BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH, NEW DELHI
ORIGINAL APPLICATION NO. 596 OF 2025

IN THE MATTER OF:

National Media Centre Co-operative House Building Society Ltd. & Ors. …Applicant(s)

Versus

State of Haryana & Ors. ….Respondent(s)

N.D.O.H.: 10.04.2026

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S.NO	PARTICULARS	PAGES
5.	**ANNEXURE-R2 (COLLY)** Copies of the 1st EIA Report and 2nd EIA Report submitted by DLF.	393 – 591

FILED BY:

[KARANJAWALA & CO.]
ADVOCATES FOR RESPONDENT NO. 8
FIRST FLOOR, 212, ROUSE AVENUE,
DEEN DAYAL UPADHYAY MARG,
NEW DELHI-110002
EMAIL: service@karanjawala.in;
karanjawala@karanjawala.in
Mobile No. 9971527766

PLACE: NEW DELHI
DATED: 30.03.2026

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TOR COMPLIANCE

S. No.	ToR Points	Compliance
(I)	**Project Details**	
i.	Need and benefits of the project	The benefits due to the development of the proposed expansion project are elaborated in **Chapter-8** of this EIA report.
ii.	Submit data for built-up area for each building, the use and occupancy classification in line with NBC 2016 also to be indicated [for differential functional requirements].	The built-up area for each building has been given in **section 2.8.3** of **Chapter 2** of EIA report and site layout plan with area statement is attached as **Annexure 7**
iii.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The Cost of the project is given in **Chapter-1 Section-2.12** & EMP Budget is given in **Chapter-9, section 9.2** of EIA report.
(II)	**Land Environment**	
iv.	Examine details of land use as per 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 on flood plain of any river.	The project site is earmarked as for Commercial development as per the plan of Gurgaon-Manesar Master Plan-2031 in **Fig 1.1**. The Land use map of 10km radius is shown in **Fig. 3.1**, **Chapter 3** of EIA report.
(III)	**Land acquisition and R&R**	
i.	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/ villages and present status of such activities.	Details of environmental sensitive places are given in **Section 2.7, Chapter 2** of EIA report. The proposed expansion project will not cause resettlement and rehabilitation of the communities/ villages.
(IV)	**Environmental Monitoring and Management**	
ii.	Examine baseline environmental quality along with projected incremental load due to the project.	Baseline environmental quality is given in **Chapter 3** of the EIA report and the projected incremental load due to proposed expansion project is given in **Section 4.3.3** of **Chapter 4** of the EIA report.
iii	Environmental data to be considered in relation to the project development would be (a) land, (b) groundwater, (c) surface water, (d) air, € bio-diversity, (f) noise and vibrations, (g) socio economic and health.	The baseline environmental data has been covered under **Chapter 3** of EIA report. Average soil analysis and Surface water quality monitoring results is given in **Table 3.5** and **Table 3.22** respectively. Average result of ambient air quality has

S. No.	ToR Points	Compliance
		been given in **Table 3.15**, whereas, noise monitoring report has been covered in **Table 3.27** of EIA report. Baseline has been assessed for the period March, 2022 to May, 2022. Monitoring Report is attached as **Annexure 11**
iv.	Submit Roles and responsibility of the developer etc. for compliance of environmental regulations under the provisions of EP Act.	Roles and responsibility of the developer for compliance of environmental regulations under the provisions of EP Act has been covered in **chapter 9** of EIA Report.
v.	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.	Environmental Management Plan and Environmental Monitoring Plan have been given as **Chapter-9** and **Chapter-6** in EIA report.
vi.	Possible carbon footprint contribution from each activity and mitigation measures proposed shall be included as part of Environment Management Plan.	Environment Management Plan includes carbon footprint contributions due to the proposed expansion project.
(V)	**Drainage**	
vii	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area. Any obstruction of the same by the project	Contour and Drainage pattern are given in **Figure 3.3 and 3.4** of Chapter-3 of EIA report respectively.
(VI)	**Forest**	
vii	Submit the details of the trees to be felled for the project.	Tree felling and transplantation was not done for the site since the project site was vacant land.
ix	Submit the present land use and permission required for any conversion such as forest, agriculture etc.	The project site is earmarked as for Commercial development as per the plan of Gurgaon-Manesar Master Plan-2031 in **Fig 1.1**., **chapter-1** of this EIA Report.
(VII)	**Water Environment**	
x.	Ground water classification as per the Central Ground Water Authority.	Details covered in **Chapter-3** of EIA report.
(VIII)	**Water Management**	
xi.	Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart.	Details of source of water, water requirement, use of treated water and water balance chart has been covered in **Section 2.9.1, chapter 2** of EIA Report.
xii.	Rain water harvesting proposals should be made with due safeguards for ground water quality.	Rain water harvesting proposals are provided under **Section 2.10, chapter 2** of EIA report.

S. No.	ToR Points	Compliance
xiii.	Maximize recycling of water and utilization of rain water. Examine details.	Details for recycle and reuse of waste water generated during operation phase of the project is provided under **Section 2.9.2, chapter 2** and Rain water harvesting proposals is provided under **Section 2.10, chapter 2** of EIA report
xiv.	Examine soil characteristics and depth of ground water table for rainwater harvesting.	Soil characteristic of the study area is given in **Section 3.6.1, chapter 3** of EIA report. Rain water harvesting proposals is provided under **Section 2.10** of **chapter 2** of EIA report
xv.	Permission from CGWA for abstraction of groundwater, if any, including dewatering during basement excavation.	Not Applicable
(IX)	**Waste Management**	
xvi.	Examine details of solid waste generation treatment and its disposal.	Details of solid waste generation, treatment and its disposal have been discussed under **Section 2.9.3, chapter 2** of EIA report.
xvii.	Construction & Demolition Waste Management Plan shall be prepared as part of EMP providing details of demolition activities involved along with quantification and disposal mechanism.	Plan for Construction & Demolition Waste Management is given in **chapter -9**, of EIA report.
(X)	**Energy Requirements**	
xviii	A certificate of power from the agency supplying power to the project along with the load allowed for the project.	Power assurance letter has been attached as **Annexure 9**
xix.	Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption. Energy conservation and energy efficiency.	Details of use of solar energy and alternative source of energy to reduce the fossil energy consumption have been discussed under **chapter 5** of EIA report. Detailed ECBC study has also been conducted and attached as **Annexure 4**
xx.	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.	Details are given in **section 2.9.4 of chapter 2** of the EIA Report. GLC Modelling for emissions generation from DG sets has been given in **section 4.3.3 Chapter-5** of the EIA report.
(XI)	**Road and Traffic**	
xxi.	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	The connectivity to the project site has been covered in **Section 2.4 of chapter 2** of EIA report. Separate entry and exit have been proposed for the smooth flow

S. No.	ToR Points	Compliance
	should be analyzed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.	of traffic and to prevent traffic congestion in the project site. Traffic Circulation Plan is attached as **Annexure 5.**
xxii.	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	Traffic Circulation Plan is attached as **Annexure 5.**
xxiii.	Examine the details of transport of materials for construction which should include source and availability.	Details of transport of materials for construction and its source have been covered under **section 2.10.2** of **chapter 2** of EIA report.
(XII)	**Disaster Management Plan**	
xxiv	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster. This should cover details of vulnerabilities due to natural and manmade hazards (earthquake, flooding, cyclone, landslides, fire etc.) and details of disaster mitigation efforts for buildings and infrastructure through structural sufficiency and Fire and Life Safety compliance in line with National Building Code NBC, 2016.	Disaster Management Plan has been covered in **section 7.2** of **Chapter 7** in EIA report.
(XIII)	**Court Cases**	
xxv	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	There is no litigation pending against the project
(XIV)	**Miscellaneous**	
xxvi	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website http://moef.nic.in/Manual/Townships.	Noted

TOR LETTER

File No.SEIAA/HR/2023/305

Goverment of India

State Level Environment Impact Assessment Authority

Haryana

***

To,

M/s M/S DLF LIMITED & OTHERS
DLF Gateway Tower, R Block, DLF City Phase-II, Gurugram-122002, Haryana, India,
Gurgaon-122002
Haryana

Tel.No.-; Email:dlflimited165@gmail.com

Sub. Terms of Reference to the Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana, DLF Centre, Sansad Marg, New Delhi-110001

Dear Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1) along with a Pre-feasibility Report. The details of the proposal are given below:

M/S DLF LIMITED	ENVIRONMENT CLEARANCE FOR EXPANSION OF ENVIRONMENTAL CLEARANCE FOR SHOPPING/COMMERCIAL BUILDING ON 32.36 ACRES (DLF DOWNTOWN FORMALLY KNOWN AS MALL OF INDIA) AT SECTOR 25A, GURUGRAM, HARYANA.	EIA

1. Proposal No.:	SIA/HR/INFRA2/414575/2023
2. Name of the Proposal:	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana
3. Category of the Proposal:	INFRA-2
4. Project/Activity applied for:	8(a) Building and Construction projects
5. Date of submission for TOR:	03 Feb 2023

Date : 06-02-2023

Sh. Pardeep Kumar, IAS
(Member Secretary)

Office : **Bays No. 55-58, Ist Floor, Prayatan Bhawan, Sector-2, Panchkula, Haryana**
Phone No : Mobile : **8448181956**
Email id : **seiaa-21.env@hry.gov.in**

Note : This is auto tor granted letter.

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

EXECUTIVE SUMMARY

1. INTRODUCTION

M/s DLF Limited proposes for Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana.

The proposed expansion project has been issued TOR from SEIAA, Haryana vide File No. SEIAA/HR/2022/305 dated 06.02.2023. The report is prepared on the basis of ToR Granted.

The project falls under Item 8(b) with built up area more than 1,50,000 sq.m. (Township and Area Development projects) of the Environmental Impact Assessment (EIA) Notification dated September 14, 2006.

This report includes the identification and prediction of environmental impacts due to the proposed project along with an Environmental Management Plan both for the construction and operation phase on the basis of the Environmental Impact Assessment (EIA) Notification dated September 14, 2006.

2. PROJECT DESCRIPTION

The proposed expansion of the project is planned having plot area 13,0956.066 sq.m. located at Sector 25A, Gurugram, Haryana, at DLF Shopping Mall, 3rd Floor, Arjun Marg, DLF City, Phase-1, Gurugram, Haryana. Earlier, EC was obtained from SEIAA vide letter no. SEIAA/HR/2019/81 dated 06.05.2019 and again amendment for ground coverage and maximum number of floors was obtained vide letter no. SEIAA(125)/HR/2020/539 dated 06.11.2020. After obtaining the EC, construction has been started at the project site. As on date only part construction has been completed (Building 2 & 3). Since there is addition in floors in building no. 4 and development of phase-2, this application is submitted to the SEIAA for expansion of the earlier Environmental Clearance according to the revised plan and layout.

Table E. 1: Salient Features of the project site

SN	Description	Particulars	Unit
	GENERAL		
1	Plot Area	130956.066	SQM
2	Proposed Built Up Area	875074	SQM
3	Max Height of Building (Upto Mummy Machine rm.)	71.25	M
4	Max No of Floors	5B+GF+15	NOS
5	Cost of Project	3498	CR
6	Expected Population	78926	PERSONS
7	Permissible Ground Coverage Area (@60%)	78573.640	SQM
8	Proposed Ground Coverage Area	74307.1	SQM

9	Permissible FAR Area (3.5)	458346.231	SQM
10	Proposed FAR Area	457132.640	SQM
11	Proposed Non FAR Area	417941.36	SQM
12	Proposed Built Up Area	875074	SQM
WATER			
13	Total Water Requirement	3881.36	KLD
14	Fresh water requirement	1361.17	KLD
15	Waste water Generation	2364.60	KLD
16	Proposed STP Capacity	3500	KLD
17	Treated Water Available for Reuse	2128.14	KLD
18	Recycled Water	2520.19	KLD
19	Additional Treated water required	392.05	KLD
RAIN WATER HARVESTING			
20	Rainwater Harvesting Potential	1456	CUM
21	Rainwater Collection Tank (Already Constructed)	660	CUM
22	No of RWH of Pits (Proposed)	16	NOS
23	No of RWH of Pits (Already Constructed)	03	NOS
PARKING			
24	Total Parking required	9167	ECS
25	Total Proposed Parking	10416	ECS
GREEN AREAS			
26	Required Green Area (20%of Plot Area)	26191.21	SQM
27	Proposed Green Area (20.03% of Plot Area)	26228.15	SQM
WASTE GENERATION			
28	Municipal Solid Waste Generation	14.23	TPD
29	Bio Degradable waste	5.69	TPD
30	Quantity of Sludge Generated from STP	1050	KG/DAY
POWER			
31	Total Power Requirement	60900	KVA
32	DG set backup	67500	KVA

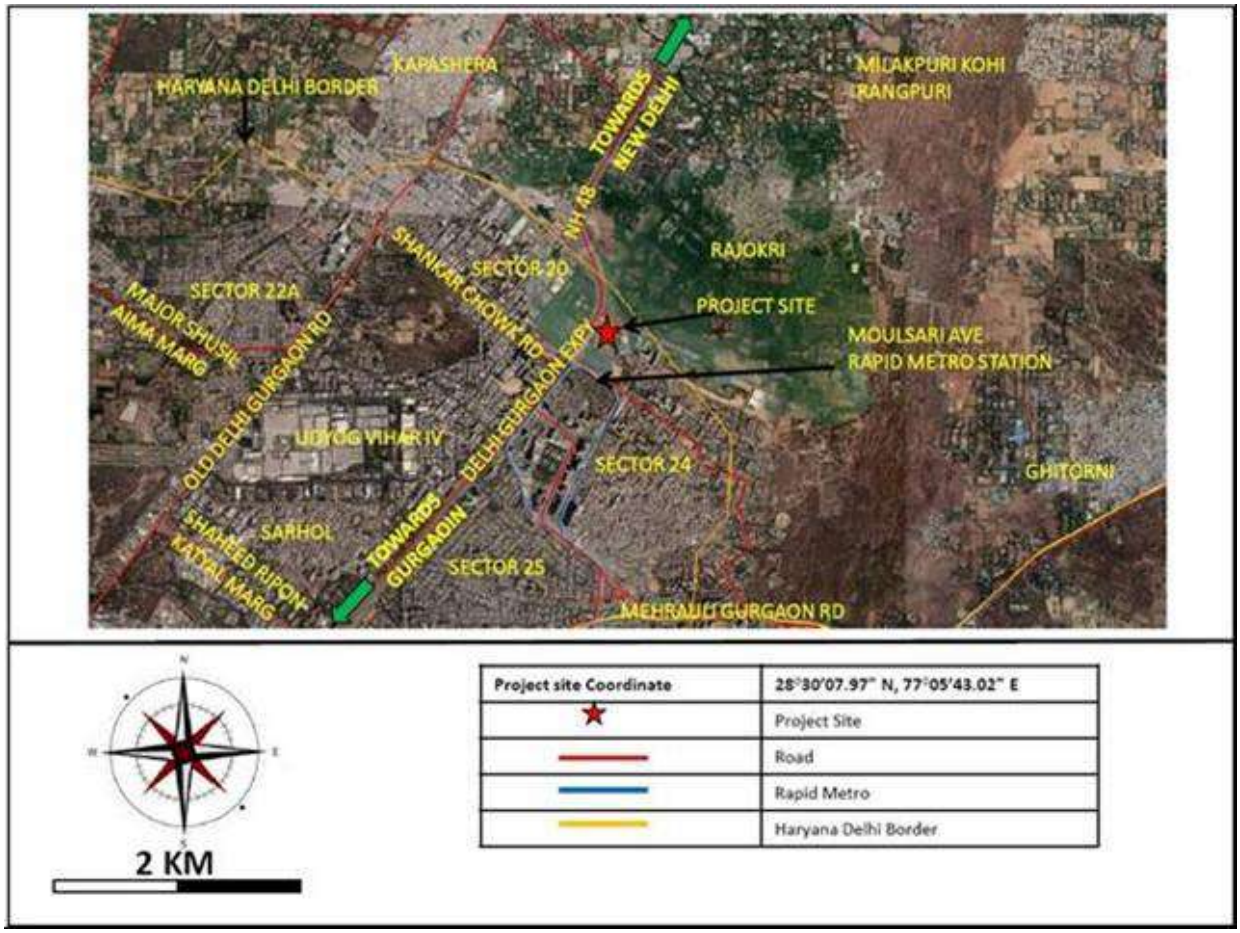


Figure E. 1: Location of the Project Site

3. DESCRIPTION OF THE ENVIRONMENT

The baseline environmental status was assessed based on primary data collected through on-site field observations and secondary data obtained from agencies such as IMD, Geological Survey of India, State Ground Water Department, Central Ground Water Board, State Pollution Control Board, Census of India and Local Forest Department. The following environmental components were focused at during this study:

- Land Environment (Soil, Geology, Hydrogeology, Land use)
- Water Environment (Quality and Quantity of Surface and Groundwater sources)
- Air Environment (Ambient Air Quality)
- Noise Environment (Ambient Noise Quality)
- Biological Environment (Terrestrial and Aquatic Flora & Fauna)
- Socio-Economic Environment (Demographic profile)

The baseline status collected from analysis of primary and secondary data is summarized in **Table-1.2**.

Table E. 2: Baseline Status Collected from Analysis of Primary and Secondary Data

Attribute	Baseline status
Meteorology	In summer, i.e., from March to June, the weather remains hot and the temperature reaches to a maximum of 42.6 °C. Monsoon season prevails during mid-June to mid-September. The cold waves from the Himalayan region makes the winters in the study area chilly and harsh. Temperatures fall to as low as 5.9 °C at the peak of winters. Study area also has fog problem. In January, a dense fog envelops the city, reducing visibility. **(Source: IMD 1997-2011)**
Ambient Air Quality	Ambient air quality was monitored at five locations in the study area. The value of $PM_{2.5}$ varies from 77.88 µg/m^3 to 87.58 µg/m^3 , PM_{10} varies from 155.46 µg/m^3 to 169.08 µg/m^3 , SO_2 varies from 8.68 µg/m^3 to 10.02 µg/m^3, NO_2 varies from 25.45 µg/m^3 to 27.31 µg/m^3 and CO was observed 1.10 to 1.13 mg/m^3. **(Source: Primary data from Baseline information for the period Mar. 2022 to May 2022 (IR&DH))**
Noise Levels	Noise monitoring was carried out at five locations. Leq for day is lying between 53.28 to 50.24 dB(A) and Leq for Night is lying in between range of 40.34 to 42.32 dB(A) **(Source: Primary data from Baseline information for the period Mar. 2022 to May 2022 (IR&DH))**
Water Quality	**Surface water:** The tested Parameters mentioned in above report shows that the water samples fall "E" Category (Irrigation, Industrial Cooling, Controlled Waste disposal) as per CPCB guidelines for surface water sample. Ground Water: The ground water sample has been

Attribute	Baseline status
	taken from one location The tested Parameters mentioned in above report shows that water can be used for drinking purpose in the absence of alternate source as few parameters such as Total Hardness, TDS, Ca, Mg, Total Alkalinity and Chloride exceed acceptable limits but, well within permissible limit of IS 10500-2012 **(Source: Primary data from Baseline information for the period Mar. 2022 to May 2022 (IR&DH))**
Soil Quality	**Physical Characteristic:** pH of all the soil samples taken ranges between 8.22 – 8.35 which shows that soil is alkaline in nature. The texture class of soil samples collected from all the sites reveals that soils are sandy clay in nature. Bulk density of soil sample ranges between 1.41 to 1.43gm/cc which confirm moderately fine texture of soil of area under study. **Chemical Characteristic:** The EC of soil sample varies from 484.0 – 515.0 µS/cm which falls under average category. The organic matter for all soil sample range between 0.54-0.58% which is average sufficient. The available nitrogen varies from 42.5 to 50.5 mg/kg showing very good nitrogen content, Phosphorous content varies between 7.76 to 8.7 mg/kg which falls under less category. The potassium content falls in range of 70.5 to 96.2 mg/kg. The calcium and magnesium content range between 1332.0-1366.0 mg/kg and 192-226mg/kg respectively. While exchangeable cation range between 14.2 to 14.6 meq/100 gm for all the sample. **(Source: Primary data from Baseline information for the period Mar. 2022 to May 2022 (IR&DH))**
Biological Environment	The regions are covered by indigenous floral species. No significant impact on flora and fauna assessed.
Socio-economic	The area is predominantly commercial and the surrounding of the project site is as per local development plan of Gurugram.

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 IMPACTS DURING CONSTRUCTON PHASE:

Table E. 3: Tab Mitigation measures for impact during construction phase

Aspects /Impact	Mitigation measures
Land Environment ▪ Compaction of soils by earth moving equipments ▪ Soil erosion	▪ No loose soil is allowed to store at site to avoid runoff during rains. Proper compaction and stabilization are being ensured during filling and leveling.

▪ Spillage of oils ▪ Solid waste deposition	▪ Top soil has been stored separately and will be used for horticultural purpose. Hence, no immediate adverse impacts on the land environment are envisaged. ▪ Spill prevention measures have been adopted at site. Hazardous waste such as used oil of DG sets is being collected and stored in leak proof containers and kept in isolated place and will be given to authorized recyclers of CPCB. ▪ Colour coded dust bins are placed at construction site so that segregation of waste can be done at source. ▪ All recycled material such as metal, paper, plastic wastes, shall be given to authorized recycler and construction waste (if any) shall be utilized with the site for leveling/ backfilling.
Water Environment • sewage generation from construction site • Runoff generation	▪ Efforts are being made to conserve the water ▪ Appropriate sanitation facilities are being provided for the construction workers to reduce impact on surface water quality. ▪ Spill prevention measures have been adopted at site. Hazardous waste such as used oil of DG sets are being collected and stored in leak proof containers and kept in isolated place and will be given to authorized recyclers of CPCB. ▪ Suitable drainage network would be made to ensure proper draining of wastewater from the construction sites, so that such water do not form stagnant pools nor aggravate soil erosion.
Air Environment ▪ Deterioration of air quality due to fugitive dust and gaseous emissions	▪ Covering of stored construction materials ▪ Covering of trucks carrying construction material ▪ Dust suppression by water sprinkling ▪ PUC certified of construction equipment & vehicles. ▪ Barricading around construction area. ▪ Wind breaker of 10 M height will be provided ▪ Provision of wheel washing ▪ Temporary access roads leading to construction site are being sprinkled with water for dust suppression to reduce emission of dust.
Noise Environment ▪ Noise due to construction activities	▪ Use of protective gears by workers. ▪ Proper maintenance of construction equipment & vehicles ▪ Use of wet jet for cutting of material ▪ Vehicles and construction equipment with internal

	combustion engines without proper silencer are not allowed to operate at the construction site.
Biological Environment • No Significant impact assessed	▪ Any animal if trapped during developed will be relocated/released in coordination with Forest Department • Proper selection of plant species to avoid bird strikes in the project area
Socio-economic ▪ **Positive impact:** Job creation, infrastructure development	▪ Health and safety of the workers during construction by providing effective provision for basic facilities of sanitation, drinking water, safety of the equipments or machinery etc.
Solid waste ▪ Waste from Construction activity	▪ Waste management systems are in place to ensure the compliance with SWM, HWM, E-waste, C&D waste, battery waste etc through Comprehensive Waste Management Plan. ▪ Dust bins are placed at requisite locations at construction site and there will be segregation of wastes before disposal

4.2 IMPACTS DURING OPERATION PHASE:

Table E. 4: Mitigation measures for impact during operation phase

Aspects /Impact	Mitigation measures
Land Environment ▪ Spillage of oils ▪ Solid waste deposition	▪ Adequate Green area will be developed and Sludge generated from STP will be used as manure for green belt development. ▪ Solid waste management systems will be in place to ensure the compliance with SWM, HWM, E-waste, battery waste etc. through Comprehensive Waste Management Plan. ▪ Dust bins will be placed at requisite locations and there will be segregation of wastes before disposal ▪ Spill containment/ management program will be adopted in accordance to regulation
Water Environment • Wastewater generation	▪ The domestic wastewater generated will be treated in well-designed Sewage treatment plant (Capacity 3500 KLD) ▪ Treated water from these zero liquid discharge plants will be used for landscaping, flushing, DG cooling and

	HVAC makeup water. ▪ Water efficient fixtures will be installed for reduction of water consumption. ▪ Spill containment/ management program will be adopted in accordance to regulation ▪ Rain Water Harvesting (RWH) system would be provided for rain water conservation
Air Environment ▪ Due to operation of DG set during power failure	▪ DG sets to comply with the applicable emission norms and to be operated during power failure only. ▪ RECD(Retro Fitted Emission Control Device) will be provided ▪ Use of ultra-low sulphur diesel variety ▪ Adequate green area development to reduce the impact of Air pollution ▪ Proper car parking facilities and traffic flow to avoid traffic congestion.
Noise Environment ▪ Impacts due to operation of DG sets and vehicular movement	▪ DG sets will be installed with inbuilt acoustic enclosure and Anti vibration mount (AVM) pads will be provided to absorb the vibration and to minimize noise. ▪ Adequate parking, road signage and traffic management to avoid traffic congestion & noise
Biological Environment • No Significant impact assessed	▪ Proper Landscape management plans will be adopted using water efficient landscaping systems ▪ Any animal if trapped during developed will be relocated/released in coordination with Forest Department ▪ Proper selection of plant species to avoid bird strikes in the project area
Socio-economic ▪ Induced Development ▪ Positive Impacts on Infrastructure ▪ Job opportunity	▪ No negative impact is anticipated
Solid waste ▪ Solid waste generation	▪ Waste management systems will be in place to ensure the compliance with SWM, HWM, E-waste, battery waste etc through Comprehensive Waste Management Plan. ▪ Dust bins will be placed at requisite locations at construction site and there will be segregation of wastes before disposal ▪ The Bio-Degradable waste will be processed, treated

	and disposed-off through composting within the premises as far as possible. The residual waste will be given to the authorized waste collector or agency.

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY& SITE)

Analysis of alternative has been carried out for building materials which has helped in energy conservation to a greater extent as well as use of recyclable materials thereby taking a step forward towards sustainability. Details given in **chapter 5.**

6. ENVIRONMENTAL MONITORING PROGRAMME

Environmental monitoring Programmed has been formed as a part of the EIA report to ensure that there is no vulnerable change in the environmental parameters due to the project. The environmental monitoring cell will co-ordinate all monitoring programmed at site and data thus generated will be regularly furnished to the state regulatory agencies.

- **Ambient Air Quality Monitoring**

The ground level concentrations of PM_{10}, $PM_{2.5}$, SO_2, $NO_2$and CO in the ambient air will be monitored at regular intervals. Any abnormal rise will be investigated to identify the causes and appropriate action will be initiated. Green cover will be developed for minimizing dust propagation.

- **Water and Wastewater Quality Monitoring and Data Analysis**

To ensure a strict control over the water consumption, flow meters will be installed for all major inlets. In addition, periodic water audits will be conducted to explore further possibilities for water conservation.

- **Monitoring of Wastewater Streams**

All the wastewater streams in the project area will be analyzed regularly for flow rate and physical and chemical characteristics. Such analysis will be carried out for at the point of entry into the wastewater treatment plant and at the point of final discharge.

- **Noise Levels**

Noise levels in the project area will be monitored. The frequency will be as per the standards.

7. ADDITIONAL STUDIES

All the risk related aspects of natural and manmade hazards like earthquake, flooding, fire, worker safety, electrical hazards, etc have been studied and are covered in chapter 7. The disaster management plan has been prepared covering all the risk and hazards. There is no R& R involved in the project. Several measures for conservation of natural resources have been proposed in the report.

8. PROJECT BENEFITS

The impact of the proposed expansion project on the socio-economic aspects will be substantial. The proposed project activities will provide employment to persons of different skills and trades. The employment potential will enhance economic conditions of these families around airport directly and provide employment to many other families indirectly who are involved in business and service-oriented activities.

The project will provide better environment in terms of development of green area which will help to mitigate the impact on air and noise environment.

9. ENVIRONMENT MANAGEMENT PLAN

The project proponent will be responsible for implementing the Environmental Management Plan. For the effective implementation of the EMP, an Environmental Management System (EMS) will be established at the proposed project. The EMS will include the following: -

- An Environmental Management cell
- Environmental Monitoring Program
- Personnel Training
- Regular Environmental Audits and Corrective Action
- Documentation – Standard operating procedures Environmental Management Plans and other records.

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

The Environmental Impact Assessment (EIA) Report is prepared for Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana by M/s DLF Limited. The total plot area of the project is 130956.066 sqm (32.36 acres) The project falls under Item 8(b) with built up area more than 1,50,000sq m (Township and Area Development projects) of the Environmental Impact Assessment (EIA) Notification dated September 14, 2006. The purpose of the report is to identify, predict and evaluate environmental and social impacts expected to arise during the construction and operation of the project while establishing the baseline environmental and social scenario of the project site and its surroundings. This report also proposed the mitigation measures to be adopted for the anticipated environmental impacts due to the proposed project along with an Environmental Management and monitoring Plan both for the construction and operation phase in line with the Environmental Impact Assessment (EIA) Notification dated September 14, 2006.

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

1.2.1 Project Background

Earlier, EC was obtained from SEIAA vide letter no. SEIAA/HR/2019/81 dated 06.05.2019 and again amendment for ground coverage and maximum number of floors was obtained vide letter no. SEIAA(125)/HR/2020/539 dated 06.11.2020. After obtaining the EC, construction has been started at the project site. As on date only part construction is completed. Since there is addition in floors in building no. 4 and development of phase-2, this application is submitted to the SEIAA for expansion of the earlier Environmental Clearance according to the revised plan and layout.

1.2.2 Project Proponent

The project proponent for the project is M/s DLF Limited. The contact's name and address is as given below:
Ms. Neelu Goel,
Authorized Signatory
M/s DLF Limited,
Gateway Tower (2nd Floor), DLF City Phase-III, Gurgaon- 122002, Haryana

1.3 NATURE, SIZE & LOCATION OF THE PROJECT

1.3.1 Nature & Size of the Project

M/s DLF Limited proposed Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana by M/S DLF Limited. Total Plot Area of the project is 13,0956.066 sq. m. (32.36 acres), and total Built-up area is 875074 sq. m. Maximum number of floors are 5B+GF+15. Estimated Cost of project is Rs. 3498 Crores.

