construction has been done so far.

INDIA NON JUDICIAL

Government of National Capital Territory of Delhi

e-Stamp

सत्यमेव जयते

Certificate No.	:	IN-DL32453415979880P
Certificate Issued Date	:	19-Sep-2017 09:57 AM
Account Reference	:	IMPACC (IV)/ dl806003/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL806003666512231829O8P
Purchased by	:	DDA
Description of Document	:	Article Undertaking
Property Description	:	Not Applicable
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	DDA
Second Party	:	MOEFCC
Stamp Duty Paid By	:	DDA
Stamp Duty Amount(Rs.)	:	50 (Fifty only)

NOTARY AZAD KUMAR Advocate Area Delhi Regd. No. 2189 NOTARIAL GOVT. OF INDIA

Please write or type below this line

AFFIDAVIT

I, C.M. Garg, Executive engineer (DDA), 1st Floor, Vikas Minar, ITO, Delhi-11002 do solemnly affirm and declare as under.

That there is no construction has been done at the proposed site of 3BHK, 2BHK & EWS Housing at Pocket-11, Sector A1 to A4, Narela.

NOTARY AZAD KUMAR Advocate Area Delhi Regd. No. 2189 GOVT. OF INDIA

Statutory Alert:
1. The authenticity of this Stamp Certificate should be verified at www.shcilestamp.com. Any discrepancy in the details on this Certificate and as available on the website renders it invalid.
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3. In case of any discrepancy please inform the Competent Authority.

20 SEP 2017

Er. Chander Mani Garg
Executive Engineer
WD-5, D.D.A.
New Delhi

2. That It is a fresh proposal.

3. That Land is allotted by Delhi Development authority. The land is in our possession and there is no R & R issue.

4. There is no difference in the documents submitted i.e., Form I, IA, Conceptual Plan, EIA/EMP report and presentation being made.

5. Built-up area more than 3 lakh SQM so, it has been submitted in the MoEFCC as per notification of MoEFCC.

Deponent

Er. Chander Mani Garg
Executive Engineer
WD-5, D.D.A.
Vikas Minar, New Delhi

Verification

Verified at Delhi on this 19/ 09/2017 (day, month and year), that the above contents of affidavit are true and correct to the best of my knowledge and belief and nothing has been concealed there from.

Deponent

Er. Chander Mani Garg
Executive Engineer
WD-5, D.D.A.
Vikas Minar, New Delhi

NOTARY
AZAD KUMAR
Advocate
Area Delhi
Regd. No. 2189
GOVT. OF INDIA

CABIN No. 33
I.T.O. Lane, Azad Bhawan Road
New Delhi-110 002

ATTESTED

BY NOTARY PUBLIC
NEW DELHI (INDIA)

20 SEP 2017

Standard ToR granted by MoEF&CC dated 19th June, 2017