1.3.2 LOCATION

The project is located at Sector 25A, Gurugram, Haryana.

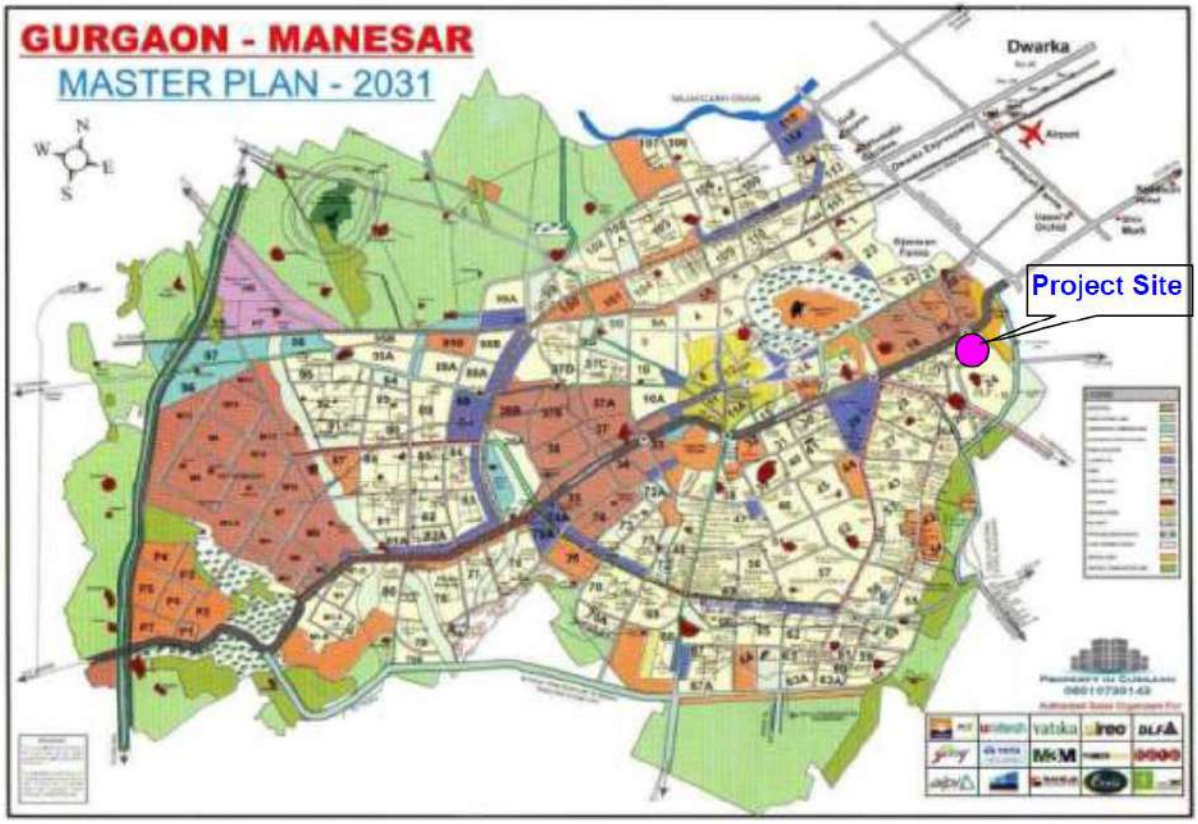


Figure 1. 1: Project site on Gurugram Master Plan

1.4 LAWS AND REGULATIONS APPLICABLE TO THE PROJECT

There is no litigation pending or filled against the proposed project and / or directions orders passed by any court of law or any statutory authority against the

project. Areas/ Activities covered in the project as per legislation is summarized in **Table-1.1**.

Table 1. 1: Areas/ Activities covered in the project as per legislation

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, 2006 in supersession of 1994 notification	The Project falls under category 8(b) [Building / Construction projects / Area Development projects and Townships having built-up area more than 1,50,000 sq. mtrs.] of the Environmental Impact Assessment (EIA) Notification dated 14.09.2006 as amended till date.
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 DG sets from SPCB Compliance to National Ambient Air Quality Standard 2009
Water (Prevention and Control of Pollution) Act, 1974 with Rules.	Protection of Water Quality Obtaining Consent to Establish (NOC) for establishing and Consent to Operate (CTO) for activities causing water pollution from SPCB
Noise Pollution (Regulation and Control) Rules, 2000	Compliance with Ambient Noise Standards in accordance to land use of the area
Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2016	Obtaining Authorization from SPCB for handling and storing of hazardous waste like waste oil and lubricants. Following guidance for handling and storing of such hazardous waste
Motor Vehicles Act with Rules	Lay down restrictions 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 project area premises
Solid Waste Rules, 2016	Management (Collection, Handling, Intermediate Storage) of domestic waste from residences
Bio-Medical Waste (Management and Handling) Rules 2016 and Amendments	Management (Collection, Handling, Intermediate Storage) of medical waste from Health Services

1.5 SCOPE OF THE STUDY

The project falls under Item 8(b) with built up area more than 1,50,000 sq m (Township and Area Development projects) of the Environmental Impact Assessment (EIA) Notification dated September 14, 2006. The EIA/EMP report has been prepared on the basis of TOR issued by SEIAA, Haryana.

The scope of study is to envisage the environmental impacts expected due to the proposed project. To assess the environmental attributes of the core area (project area) and 10 Km radius around the proposed project site i.e., buffer zone (study area) is considered. The broad scope of the study includes:

i) Primary data collection coupled with secondary data collection so as to establish the baseline environmental status of the study area;
ii) Identify various existing pollution loads due to industrial, Commercial and Residential activities in the study area;
iii) Predict incremental levels of pollutants in the study area due to the proposed activity;
iv) Evaluate the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted Environmental techniques.
v) Identification of mitigation measures and preparation of an Environmental Management Plan (EMP) outlining the measures for improving environmental quality and scope for future projects for environmentally sustainable development;
vi) Identification of critical environmental attributes required to be monitored regularly.

1.6 EIA METHODOLOGY

This EIA/EMP report is based on the observations made by the team during visits to the study area and collection of primary and secondary environmental data. Literatures have also been reviewed and relevant information has been collected for environmental and social baseline. Reconnaissance surveys have been conducted to identify the major environmental issues in the study area. The sampling locations were identified on the basis of:

- Existing topography;
- Location of water bodies;
- Location of villages/ towns/ sensitive areas;
- Accessibility, power availability, security of monitoring equipment; and
- Areas, which represent baseline conditions.

The EIA study for the proposed project has been carried out as per the Terms of Reference (ToR), issued to the project by SEIAA, Haryana and EIA guidelines of the

Ministry of Environment, Forest and Climate Change (MoEF&CC). The EIA methodology for the proposed project has been described in **Figure-1.2**

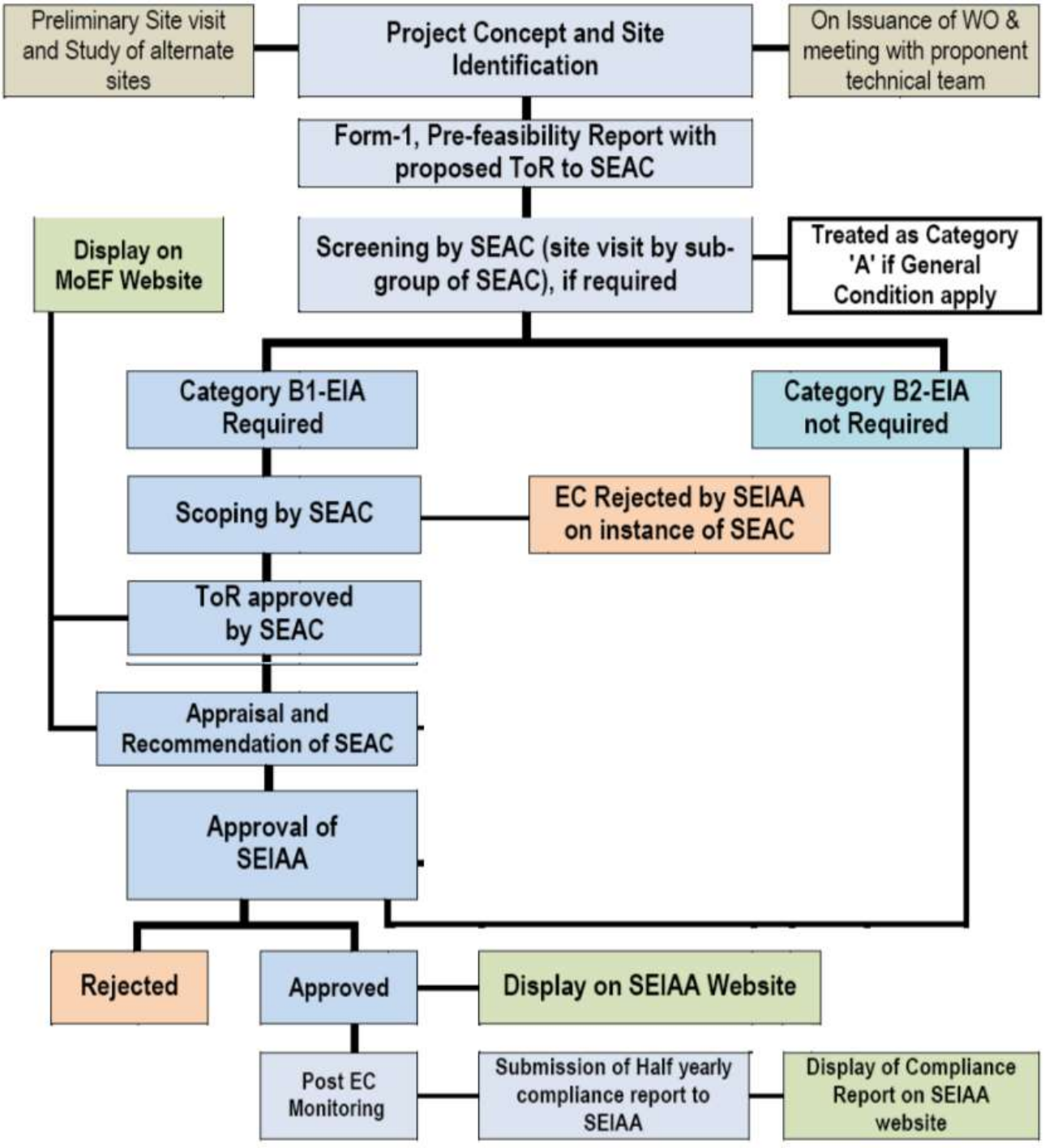


Figure 1. 2: EIA Methodology

1.7 STRUCTURE OF THE REPORT

The REIA Report presents the existing baseline scenario, assessment and evaluation of the environmental impacts that may arise during the construction and operation period. Following impact prediction, required mitigation measures and Environmental Monitoring Plan have been formulated. The content of the remainder part of the report is as follows:

Chapter 1: Introduction
Chapter 2: Project Description
Chapter 3: Description of Environment
Chapter 4: Anticipated Environmental Impacts & Mitigation Measures
Chapter 5: Analysis of Alternatives (Technology & Site)
Chapter 6: Environmental Monitoring Program
Chapter 7: Additional Studies
Chapter 8: Project Benefits
Chapter 9: Environmental Cost Benefit Analysis *(Not applicable, as not recommended in Scoping)*
Chapter 10: Environment Management Plan
Chapter 11: Summary & Conclusion
Chapter 12: Disclosure of Consultant

2.0 PROJECT DESCRIPTION

2.1 PURPOSE/ NEED OF THE PROJECT

Earlier, EC was obtained from SEIAA vide letter no. SEIAA/HR/2019/81 dated 06.05.2019 and again amendment for ground coverage and maximum number of floors was obtained vide letter no. SEIAA(125)/HR/2020/539 dated 06.11.2020. After obtaining the EC, construction has been started at the project site. As on date only part construction is completed. Since there is addition in floors in building no. 4 and development of phase-2, this application is being submitted to the SEIAA, Haryana for expansion of the earlier Environmental Clearance according to the revised plan and layout.

2.2 TYPE OF PROJECT

The proposed expansion project is a commercial project. The project is located at Sector-25 A, Gurugram, Haryana.

2.3 LOCATION OF THE PROJECT

The project is located at Sector-25 A, Gurugram, Haryana. As per approved Master Plan for Gurugram, the Project Site is designated as "Commercial Zone".

2.4 SITE CONNECTIVITY

Roads & Highways:
The sector roads are well connected to the major roads the site is connected with network of roads and is situated adjacent to the NH-8 in the west direction.

Airport:
Indira Gandhi International Airport is approx. 5.9 km in the North direction.

Railways:
Gurugram Railway Station is approximately 8.4 km, WSW from the project site.

Overall, the site is very well connected with NCR and nearby towns both by rail and road transport as shown in **Figure-2.1**

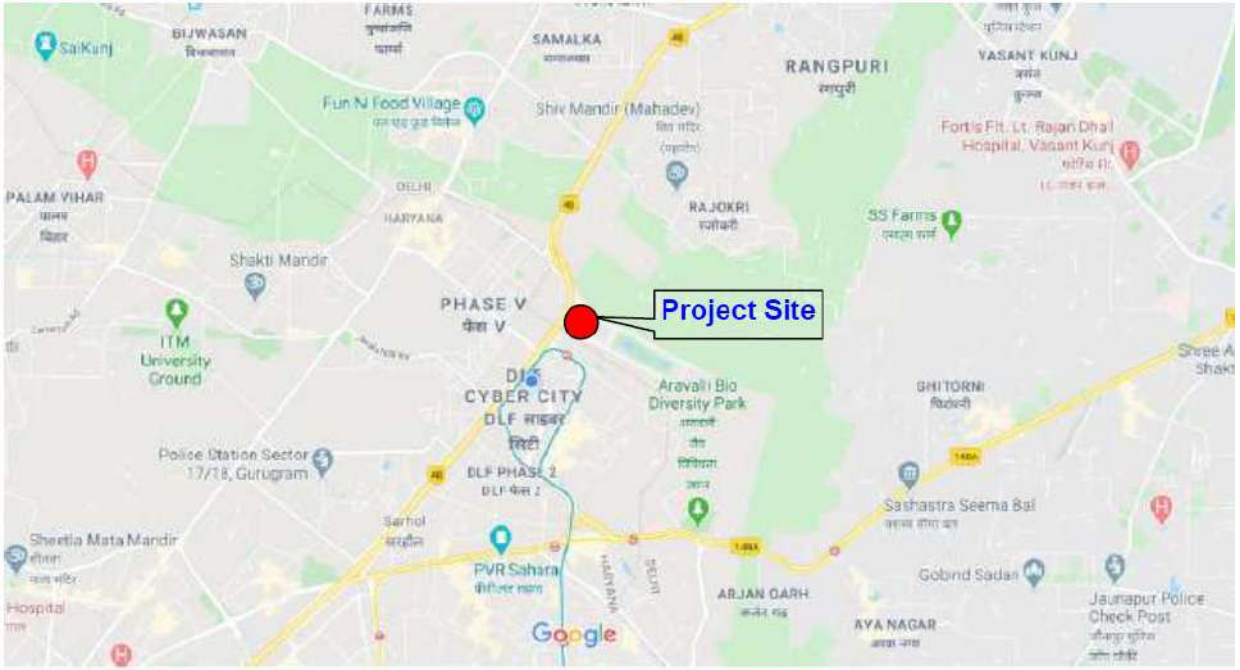


Figure 2. 1: Site Connectivity at Project Site

2.5 SIZE OF THE PROJECT

Total Plot Area of the project is 13,0956.066 sq. m, and total Built-up area is 875074 sq. m. Maximum number of floors are 5B+GF+15.

2.6 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION

The proposed expansion project is likely to be completed in 60 months after obtaining Environmental Clearance.

2.7 PROJECT SITE AND SURROUNDING FEATURES 500 METERS AND 15 KM

The site surroundings comprise of mostly commercial setup and mix land use in the surrounding area. Site surrounding features mentioned in **Table-2.1**. The map of the surrounding area within 500 meters has been shown in **Figure-2.2**and 10 km map of the project site on Toposheet is shown in **Figure-2.3**.

Table 2. 1: Site surrounding features within 15 KM

SN	Type of Facility	Name of Nearest Facility	Distance & Direction from Project Site
1.	Hospital	a) Narayna Hospital b) ESIC Hospital	0.77 km SE 0.84 km WNW
2.	School	a) Shri Ram School b) Rabindranath World School	0.57 km SE 0.80 km S
3.	Community Facilities	a) Ambience Mall b) DLF Club Phase III c) DLF Cyber Hub d) Hotel Trident e) Hotel Radisson Gurgaon	100 m North 1.3 km SE 1.0 km SW 0.25 km WSW 0.63 km NNW
4.	Places of worship	Sheetala Mata Mandir	7.0 km WSW
5.	Defence installations	Arjangarh Air Force Station	3.6 km SE
6.	Historical & heritage places	a) Qutab Minar b) India Gate	9.1 km ENE 17.7 km NE
7.	State/National boundaries	Delhi State boundary	0.67 km North

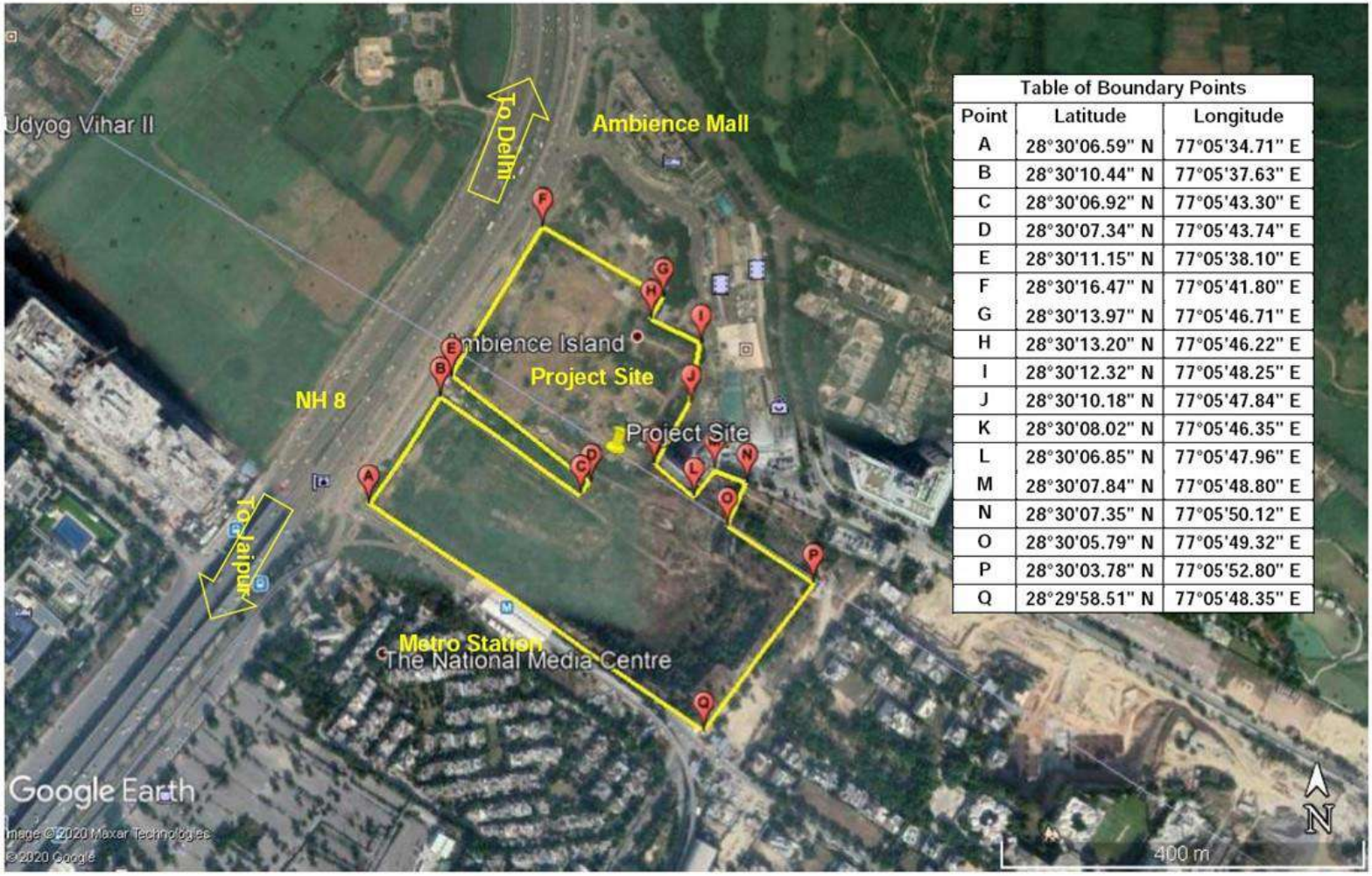


Table of Boundary Points

Point	Latitude	Longitude
A	28°30'06.59" N	77°05'34.71" E
B	28°30'10.44" N	77°05'37.63" E
C	28°30'06.92" N	77°05'43.30" E
D	28°30'07.34" N	77°05'43.74" E
E	28°30'11.15" N	77°05'38.10" E
F	28°30'16.47" N	77°05'41.80" E
G	28°30'13.97" N	77°05'46.71" E
H	28°30'13.20" N	77°05'46.22" E
I	28°30'12.32" N	77°05'48.25" E
J	28°30'10.18" N	77°05'47.84" E
K	28°30'08.02" N	77°05'46.35" E
L	28°30'06.85" N	77°05'47.96" E
M	28°30'07.84" N	77°05'48.80" E
N	28°30'07.35" N	77°05'50.12" E
O	28°30'05.79" N	77°05'49.32" E
P	28°30'03.78" N	77°05'52.80" E
Q	28°29'58.51" N	77°05'48.35" E

Figure 2. 2: Site Features within 500 m Boundary of Project Site

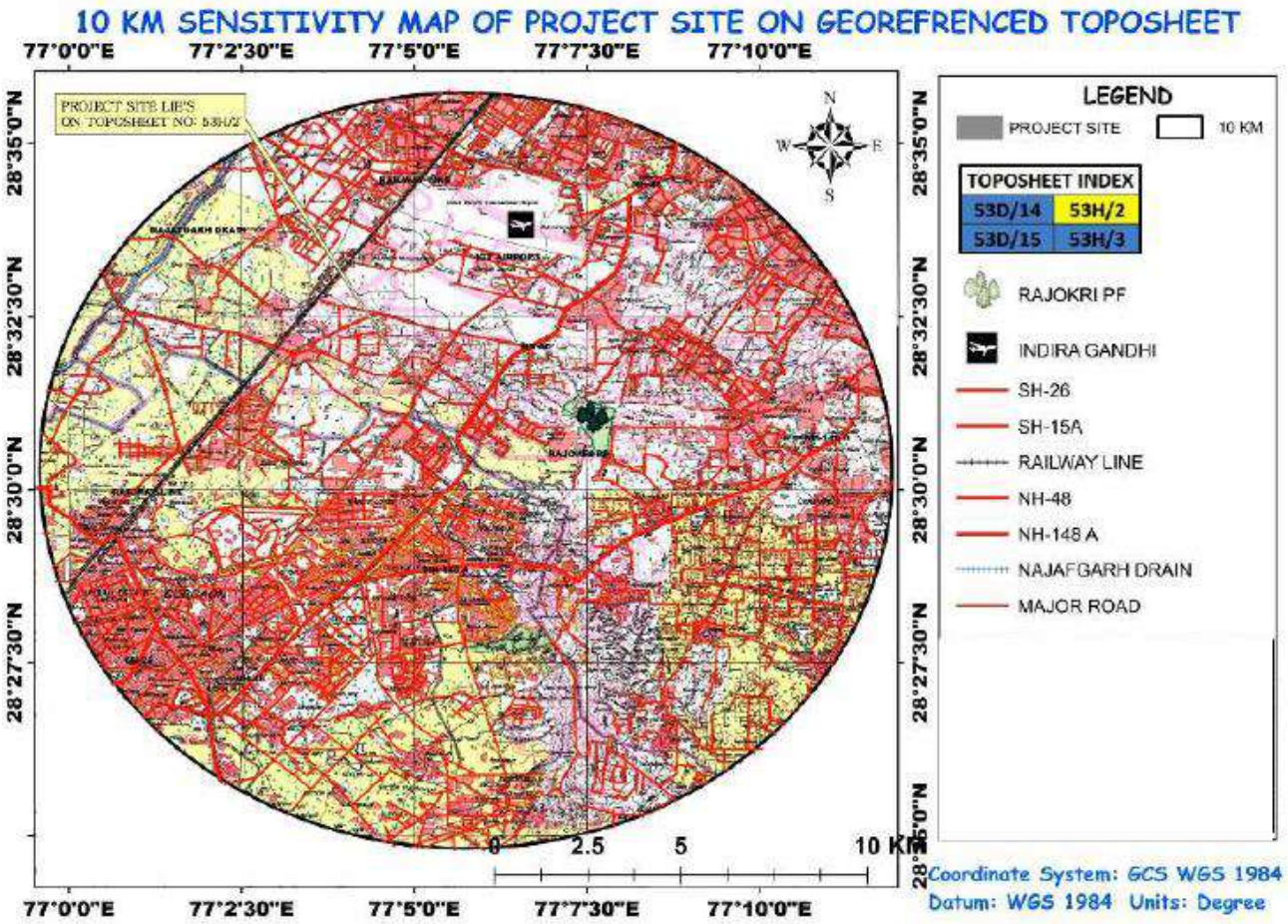


Figure 2. 3: 10 KM map of the project site on Toposheet

2.8 PROJECT DESCRIPTION

M/s DLF Limited proposes for Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana. Total Plot Area of the project is 13,0956.066 sq. m, whereas, total Built-up area is 875074 sq. m. Maximum number of floors are 5B+GF+15. Estimated Cost of project is Rs. 3498 Crores.

The project has also involved internal development of basic infrastructure such as internal roads, power supply, water supply, sewer and storm water pipe network, waste management system along with landscape development, commercial building with all the ancillary facilities for the occupants within the project premises.

2.8.1 INTERNAL ROAD NETWORK AND MAIN ROAD CONNECTIVITY

The project site is approachable from NH-48. The project will provide separate entry & exit gates for smooth flow of traffic and to avoid traffic congestion.

The internal road network of the proposed project will be developed in such a manner that it will not only cater to various buildings but also integrate the whole complex in an interesting composition of built masses and open spaces as well will allow smooth traffic movement inside the complex. The internal road width will be 8.0 m.

2.8.2 SITE LAYOUT PLAN

Site layout plan is shown in **Figure-2.4.**

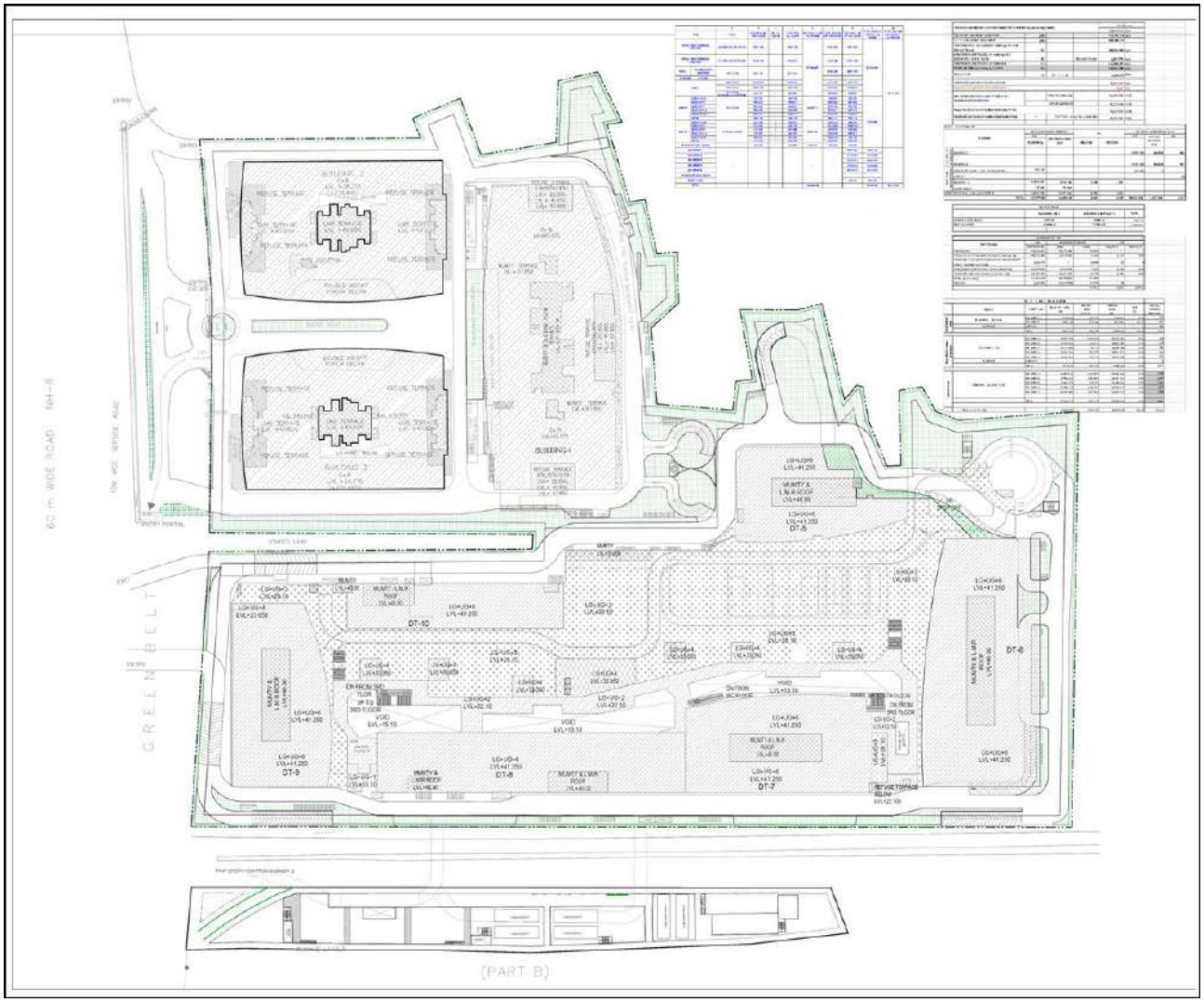


Figure 2. 4: Site Layout Plan

2.8.3 Project salient features

The project will have facilities like water supply, power supply, power backup, adequate parking space in the basement, firefighting system and beautiful landscape. Area statement and salient feature of the proposed expansion project is given in **Table-2.2.**

Table 2. 2: Area Statement & Salient Features of Project

SN	Description	Particulars	Unit
GENERAL			
1	Plot Area	130956.066	SQM
2	Proposed Built Up Area	875074	SQM
3	Max Height of Building (Upto Mummy Machine rm.)	71.25	M
4	Max No of Floors	5B+GF+15	NOS
5	Cost of Project	3498	CR
6	Expected Population	78926	PERSONS
7	Permissible Ground Coverage Area (@60%)	78573.640	SQM
8	Proposed Ground Coverage Area	74307.1	SQM
9	Permissible FAR Area (3.5)	458346.231	SQM
10	Proposed FAR Area	457132.640	SQM
11	Proposed Non FAR Area	417941.36	SQM
12	Proposed Built Up Area	875074	SQM
WATER			
13	Total Water Requirement	3881.36	KLD
14	Fresh water requirement	1361.17	KLD
15	Waste water Generation	2364.60	KLD
16	Proposed STP Capacity	3500	KLD
17	Treated Water Available for Reuse	2128.14	KLD
18	Recycled Water	2520.19	KLD
19	Additional Treated water required	392.05	KLD
RAIN WATER HARVESTING			
20	Rainwater Harvesting Potential	1456	CUM
21	Rainwater Collection Tank (Already Constructed)	660	CUM
22	No of RWH of Pits (Proposed)	16	NOS
23	No of RWH of Pits (Already Constructed)	03	NOS
PARKING			
24	Total Parking required	9167	ECS
25	Total Proposed Parking	10416	ECS
GREEN AREAS			
26	Required Green Area (20%of Plot Area)	26191.21	SQM
27	Proposed Green Area (20.03% of Plot Area)	26228.15	SQM
WASTE GENERATION			
28	Municipal Solid Waste Generation	14.23	TPD
29	Bio Degradable waste	5.69	TPD

30	Quantity of Sludge Generated from STP	1050	KG/DAY
POWER			
31	Total Power Requirement	60900	KVA
32	DG set backup	67500	KVA

The project has been designed as per applicable building bye laws, NBC 2016.

Table 2. 3: Comparative Statement for the proposed expansion

S. No.	Particulars	As per Previous EC	After Expansion	Changes	Unit
1	Plot Area	1,30,956.07	130956.07	0.00	sqm
2	Built Up area	10,57,114.090	875074	-182040.09	sqm
3	No. of Floors	5B+LG+UG+9	5B+GF+15	6.00	No.
4	Green Area	32,754.438	26228.15	-6526.29	sqm
5	Total Water Requirement	2354.4	3881.36	1526.96	KLD
6	Fresh Water Requirement	1204.7	1361.17	156.47	KLD
7	Waste Water Generation	1171.7	2364.6	1192.90	KLD
8	STP Capacity	1600	3500	1900.00	KLD
9	Power Requirement	28310	60900	32,590.00	KW
10	DG Sets	40000	67500	27500.00	KVA
11	Parking Required	8243	9167	924.00	ECS
12	Parking Proposed	10522	10416	-106.00	ECS
13	Total Solid waste	9322	14230	4908.00	kg/day
14	Bio Degradable Waste	3729	5690	1961.00	kg/day
15	No. of RWH Pits	28	16 (03 Constructed)	-12.00	No.
16	Cost of Project	4551	3498	-1053.00	Cr

2.9 Utilities & Infrastructure Required During Construction and Operation Phase

2.9.1 Water Requirement & Supply

Construction phase

Water requirement for laborers to be deployed at site for construction activities are also estimated. The estimated Fresh water requirement during construction phase is approximately 30 KLD. During construction phase, water demand is being met through authorized tankers.

Operation phase

During operation phase, fresh water will be sourced from Municipal Corporation Gurugram (MCG). The total water demand during operation phase is 3881 KLD. Out of this, total fresh water requirement (met from MCG) has been estimated as 1361 KLD. The balance water demand will be met through recycling of treated water from

onsite STP. Details of water demand and source are given below in **Table-2.4**. **& 2.5** (Water Balance Diagram **Figure-2.5** respectively.

Table 2. 4: Water Demand during operation phase

S. No	Particular	Details
1	Fresh Water	1361 KLD
2	Treated water	2520 KLD
3	**Total**	**3881 KLD**

Table 2. 5: Break up of total water demand

SN	Particulars	Water Demand (KLD)
1	Total Water Demand	3881
2	Fresh Water Requirement	1361 (35.1% 0f the total water demand)
3	Treated Water Requirement	2520 (64.9% 0f the total water demand)
4	Flushing	1137
	Gardening	131
	AC & DG cooling	1252
5	Waste Water Generation	2364
6	Capacity of STP Proposed	3500 (2000 KLD existing+ 1500 KLD proposed)

WATER BALANCE DIAGRAM

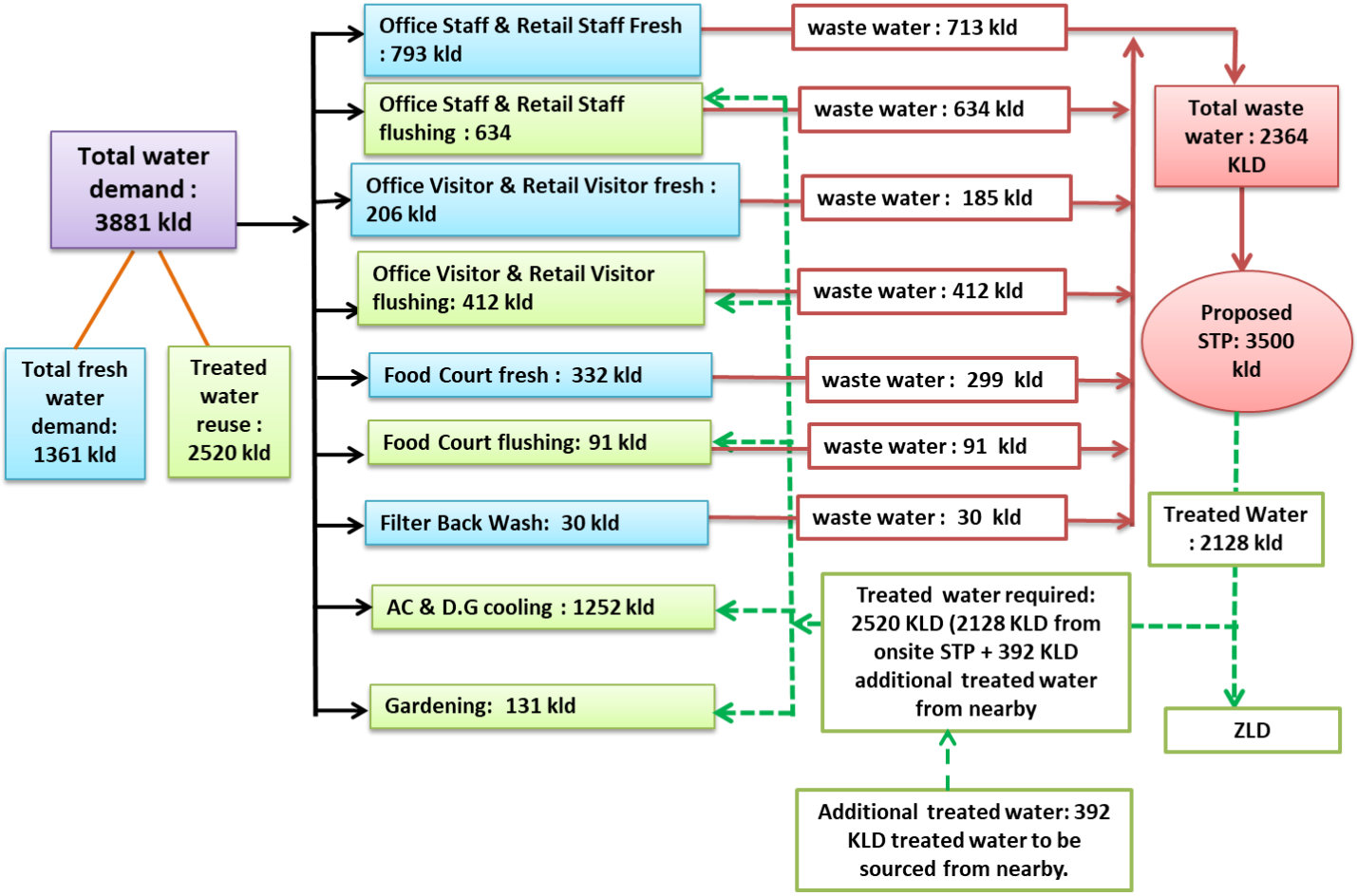


Figure 2. 5: Water Balance Diagram

2.9.2 Sewage Disposal

During the construction phase, Waste water being generated from project site is being collected and disposed through authorized waste disposal agency through tanker.

During Operation Phase, the total wastewater generated from the proposed project site will be 2364 KLD. This wastewater generated will be treated in an on-site sewage treatment plant based on MBR technique treated upto tertiary level having total design capacity of 3500 KLD (2000 kld existing + 1500 KLD proposed). The detail design of proposed STP is given in **Figure-2.6.**

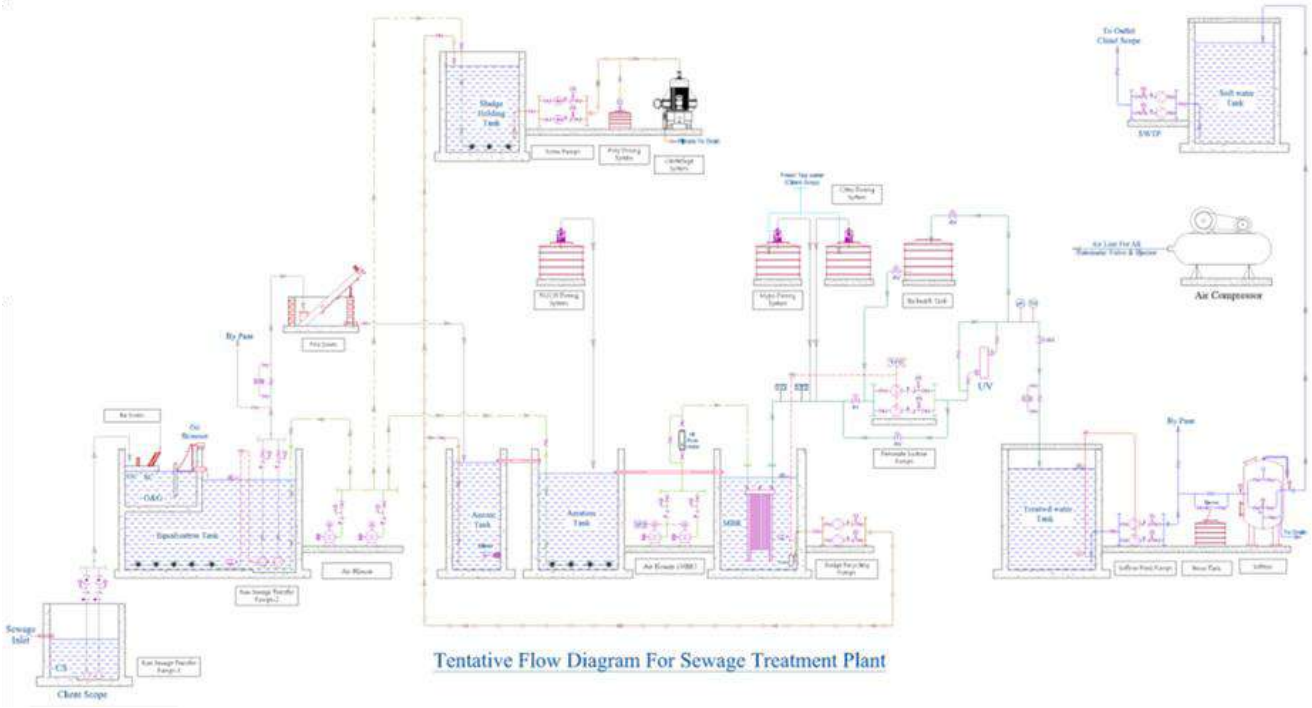


Figure 2. 6: Schematic flow diagram of STP proposed

- STP output parameter shall meet the Updated / Latest CPCB & NGT Norms.

Table 2. 6: Characteristics of Wastewater and Treated Water

Parameter	Inlet Characteristics	Outlet Characteristics
pH	6.0 to 8.5	5.5 to 9.0
B.O.D	250 to 400 mg/l	<10 mg/l
Total Suspended Solid	200 to 450 mg/l	<10mg/l
C.O.D	500-700 mg/l	50 mg/l
Ammonical Nitrogen		<5 mg/l
Nitrogen Total	-	<5 mg/l
Fecal Coliform (FC)	-	Desirable100, Permissible 230

(MPN/100 ml)		

2.9.3 Waste Management

During the operation phase, wastes would mainly be i) biodegradable and other recyclable wastes such as paper wastes, glass, wood pieces, plastic bags etc., ii) e-waste from commercial building. The waste generated during operation shall be collected, segregated, transported, disposed and treated in a scientific manner, based on the integrated approach.

Table 2. 7: Solid waste generation

Municipal Solid Waste Generation	14.23	TPD
Bio Degradable waste	5.69	TPD
Quantity of Sludge Generated from STP	1050	KG/DAY

The possible hazardous wastes during both phases would include used/spent oil from transformer/other utilities classified under hazardous waste category 5.1 as per Hazardous & other Wastes (Management and Transboundry movement) Rules, 2016. The project will handle and dispose of the hazardous wastes as per Hazardous and Other Wastes (Management &Transboundary Movement) Rules, 2016. Waste generation factors are selected for each activity based on the National standards applicable in similar setting.

2.9.3.1 Solid Waste Management

- **Solid waste:** Biodegradable waste will be treated in the OWC proposed at site whereas non-biodegradable waste will be further segregated into recyclable and non-recyclable waste which will be handed over to authorized dealers for further process. All the requirement of SHW Rules, 2016.
- **Hazardous waste:** Waste oil will be disposed off through authorized recyclers.
- **E- Waste:** Will be separately stored in an exclusive area and disposed off through authorized recyclers.
- **Construction Waste:** Excavated soil, concrete waste, brick bats will be used on site as filler material for covering open spaces such as internal roads and pavements remaining construction waste if any will be sent to an approved dumping site. Total construction waste generated from the project will approx. 35,002.96 MT.

2.9.4 Power Requirement and Supply

Construction phase

In construction phase grid power along with DG set of 1x500 KVA is being operated and Ultra low sulphur diesel (ULSD) is being used as fuel for DG sets.

Operation phase

Power demand for the project will be sourced from DHBVN. Total load for the proposed development is 60900 KVA. Appropriate arrangements for drawing power from electrical sub-stations (ESS) and suitable distribution arrangements will be made.

The power shall be supplied by DHBVN. DG sets of 67500 kVA (6 X 2250 + 18 X 3000 kVA) are proposed to meet the requirement of power back up during power failure. The DG sets will be placed inside the project premises. DG sets procured will be of silent type and will maintain CPCB noise emission criteria. All the DG sets will be kept within inbuilt acoustic enclosure. Total power demand & back up supply details has been tabulated in **Table 2.8**.

Table 2. 8: Power Demand

Power requirement	60900 KVA
Sources of power	Grid supply of Dakshin Haryana Bijli Vitaran Nigam Limited (DHBVNL)
Back-up power supply arrangement	Back-up DG sets of total capacity 67500 kVA (6 X 2250 + 18 X 3000 kVA)
Stack height of DG	6 m above terrace of DG room or 30 m whichever is higher

2.9.5 Fuel Requirements

The fuel (HSD) required for the DG sets will be stored in limited quantity onsite as a reserved stock and it will be stored in drums with proper identification mark/labels in an identified area. All fire and safety measures will be taken as per the guidelines from the concerned authorities.

2.9.6 Parking

Adequate parking facility has been provided in the form of basement parking. Detail of parking required and provided in the proposed project is given in **Table-2.9.**

Table 2. 9: Parking Details

Total Parking required	9167	ECS
Total Proposed Parking	10416	ECS

2.9.7 Landscaping & Green Area Details

Proposed project has adequate green area of 26228.15 sq.m. (20.03 % of the plot area including terrace green). Landscape development plan prepared for the project includes peripheral & avenue plantation with local species, as well as large and dense foliage plants. Green area also includes ground cover, lawns at selected

locations and trees for shade. Trees and plant species for plantation in the project will be as per attached landscape plan and roof top terraces as **Annexure 6.**

2.10 Storm water management

The storm water management for the premises shall be self-sufficient to avoid any collection/stagnation and flooding of water. The amount of storm water run-off depends upon many factors such as intensity and duration of precipitation, characteristics of the tributary area. Rain water will be harvested and the potential for rain water harvesting projected is given as per the **table 2.10**. 16 rain water harvesting pits at selected locations, which will harvest the maximum run-off from the area.

Table 2. 10: Rain Water Harvesting Details

Description	Particulars	Unit
Rainwater Harvesting Potential	1456	CUM
Rainwater Collection Tank (Already Constructed)	660	CUM
No of RWH of Pits (Proposed)	16	NOS
No of RWH of Pits (Already Constructed)	03	NOS

Table 2. 11: Rain Water Harvesting Calculation

RAIN WATER HARVESTING CALCULATION FOR(DOWN TOWN, GURUGRAN)-32.36 acre		
The capacity of tank and recharge pit is designed to retain runoff for at least 15 minutes of rain fall of thepeak intensity.		
Peak Rainfall in one hour	=	100 mm / hr
Peak Rainfall in 15 minutes, R	=	100/4
Say,	=	25 mm
	=	0.025 m.
Total catchment area, (Plot Area)	=	130957
Proposed Ground Coverage	=	51218
Road/Parking/Paved area	=	46316
Green area (@ 20.03% of plot area as/submitted earlier)	=	26228.15
Total Calculated Runoff (15min peak)	**=**	**1455.29**
Rain Water Collection Tank	**=**	**660.00**

Rain Water Available for Discharge	**=**	**795.29**
Provided Nos of Rain Water Harvesting Pits (Total Capacity of De-silting Chamber + Harvesting Pit)	**=**	**16**

Catchments/roofs would be accessible for regular cleaning. No sewage or wastewater would be admitted into the system.

The roof will have smooth, hard and dense surface which is less likely to be damaged, thus not allowing release of material into the water.

2.10.1 Fire Fighting Facility

The Proposed project has been planned, designed and constructed with adequate firefighting installations like wet risers, sprinklers, internal hydrants etc. The fire detection will be through ionization-based smoke detectors. Addressable analogue fire detection and alarm system will be installed on every floor of different blocks. In addition, manually operated 'break-glass' type electrical fire alarm system will be provided.
All Fire Fighting provision shall be as per National Building Code 2016 Part IV (Fire & Lift Safety)/Approval from Fire Authority.

2.10.2 Building Materials for Construction

Construction materials as concrete, aggregates etc are required and made available from the local markets. Aluminium, bricks, stones, marbles, paint, tiles, electrical ware, glass is being purchased from reputed manufacturers. Construction materials is being transported in covered trucks. The construction materials and machineries required for the project construction are given in **Table-2.12**.

Table 2. 12: List of Construction Materials

1	Adhesive	19	Hydrochloric Acid
2	Aggregate – Brick	20	Araldite
3	Aggregate - Over Burnt	21	Hardner
4	Aggregate – Stone	22	Flow Control Agent
5	Aggregate - Stone Chipping	23	Plasticizer
6	Aluminum	24	Bhusa
7	Asbestos Cement Product	25	Hessian Cloth
8	Bitumen Felt Fibres Base	26	Spun Yarn
9	Bitumen Hot Sealing Compound	27	Bleaching Powder
10	Bitumen& Coal Tar	28	Cramp
11	Brackets	29	Paints

12	Bricks	30	Fly Ash
13	Brushes	31	Fittings (for doors & windows)
14	Cement	32	Butt hinges
15	Lime	33	Tower bolt
16	Caustic Soda	34	Brass fitting
17	Water Proofing Compound	35	Cement stays
18	Polymer	36	Cupboard lock
19	Fine Aggregate/Sand	37	Glass
20	Steel		
21	Floor tile		

Table 2. 13: List of Construction Machineries

SN	Machineries
1	Excavators
2	Concrete Pump
3	Transit Mixer
4	Tower Cranes
5	Bar Bending & cutting machine
6	Bar Shearing Machine
7	Material Hoist
8	Passenger Hoist
9	Wood Cutting Machine
10	Tile Cutting Machine
11	Pumps (curing)
12	Vibrator (Needle)
13	Conc. Testing machine
14	DG Sets

2.11 Resettlement and Rehabilitation

The proposed construction will not cause resettlement and rehabilitation of the population. No R & R involved for the project.

2.12 Cost of the Project

The estimated cost of the project is Rs. 3498 Crores.

3.0 DESCRIPTION OF ENVIRONMENT

3.1 Introduction

This chapter describes the existing environmental settings in the study area and is based upon the primary survey and environmental monitoring of air, noise, soil, ground and surface water in the study area and secondary information collected from the published sources. The major purposes of describing the environmental settings of the study area are:

- To assess the existing environmental quality, as well as the environmental impacts of the proposed development being studied.
- To identify environmentally significant factors or geographical areas that could preclude any future development.
- Additional purpose of the baseline study is to provide sufficient information so that decision makers can develop an understanding of Environmental characteristics of the study area.

3.2 Methodology of Conducting Baseline Study

The guiding factors of the present baseline study are the guidelines laid down by the Central Pollution Control Board (CPCB)/ Delhi pollution control committee (DPCC), and procedure defined in EIA notification.

The baseline environmental monitoring has been carried for the period of March-2022 to May—2022.

For the purpose of the EIA study, the general impact zone for the proposed implementation shall confine within the project area and study area (radius of 10 km from the center of the project site).

3.3 Components and Parameters for Baseline Environment Study

The various components studied as a part of the baseline study are discussed in the following sections components:

- Land Environment
- Air Environment
- Noise Environment
- Water Environment
- Biological Environment
- Socio-Economic Environment

Table- 3.1 gives various environmental attributes considered for formulating environmental baseline and **Table-3.2** gives frequency and monitoring methodologies

for various environmental attributes.

Table 3. 1: Various Environmental Attributes

S. No	Components	Parameters
1	**Land Environment**	
	Land Use Pattern	Landuse within 10 km radius from the project Site
		Landuse within project Site
	Geography & Topography	General terrain
		Relief / Contour, Slope & Terrain of Project Site
	Geology	General Geology of the Area
		Sub-surface Geology
		Geotechnical Investigations at Site
	Drainage	Drainage pattern within 10 km radius of project site
	Cropping Pattern	Cropping Pattern in the region
	Soil	Study the soil profile of the study area by collecting one grab soil samples from project site • Soil type & Characteristics • Soil porosity and Permeability
2	**Air Environment**	
	Meteorological Data	Secondary data for climatic aspects collected from nearest IMD station - temperature, precipitation, wind speed, wind rose, atmospheric stability and mixing height.
		Primary data for climatic aspects collected by onsite meteorological monitoring conducted for one season for relative pressure, temperature, precipitation, humidity, wind speed and wind direction
	Ambient Air Quality	Ambient air quality monitoring at identified locations
		Parameters: PM_{10}, $PM_{2.5}$, SO2, NO2, and CO
		Frequency: 24 hourly sample for PM_{10}, $PM_{2.5}$, SO2, NO2, and 8 hourly sample for CO - 2 times a week for 3 month
3	**Noise Environment**	
	Ambient Noise Quality	Ambient noise quality monitoring at identified locations (Leq day, Leq night)
		Frequency: Continuous monitoring (24 hourly)
		Parameters: Equivalent Noise level in dBA (Leq day &Leq Night)
		Location: Five Locations
4	**Traffic**	
	Traffic Analysis	Existing Traffic Study and Analysis with future scenario
5	**Water Environment**	
	Ground Water and surface water	Ground water resources in the study area, depth of water table

S. No	Components	Parameters
	Resources and Availability	Hydro-geology within project site
		During operational
		Alternate Sustainable Water Management Strategies
	Water Quality	Groundwater quality near the project site monitored and compare with IS 10500 standards
6	**Biological Environment**	
	Habitat Assessment	Assessment of habitation within the project site
	Terrestrial Ecology	Study of flora within 10 km radius and project area
		Study of fauna within 10 km radius and project area
7	**Socio-economic Environment**	
		General Socio-economic profile
		Demographic profile
		Economic activity and livelihood pattern
		Existing Physical & Social Infrastructure Facilities in the Region

Table 3. 2: Environmental Attributes: Frequency and Monitoring Method

Attributes	Sampling		Measurement Method	Remarks
	Network	Frequency		
A. Air Environment				
Particulate Matter less than 2.5 µg/m^3($PM_{2.5}$)	Requisite locations in the project influenced area	24 hourly (One Season)	Gravimetric; CPCB Guidelines 2012	As per CPCB standards for NAAQS, 2009
Particulate Matter less than10 µg/m^3 (PM_{10})			Gravimetric; IS:5182 (Part - 23)	
SO_2			IS:5182 (Part-2) Reaffirmed 2012 Modified West &Gaeke Method	
NO_2			IS:5182 (Part-6) Modified Jacob &Hochheiser	
CO			IS:5182 (Part-10)	
B. Noise				
Day and Night equivalent noise levels Day (06:00 A.M to 10:00 PM) Night (10:00 PM to 06:00	Requisite locations in the project influenced area	One Season	Instrument: Noise level meter	IS: 4954-1981

Attributes	Sampling		Measurement Method	Remarks
	Network	Frequency		
AM)				
C. Water				
Parameters for water quality: pH, temp, total suspended solids, total dissolved solids, total hardness, calcium hardness, magnesium hardness, total alkalinity, chloride, sulphate, nitrate, phosphate, fluoride, total phosphorus, BOD, COD, Heavy metals (iron, arsenic, zinc) Total coliforms	Set of grab samples at requisite locations for ground and surface water	One Season	Samples for water quality, collected and analyzed as per • IS: 3025, methods for sampling and testing of Industrial effluents and • Standard methods for examination of water and wastewater analysis published by American Public Health Association (APHA).	`
D. Land Environment				
Parameters for soil quality: pH, texture, electrical conductivity, organic matter, nitrogen, phosphate, sodium, calcium, potassium and magnesium.	Requisite soil samples be collected as per BIS specifications within project influenced area	One Season	Collected and analyzed as per soil analysis reference book, M.L.Jackson	

3.5 Land Environment

3.5.1 Land Use Pattern

The objectives of land use studies are: -

- To determine the existing land use pattern in the study area and to assess its compatibility with the proposed development;
- To analyze the impacts on land use in the study area.

The study of land use in the area enables one to know about the present land use practices as well as to know the type of land that can be used for various development activities envisaged in post project scenario. It also enables to envisage

the scenario emerging due to the increase in demand for land with increase in population and the impacts arising due to the interface with the various project activities.

3.5.1.1 Landuse pattern of Study area

A study of the land use pattern of the project site reveals that the proposed project site is very sparsely vegetated land with very small bushes. There are no habitations, forests and crops within the project site. Land Use map of the 10 km radius is shown in **Figure-3.1** and tabulated in **Table-3.3**.and surrounding features around the project site is shown **in Figure 3.2**.

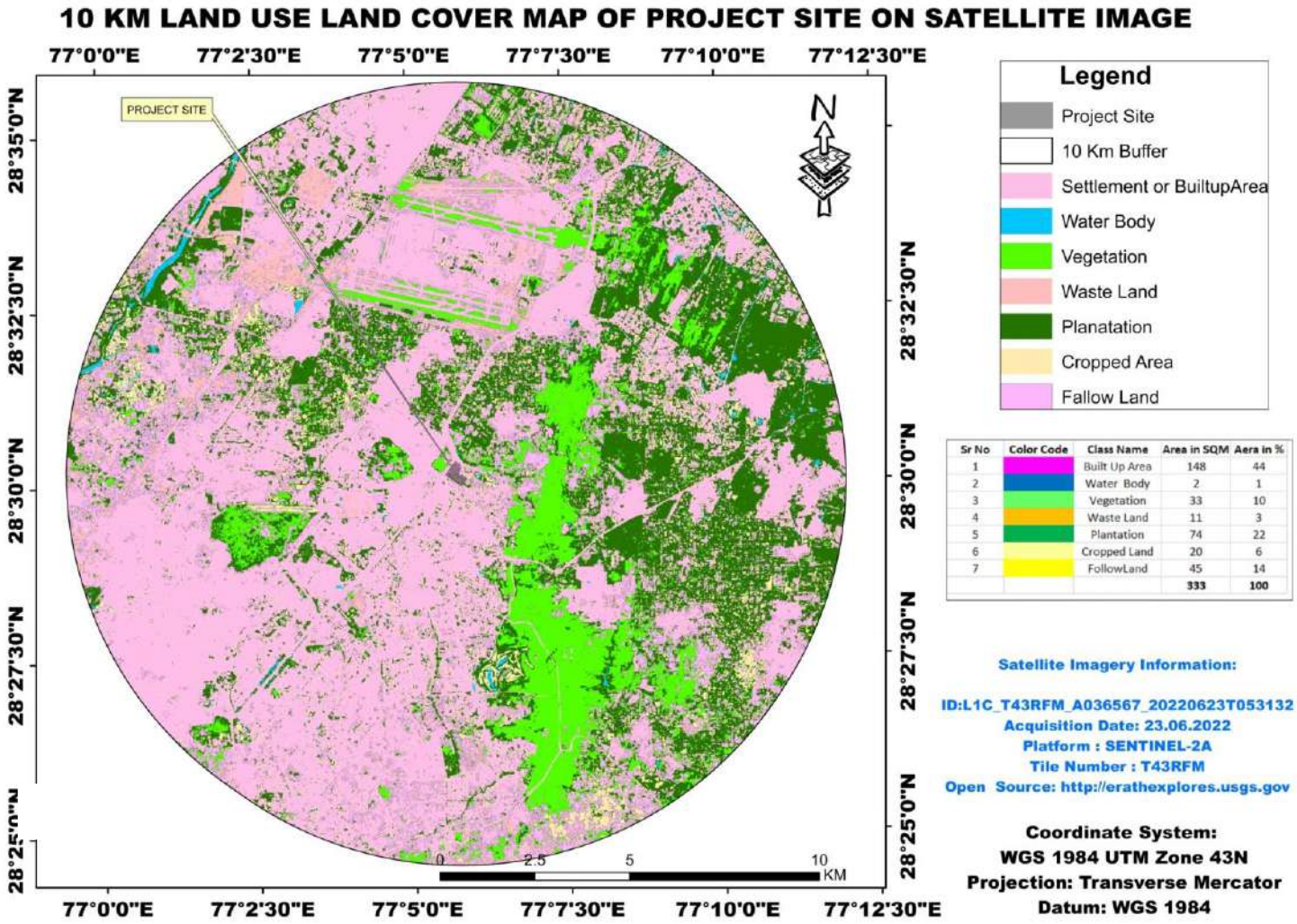


Figure 3. 1: Land Use map of the 10 km radius

Table 3. 3: Land use of 10 km radius of the Project Site

Particulars	Area (in Sq.km.)	Percentage (%)
Built-up Area	148	44
Vegetation	33	10
Cropped Land	20	6
Plantation	74	22
Waste Land	11	3
Water Body	2	1
Fallow Land	45	14
Total	**333**	**100**

3.5.2 Topography &Contour

Contours are lines that connect points of equal value (such as elevation, temperature, precipitation, pollution, or atmospheric pressure). Contour map is prepared by using surface tool which is present in Spatial analyst tool which can be achieved by using Arc GIS 10.2

- Project site and its surrounding area is situated on Flat terrain. Contour elevation at project site varies about from 237m to244m AMSL.
- Map is showing maximum elevated contour of 252m AMSL in East ern part of Map.
- While lowest contour is located in North West Part of the Map showing 204 m AMSL.
- Whitish portion of the map showing moderately flat Terrain.
- Contour map comprising in 10 km buffer area from the project site is situated on Moderately Flat topography. Contour topography reveals that terrain is moderately Flat and slopes towards North West direction.
- Map is not showing dense contours .while less dense contour occurs in whole Map.

- Contour map clearly demonstrate area is overlain by Alluvial terrain

The topographical map and contour map of the project area is shown in **Figure-3.2 & 3.3**

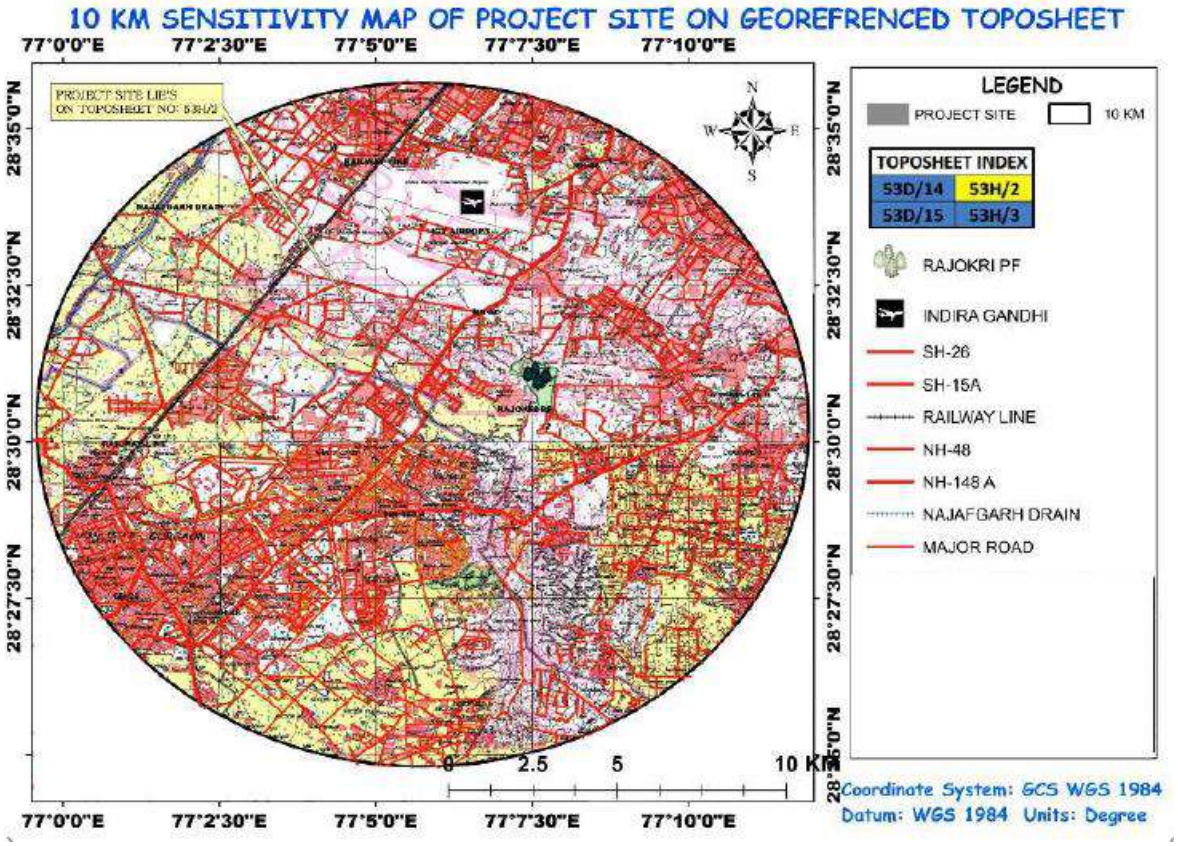


Figure 3. 2: 10 KM Sensitivity Map of the project site on Toposheet

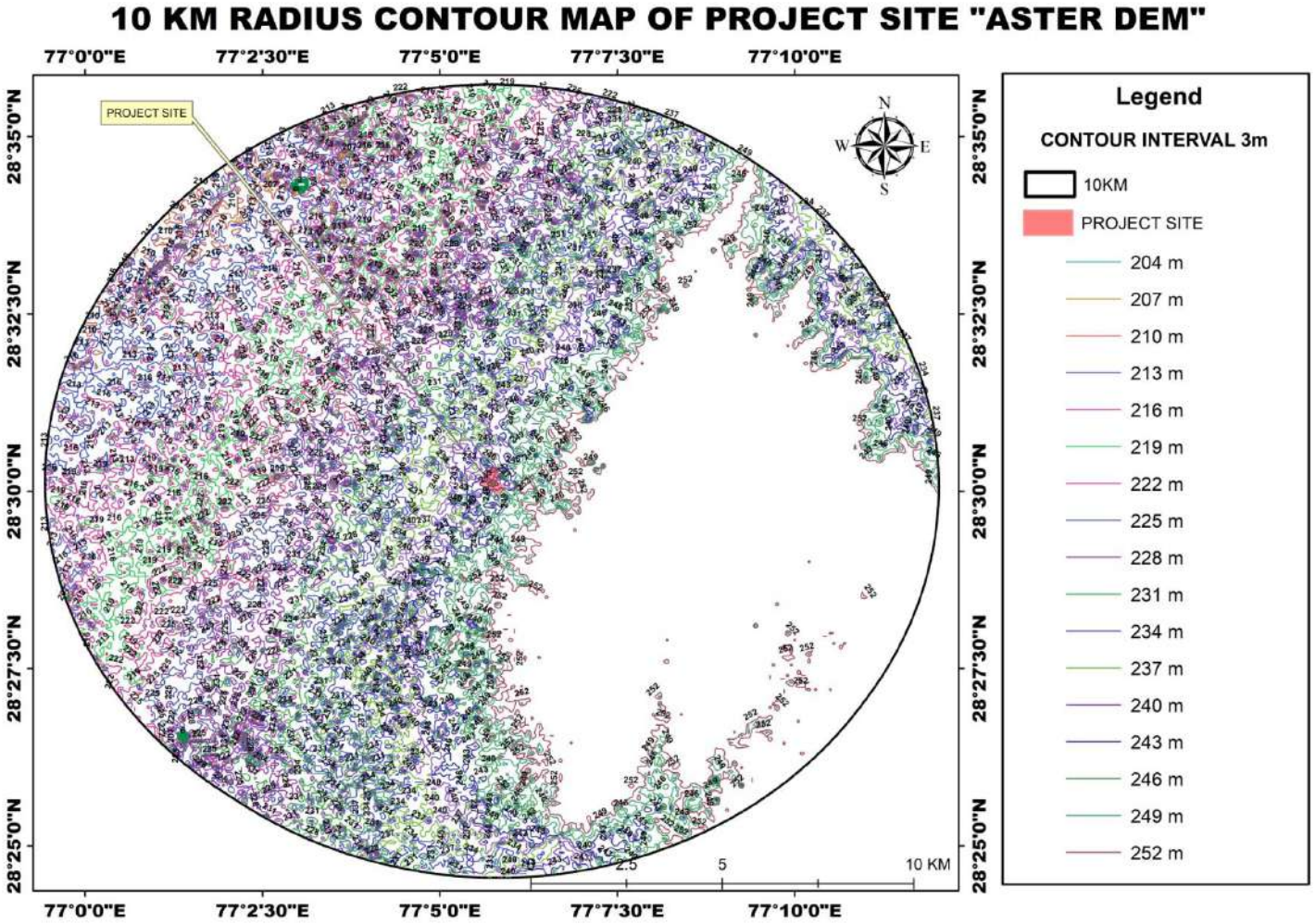


Figure 3. 3: Contour Map of 10 KM Radius

3.5.3 Drainage Pattern

The study area displays a variety of drainage pattern which is governed by the arrangement of lithological boundaries, drainage network and distribution of linear structural features such as faults, lineaments and thrusts.

- This drainage map is prepared in10 km radius area from the project site and which covers about 333 SqKm.
- After interpretation map reveals 4 no's of Drainage Orders.
- The Lease area & Surrounding area sloping towards 1st order Drainage (First Order)
- First order drainage (Blue Color) having characteristic situated at high elevation with smallest distance in comparison with other drainage in its drainage Basin.
- While Fourth order drainage (Red Colour) situated at lowest elevation and having greater length than other drainage in its drainage Basin.
- First, Second, & Third order of drainage successively meet to fourth order drainage which is the main channel of whole Catchment area and flows towards South West direction.
- Drainage map is showing dominantly Dendritic to sub dendritic drainage pattern.
- Drainage map showing system is controlled by Alluvial Terrain.

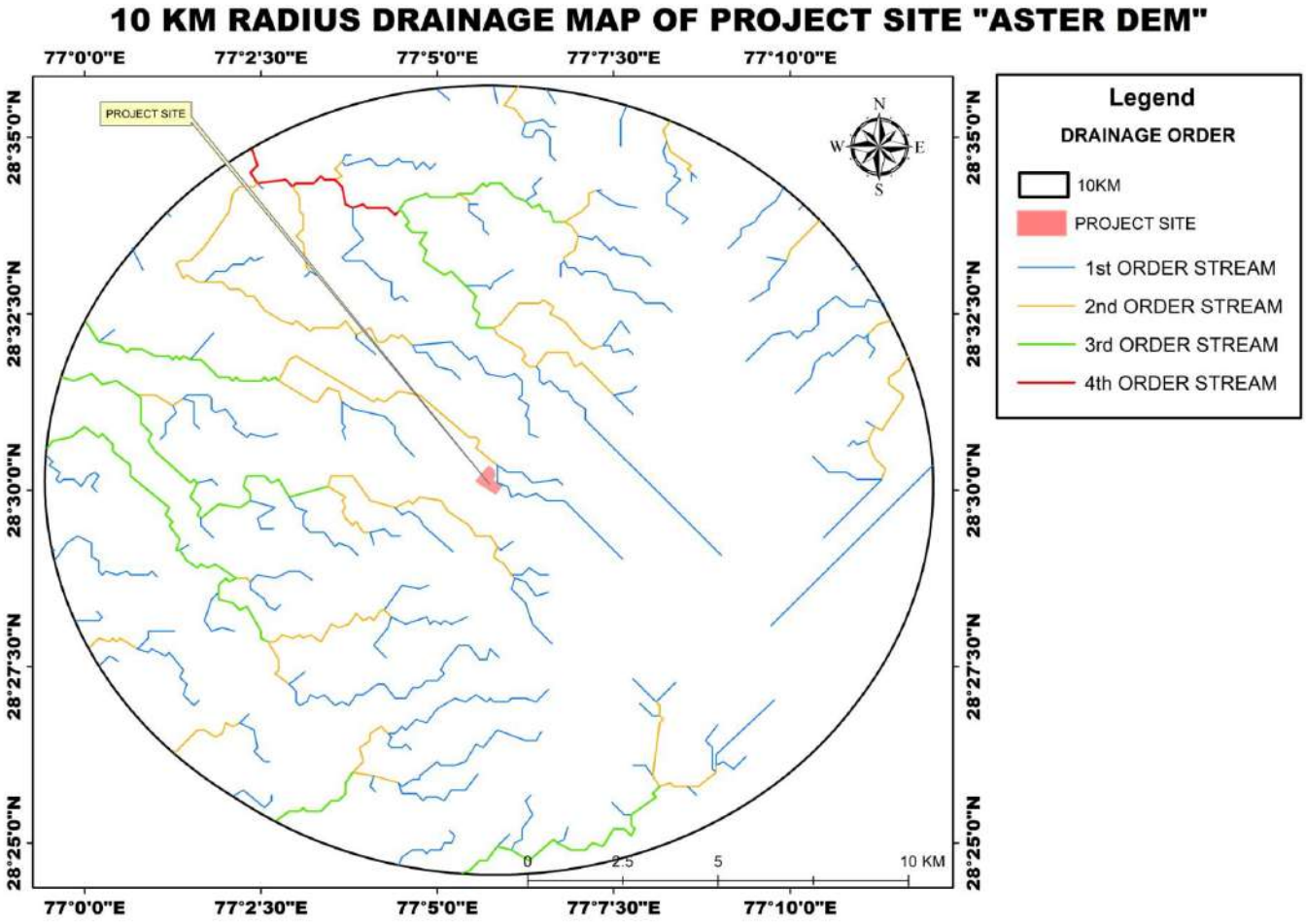


Figure 3. 4: Drainage Map of 10 KM Radius

3.5.4 Geology

The Gurgaon district is occupied by Quaternary alluvium and Pre-Cambrian meta- sediments of Delhi Super Group. The alluvium comprises of thick beds of fine to coarse-grained sand with alternating layers of thin clays.

3.5.5 Geomorphology

The area is conspicuously flat topography; however, in the north-eastern part small isolated hillocks of Precambrian rocks are exposed. The alluvial plain is formed by the sahibi river which is tributary of River Yamuna. Soils of the Gurgaon district are classified as tropical and brown soils, existing in the north western extreme, northern and north eastern parts of the district and water logged and salt affected soils in the southern parts of the district.

3.5.6 Hydrogeology

The major part of Gurgaon district is underlain by Quaternary alluvium consisting of sand, clay and silt. In Udyog vihar and city area the depth of first aquifer varies from 34 to 43 mbgl. The thickness of sandy layer is very limited. The drawdown is generally high indicating absence of highly potential ground water bearing aquifers. Tubewells in the depth range of 45 to 90 m bgl have been installed

by different agencies in the block. The yield of these tubewells varies in different areas ranging within 129 to 606 lpm.

A fence diagram was prepared on the basis of lithological log /Geophysical logging result showing fresh/ saline water interface and thickness of unsaturated zone (figure) .It is evident from the fence diagram that northwest part of the area has saline ground water and less thickness of unsaturated zone where as central part and eastern part are having fresh ground water. In western part of the block saline water occurs at a depth of about 70m below ground level. In sector 29 borehole, fresh ground water has been found up to about around 85m only below which quality of ground water deteriorates sharply.

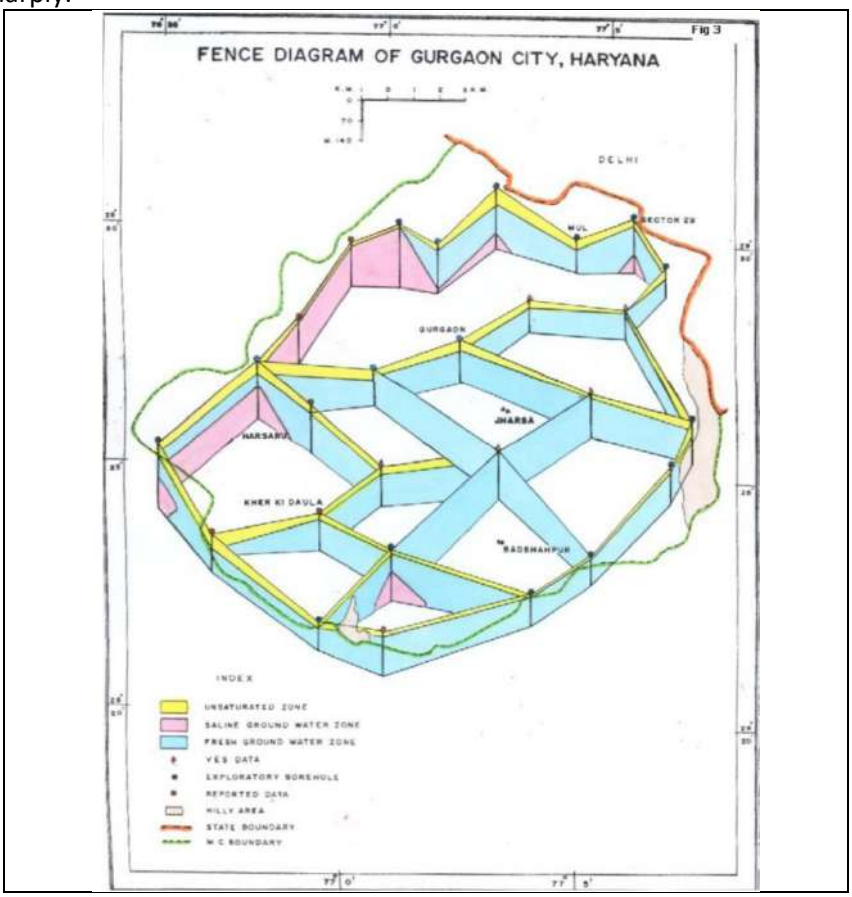


Figure 3. 5: Fence diagram of Gurgaon

(Source: http://cgwb.gov.in/District_Profile/Haryana/Gurgaon)

3.5.6.1 Ground Water Level Depth

The pre-monsoon depth to water level in the district ranges from 3.30 mbgl to 79.70 m bgl . The water level is deep in the northeastern, central and southeastern part of the district.

Pre-monsoon -

During the pre-monsoon the water levels of 40 key observation wells are monitored and the water level ranges between 3.30 to 79.70 m.bgl. The deeper water level is observed at Dundahera, Gurgaon. Water level is less than 10 m in small patches in northwestern and southeastern parts adjacent to Jhajjar and Faridabad district and between 10 and 20 m in northwestern and southeastern parts of the district. The water level ranges between 20 and 30 m in major parts viz. central southern and eastern parts of the district. Deeper water level has been observed in Gurgaon

and northern parts of Sohana blocks which is due to Infrastructural development and industrialization in these areas.

Post monsoon -
During the post-monsoon, the water levels range between 3.05 to 77.55 m.bgl. The deeper water level is recorded at Dundahera, Gurgaon.

3.6 SOIL QUALITY

3.6.1 Soil characteristics

Soil sample was collected from three locations, to assess the soil condition in the project influenced area and soil analysis was carried out as per guidelines of USDA and IS: 2720. The average analysis report of soil sample is presented in **Table-3.5.** In order to understand the physico-chemical properties of the region, soil sample was taken for one season i.e. Summer season. Soil quality monitoring location is shown in **Figure-3.6.**

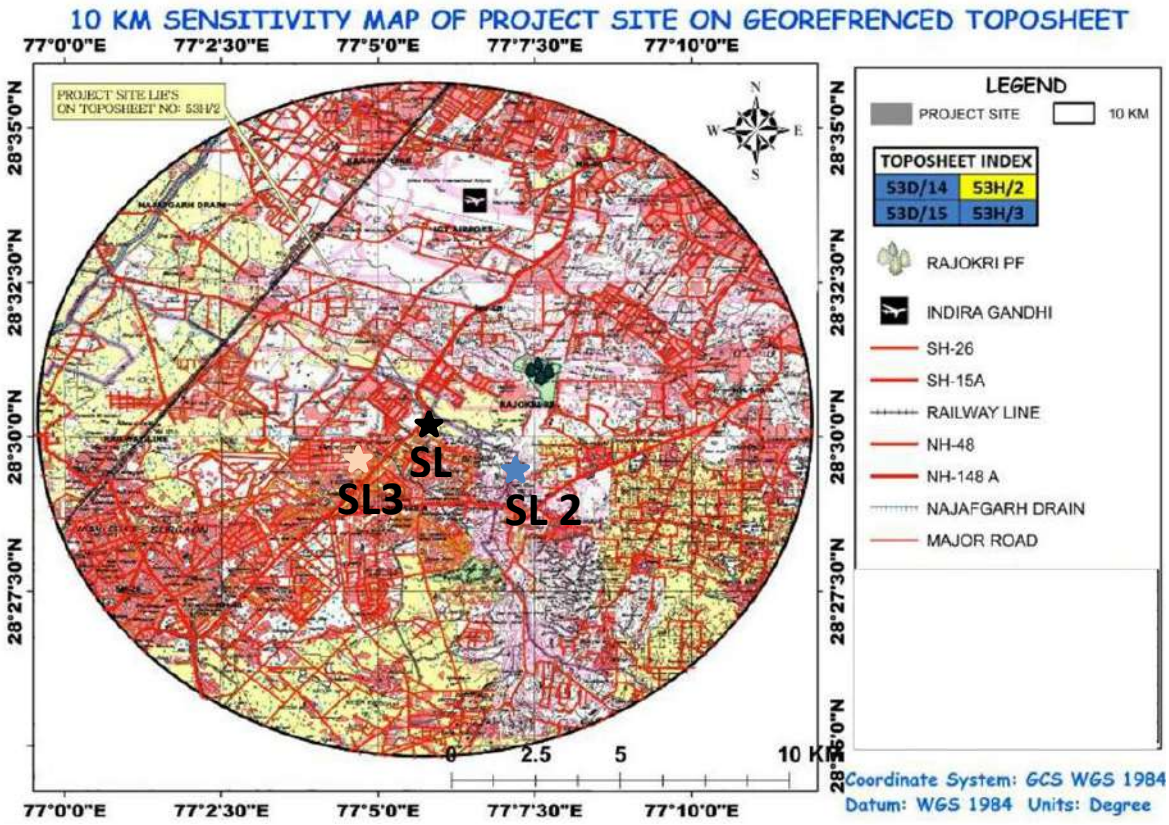


Figure 3. 6: Soil Quality Monitoring Location

Table 3. 4: Soil Quality Monitoring Location

S.	Code	Location	Coordinates	Distance

No				
1	SQ1	Project Site	28°30'7.79"N 77°05'40.60"E	--
2	SQ2	Govt. Boys Sr. Sec school, Ayanagar	28°28'36.63"N 77°07'48.60"E	4.08 KM SE
3	SQ3	Sanatan Dharm mandir, Sukhrali	28°28'37.76"N 77°03'27.18"E	4.42 KM SW

Table 3. 5: Soil Analysis Result

S. No.	Parameter	Test Method	SL_1	SL_2	SL_3	Unit
1.	pH	IS 2720 P-26 (1987)	8.35	8.26	8.22	--
2.	Conductivity	IS 14767 (RA 2016)	515.0	495.0	484.0	µS/cm
3.	Moisture	IS 2720 P-25 (1972)	13.7	13.2	13.0	% by mass
4.	Water Holding Capacity	IRDH/SOP-SL/07	18.4	17.5	17.0	%
5.	Specific Gravity	IS 2720 P-3 (1980)	1.95	1.94	1.93	-
6.	Bulk density	IRDH/SOP-SL/06	1.43	1.43	1.41	gm/cc
7.	Chloride	IRDH/SOP-SL/14	309.0	285.0	261.0	mg/kg
8.	Calcium	IRDH/SOP-SL/17	1366.0	1345.0	1332.0	mg/kg
9.	Sodium	IRDH/SOP-SL/11	196.0	182.0	164.0	mg/kg
10.	Potassium	IRDH/SOP-SL/12	96.2	87.4	70.5	mg/kg
11.	Magnesium	IRDH/SOP-SL/16	226.0	215.0	192.0	mg/kg
12.	Organic matter	IS 2720 P-22 (1972)	0.58	0.56	0.54	% by mass
13.	Cation Exchange Capacity (CEC)	IRDH/SOP-SL/09	14.6	14.4	14.2	meq/100gm
14.	Available nitrogen	IS 14684	50.5	48.2	42.5	mg/kg
15.	Available Phosphorous	IRDH/SOP-SL/10	8.7	8.2	7.76	mg/kg
16.	Iron as Fe	IRDH/SOP-SL/22	2115.0	2106.0	2090.0	mg/kg
17.	Copper as Cu	IRDH/SOP-SL/21	30.4	28.0	26.0	mg/kg
18.	Zinc as Zn	IRDH/SOP-SL/20	44.0	38.0	36.5	mg/kg
19.	Texture	IRDH/SOP-SL/08				% by mass
	Sand		58.6	58.2	57.8	
	Slit		16.3	17.0	17.6	
	Clay		25.1	24.8	24.6	
20.	Sodium Adsorption Ratio(SAR)	IRDH/SOP-SL/13	1.29	1.21	1.11	By calculation

(**Source: Primary data (Sample Collected & tested by IR&DH, Noida))**

3.6.2 Observations

Remark:
The soil sample has been taken from Three different locations (SL1, SL2 & SL3) and analyzed.
Physical Characteristic:
pH of all the soil samples taken ranges between 8.22 – 8.35 which shows that soil is alkaline in nature.
The texture class of soil samples collected from all the sites reveals that soils are sandy clay in nature.
Bulk density of soil sample ranges between 1.41 to 1.43gm/cc which confirm moderately fine texture of soil of area under study.

Chemical Characteristic:
The EC of soil sample varies from 484.0 – 515.0 µS/cm which falls under average category. The organic matter for all soil sample range between 0.54-0.58% which is average sufficient. The available nitrogen varies from 42.5 to 50.5 mg/kg showing very good nitrogen content, Phosphorous content varies between 7.76 to 8.7 mg/kg which falls under less category.
The potassium content falls in range of 70.5 to 96.2 mg/kg.
The calcium and magnesium content range between 1332.0-1366.0 mg/kg and 192-226mg/kg respectively. While exchangeable cation range between 14.2 to 14.6 meq/100 gm for all the sample.

3.7 AIR ENVIRONMENT

The prime objective of the baseline air quality study is to assess the existing air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the project operations.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling. The ambient air quality was monitored at five locations in and around the existing airport. The air quality monitoring was conducted as per revised NAAQS 2009.

3.7.1 Meteorological Data from Secondary Sources

Meteorological conditions prevailing at a geographical area play an important role in determining its existing air quality and environmental conditions. Climate, seasons and other meteorological parameters influence and alter site-specific activities and operations. The meteorological data collected from secondary sources for the area are presented in the subsequent sections.

3.7.2 Temperature

Climatological data is used for devising baseline ambient air quality monitoring plans. **Table 3.6** & **Table 3.7** presents the minimum and maximum temperature profile of the region (data collected at MET Station Palam, New Delhi) for the period 1997 to 2011 from Indian Meteorological Department (IMD), Lodhi Road, New Delhi. As per the data given in **Table 3.6** and **Table 3.7**, the study area experienced averaged extreme lowest temperature 5.9° C in the month of December, 2005 and extreme highest 42.6°Cin the month of June, 2009 respectively.

Table 3. 6: Averaged Minimum Temperature Profile (1997 to 2011) –Met station Palam

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	6.6	9.2	15.2	20.4	24.4	25.9	27.4	25.8	25.2	19	14.2	9.2
8	7.2	11.2	14.4	22.9	27.9	28.1	27.1	26.4	26.1	21.6	14.9	8.9
9	8.5	9.6	14.3	20.9	26.8	27.9	27.8	26.9	25.7	19.6	13.1	7.4
2000	7.6	9	14.2	22.5	27.4	27.6	26.2	26.5	24.5	20.2	14	7.1
1	6.1	9.4	14.8	21.3	26.3	26.4	27.3	26.5	24.8	20.4	12.8	8.5
2	7	9.6	15.4	23	27.2	28.6	30.7	27.2	23.5	20	13.2	8.9
3	6.6	11	15.1	22.2	25.7	29.6	26.3	26.5	25	18	11.8	10.1
4	7.9	9,9	16.3	23.3	26.1	27.1	28.6	26.2	24.9	19.5	13.2	9.3
5	7.1	10.9	17.3	20.6	25.9	28.4	27.2	26.9	25.1	18.6	12.3	5.9
6	6.6	13.3	15.5	22.7	26.8	27	28.2	26.8	24.5	20.4	14.2	18.7
7	6.4	12.3	15.1	22.9	26.3	28.3	27.4	26.9	25.5	17.7	13.6	8.2
8	6.3	8.3	17.3	21.6	25	26.2	26.9	26.3	24.4	21.2	13.8	10.6
9	8.8	11	16.5	22.5	27	29	28.2	27.5	25.2	19.7	14.4	9.7
2010	8.5	11.7	18.8	25.7	28.7	28.8	27.5	26.4	24.3	21.3	15.8	8.6
2011	7	11.3	16.3	21.1	27.2	27.3	27.2	26.6	25	20	15.6	8.8

Source: India Meteorological Department (IMD), Regional Meteorological Centre, Lodhi Road, New Delhi - 110003

Table 3. 7: Averaged Maximum Temperature Profile (1997 to 2011) –Met station Palam

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	20.3	23.7	28.7	33.7	38.7	37.5	36.1	33.7	35.2	29.1	25.4	17.1
8	19.6	23.3	27.2	37.1	42.6	39.8	34.7	33.5	33.9	31.4	27.6	22.1
9	18.6	23.7	31.4	39.6	41.1	39.5	36.3	35.8	34.0	33.3	29.5	23.3
2000	20.2	21.6	29.9	39.2	40.8	37.6	33.6	34.5	34.8	35.2	29.4	24.1
1	19.1	25.2	30.8	36.3	39.6	35.6	34.9	35.5	37.3	34.7	29.7	23.4
2	20.4	24.0	31.3	39.6	41.8	39.7	40.5	35.2	32.3	34.0	28.9	24.6

3	17.0	23.2	30.0	38.3	40.8	41.1	34.1	33.6	32.7	33.1	28.1	20.5
4	18.4	25.2	33.7	38.8	39.5	38.3	38.5	33.5	35.7	30.9	28.6	22.7
5	19.5	22.8	30.8	37.1	40.6	40.9	34.2	35.8	33.7	32.8	28.9	22.0
6	21.8	29.6	29.7	38.1	40.3	38.5	35.2	35.4	34.7	34.0	28.9	22.9
7	21.5	24.5	28.1	38.8	39.7	38.6	36.2	35.0	34.8	33.8	29.0	22.1
8	20.0	22.5	33.3	36.9	37.7	34.7	34.8	33.4	33.6	34.1	28.7	23.8
9	21.1	25.6	31.7	37.4	41.0	42.6	38.0	36.0	34.3	33.7	27.8	23.8
2010	19.2	25.7	34.6	41.5	42.4	41.7	35.7	33.6	31.0	33.1	27.5	22.1
2011	19.2	24.5	30.6	36.3	41.3	38.9	35.4	34.4	33.8	33.5	29.6	23.5

Source: India Meteorological Department (IMD), Regional Meteorological Centre, Lodhi Road, New Delhi – 110003

3.7.3 Precipitation

Table 3.8 shows averaged monthly rainfall during last fifteen years in Delhi. The maximum mean monthly rainfall for year 2003 is 495.6 mm and occurs during July while the mean minimum monthly rainfall of 0.0 mm takes place in the month of October, November and December of 2008.

Table 3. 8: Rainfall Data for Last Fifteen Years in Delhi (Palam)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	6.3	1.4	13.4	28.6	43.1	80.3	70.2	295.3	23.9	52.8	15.7	51.4
8	1	23	16.7	4.4	6.1	107.1	166.6	186.6	131.8	49.4	9.5	0
9	65.7	2.5	6.3	0	9.3	36.4	143.5	24.5	73.1	8	0	0
2000	17.4	44.7	5.3	2.6	32.7	96.8	232.1	127.7	27.5	0	1.4	1.5
1	23	11.2	6.5	27.9	88.3	150.2	99	77.1	15.4	29.9	0.5	0.5
2	16.9	11.1	0	0	150.7	13.1	1.7	121.3	124.2	0	0.9	16.1
3	39.2	24	2.1	0	9.9	75.2	495.6	171.2	52.3	0	0.3	18.7
4	28.4	0	0	28.3	73	16.8	65.8	218.6	2.9	76.7	0	0
5	5	39.7	19.7	7.9	5.6	100.2	295.4	107.5	293.5	0	0	0
6	1.8	0	25.1	3.4	44.6	53.9	107	103.2	186.9	3.4	0.2	8.2
7	0.7	63.5	53	1	50.3	148.8	126.3	177.2	9.1	0	0	0.3
8	0.7	0.3	0	27.3	148.6	153.1	149.5	169.6	76.5	0	0	0
9	4.1	5.8	7.5	3.1	15.5	18.6	113.6	142.1	184.6	2.8	13.2	3.1
2010	0.7	11.2	0	7.5	12.8	9.2	203	362.3	344	1.3	27.2	3.7
2011	0.2	38.8	2.8	10	22.6	120.4	67.1	144.5	320.6	0	0	0

Source: India Meteorological Department (IMD), Regional Meteorological Centre, Lodhi Road, New Delhi – 110003

3.7.4 Cloud Cover

The historical data of cloud cover have been obtained from the Indian Meteorological Department (IMD). **Table 3.9** and **Table 3.10** provide the details of cloud cover data of morning hours and evening hours of Safdarjung, New Delhi.

Table 3. 9: Cloud Cover Data for Last Fifteen Years of Delhi (Safdarjung), Morning Hours (8.30 IST)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	2	1	4	2	2	3	5	5	3	3	3	6
8	3	3	3	2	1	4	5	6	3	2	1	4
9	6	3	1	0	2	2	5	4	4	1	0	2
2000	4	2	1	1	1	3	6	4	3	0	1	1
1	4	1	2	2	3	4	6	4	1	1	0	2
2	3	2	2	1	3	6	4	4	0	1	1	1

3	5	2	2	2	1	3	6	4	4	0	1	1
4	6	2	0	2	1	3	4	5	1	2	1	3
5	4	3	2	1	2	3	5	3	4	0	0	1
6	2	2	3	2	2	4	5	4	2	1	0	3
7	2	3	2	1	2	4	5	5	3	0	0	2
8	3	2	2	2	3	6	6	5	3	0	0	2
9	3	2	2	1	2	2	4	4	2	1	-	-
2010	5	2	1	1	1	3	5	6	5	0	2	1
2011	5	2	2	1	1	4	6	5	4	0	1	1

Source: India Meteorological Department (IMD), Regional Meteorological Centre, Lodhi Road, New Delhi - 110003

Table 3. 10: Cloud Cover Data for Last Fifteen Years of Delhi (Safdarjung), Evening Hours (17.30 IST)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	2	2	4	3	3	4	6	5	4	4	4	4
8	3	3	4	3	2	4	5	6	3	2	1	0
9	4	3	2	0	2	3	5	5	4	1	1	1
2000	2	2	1	1	2	4	6	6	3	0	1	1
1	1	2	2	-	3	5	6	5	2	1	0	1
2	2	3	2	3	3	3	4	6	3	0	1	2
3	3	2	-	1	2	4	6	6	5	0	1	2
4	2	1	0	2	2	4	6	6	2	2	1	2
5	3	4	3	2	4	3	6	3	4	0	0	1
6	3	2	2	2	2	3	6	3	4	0	0	1
7	3	3	3	1	3	3	6	5	3	0	1	2
8	4	1	2	2	3	5	6	6	4	1	0	2
9	6	2	2	2	3	3	5	5	2	1	-	-
2010	3	3	1	1	2	3	6	6	5	1	2	2
2011	0	3	1	1	2	3	6	6	5	1	2	2

Source: India Meteorological Department (IMD), Regional Meteorological Centre, Lodhi Road, New Delhi – 110003

3.7.5 Wind Speed and direction

Wind direction is reported as the direction from which the wind blows and is based on surface observations. Over the course of a year, wind usually blows in all directions with varying frequencies. Certain directions, which occur more frequently than others, are known as the prevailing wind directions.

The wind data has been obtained from nearest IMD station for the period 1993-2002. The Analysis of wind records during 1993 – 2002 shows that the winds are generally light to moderate in this area. It can be seen that the Monthly mean wind speed varies from 1.9 to 14.2 Km/h. The strongest winds are observed during the months of May – June i.e., Summer Season and the weakest during October –

November. The monthly mean values of the various meteorological parameters for the period 1993-2002 and Year wise monthly mean value from year 2000 to 2005 are presented in **Table 3.11.**

Table 3. 11: Monthly Mean Wind Speed in KMPH (Year 1993 – 2005)

Year	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993-2002	6.7	7.2	8.02	7.9	9.4	8.9	7.6	8.0	6.6	3.9	4.2	5.19
2000	7.2	6.7	6.3	7.9	12.3	8.0	7.1	8.0	7.4	3.4	4.3	5.2
2001	7.6	7.7	7.5	8.0	9.5	7.0	8.0	9.8	5.0	0.8	1.9	3.6
2002	3.4	7.0	7.2	7.3	8.5	8.0	14.2	6.8	5.8	3.9	4.3	4.3
2003	5.7	7.3	7.9	8.4	8.5	8.6	6.2	6.2	5.1	4.1	5.4	5.7
2004	6.6	8.9	9.6	8.3	11.8	8.3	10.0	7.1	7.2	3.2	3.6	6.0
2005	6.9	8.0	6.7	8.7	7.2	9.1	7.1	10.8	5.3	4.1	5.6	5.3

Statistics mean monthly wind data for the Year 2009 – 2012 is shown below in **Table-3.12**

Table 3. 12: Monthly Mean Speed in KMPH (Year 2009 – 2012)

Month of year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	SUM
Dominant Wind dir	WNW	WNW	WNW	WNW	WNW	WNW	E	ESE	WNW	WNW	WNW	W	WNW
Wind probability > = 4 Beaufort (%)	5	10	10	12	13	19	10	9	8	4	2	2	8
Average Wind speed (Knots)	6	7	8	8	8	9	7	7	7	6	5	5	6

Source – http://www.windfinder.com/windstats/windstatistic_delhi_indira_gandhi_airport.htm#

3.7.6 Atmospheric stability

The amount of turbulence in the ambient air has a major effect upon the rise and dispersion of air pollutant plumes. The amount of turbulence can be categorized into

defined increments or "stability classes". The most commonly used categories are the Pasquill stability classes A, B, C, D, E, and F. Class A denotes the most unstable or most turbulent conditions and Class F denotes the most stable or least turbulent conditions. The frequency of stability classes during the monitoring period is provided in **Table 3.13.**

Table 3. 13: FREQUENCY OF STABILITY CLASSES

Stability Class	Frequency (%)
A – Extremely Unstable	18.6
B – Unstable	16.3
C – Slightly Unstable	5.8
D – Neutral	6.5
E – Slightly Stable	12.1
F – Stable to Extremely Stable	40.7

The data indicate that during the monitoring period, the site exhibited trends of Slightly unstable to unstable conditions. Stable conditions exhibit poor vertical mixing, and low levels of contaminant dispersion. Use of this stability data for modeling purposes will produce higher concentrations of pollutants at a given receptor (i.e., more conservative results).

3.7.7 Averaged Meteorological Data

The meteorology of the area plays an important role in the air quality surveillance programmes. The micrometeorological parameters regulate the transport and diffusion of pollutants into the atmosphere. The Meteorological study has been carried at the project site for one season i.e., March 2022 to May 2022. The measurements of wind speed and direction, temperature, humidity and rainfall are important parameters used in the study of air quality monitoring results and to further understand the chemical reactions that occur in the atmosphere. Meteorological monitoring is used to predict air pollution events such as inversions, high pollutant concentration days.

3.7.8 Windrose

Wind speed and wind direction data recorded during the study period (March 2022 to May 2022) is useful in identifying the influence of meteorology on the air quality of the area. Based on the collected meteorological data, relative percentage frequencies of different wind directions are calculated and plotted as wind roses of eight directions viz., N, NE, E, SE, S, SW, W and NW for eight hourly and twenty four hour duration respectively. Maximum and minimum temperatures including percentage relative humidity were recorded simultaneously. A windrose has been plotted for average of 24 hours for 3 successive months that shows the predominant wind direction and has been presented in **Figure-3.7.**

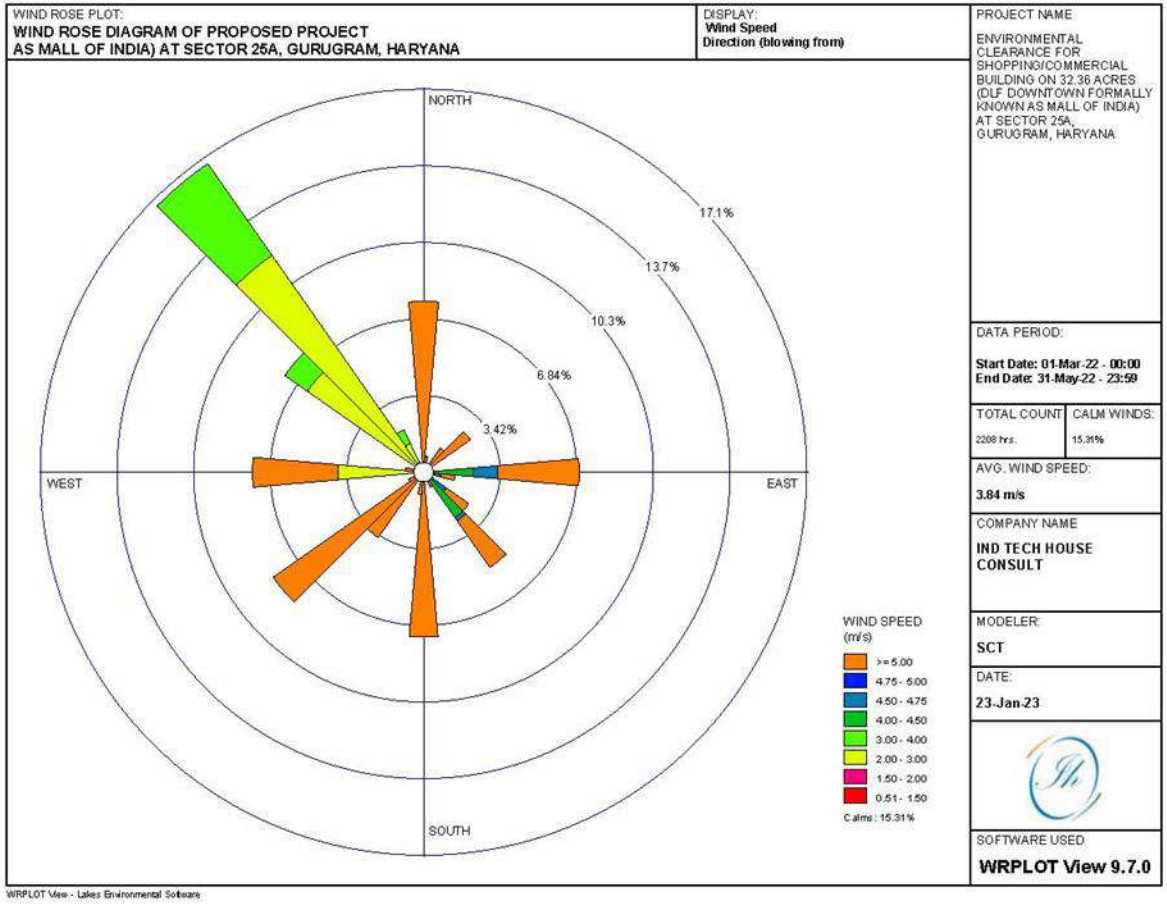


Figure 3. 7: Windrose of the project site for period of March 2022 to May 2022

- Wind direction is NW to SE and Average wind speed was in 3.84 m/s.

3.8 AMBIENT AIR QUALITY

The prime objective of collecting baseline air quality data is to assess the ambient air quality of the project influenced area. Ambient air quality monitoring locations were selected based on the representation of population, material and ecosystem exposure monitoring for the pollutants emitted from the project and the compliance monitoring for compliance of National Ambient Air Quality Monitoring Standards. The baseline study of air quality within the project-influenced area of 10 km has been carried out by selecting the monitoring locations based on the following criteria:

- Meteorological condition on a synoptic scale
- Topography of the project influenced area
- Representation of the regional background levels
- Representation of the site
- Influence of the existing sources
- Major human settlement in the project influenced area

3.8.1 Ambient Air Quality Monitoring

Ambient air quality monitoring (24 hrs –average result for monitoring period) has been carried out during one season i.e., March 2022 to May 2022 at five locations. The parameters for air quality were selected as per the stipulated National Ambient Air Quality standards, MoEF&CC and these were Particulate Matter less than 2.5 µg/m^3 ($PM_{2.5}$), Particulate Matter less than 10 µg/m^3 (PM_{10}), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Carbon Monoxide (CO) etc. were monitored and average results are as tabulated in **Table-3.15**. Map showing the ambient air quality monitoring locations is shown in **Figure-3.8**.

Table 3. 14: Air Quality Monitoring Locations

S. No	Code	Location	Coordinates	Distance
1	AAQ1	Project Site	28°30'07.79"N 77°05'40.60"E	--
2	AAQ2	Govt. Boys Sr Sec school, Ayanagar	28°28'36.63"N 77°07'48.60"E	4.08 KM SE
3	AAQ3	MCD Primary School, Kapashera	28°31'29.17"N 77°04'57.55"E	2.56 KM NW
4	AAQ4	Govt. Boys Sr Sec school, Rajokri	28°31'04.13"N 77°06'34.27"E	1.95 KM NE
5	AAQ5	Sanatan Dharm Mandir, Sukhrali	28°28'37.76"N 77°03'27.18"E	4.41 KM SW

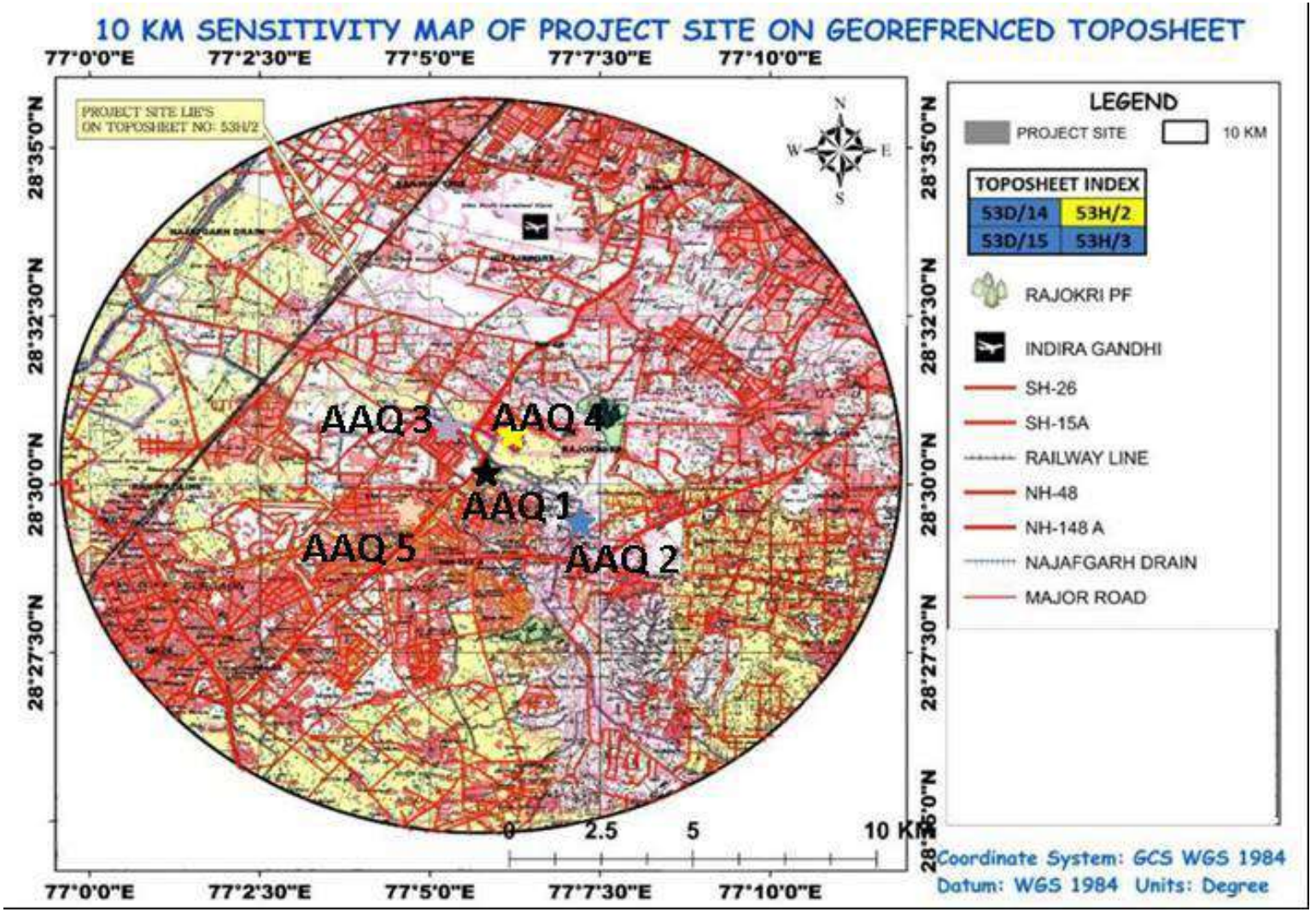


Figure 3. 8: Ambient Air monitoring locations

Table 3. 15: Ambient Air Quality Results

S. No.	Parameters	AQ-1	AQ-2	AQ-3	AQ-4	AQ-5	NAAQS
1.	PM10 (µg/m3)	166.50	159.38	169.08	155.46	162.92	100
2.	PM2.5 (µg/m3)	84.33	79.71	87.58	77.88	83.08	60
3.	NO2 (µg/m3)	26.40	25.63	27.31	25.45	26.75	80
4.	SO2 (µg/m3)	9.53	8.97	10.02	8.68	9.21	80
5.	CO (mg/m3)	1.12	1.11	1.13	1.10	1.12	2

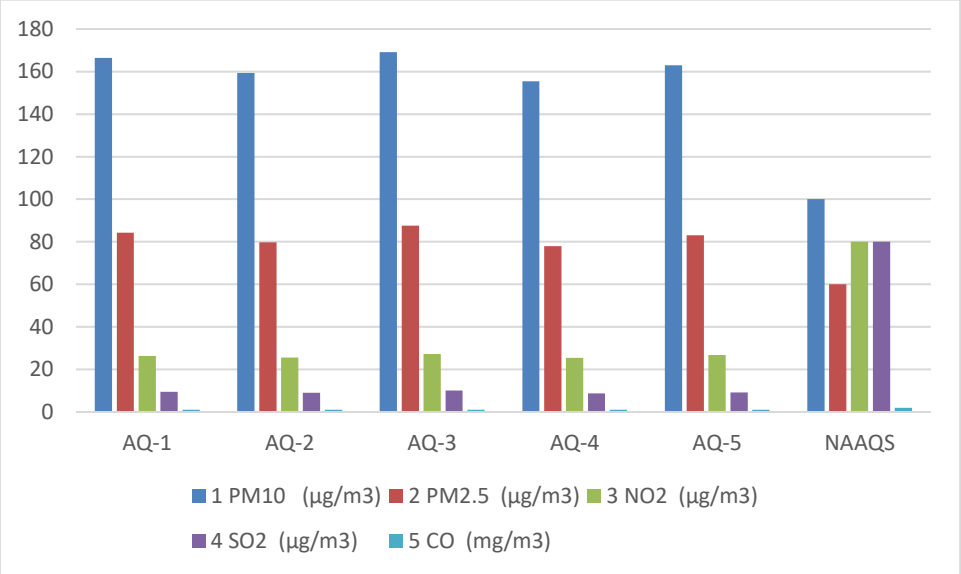


Figure 3. 9: Ambient Air monitoring Result

Table 3. 16: Ambient Air Quality Results (AAQ – Monitoring Station-1)

Minimum	86.00	50.00	6.10	16.60	1.01
Maximum	262.00	140.00	13.70	35.10	1.25
98th Percentile	253.72	129.88	13.42	34.46	1.24
Average Values	166.50	84.33	9.53	26.40	1.12

Table 3. 17: Ambient Air Quality Results (AAQ – Monitoring Station-2)

Minimum	89.00	51.00	6.20	15.30	1.03
Maximum	247.00	129.00	12.80	34.90	1.24
98th Percentile	241.94	125.78	12.52	34.30	1.24

Average Values	159.38	79.71	8.97	25.63	1.11

Table 3. 18: Ambient Air Quality Results (AAQ – Monitoring Station-3)

Minimum	93.00	62.00	6.40	17.70	<1
Maximum	272.00	150.00	13.80	35.20	1.25
98th Percentile	246.70	133.44	13.48	33.82	1.24
Average Values	169.08	87.58	10.02	27.31	1.13

Table 3. 19: Ambient Air Quality Results (AAQ – Monitoring Station-4)

Minimum	87.00	57.00	6.30	16.30	1.02
Maximum	239.00	122.00	13.30	33.50	1.22
98th Percentile	232.10	116.02	12.66	32.58	1.22
Average Values	155.46	77.88	8.68	25.45	1.10

Table 3. 20: Ambient Air Quality Results (AAQ – Monitoring Station-5)

Minimum	109.00	57.00	6.20	19.90	1.01
Maximum	231.00	135.00	13.40	33.40	1.23
98th Percentile	233.06	123.50	13.03	32.99	1.23
Average Values	162.92	83.08	9.21	26.75	1.12

3.8.2 Observations

It is observed that PM 10 and PM 2.5 exceed at all monitored locations and its continuous exposure to human being can have health impacts. All other parameters like SO_2, NO_2 and CO were found well within the NAAQS, 2009 limits as specified by CPCB.

Inference: PM 10 and PM 2.5 parameters of ambient air quality is higher in the entire region due to non-anthropogenic reasons like dust borne wind and due to anthropogenic reasons like some construction related activity and vehicle movement in the region.

3.9 WATER ENVIRONMENT

3.9.1 Water Quality Monitoring

During the survey samples of water within the periphery of 10 km radius were analyzed.

In order to assess the existing water quality, ground water sample was collected from nearby project site and analyzed as per standard methods for examination of water and wastewater published by American Public Health Association/ American Water Works Association and the Bureau of Indian Standards (APHA/ AWWA & BIS)

and compared with permitted desirable standards set by BIS (IS 10500:2012). The surface and ground water monitoring locations have been shown in **Table-3.21**. The important ground & surface water parameters were analyzed for one season i.e. Mar-2022 to May-2022 and the average results are produced in **Table-3.22, Table-3.23**

Table 3. 21: Water Quality Monitoring Location

S. No	Code	Location	Coordinates	Distance
1	SW1	Najafgarh Drain	28°32'39.31"N 77°00'37.63"E	9.34 KM NW
2	GW1	Sanatan Dharm Mandir, Sukhrali	28°28'37.76"N 77°03'27.18"E	4.42 KM SW

Table 3. 22: Surface Water Quality Monitoring Results (Najafgarh Drain)

S.NO.	Parameter	Test Method	Results	Units
1.	pH	IS 3025 P-11 1983	7.61	-
2.	Conductivity	IS 3025 P-14 1984	908.0	µs/cm
3.	Turbidity	IS 3025 P-10 (1984)	92.0	NTU
4.	Free Residual Chlorine	IS 3025 P-26 (1986)	<0.1	mg/l
5.	Total Hardness	IS 3025 P-21 (2009)	208.0	mg/l
6.	Total Dissolved Solids (TDS)	IS 3025 P-16(1984)	576.0	mg/l
7.	Calcium as Ca	IS 3025 P-40 (1991)	35.2	mg/l
8.	Magnesium as Mg	IS 3025 P-46 (1994)	29.16	mg/l
9.	Total Alkalinity as $CaCO_3$	IS 3025 P-23 (1986)	244.0	mg/l
10.	Chloride as Cl	IS 3025 P-32 (1988)	129.0	mg/l
11.	Barium as Ba	Annex F of IS:13428	<0.05	mg/l
12.	Ammonia as N	IS 3025 P-34 (1988)	<0.1	mg/l
13.	Sulphate as SO_4	IS 3025 P-24 (1986)	55.2	mg/l
14.	Nitrate as NO_3	IS 3025 P-34	26.5	mg/l

		(1988)		
15.	Fluoride as F	APHA 4500F⁻(D)	0.41	mg/l
16.	Iron as Fe	IS 3025 P-53 (2003)	0.62	mg/l
17.	Chemical Oxygen Demand(COD)	IS 3025 P-58 2006	150.0	mg/l
18.	Biochemical Oxygen Demand(BOD)at 27° C for 3 days	IS 3025 P-44 1993	34.0	mg/l
19.	Dissolve Oxygen	IS 3025 P-38 1989	2.2	mg/l
20.	Aluminium as Al	IS 3025 P-55(2003)	<0.01	mg/l
21.	Anionic Detergent	Annex K of IS:13428	<0.05	mg/l
22.	Phenolic Compounds	IS 3025 P-43 (1992)	<0.001	mg/l
23.	Boron as B	IS 3025 P-57 (2005)	<0.1	mg/l
24.	Chromium as Cr	IS 3025 P-52 (2003)	<0.01	mg/l
25.	Lead as Pb	IS 3025 P47 (1994)	<0.01	mg/l
26.	Copper as Cu	IS 3025 P42 (1992)	<0.01	mg/l
27.	Mercury as Hg	IS 3025 P-48 (1994)	<0.001	mg/l
28.	Manganese as Mn	IS 3025 P-59 (2006)	<0.01	mg/l
29.	Zinc as Zn	IS 3025 P-49 (1994)	<0.01	mg/l
30.	Arsenic as As	IS 3025 P-37 (1988)	<0.01	mg/l
31.	Nickel as Ni	IS 3025 P-54 (2003)	<0.01	mg/l
32.	Cadmium as Cd	IS 3025 P-41 (1992)	<0.001	mg/l

3.9.2 Observations Surface Water Quality

The tested Parameters mentioned in above report shows that the water samples fall “E” Category (Irrigation, Industrial Cooling, Controlled Waste disposal) as per CPCB guidelines for surface water sample

Table 3. 23: Ground Water Quality Monitoring Results

S No.	Parameter	Test Protocol	Results	Unit	Requirements as per IS 10500- 2012	
					Acceptable Limits (Max)	Permissible Limits (Max)
1.	pH	IS 3025 P-11 1983	7.91	--	6.5-8.5	No Relaxation
2.	Turbidity	IS 3025 P-10 (1984)	<0.5	NTU	1	5
3.	Total Hardness	IS 3025 P-21 (2009)	476.0	mg/l	200	600
4.	Total Dissolved Solids (TDS)	IS 3025 P-16(1984)	1034.0	mg/l	500	2000
5.	Calcium as Ca	IS 3025 P-40 (1991)	91.2	mg/l	75	200
6.	Magnesium as Mg	IS 3025 P-46 (1994)	60.26	mg/l	30	100
7.	Total Alkalinity as $CaCO_3$	IS 3025 P-23 (1986)	388.0	mg/l	200	600
8.	Chloride as Cl	IS 3025 P-32 (1988)	290.0	mg/l	250	1000
9.	Barium as Ba	Annex F of IS:13428	<0.05	mg/l	0.7	No Relaxation
10.	Ammonia as N	IS 3025 P-34 (1988)	<0.1	mg/l	0.5	No Relaxation
11.	Sulphate as SO_4	IS 3025 P-24 (1986)	86.5	mg/l	200	400
12.	Nitrate as NO_3	IS 3025 P-34 (1988)	31.4	mg/l	45	No Relaxation
13.	Fluoride as F	APHA,22nd Edition	0.33	mg/l	1	1.5
14.	Iron as Fe	IS 3025 P-53 (2003)	0.18	mg/l	1.0	No Relaxation
15.	Aluminium as Al	IS 3025 P-55(2003)	<0.01	mg/l	0.03	0.2
16.	Anionic Detergent	Annex K of IS:13428	<0.05	mg/l	0.2	1
17.	Phenolic Compounds	IS 3025 P-43 (1992)	<0.001	mg/l	0.001	0.002
18.	Boron as B	IS 3025 P-57 (2005)	<0.1	mg/l	0.5	2.4
19.	Chromium as Cr	IS 3025 P-52 (2003)	<0.01	mg/l	0.05	No Relaxation
20.	Lead as Pb	IS 3025 P47 (1994)	<0.01	mg/l	0.01	No Relaxation
21.	Copper as Cu	IS 3025 P42 (1992)	<0.01	mg/l	0.05	1.5
22.	Mercury as Hg	IS 3025 P-48	<0.001	mg/l	0.001	No Relaxation

		(1994)				
23.	Manganese as Mn	IS 3025 P-59 (2006)	<0.01	mg/l	0.1	0.3
24.	Zinc as Zn	IS 3025 P-49 (1994)	<0.01	mg/l	5	15
25.	Arsenic as As	IS 3025 P-37 (1988)	<0.01	mg/l	0.01	No Relaxation
26.	Nickel as Ni	IS 3025 P-54 (2003)	<0.01	mg/l	0.02	No Relaxation
27.	Cadmium as Cd	IS 3025 P-41 (1992)	<0.001	mg/l	0.003	No Relaxation

3.9.3 Observations (Ground water)

The ground water sample has been taken from one location The tested Parameters mentioned in above report shows that water can be used for drinking purpose in the absence of alternate source as few parameters such as Total Hardness, TDS, Ca, Mg, Total Alkalinity and Chloride exceed acceptable limits but, well within permissible limit of IS 10500-2012

3.10 NOISE ENVIRONMENT

The noise level prevailing at a particular location in the outdoor environment is contributed by all kinds of sources at various distances around that location. Continuous, temporal and spatial variations occur in ambient noise levels depending on the type of surrounding activities. The impact of noise on the health of individual depends on physical dose of noise viz. noise level, frequency, intermittency etc. and human factors viz. sex, age, health status, type of activity, occupational exposure etc. The intensity also depends on psychological and physiological state of individuals.

The impact due to noise does undergo seasonal variations except some directional changes depending upon the predominant wind direction. Noise levels have been measured for five locations. The baseline study of noise levels in the study area of 10 km has been carried out by selecting the noise monitoring locations based on the following criteria:

- Source of noise
- Proximity of the noise generating source to the human settlements
- Exposure time
- Time-scaled dose response ratio of individual receptor

Table-3.24 provides primary sources and effects of Noise Pollution at site during the construction and operation phases.

Table 3. 24: Primary Effects of Noise Pollution from Construction & Operation Activities of the Site

Pollutant	Source	Primary Effects
Noise	▪ Construction activities ▪ Transport ▪ Human activities	▪ Annoyance ▪ Interference with communication ▪ NIHL ▪ Interference with sleep ▪ Aural pain, nausea & reduced muscular control ▪ Performance effects ▪ Effects on social behavior

Source:http://www.epa.nsw.gov.au/soe/97/ch1/15_3.htm

3.10.1 Noise Quality

Methodology of Background Noise Quality Monitoring

A site–specific background noise quality monitoring program was conducted for the existing project site.
The basic considerations for designing noise quality surveillance programme include:

- Vehicle Movement Within the Impact Zone
- Activities in surrounding villages / settlements/nearby areas

Based on the above-mentioned criteria, noise monitoring was conducted at 5 locations within the impact zone. Sound Pressure Level (SPL) measurements were automatically recorded to give the noise level for every hour, continuously for 24 hours in a day. Accordingly, one full day (i.e., 24 hourly values) of data was collected at each of the locations.

The standards of equivalent noise levels viz. L_{eq}-day and L_{eq}-night, have been prescribed by the CPCB as given in **Table-3.25**.

Table 3. 25: Ambient Noise Standards as per CPCB

Area Code	Category of Area/ Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night-time shall mean from 10.00 p.m. to 6.00 a.m.

3. Silence zone is defined as an area comprising not less than 100 m around hospitals, educational institutions and courts. The silence zones are zones, which are declared as such by the competent authority.

Noise levels were calculated using the following equation:

Where L_i = levels $L_{eq,T} = 10\log\left(1/n\sum_{i=1}^{n}10^{\frac{L_i}{10}}\right)$ observed at n equally spaced times during interval T.

Sources of Noise Emissions Surrounding the Site

The major source of noise in the site surrounding area is the vehicular movement along Southern peripheral road and construction activities in the vicinity of the site. The impacts from these sources are expected to be captured in the levels of noise measured in the site-specific background noise monitoring study.

Noise Level in the Project Influence Area

Baseline monitoring of noise was carried out at five selected monitoring locations for 24 hours considering. The monitoring average results have been summarized in the **Table-3.27**. Map showing the noise quality monitoring locations with coordinate is shown in **Figure-3.10**.

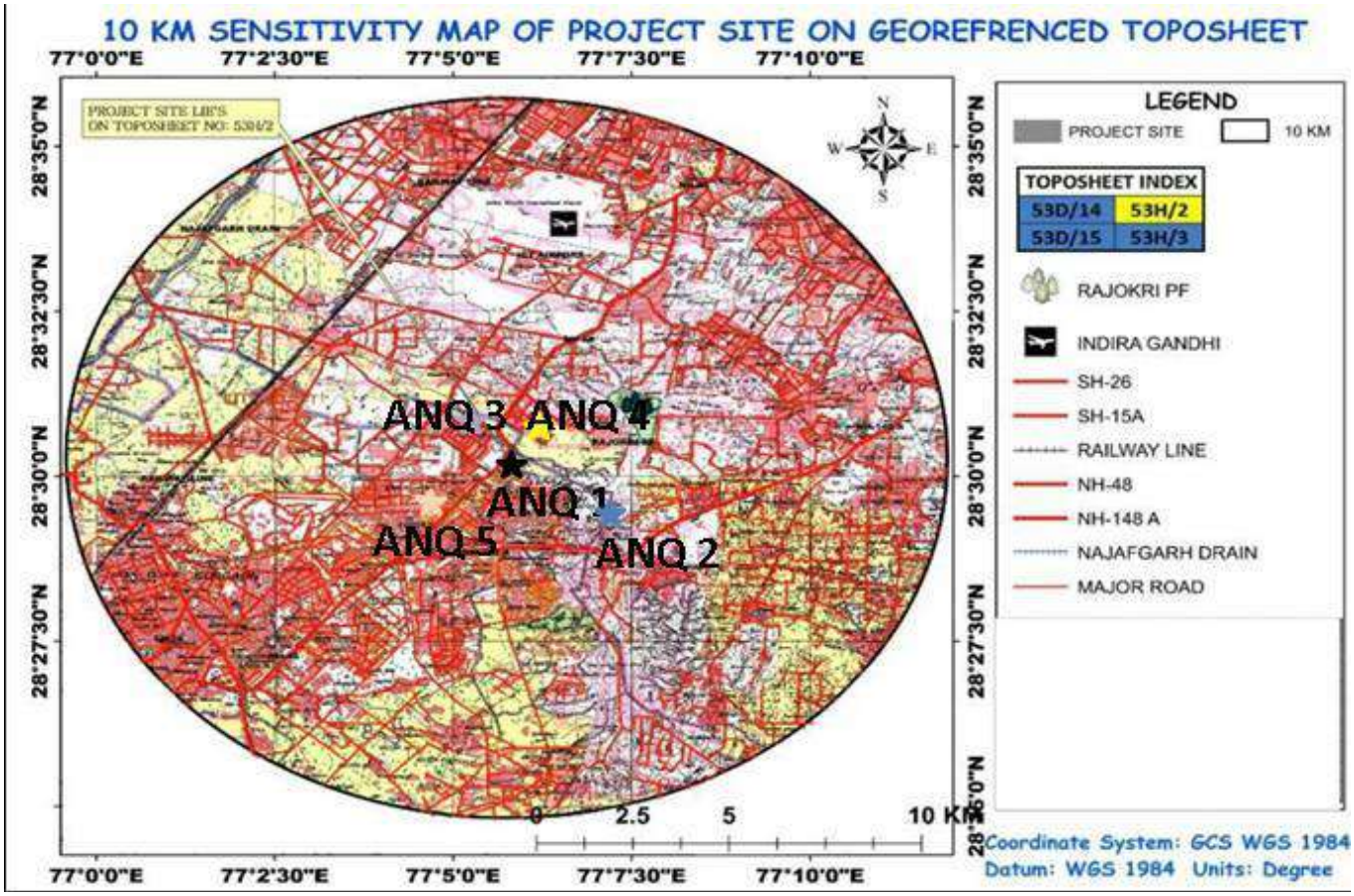


Figure 3. 10–Noise Monitoring locations

Table 3. 26–Noise Monitoring locations

S. No	Code	Location	Coordinates	Distance
1	ANQ1	Project Site	28°30'07.79"N 77°05'40.60"E	--
2	ANQ2	Govt. Boys Sr Sec school, Ayanagar	28°28'36.63"N 77°07'48.60"E	4.08 KM SE
3	ANQ3	MCD Primary School, Kapashera	28°31'29.17"N 77°04'57.55"E	2.56 KM NW
4	ANQ4	Govt. Boys Sr Sec school, Rajokri	28°31'04.13"N 77°06'34.27"E	1.95 KM NE
5	ANQ5	Sanatan Dharm Mandir, Sukhrali	28°28'37.76"N 77°03'27.18"E	4.41 KM SW

Table 3. 27: Noise Monitoring Results

LOCATION	DAY TIME		NIGHT TIME	
	Leq dB(A)	Limit dB(A)	Leq dB(A)	Limit dB(A)
NQ-1	53.28	65	42.32	55

NQ-2	50.24	50	41.16	40
NQ-3	51.63	50	41.80	40
NQ-4	50.71	50	40.34	40
NQ-5	51.20	50	40.79	40

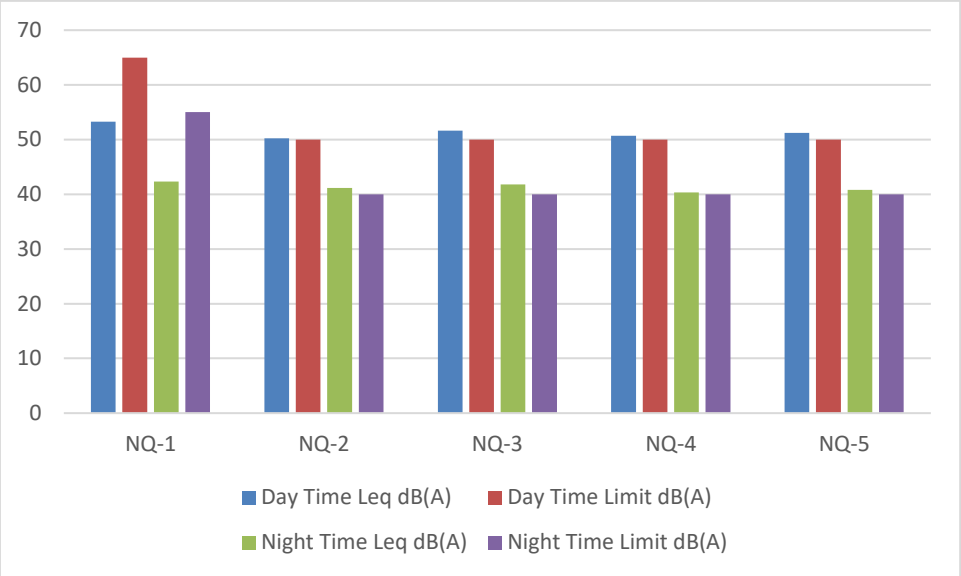


Figure 3. 11: Noise Monitoring Result

3.10.2 Observations

It is observed that the noise quality of the project site found within limit in day and night. Leq for day is lying between 53.28 to 50.24 dB(A) and Leq for Night is lying in between range of 40.34 to 42.32 dB(A).

3.11 BIOLOGICAL ENVIORNMENT

The basic purpose of exploring the biological environment under Environmental Impact Assessment (EIA) is to assist the decision making and to ensure that project option under consideration is environmental friendly. An Ecological survey of study area was conducted particularly with reference to listing of species and assessment of existing baseline ecological condition in study area. The main objective of ecological survey were aimed at assessing the existing flora and fauna component to study area to understand the possible impact on biological environment caused by proposed project activity and to formulate if necessary the appropriate mitigation/preventive measures for such impact. Data for same has been collected through secondary source and by site visit.

- ***Scope Aim and Objectives of the Study:***

1. To inventories the floral and faunal components of the project area (Project site or core zone and 10 km radius buffer zone)

2. To locate demarcate and understand ecological setting of the project area in term of National Park/Wildlife sanctuary/Reserve Forest/ Eco sensitive area/wetland etc within 10 km radius of project site (if any).
3. To identify schedule-I, rare, endemic and endangered species within the study area and prepare conservation plan for the same.
4. To identify impact zone and evaluate the likely impact of the proposed project on floral and faunal component of project study area.
5. To suggest/prepare action plan to mitigate likely impact on biodiversity of project area through plantation around project area.

The information present in this chapter has been collected through field study, consultation with local people and collation of available literature with various institution and organization. The summary of data collected from these sources as a part of EIA study is outlined. With change in environmental condition the vegetation cover as well as animal reflects several changes in it's structure, density and composition respectively.

- ***Survey Methodology:***

For field assessment i,e primary data collection, a standard statistical sampling method was followed. The sampling design followed random sampling method and sampling area was decided based on prior land use map of the project influence zone outlining forest area and other type of habitat, topographic features and built up area.

Field study: The detailed ecological survey was carried out in the following two zones of project area:

- **Core zone:** At the project site.
- **Buffer zone:** Around the project site in 10 km radius.

- ***Flora***

Methodology for Floral Study:

1. Secondary Literature Survey:

Published literature including those from relevant organization like the Botanical Survey of India (BSI) and Wildlife Institute of India (WII, Dehradun). The respective forest department of the state concerned etc research papers, articles; book and reliable website available within and adjacent to study area were compiled and invented as "Secondary Floral Diversity Database".

2. Primary Field Survey:

Primary field survey was carried out using sample plot method and Quadrate sampling technique. which includes identification of square sample plot unit of suitable size for detailed analysis of

vegetation so it is also called as Sample Plot Method it may be a single sample plot or divided into several subplots. Random sampling methods was used for the study. The size of each quadrate for Herb survey was 1m x 1m, for shrubs it was 10-20 m^2 and for tree it was 100 m^2 field identification of the species and later identification through photograph were followed.

General Vegetation Pattern- The climatic, edaphic and biotic variations with their complex interrelationship and composition of species, which are adapted to these variations, have resulted in different vegetation cover, characteristic of each region (Ohasi,1975). The tree species, herbs, shrubs, climbers and major crops, were documented during this baseline study. The prevailing vegetation cover over the area is mainly of tropical dry deciduous forest as per Champion & Seth (1968) "Classification of Forest type of India"

Core Zone- The Core Zone of the project is devoid of any kind of vegetation except for some grasses and scattered bushes

Buffer Zone-There is no protected forest area in this zone The vegetative community of the area is mainly under open scrub forest and because of urbanization area is usually surrounded with planted varieties e.g, Neem (*Azadirachta indica*), Safeda (*Eucalyptus*), Peepal (*Ficus religiosa*),Shisham (*Delbergia sissoo*),etc. The prominant grass species is *Cyanodondactylon.*

Trees: The dominant trees in and around the study area are Listed below in the **Table 3.28**

Table 3. 28: Dominant Trees In and Around the Study Area

S.No.	Botanical Name	Common Name	Family
1	*Albizzia lebbeck*	Siris	Fabaceae
2	*Aegle marmelos*	Bel	Rutaceae
3	*Azadirachta indica*	Neem	Meliaceae
4	*Acacia nilotica*	Babool	Fabaceae
5	*Anogeissus latifolia*	Dhau	Combretaceae
6	*Acacia catechu*	Khair	Fabaceae
7	*Artocarpus heterophyllus*	Jackfruit	Moraceae
8	*Bauhinia purpurea*	Kachnar	Fabaceae
9	*Butea monosperma*	Palash	Fabaceae
10	*Bombax ceiba*	Semur	Malvaceae
11	*Cassia fistula*	Amaltas	Caesalpiniaceae
12	*Callistemon lanceolatus*	Bottle Brush	Myrtaceae
13	*Carrisa karandas*	Karaunda	Apocyanaceae

S.No.	Botanical Name	Common Name	Family
14	*Delbergia sisso*	Sheesham	Fabaceae
15	*Delonix regia*	Gulmohar	Caesalpeniaceae
16	*Diospyrus cardifolia*	Bistendu	Ebenaceae
17	*Emblica officinalis*	Amla	Euphorbiaceae
18	*Eucalyptus sp.*	Safeda	Myrtaceae
19	*Ficus palmeta*	Anjeer	Moraceae
20	*Ficus racemosa*	Goolar	Moraceae
21	*Ficus virens*	Pakad	Moraceae
22	*Ficus benghalensis*	Bargad	Moraceae
23	*Ficus religiosa*	Pipal	Moraceae
24	*Ficus infectoria*	Pilkhan	Moraceae
25	*Morus alba*	Sahtoot	Moraceae
26	*Mangiifera indica*	Aam	Anacardiaceae
27	*Madhuca longifolia*	Mahua	Sapotaceae
28	*Mimusops elengii*	Moulasari	Sapotaceae
29	*Moringa oleifera*	Sahajan	Moringaceae
30	*Polyalthia longifolia*	Asoka	Annonaceae
31	*Phoenix sylvestris*	Khajoor	Arecaceae
32	*Pongamia pinnata*	Karanj	Fabaceae
33	*Pithecolobium dulce*	Jungle Jalebi	Fabaceae
34	*Prosopis julifera*	Khejri	Fabaceae
35	*Psidium guajava*	Amrood	Myrtaceae
36	*Populus ciliata*	Poplar	Saliaceae
37	*Syzygium cumini*	Jamun	Myrtaceae
38	*Terminalia arjuna*	Arjun	Combretaceae
39	*Terminalia bellirica*	Bahera	Combretaceae
40	*Thevetia peruviana*	Kaner	Apocyanaceae
41	*Tamarindus indicus*	Imli	Fabaceae
42	*Tectona grandis*	Teak	Lamiaceae
43	*Ziziphus mauritiana*	Ber	Rhamnaceae

Source: On the basis of primary site visit and in consultation with Local Peoples and concerned State forest department

Herbs Shrubs & Grasses: The species observed in the study area are listed below in the in the **Table 3.29.**

Table 3. 29: Herbs, Shrubs & Grasses Observed in the Study Area

S.No.	Botanical Name	Common Name	Family
HERBS			
1	*Aloe vera*	Ghrit Kumari	Liliaceae
2	*Achyranthus*	Chirchita	Amaranthaceae
3	*Amaranthus gracilis*	Cholai	Amaranthaceae
4	*Argemone maxicana*	Satyanasi	Papavaraceae
5	*Ageratum conyzoides*	Gandhauri Ghas	Asteraceae
6	*Calatropis procera*	Madar	Asclepiadaceae
7	*Chenopodium albus*	Bathua	Amaranthaceae
8	*Dhatura inoxia*	Dhatura	Solanaceae
9	*Euphorbia hirta*	Dudhi	Euphorbiaceae
10	*Ocimum sanctum*	Tulsi	Lamiaceae
11	*Parthenium hysterophorus*	Gajar Ghas	Asteraceae
12	*Solanum nigrum*	Makoi	Solanaceae
13	*Tribulus terrestris*	Gokaharu	Zygophyllaceae
14	*Jatropha curcas*	Ratanjyot	Euphorbiaceae
SHRUBS			
1	*Abutilon indicum*	Kanghi	Malvaceae
2	*Bougainvellia glabra*	Bougainvellia	Nyctaginaceae
3	*Cestrum nocturnum*	Raat Rani	Solanaceae
4	*Carrisa carandas*	Karaunda	Apocyanaceae
5	*Citrus aurentifolia*	Lime	Rutaceae
6	*Ipomea*	Besharam/Behaya	Convolvulaceae
7	*Lawsonia inermis*	Mehandi	Lytharaceae
8	*Mimosa pudica*	Chui Mui	Fabaceae
9	*Riccinus communis*	Arandi	Euphorbiaceae
10	*Sacchrum munja*	Moonj	Gramineae
11	*Tridax procumbens*	Baramasi	Asteraceae
12	*Vinca rosea*	Sadabahar	Apocyanaceae
GRASSES			
1	*Andropogan annulatus*	Gandra	Poaceae
2	*Cyanodon dactylon*	Dub	Poaceae
3	*Cymbopogan martini*	Lemon Grass	Poaceae
4	*Desmostachya*	Kusha	Poaceae

Source: On the basis of primary site visit and in consultation with Local Peoples and concerned State forest department

Economically Important Flora of Study Area:

Agricultural Crops: The climatic condition of a region affect the agricultural cropping pattern of different are. Thus it produce different crop. Amongst the host of climatic factor i,e rainfall, temperature, Humidity, Wind Velocity, and duration of sunshine affect the cropping pattern in

significant way, Annual rainfall and it's distribution over the entire year and regimes of diurnal and annual temperature are by far the prominent factor affecting agriculture and life style of people. Cropping pattern is shown in Table-

Crop	Name	Season
Rabi	Wheat,Gram,Mustard Seeds,Potatoes,Onion	September-April
Kharif	Paddy,Maize,Bajra,Groundnut,Sugarcane, Rice	June-October

Different fruits like Banana, Papaya, Mangoes, and Vegetables like potatoes, chilli, brinjal, cauliflower, capsicum is also grown by local peoples. The consultation with local peoples reveals that farmers are cultivating the improved varieties in the fields.

Table 3. 30: Vegetables of the Study Area

Capsicum annum	Chilly	*Solanum tuberosum*	Potato
Zinziber officinale	Ginger	*Coriandrum annum*	Coriander
Allium cepa	Onion	*Allium sativum*	Garlic
Vitis vinifera	Grapes	*Daucus carota*	Carrot
Solanum melongena	Brinjal	*Pisum saivum*	Pea
		Solanum lycopersicum	Tomato

Source: On the basis of primary site visit and in consultation with Local Peoples and concerned State forest department.

Rare, Endangered & Endemic Species: No rare, endangered or endemic species of flora is recorded from core area as well as buffer zone of the project site.

- ***Fauna***

Methodology for Faunal Study:

1. Secondary Literature Survey:

Published literature including those from relevant organization like the Zoological Survey of India (ZSI) and Wildlife Institute of India (WII, Dehradun). The respective forest department of the state concerned etc research papers, articles, book and reliable website available within and adjacent to study area were compiled and invented as" Secondary Faunal Diversity Database".

2. Primary Field Survey:

Several survey techniques such as Random walk and opportunistic observation were used for documenting the faunal species. For Avian diversity assessment Point Count Method, was used, the

radius of each point was 50 mt, For Mammalian, Amphibian and Reptilian diversity assessment direct observation and indirect evidence/sign such as dung, dropping, scats, pugmarks, scratch sign, burrows and nest survey were done in the field site. Identification of species was done on site or through photograph and with help of field book or other reliable sources.

Core Zone-The core zone of the project area doesn't have any unique faunal community as the habitat and environmental conditions of core area is similar to buffer zone so some faunal species from buffer zone frequently visit to core zone in search of food.

Buffer Zone-The species observed in buffer zone (10 Km around the project area) are listed in the table 3.31

Table 3. 31: Faunal Biodiversity of Study Area

S.No.	ZOOLOGICAL NAME	COMMON NAME	FAMILY	STATUS IN WPA 1972	STATUS IN IUCN CATEGORY
MAMMALS					
DOMESTIC SPECIES					
1.	*Felis catus*	Domestic Cat	Felidae	Schedule II	Least Concern
2.	*Sus scrofa*	Pig	Suidae	Schedule III	Least Concern
3.	*Bos taurus*	Cow	Bovidae	Not Enlisted	Not Evaluated
4.	*Canis lupus*	Dog	Canideae	Not Enlisted	Not Evaluated
5.	*Capra aegagrus hircus*	Goat	Bovidae	Not Enlisted	Not Evaluated
6.	*Bubalus bubalis*	Buffalo	Bovidae	Not Enlisted	Not Evaluated
7.	*Herpetes edwardsii*	Nevala	Herpestidae	Schedule II	Least Concern
WILD SPECIES					
8.	*Funambulus pennantii*	Gilhari	Sciuridae	Schedule IV	Least Concern
9.	*Rattus rattus*	Chuha	Muridae	Schedule V	Least Concern
10.	*Rousettus leschenaultii*	Indian Fruit Bat	Pteropodidae	Schedule V	Least Concern
11.	*Semnopithecus entellus*	Langur	Cercopethicidae	Not Enlisted	Least Concern
REPTILES					
12.	*Ptyas mucosus*	Common rat snake/Dhaman	Colubridae	Schedule II	Least Concern
13.	*Bungarus caeruleus*	Common Indian Krait	Elapidae	Schedule IV	Least Concern
14.	*Hemidactylus maculates*	Rock Gaeko	Gekkonidae	Not Enlisted	Not Evaluated
15.	*Chamaleo chamaleons*	Chameleon	Gekkonidae	Not Enlisted	Not Evaluated

S.No.	ZOOLOGICAL NAME	COMMON NAME	FAMILY	STATUS IN WPA 1972	STATUS IN IUCN CATEGORY
16.	*Hemidactylus brooki gray*	Chipkali	Gekkonidae	Not Enlisted	Not Evaluated
AMPHIBIANS					
17.	*Rana tigrina*	Common Frog	Ranidae	Schedule IV	Least Concern
18.	*Rana hexadactyla*	Indian Pond Frog	Ranidae	Schedule IV	Least Concern
19.	*Bufo bufo*	Toad	Bufonidae	Not Enlisted	Not Evaluated
BUTTERFLIES/INSECTS					
20.	*Delias eucharis*	Common jezebel	Pieridae	Schedule II	Least Concern
21.	*Danaus chrysippus*	Plain tiger	Nymphalideae	Schedule IV	Least Concern
22.	*Eurema hecabe*	Common grass yellow butterfly	Pieridae	Schedule II	Least Concern
23.	*Papilio polymnestor*	Blue mormon	Papilionidae	Schedule IV	Least Concern
24.	*Acheta domesticus*	Jhingur/Cricket	Gryllidae	Not Enlisted	Not Evaluated
25.	*Apis dorsata*	Honey Bee	Apidae	Not Enlisted	Not Evaluated

Source: On the basis of primary site visit and in consultation with Local Peoples and concerned State forest department.

Birds: The List of Avifauna present in and around the study area are listed below in the **Table:3.32**

Table 3. 32: Avifauna present in and around the study area

S.No.	ZOOLOGICAL NAME	COMMON NAME	FAMILY	STATUS IN WPA 1972	STATUS IN IUCN CATEGORY
1	*Gallus gallus*	Jungli Murghi	Phasianidae	Schedule IV	Least Concern
2.	*Achridotherus tristris*	Common Myna	Sturnidae	Schedule IV	Least Concern
3.	*Corvus splendens*	Crow	Corvidae	Schedule IV	Least Concern
4.	*Eudynamys scolopaceous*	Koel	Cuculidae	Schedule IV	Least Concern
5.	*Psittacula krameri*	Parrot	Psittaculadae	Schedule IV	Least Concern
6.	*Pycnonotus cafer*	Bulbul	Pycnonotidae	Schedule IV	Least Concern
7.	*Saxicoloides fulicatus*	Robin	Muscicapidae	Schedule IV	Least Concern
8.	*Ploceus philippinus*	Baya Weaver	Plocidae	Schedule IV	Least Concern

S.No.	ZOOLOGICAL NAME	COMMON NAME	FAMILY	STATUS IN WPA 1972	STATUS IN IUCN CATEGORY
9.	*Coturnix coturnix*	Bater	Phasianidae	Schedule IV	Least Concern
10.	*Vanellus indicus*	Red Wattled Lapwing	Charadriidae	Schedule IV	Least Concern
11.	*Bubulcus ibis*	Bagula	Ardeidae	Schedule IV	Least Concern
12.	*Bubo bubo*	Owl	Strigidae	Schedule IV	Least Concern
13.	*Ardeola grayii*	Pond Heron	Ardeidae	Schedule IV	Least Concern
14.	*Columba livia*	Pigeon	Columbidae	Not Enlisted	Least Concern
15.	*Passer domesticus*	Sparrow	Passeridae	Not Enlisted	Least Concern

Source: On the basis of primary site visit and in consultation with Local Peoples and concerned State forest department.

Table 3. 33: Number of Species Present as Per Schedule of Wildlife Protection Act 1972

S.No.	Schedule of Wildlife Protection Act 1972	Number of Species
1	Schedule I	0
2	Schedule II	5
3	Schedule III	1
4	Schedule IV	20
5	Schedule V	2
6	Schedule VI	0

CONCLUSION-

The biological environment in the surrounding of the study area is dominated by grasses with scattered tree/Shrub species, All the species reported from core zone are common and generally found in wide variety of habitat of the urban ecosystem of the study area, no endemic/endangered sp. were recorded from core area of the project site. Apart from that there is no Biosphere reserve, National Park, Wildlife sanctuary, Tiger Reserve or Elephant reserve are reported within 10 Km radius of project site and project area is also devoid of any breeding and nesting ground of any faunal species. So, it can be stated that proposed project and associated activities will not influence biodiversity of the area.

3.12 SOCIO ECONOMIC ENVIRONMENT

Socio economic study provides necessary help to get an idea of change in social, economic and cultural status of study area. Baseline data for Occupation Status and Health amenities existing in the study area has been collected by personal interaction/ secondary sources such as census/ statistics data etc. with the villagers in the study area and are given in the following subsections.

Any development activity like project generally has positive impact on the socio-economic profile of the study area. As part of the project there shall be direct and indirect employment opportunities. This project mainly affects the population in the nearby areas and will have positive influence as it will provide employment to the people.

1.2.3 Demographic Profile of District

An official Census 2011 detail of Gurgaon, a district of Haryana has been released by Directorate of Census Operations in Haryana. Enumeration of key persons was also done by census officials in Gurgaon District of Haryana.

In 2011, Gurgaon had population of 1,514,432 of which male and female were 816,690 and 697,742 respectively. In 2001 census, Gurgaon had a population of 870,539 of which males were 470,504 and remaining 400,035 were females.

There was change of 73.96 percent in the population compared to population as per 2001. In the previous census of India 2001, Gurgaon District recorded increase of 44.15 percent to its population compared to 1991.

Table 3. 34: Demographic Profile of the District

State Name	Number of Households	Total Persons	Males	Females
Haryana (06)	326,428	1,514,432	816,690	697,742
Population		**Persons**	**Males**	**Females**
Total		1,514,432	816,690	697,742
Literates		1,111,116	638,666	472,450
Illiterate		403,316	178,024	225,292
Total Worker		544,716	432,456	112,260
Non Worker		969,716	384,234	585,482

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

This chapter discusses identification and appraisal of various environmental impacts due to the proposed expansion project during the construction and operation phase. Generally, the environmental impacts can be categorized as either primary or secondary. For proper evaluation and assessment of the environmental impacts due to construction and operation phase of proposed project, understanding to the various activities associated with the proposed project is essential.

The impact identification and prediction process aims to:

- Identify potential source or cause of impact throughout the life of project.
- Characterize the potential impacts affecting a target or receptor (physical, human and socioeconomic).

The mitigation measures during construction and operational phases of the proposed expansion project are also described in the present chapter.

4.1 POLLUTION SOURCES

Pollutants generated during the construction and operation phase of the proposed development either be liquid, solid and gaseous in nature. The generation of pollution may be periodic, continuous or accidental. Potential sources of pollutants and their characteristics during the construction and operation phase are given below in **Table-4.1**.

Table 4. 1: Potential Pollutant Sources & Characteristics

S.No	Activity / Area	Pollutant	Pollutant Characteristics	Frequency
CONSTRUCTION PHASE				
1.	Site preparation and construction	Air emissions: PM_{10}, $PM_{2.5}$ CO, NO_2, SO_2	Dust from construction activities and excavation. Particulates, NO_2 and CO from vehicle exhaust	Temporary during construction phase emissions are expected from ground working and leveling activities.

S.No	Activity / Area	Pollutant	Pollutant Characteristics	Frequency
		Earth / solid waste	Solid waste from construction activity and excavation.	Periodic.
		Noise	Noise generated from construction equipment and machinery	Temporary during initial construction phase.
		Solid Waste	Solid Waste generated from labours	Temporary – during the initial construction phase
3	Vehicular movement	Air emissions and noise	Vehicle exhaust emissions	Continuous / Periodic
4	Diesel power generators	Air emissions	SO_2, NO_2, PM, CO from fuel burning	Continuous
		Noise	Noise due to running of equipment	Continuous
		Hazardous waste	Used Oil Generation	Periodic, during oil changes
OPERATION PHASE				
1.	Vehicular movement	Air emissions and noise	Vehicle exhaust emissions	Continuous / Periodic
2.	Diesel power generators	Air emissions	SO_2, NO_2, PM, CO from fuel burning	Continuous
		Noise	Noise due to running of equipment	Continuous
		Hazardous waste	Used Oil Generation	Periodic, during oil changes
3.	Commercial	Wastewater	Wastewater containing waste food matter	Continuous

S.No	Activity / Area	Pollutant	Pollutant Characteristics	Frequency
		Solid waste	Garbage / Food waste / other waste	Continuous
4.	Project area including common toilets	Sewage	wastewater – BOD, S.S, Pathogens	Continuous
		Solid Wastes	Bio-degradable and non-biodegradable wastes	Continuous – small quantities
5.	Raw water treatment	Wastewater	Backwash water discharge	Continuous
		Solid waste	Sludge from coagulation process	Continuous
6.	Sewage treatment Plant	Solid waste	Settled and stabilized sludge	Continuous
		Treated water	Treated sewage used for horticulture	Continuous
7.	Diesel Storage	Solid waste	Settled sludge during tank cleaning	Occasional
		Oil	Oil spillage – Accidental large spills due to pipe rupture Oil Spillage - Small quantities due to small pipe leaks	Accidental / Only due to poor housekeeping
8.	Maintenance/ housekeeping	Wastewater	Floor washing	Continuous
		Solid waste	Used equipment parts and garden wastes	Continuous
9.	Vehicle Parking Area	Oil Spills	Minor oil leaks in parking lot	Continuous – small quantities
10.	Storm water drains	Wastewater	Contamination discharge from site – Mainly suspended solids	During rainy season

4.2 ANTICIPATED IMPACTS AND MITIGATION MEASURES DURING CONSTRUCTION PHASE

4.2.1 Impact on Land

During construction phase there is procurement of material specially the construction material like bricks, cement, murrum, lining material, insulation bricks, HDPE pipes, backfill material, sand, clay, etc, which may change the characteristic of the soil in the construction area. In addition to that, municipal wastes due to construction workers, sewage & sludge from construction labour canteen and office at project site etc, contribute to changing the soil characteristics. Environment management plan have been adopted to mitigate the soil contaminations. Quantities of earthwork involved in cutting, filling, etc. The soil is being collected separately and preserved in stacks with side slopes not exceeding 3:1. Efforts have been made to reinstate the soil for backfilling purposes. 200 mm depth of top soil was excavated and preserved. The same has been preserved by proper covering or by seeding temporary grass.

The spillage of oil from the machinery or cement residue from concrete mixer plants might contaminate the soil if not properly collected and disposed off. Thus, most stringent safety and construction management norm have been implemented at site. The dripping of oil from construction vehicles might cause soil contamination. In order to prevent soil contamination likely to result from the oil spill and dripping from vehicles, drip pans have been placed at the parking places of vehicles and the dripped oil shall be collected and subsequently sent to the authorized recycling agencies.

Hazardous waste is being managed as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Apart from localized constructional impacts, no major adverse impact on the soil in the surrounding area is anticipated.

Mitigation Measures

- The topsoil (soil on the top 200 mm depth) has been collected & preserved separately in a stack covered by tarpaulin. Topsoil will be reused for horticultural areas.
- Sedimentation pits have been created
- Temporary gravel road at the site entrance has been provided
- No loose soil is being allowed to store at site to avoid runoff during rains. Proper compaction and stabilization will be ensured during filling and levelling.
- Hazardous waste such as used oil of DG sets is being collected and stored in leak proof containers and kept in isolated place and given to authorised recyclers of CPCB.
- Diesel and other fuels are stored in separate enclosures

- Colour coded dust bins have been placed at construction site so that segregation of waste could be done at source.
- All recycled material such as metal, paper, plastic wastes, is given to authorised recycler and construction waste (if any) is utilised within the site for levelling/ backfilling.

4.2.2 Impact on Water Quality

No bore-well exists within the site and within the vicinity of project site no designated perennial water body is present. Water requirement for construction phase is met by authorized water tanker. Development of the proposed site could lead to stockpiling and excavation activity on site, thereby causing erosion of base soil. The runoff from the site may contain high quantity of suspended solids (SS). The impact of runoff may not be very significant except during rainy season. Further construction of garland drains has reduced the runoff from the stockpiles.

Following are the most susceptible locations for contamination of water during construction:

- Waterlogged areas during the period of construction and erosion
- Ground water resources close to construction material storage yard, concrete mixer plants and maintenance sites of construction vehicles; and Leakage of lubricant or spill may cause water pollution of surface and ground water body.

Further, wastewater is being generated from the construction work force stationed at site.

Mitigation Measures

Following measures are being taken for water quality during construction phase:

- Efforts has been made to conserve the water
- Appropriate sanitation facilities have been provided for the construction workers to reduce impact on surface water quality.
- Entire waste water is treated and reused for landscaping & horticulture, flushing, HVAC activities and construction sites, where ever possible.
- Control of spillage of fuel oil and storage of oil barrels on cemented floor.
- Waste oil generated during maintenance of construction equipment is being collected and disposed to approved waste oil recyclers for recycling and reuse.
- Runoff from fueling area is passed through oil interceptor.
- A sediment trap has been provided to prevent the discharge of excessive suspended solids
- Municipal and other wastes generated at the proposed project is collected and disposed suitability as per standards practices and regulatory requirement.

- Suitable drainage network has been made to ensure proper draining of wastewater from the construction sites, so that such water do not form stagnant pools nor aggravate soil erosion.

4.2.3 Impact on Air Quality

Potential impacts on the air quality during the construction stage is due to the fugitive dust and the exhaust gases generated in and around the construction site due to DG set operation, vehicular movement, earthworks, foundation, drilling, grading and other construction related activities. The impacts are however marginal and temporary in nature and appropriate mitigation measures reduce the increased concentration levels due to the constructional activities.

Dust is major component of air pollution, generated mainly from the following construction activities:

- Site clearance and use of heavy vehicles and machinery / equipment etc. at construction site;
- Storage & Handling of construction materials such as sand, cement, etc. at the construction site;

Mitigation Measures

It is a better way to plant more trees to avoid air pollution along with proper maintenance of vehicles, DG sets, sprinkling of water on construction areas. In addition of this, following measures are being adopted:

- Regular sprinkling of water on construction site to suppress dust emissions.
- Temporary access roads leading to construction sites is sprinkled with water for dust suppression to reduce emission of dust.
- Only PUC holding vehicles are allowed to the project site to check proper maintenance to avoid air pollution.
- Covering of stored construction materials and trucks carrying construction material
- Wind breaker of 10 M height has been provided and green cover on built structure.
- Provision of wheel washing

4.2.4 Impact on Noise Quality

Due to the various construction activities such as loading and unloading, fabrication and handling of equipment and construction materials, there is short-term increase in noise level at the immediate vicinity of the project corridor. The construction activities include:

- Operation of DG sets, concreting and mixing

- Excavation for basements and foundations with excavator
- Construction plant and heavy vehicle movement.
- Piling and hammering activities

The areas affected are those close to the project site. At the peak of construction, increase in the noise level is expected to occur.

Table 4. 2: Typical Noise Levels from Construction Equipment

Description	Typical Noise Level Range , dB (A)	Reference Distance, m
Front loaders	72-84	1.0
Backhoes	72-93	1.0
Tractors	76-96	1.0
Scrapers, Graders	80-93	1.0
Pavers	86-88	1.0
Trucks (>1200 cc)	82-94	1.0
Concrete mixers	75-88	1.0
Concrete pumps	81-88	1.0
Crane (moveable)	75-86	1.0
Crane (derrick)	86-88	1.0
Pumps	69-71	1.0
Compressors	74-86	1.0

Overall, the impact of noise on the environment is insignificant, reversible and mainly confined to the day hours. Noisy construction activities are carried during the day time only and this effectively reduce the night time ambient noise level.

As per best practice all the noise generating activities have been undertaken during day hours and enclosure are provided wherever applicable to further minimize noise pollution.

These impacts are short term during construction phase, with provision of proper enclosures for high noise generation sources and use of proper personal protective devices i.e., ear plug and ear muff are marginalizing the impact.

Mitigation Measures

- Ear plugs and Ear muffs have been provided to the workers at construction site
- All the construction site has been provided with barricades;
- Provision of silencers at the exit of noise source on the machinery;
- Vehicles are properly maintained and serviced.
- Regular maintenance of construction equipment;
- Inlet and outlet mufflers have been provided which are easy to design;

4.2.5 Impact on Biological Environment

As the project was developed on barren land, no significant impact on flora and fauna is assessed.

4.2.6 Impacts on Solid Waste

The construction waste generated during construction phase at the project site is inert waste, mainly comprising of clay, sand, gravel, brick, concrete, concrete block, asphalt, pipes, conduits, steel waste etc. The solid wastes in terms of canteen wastes, food packet wrappers, paper, plastic drums, paints, oil containers etc. is being generated. This may cause for environmental degradation at the site as well at its immediate surroundings, if adequate measures are not taken.

In order to avoid any solid waste disposal problems, an effective solid waste management system is being implemented by different type of dustbins supporting the segregation at source. The domestic solid waste is being generated pertains to the two categories, Bio-degradable and Non-biodegradable. The Municipal solid waste and Hazardous wastes produced is handled as per regulation. Strict adherence to the established solid waste collection and disposal system ensures clean environment during construction period.

Mitigation Measures

- Waste management systems is in place to ensure the compliance with SWM, HWM, E-waste, C&D waste, battery waste etc. through Comprehensive Waste Management Plan.
- Dust bins have been placed at requisite locations at construction site and there is segregation of wastes before disposal
- All metal, paper, plastic wastes, debris and cuttings are collected from the site as soon as particular construction activity is over and sent to authorized agencies.
- The solid waste is disposed through authorized vendor.

4.2.7 Impacts on Socio-economic

The social impacts during the construction stage could result due to influx of some migrant workers and associated induced development etc. This has ensured a rise in the consumption of consumer goods in the local area, which tends to boost up the local economy.

As local labours have been hired from the villages in vicinity of the project site, initial conflict is not envisaged. As far as possible local labour within the project influenced area are utilized for the construction purpose and all the activities related to

construction worker is confined to the project site only, hence no adverse social impacts are envisaged due to the proposed expansion of the project.

4.3 ANTICIPATED IMPACTS AND MITIGATION MEASURES DURING OPERATION PHASE

During the Operation phase, there might be impacts on the air, water and land environment and socio-economic aspects. The subsequent sections present the adverse, beneficial, short term and long term impacts due to the operation of the proposed project.

4.3.1 Impact on Land

During the operation phase, impact on soil is envisaged due to handing of solid waste and hazardous waste at project site. Carefully designed landscaped areas and plantation will be maintained. Soil contamination shall be controlled by adopting proactive mitigation measures.

Mitigation Measures

- Adequate Green area will be developed and sludge generated from STP will be used as manure for green belt development.
- Waste management systems will be in place to ensure the compliance with SWM, HWM, E-waste, battery waste etc. through Comprehensive Waste Management Plan.
- Dust bins will be placed at requisite locations and there will be segregation of wastes before disposal
- Spill containment/ management program will be adopted in accordance to regulation

4.3.2 Impact on Water Quality

The water demand for the project will be sourced through MCG. The total water demand during operation phase is 3881 KLD. Out of this, total fresh water requirement (met from municipal supply) has been estimated as 1361 KLD. The balance water demand will be met through recycling of treated water from onsite STP. Rainwater harvesting structures will be developed to benefit the water resource at the project area.

All the sewage generated from the operation will be treated at the STP. Treated water will be used for HVAC makeup, toilet flushing and landscaping purposes which help in reducing and optimizing fresh water demand. The estimated wastewater generation during the operation phase will be 2364 KLD, which shall be treated in

onsite sewage treatment plant (STP) of capacity 3500 (2000 KLD existing+1500 KLD proposed) KLD. The STP will be provided with primary, secondary and tertiary treatment facilities and is based on MBR technology. **Table-4.3** below shows the expected wastewater as well as treated wastewater characteristics. The schematic flow diagram of the STP is shown as **Figure-4.1**.

Table 4. 3: Characteristics of Wastewater and Treated Water

Parameter	Inlet Characteristics	Outlet Characteristics
pH	6.0 to 8.5	5.5 to 9.0
B.O.D	250 to 400 mg/l	<10 mg/l
Total Suspended Solid	200 to 450 mg/l	<10mg/l
C.O.D	500-700 mg/l	50 mg/l
Ammonical Nitrogen		<5 mg/l
Nitrogen Total	-	<5 mg/l
Fecal Coliform (FC) (MPN/100 ml)	-	Desirable100, Permissible 230

About 2128 KLD of treated effluent will be generated, which shall be used in flushing and other purposes. This will reduce the water demand efficiently. Regular maintenance check shall be carried out by the project proponent staff. Hence no major adverse impact on the water environment is envisaged.

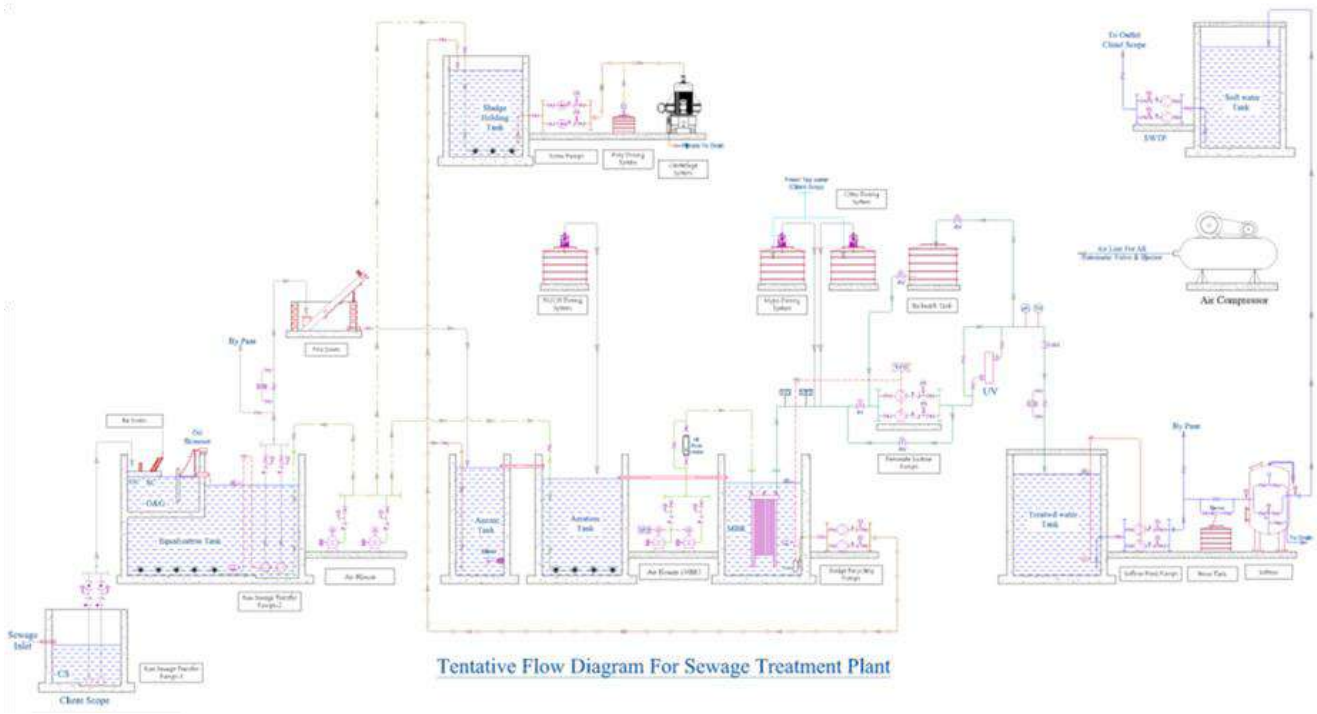


Figure 4. 1: Schematic flow diagram of STP proposed

Mitigation Measure

- Use of low flow fixtures and appliances for reduced water consumption such as low flush water closets and cisterns;
- Water saving shower with head flow controls, spray taps and faucet aerators and photo-sensitive taps will be considered;
- Sewage generated will be treated in the sewage treatment plant and reused for green belt development, cooling system to reduce the fresh water requirement;
- Ensure compliance of wastewater discharge/use to standards through existing treatment plant
- Waste oil generated will be collected and disposed to approve waste oil recyclers for recycling and reuse.
- The storm water from the roof top and paved areas will be routed to the water harvesting structures to recharge the ground water table:
- Use of plants in green cover that have minimal watering requirements;
- Drip and sprinkler irrigation system to minimize the water requirement for the site management;
- Municipal and other wastes generated at the proposed project will be collected and disposed suitability as per standards practices.
- Creating awareness among the employees on water conservation.
- Water assessment will be conducted during the project/operation to with the focus of water sustainability and water positive by applying effective water management programs.

4.3.3 Impact on Air Environment

During operation phase of project DG capacity provided of 67500 kVA (6 X 2250 + 18 X 3000 kVA) will be expected as the main air pollution sources. DG sets will be expected to run as back-up power supply during power failure. Thus, for air quality modeling study, it is assumed that the DG sets will be operated as on average four hours (09:00-12:00 Hrs) during daytime and four hours (19:00-22:00 Hrs) in the evening time per day. PM, SO_2, NO_2 and CO will be expected as prime criteria air pollutants during the operation phase of the project. The isopleths showing the concentration of PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO are shown in **Figure-4.2 through Figure-4.6** respectively. Modeling result envisages that incremental ground level concentrations of modeled pollutants during operation phase of proposed project during the operation phase are negligible. The resultant concentration level of SO_2, NO_2 and CO pollutants are expected to be well within the NAAQS.

Table 4. 4: Input Values for DG Modelling

DG Capacity	67500 kVA (6 X 2250 + 18 X 3000 kVA)
Model Source Type	Point Source
Model Used	Aermod 9.7.0
Stack Height	77.25 m
Stack Dia	0.45
Exit velocity	18 m/s

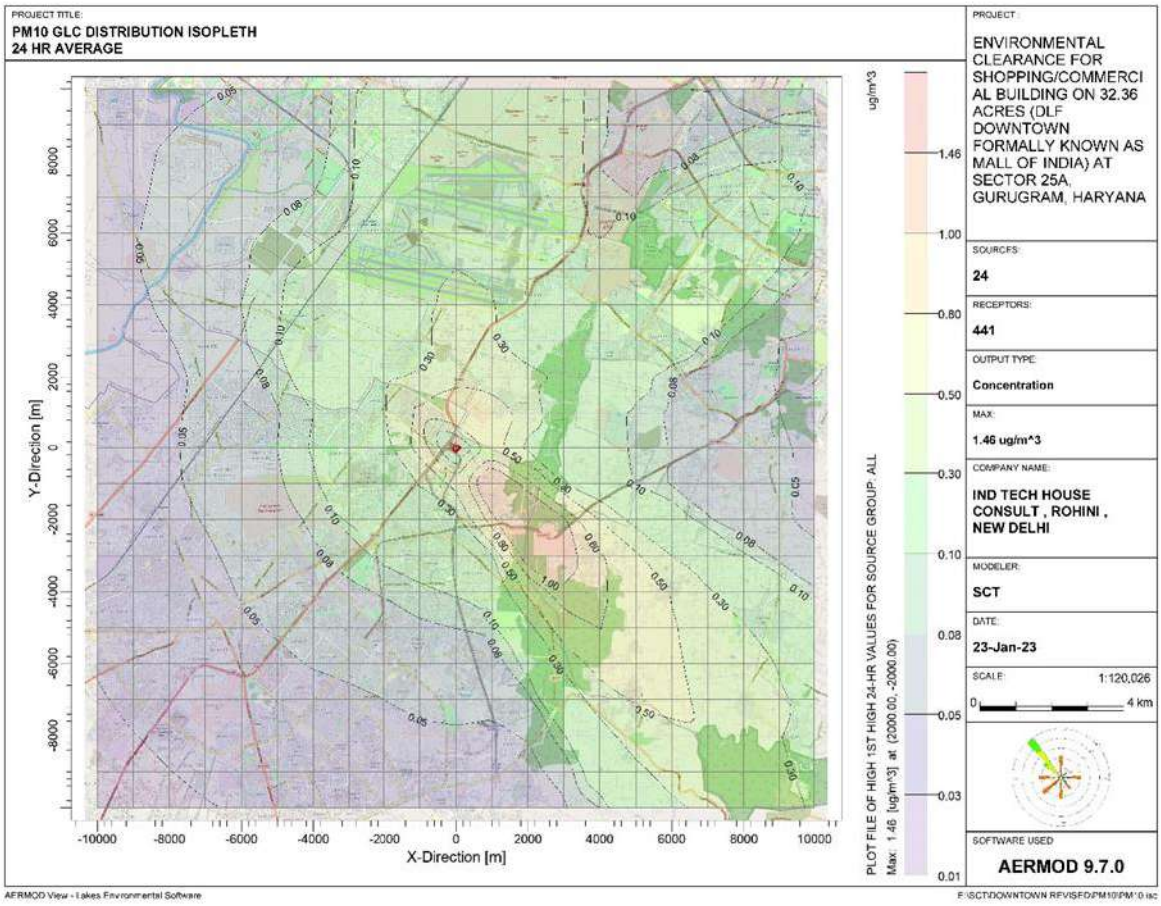


Figure 4. 2: Spatial distribution of 24-hour average PM10 Conc. (µg/m^3)

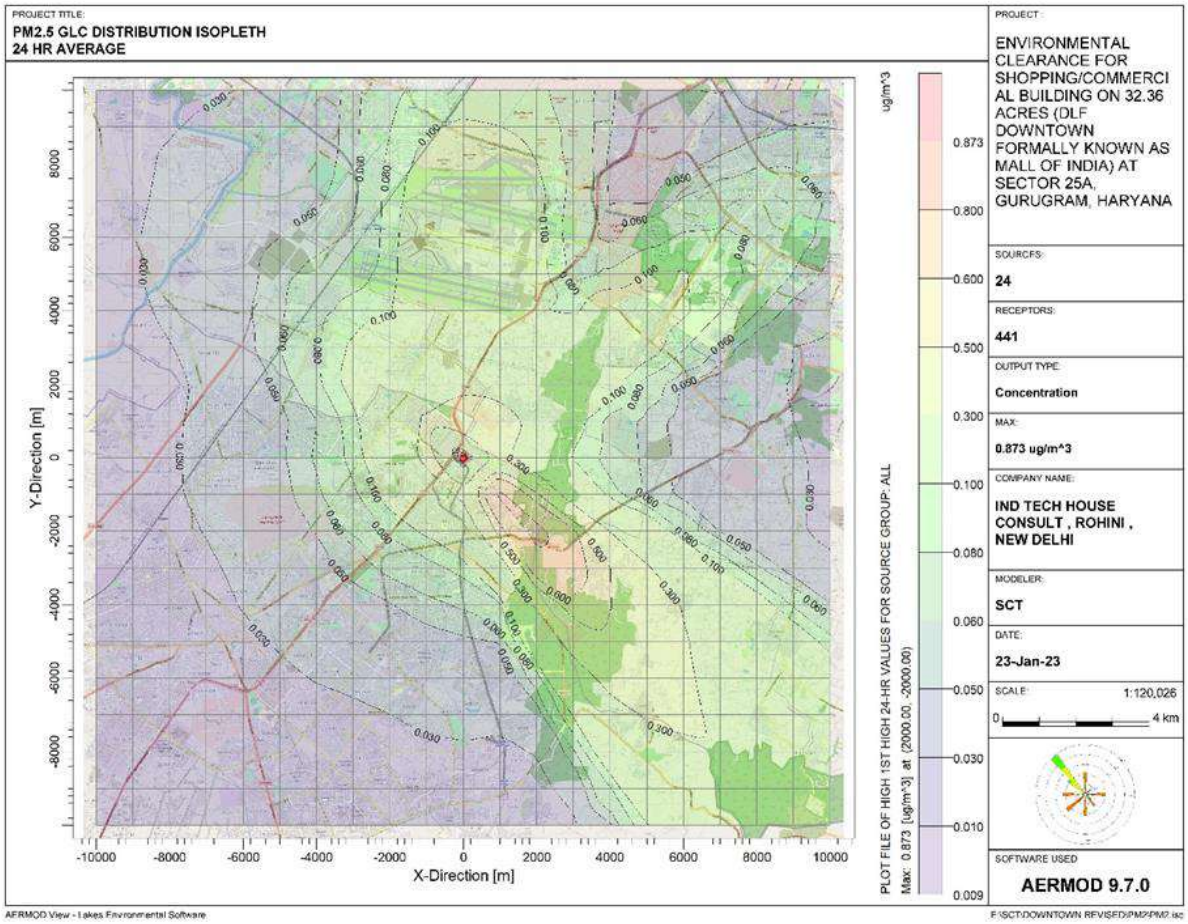


Figure 4. 3: Spatial distribution of 24-hour average PM2.5 Conc. (µg/m^3)

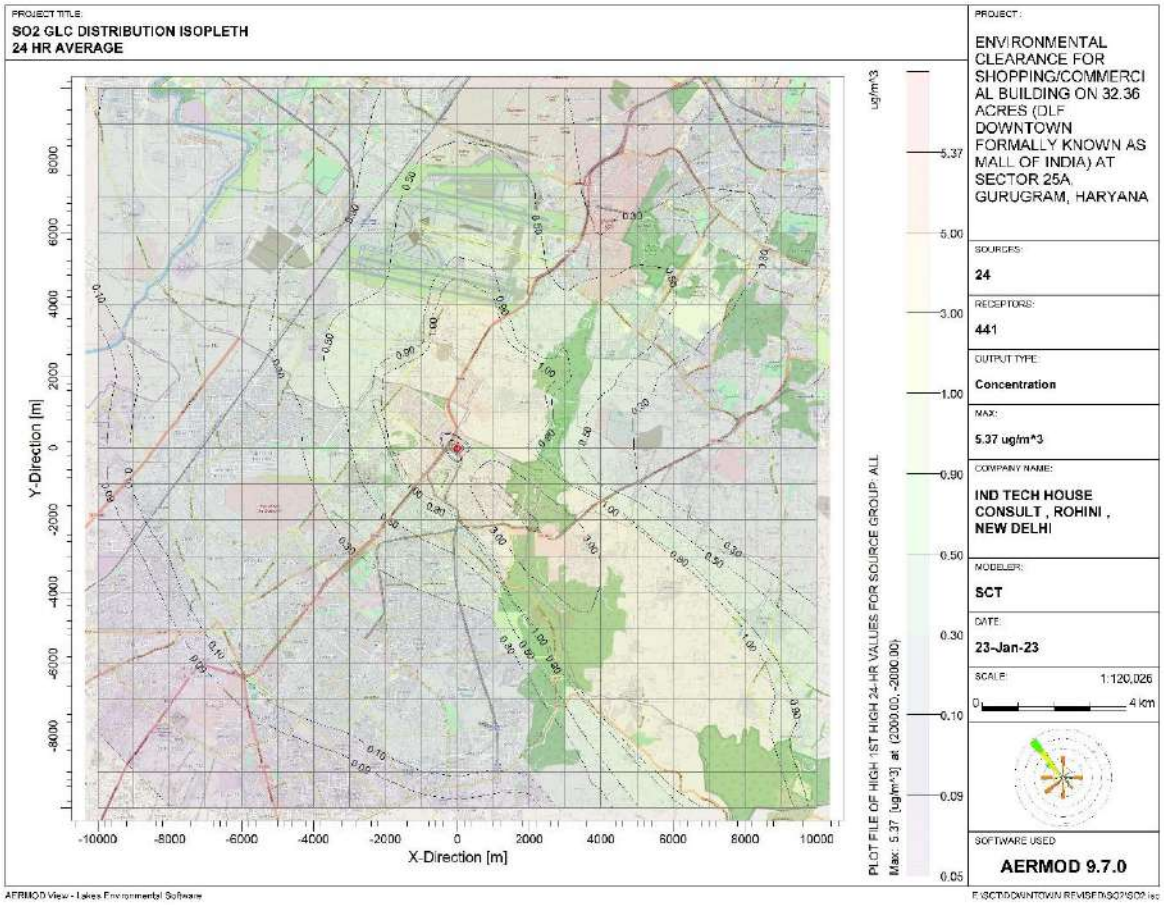


Figure 4. 4: Spatial distribution of 24-hour average SO_2 Conc. (µg/m³)

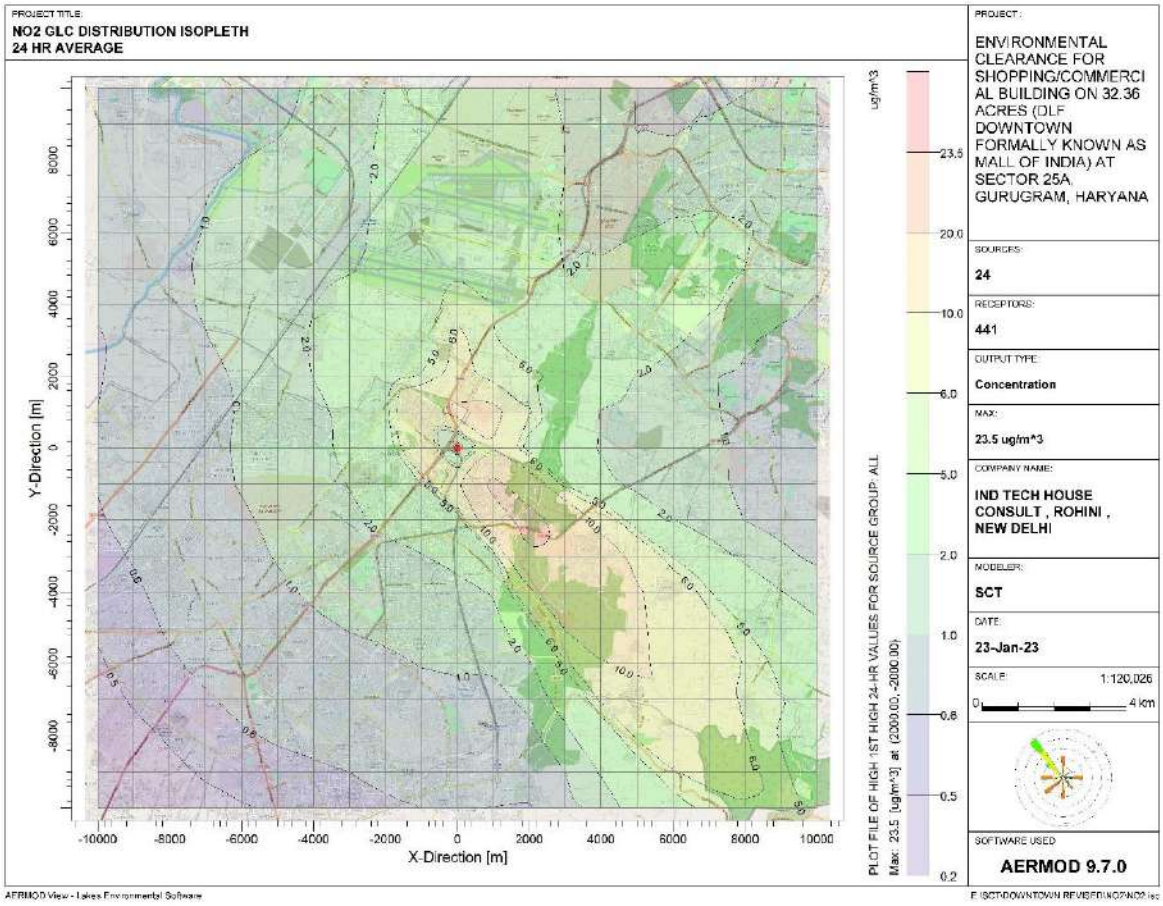


Figure 4. 5: Spatial distribution of 24-hour average NO_2 Conc. (µg/m³)

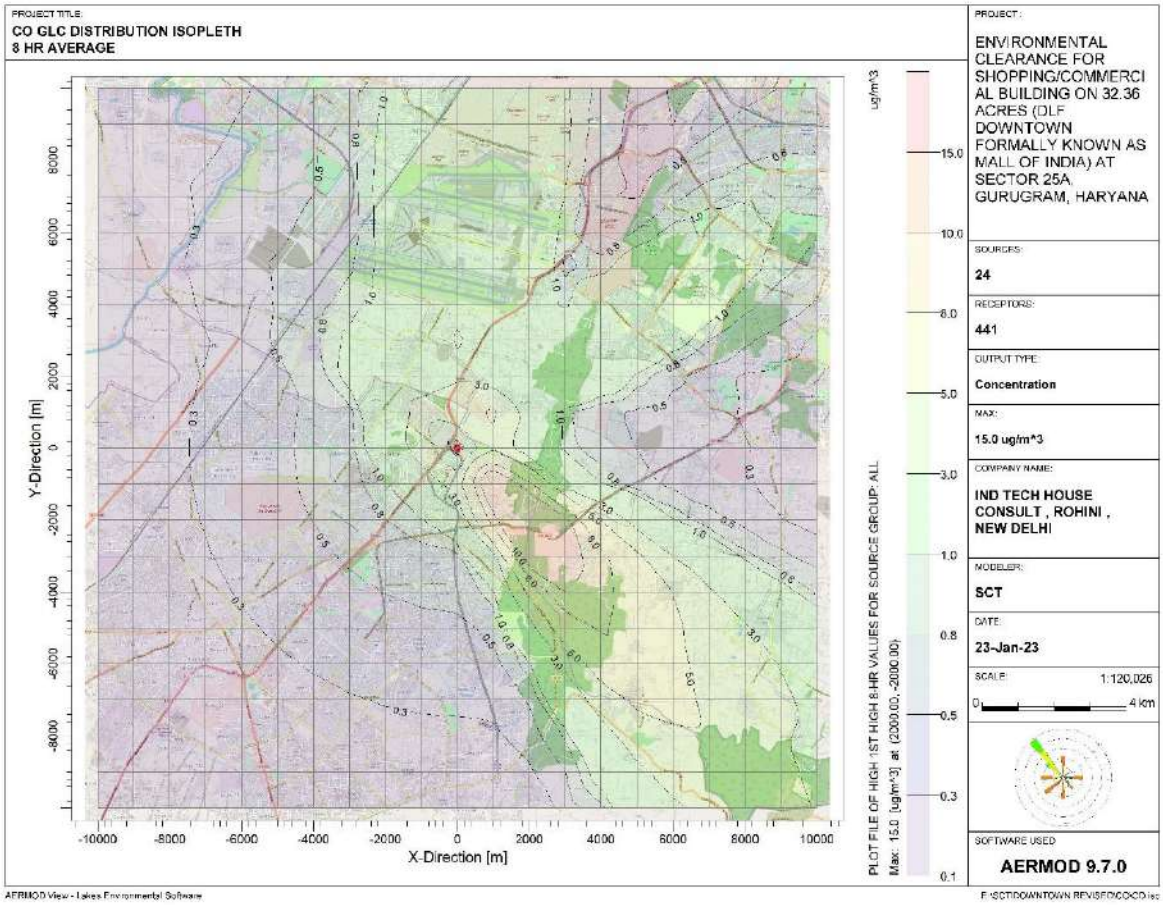


Figure 4. 6: SPATIAL DISTRIBUTION OF 8-HOUR AVERAGE CO CONC. (mg/M^3)

Table 4. 5: Resultant Concentration Level of Pollutants

PARAMETERS	UNITS	Background GLCs	Max. Incremental GLCs	Max. Resultant GLCs
PM_{10}	µg/m^3	166.50	1.46	167.96
$PM_{2.5}$	µg/m^3	84.33	0.873	85.203
SO_2	µg/m^3	9.53	5.37	14.9
NO_2	µg/m^3	26.40	23.5	49.9
CO	mg/m^3	1.12	0.0150	1.135

Inference

The location of the MGLC is at Grid 2000,-2000. The location of the MGLC is at the downwind direction (South East) of the predominant wind direction (blowing from

North West) as per the Wind rose as shown above. The incremental increase value of the pollutants due to the proposed project is mentioned in the table above. It can be concluded that the incremental increase value of the PM10 and PM2.5 is negligible. However, for SO_2 and NO_2 there is significant increase. But it might be noted that the modelling is done on the worst case of running all the DGs simultaneously however, normally the DGs will be in operation only in case of power failure.

Mitigation Measures

- DG sets 67500 KVA with RECD's will be used as power backup during Power failure.
- RECD(Retro Fitted Emission Control Device) will be provided for DG sets.
- Use of ultra-low Sulphur diesel variety
- Adequate green area development to reduce the impact of Air pollution
- Proper car parking facilities and traffic flow to avoid traffic congestion.

4.3.4 Impact on Noise Environment

During the operation phase, the impact on noise environment will be due to operation of DG set and vehicular movement. Monitoring of ambient/source noise level will be carried out as per regulations.

Mitigation Measures

- DG sets will be installed with inbuilt acoustic enclosure and Anti vibration mount (AVM) pads will be provided to absorb the vibration and to minimize noise.
- Adequate parking, road signage and traffic management to avoid traffic congestion & noise
- Free flow of traffic movement shall be maintained.
- Proper plantation shall be done all along the roads & periphery to reduce noise.

4.3.5 Impact of Solid Waste

Environmental impact from the solid waste disposal can typically include contamination of soil, ground water and air quality. During the operation stage of the project, some quantity of hazardous waste like used oil from DG sets shall be generated

Mitigation Measures

- The solid waste will comprise of biodegradable waste e.g. food waste, horticultural waste etc. and recyclable waste, like plastic, paper, tin, glass etc.
- Different colored bins will be used for collection of biodegradable and non-biodegradable waste as per MSW rules, 2016.
- Bio-degradable wastes will be composted in onsite organic waste converter.

- Non-biodegradable fraction like plastic, tin, glass etc. will be sold to local recyclers
- Horticultural waste shall be collected and dispose off with biodegradable waste.
- Used oil generated from DG sets will be stored in HDPE drums and sold to authorized vendors.

4.3.6 Impact on Socio Economic

Only positive effect due to this project is anticipated.

5.0 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 USE OF ENVIRONMENT FRIENDLY MATERIALS& ENERGY SAVING

As per ECBC compliance reporting, project is getting overall 15% reduction from ECBC 2017 baseline Project has proposed the following energy conservation or efficiency measures in compliance with ECBC requirement,

- 75 MM PUF insulation on roof for better U value
- AAC Block work for external wall for better U value
- Double Glazing for external façade having SHGC <=0.29
- Energy efficient lighting fixtures like LED is proposed for common area lighting of the building.
- Only common area lighting is under developer scope and thus the installation and controls will be provided accordingly.
- Basement lighting is controlled by alternate circuit switch for reducing energy consumption during peak hours, by switching off the alternate lighting fixtures.
- Lighting for external areas shall be 100 % on LED and timer-controlled.
- Efficient Water-Cooled VSD drive Centrifugal Chiller having COP >=6.3 @ AHRI condition
- VSD drives proposed in HVAC Pumping, AHU and Cooling Tower Fans
- >=IE02 rated energy efficient motors considered for HVAC system
- Dedicated DOAS system with HRW to provide treated fresh air in AHU rooms
- Voltage drop for feeders shall not exceed 4% at design load and voltage drop for branch circuit shall not exceed 5% at design load.
- Cast resin dry type transformer is considered and the total losses of them at 100% and 50% load are less than ECBC 2017 recommended values.
- All 3 phases shall maintain 0.97 power factor at the point of connection.
- >=IE02 rated energy efficient motors are considered for the plumbing system.
- Transformer losses will comply ECBC 2017 norms
- 2% of total connected load i.e., 1218 KWp Solar PV

5.2 GREEN BUILDINGS

A building complies with the Code using the Whole Building Performance (WBP) Method when the estimated annual energy use of the Proposed Design is less than that of the Standard Design, even though it may not comply with the specific provisions of the prescriptive requirements in §4 trough §7. The mandatory requirements of §4 through §7 (§4.2, §5.2, §6.2, and §7.2) shall be met when using the WBP Method.

Project has been modeled using the e-QUEST energy simulation software which is able to model energy flows on hourly basis for the entire year. This simulation tool has the capability to model hourly variations, lighting, HVAC equipment, daylight control and thermal zones. e-QUEST uses the DOE 2.2 simulation engine. The SLD has

been created so that the single line rests on the interior side of the external walls and in the middle of the interior walls. For representing the weather conditions, project has used the ISHRAE weather file database to represent the external weather conditions. Provided below the chart indicating the steps flow of 'Whole Building Energy Performance Process',

To comply with the Code, buildings shall -:
(a) have an Energy Performance Index Ratio (EPI Ratio) as defined in §3.1.1 that is less than or equal to 1 and
(b) meet all mandatory requirements mentioned under §4.2, §5.2, §6.2, and §7.2.
The Energy Performance Index (EPI) of a building is its annual energy consumption in kilowatt-hours per square meter of the building. While calculating the EPI of a building, the area of unconditioned basements shall not be included. EPI can be determined by

EPI = Annual energy consumption in kWh /Total Built Up Area (excluding Basement)

The EPI Ratio of a building is the ratio of the EPI of the Proposed Building to the EPI of the Standard Building:

EPI ratio = EPI of Proposed Building / EPI of Standard Building

Green Building Consultant has proposed BMS and EMS system to monitor all critical electricity consumption system such as chiller, HVAC pumps, lights, plumbing pumps and motor so that real time energy monitoring will be done. All HVAC, Electrical and Plumbing system will have preventive maintenance checklist so that all system efficiency can be maintained during operation. Dedicated AMC will be placed for major equipments such as Chiller, Pumps etc. Also, energy audit shall be conducted in every three years to improve energy performance index.

5.2.1 Other Energy Conservation Measures

- To use time-based circuits for street light to switch off part of the lights during day hours.
- To use dimmer to reduce the illumination level to reduce the energy consumption.
- To use automation for all the mechanical plants like STP, WTP, Transmission Lines, etc.
- To use star rated high efficiency motors for all the plants.
- To activate lights, A/C or any other equipment on occupancy basis.

6.0 ENVIRONMENTAL MONITORING PROGRAMME

6.1 PREAMBLE

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

As per the directive of SEAC, MoEF&CC, CPCB and SPCB, the project administration will monitor ambient air quality, water quality, noise levels, soil quality and solid waste management both during the construction and operation period of the project in accordance with the approved monitoring schedule. A suggested monitoring programme, based on the predicted impacts, is given in **Table-6.1** below:

Table 6. 1: Suggested Monitoring Program for Proposed Expansion

S.N.	Potential Impact	Action	Parameters for Monitoring	Timing
I. Construction Phase				
1.	Air Emissions	All equipments are operated within specified design parameters.	Random checks of equipment logs/ manuals	Construction activities
		Vehicle trips to be minimized to the extent possible	Vehicle logs	Site Clearance and Construction activities
		Any dry, dusty materials stored in covered area/ containers or prevented from blowing.	Absence of stockpiles or open containers of dusty materials.	Construction activities
		Compaction of soil during various construction activities	Construction logs	Construction activities

S.N.	Potential Impact	Action	Parameters for Monitoring	Timing
		Ambient air quality within the project site to be monitored.	General parameters as per NAAQS notification 2009.	Monthly
2.	Noise	Prepare list of all onsite noise generating machineries along with age. Equipments to be maintained in good working order.	Equipment logs, noise reading	During construction phase.
		Night time work to be minimized.	Working hour records	Construction activities
		Implement good working practices (equipment selection and siting) to minimize noise and also reduce its impacts on human health (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.
		Ambient noise level to be monitored within the project premises.	Noise reading	Monthly
		All equipments operated within specified design parameters.	Random checks of equipment logs/ manuals	During construction phase.

S.N.	Potential Impact	Action	Parameters for Monitoring	Timing
		Vehicle 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.
		Take care in disposal of wastewater generated so that soil and groundwater resources are protected.	Check frequency of sewage disposal in case of mobile toilets used.	During construction phase.
4.	Soil Erosion	Protect topsoil stockpile where possible at edge of site.	Effective cover in place.	During construction phase
5.	Drainage and effluent Management	Ensure drainage system and specific design measures are working effectively.	Visual inspection of drainage and records thereof	During construction phase.

S.N.	Potential Impact	Action	Parameters for Monitoring	Timing
6.	Waste Management	Implement waste management plan that identifies and characterizes every waste arising from project activities including hazardous wastes and which identifies the procedures for collection, handling & disposal of each waste.	Comprehensive Waste Management Plan in place and available for inspection on-site. Strict compliance with the plan regarding collection, storage and disposal.	Prepare plan prior to site clearance and implementation during construction phase.
7.	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.
II. Operational Phase				
9.	Air Emissions	DG sets with acoustic enclosures shall be provided	Parameters as per CPCB standard.	During operation phase (Quarterly)
		Ambient air quality within the project site to be monitored.	General parameters as per NAAQS notification, 2009	During operation phase (Monthly)
10.	Noise	Noise generated from operation of DG set to be optimized and monitored. DG sets to be provided with acoustic enclosure	Ambient Noise and DG noise Monitoring	Ambient Noise will be monitored Monthly and DG Noise will be monitored (Quarterly)

S.N.	Potential Impact	Action	Parameters for Monitoring	Timing
11.	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 groundwater resources are protected	Parameters as per CPCB standard depending on the final disposal of treated effluent from onsite STP.	Monthly throughout the project life.
12.	Drainage and effluent Management	Ensure drainage system and specific design measures are working effectively.	Visual inspection of drainage and records of maintenance.	During operation phase
13.	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 plan, evacuation plan	During operation phase
14.	Environment Management Cell/Unit	The Environment Management Cell/Unit 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 operation phase

6.2 WATER QUALITY MONITORING

Since water contamination leads to various water related diseases, the project proponent shall establish a procedure for water quality surveillance and ensure safe water for the consumers. Drinking water quality shall be monitored as per IS:

10500:2012 parameters and construction water quality has been monitored as per standards applicable for use in construction activity. During the operation phase, no ground water shall be abstracted onsite and water supply from municipal supply shall be availed. Therefore, during the operation phase, water quality monitoring shall be limited to the STP treated effluent as per the CPCB standards.

6.3 AIR, NOISE & WATER QUALITY MONITORING

The attributes to be monitored as a part of the mitigation measures are Air Quality, Noise Levels; the monitoring programme for the construction and operation stage is presented in **Table-6.2**.

Table 6. 2: Monitoring Programmed during Construction and Operation Stage

Ambient Air Quality Monitoring		
1	Parameters to be monitored	Particulate Matter, Size less than 10µm (PM_{10}) Particulate Matter, Size less than 2.5µm ($PM_{2.5}$) Sulphur Dioxide (SO_2) Nitrogen dioxide (NO_2) Carbon Monoxide (CO)
2	No. of locations	One at the project site
3	Frequency of Monitoring	Monthly @ One day monitoring [24 hourly sample]
4	Compliance	The monitoring results should be compared with the Revised National Ambient Air Quality Standards, 2009.
Noise Quality Monitoring		
1	Parameters to be monitored	Hourly equivalent noise levels for 24 hours
2	No. of locations	Two locations near boundary.
3	Frequency of Monitoring	Monthly
4	Compliance	The monitoring results should be compared with the National Ambient Noise Quality Standards.
STP Outlet Water Quality Monitoring		
1	Parameters to be monitored	pH, Total suspended solids (TSS), BOD, COD, O & G
2	Location	One at outlet of STP
3	Frequency of Monitoring	Monthly
4	Compliance	The monitoring results should be compared with the CPCB standard for discharge.

6.4 COMPILATION AND ANALYSIS OF DATA AND REPORTING SYSTEM

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation of the project. The monitoring shall be carried out through MoEF&CC/ NABL approved laboratory. All records shall be maintained for regulatory, monitoring and operational issues. Typical record keeping requirements for the proposed project is summarized in **Table-6.3**.

Table 6. 3: Record Keeping Requirements

Parameter	Particulars
Solid Waste Handling & Disposal	• Daily quantity of waste collected • Daily quantity treated and recycled • Daily quantity sent for disposal through agency
Hazardous Wastes [Used Oil]	• Quantity of waste generated • Quantity of wastes sold to authorized recyclers • Waste manifests and record keeping as per rules
Sewage Treatment	• Daily quantity of raw and treated sewage • Quantity and point of usage of treated wastewater • Treated wastewater quality
Regulatory Licenses (Environmental)	• Consents from Delhi Pollution Control Committee • Copy of Waste manifests as per requirement
Monitoring & Survey	• Records of all monitoring carried out as per the finalized monitoring protocol.
Accident reporting	• Date and time of the accident • Sequence of events leading to accident • Name of hazardous waste/fuel/chemical involved in the accident • Emergency measure taken • Step to prevent recurrence of such events
Other	• Log book of maintenance and compliance • Equipment inspection and calibration records, where applicable

7.0 ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

RISK

A probability or threat of damage, injury, liability, loss or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be avoided through preemptive action.

HAZARD

A hazard is any object, situation, or behavior that has the potential to cause injury, ill health, or damage to property or the environment.

RISK HAZARD & ITS CONTROL MEASURES

It is attempted to plan and construct the buildings following all safety norms. However, it is not always possible to totally eliminate such eventualities and random failures of equipment or human errors. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such emergency and restoration of normalcy at the earliest. A detailed Table showing activity during construction and operation phase along with mitigation measures are given in **Table-7.1**.

Table 7. 1: Activities during construction and operation along with mitigation measures

HAZARDS ASSOCIATED WITH ACTIVITIES (During Construction & Operation)	CONTROL/MITIGATION MEASURES
• **Manual Handling** Strains and sprains - incorrect lifting - too heavy loads -twisting - bending - repetitive movement - body vibration.	Exercise/warm up - get help when needed -control loads - rest breaks/no exhaustion -no rapid movement/ twisting/bending/repetitive movement – good housekeeping.
• **Falls - Slips - Trips** Falls on same level - falls to surfaces below - poor housekeeping - slippery surfaces, uneven surfaces - poor access to work areas -unloading materials into excavations wind - falling objects.	Housekeeping - tidy workplace - guardrails, safety net, handholds, warning line and barriers, clear & safe access to work areas - egress from work areas and constant supervision of the worker from ground level.
• **Fire** Flammable liquids/Gases like LPG, Diesel Storage area and combustible building materials - poor housekeeping - grinding sparks - open flames, absence of Fire hydrant net work.	Combustible/flammable materials properly stored / used - good housekeeping - fire extinguishers made available & Fire hydrant Network as per approval - Emergency Plan in case of Fire

	or collapse of structure.
• **Absence of Personal Protective Equipment** Lack of adequate footwear, gloves - goggles - head protection -hearing / eye protection - respiratory protection.	Use of personal protective equipment and awareness training.
• **Defective or wrong Hand Tools /machines** Wrong tool - defective tool - struck by flying debris or missing safety devices over the equipment/machines strains and sprains - dust and carbon monoxide emission.	Right tool for the job - used properly - good condition/ using safety devices over the equipments and machines - eye/face protection.
• **Electricity** Electrocution - overhead/underground services - any leads damaged or poorly insulated - temporary repairs -no testing and tagging - circuits overloaded - non use of protective devices.	Leads good condition and earthed - no temporary repairs - no exposed wires - good insulation - no overloading - use of protective devices - testing and tagging - no overhead/ underground services
• **Scarffolding** Poor foundation - lack of ladder access insufficient planking - lack of guardrails and toe boards - insufficient ties or other means - all scaffolds incorrectly braced or stabilized to prevent overturning.	All scaffolds correctly braced and stabilized - 3:1 height to base ratio - firm foundation, plumb and level - ladder access provided and used - proper platform (3 planks/675 mm) - planks secured - guardrails and toe boards.
• **Ladders** Carrying loads - not secured against dislodgement -defective ladders - insufficient length - wrong positions - incorrectly placed angles in access way.	Secured against movement or footed - ladders in good condition - regularly inspected – sufficient length - use for access only, not working platforms.
• **Excavations** Trench collapse - material falling in undetected underground services - falls - hazardous atmosphere struck by traffic and mobile plant.	Soil stability known - no water accumulation - existing services known - clear of suspended loads – hardhats / PPE - ladders - public protection – atmospheric testing - traffic controls - Emergency Plan.
• **Gas Cutting and Welding** Fire - welding flash, burns, fumes, electrocution in wet conditions - flashback in oxygen set, leaking cylinders, acetylene cylinders lying down - poorly maintained leads.	Recognition of symptoms of harmful exposure, limiting occupational exposure, substituting less hazardous flux materials, wearing respiratory protection/ PPE, ventilation in the working area, training to operators.

• **Noise** Unknown noise levels - known noise levels exceeding the limits applicable.	Levels below 85 decibels - proper protection.
• **Falling Material** Fall during carrying/Lifting materials-dislodged tools and materials from overhead work areas.	Materials to be secured – kept away from edge - toe boards –Use of hard hats.
• **Crane & Lifts** Display of carrying capacity i.e., load (no. of person), incorrectly slung, defective lifting equipment, unsecured loads, craning in close proximity to building people and plant - falls - falling materials.	Periodic testing by competent authority - correctly slung /secured loads, lifting equipment good condition - use of proper hand signals - falls while unloading controlled.
• **Visitors Presence at site** Falls - struck by - dropped materials - road accidents -insufficient warning signage, fencing - pedestrian access.	Sufficient hoarding - fencing and barricades - safe pedestrian access past site traffic management for loading and delivery-construction separated from occupied areas of projects.

7.2 DISASTER MANAGEMENT PLAN (DMP)

A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering and as a result, need protection, clothing, shelter, medical, social care and other necessities of life.

Disasters can be divided into two main heads. In the first head, the disasters result from natural phenomena like earthquakes, volcanic eruptions, storm surges, cyclones, tropical storms, floods, avalanches, landslides, forest fires.

The second head includes disastrous events occasioned by man, or by man's impact upon the environment. Examples are armed conflict, industrial accidents, radiation accidents, factory fires, explosions and escape of toxic gases or chemical substances, river pollution, mining or other structural collapses, air, sea, rail and road transport accidents and can reach catastrophic dimensions in terms of human loss.

There is no set criteria for assessing the gravity of a disaster in the abstract since this depends to a large extent on the physical, economic and social environment in which it occurs. However, all disasters bring in their wake similar consequences that call for immediate action, whether at the local, national or international level, for the rescue and relief of the victims.

The project encompasses the lives of a large number of people. It also involves installation of various structures and machineries that meet the comfort and need of

its population but may also pose serious threat to the occupants in case of an accident. It is thus considered necessary to carry out a risk assessment and disaster management plan for the project.

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the Disaster Management Plan, it should be widely circulated and personnel training through rehearsals/drills.

To tackle the consequences of a major emergency inside the site or immediate vicinity of the site, a Disaster Management Plan has to be formulated and this planned emergency document is called "Disaster Management Plan". The objective of the Disaster Management Plan is to make use of the combined resources of the project site and the outside services to achieve the following:-

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Identify any dead;
- Provide for the needs of relatives;
- Provide authoritative information to the news media;
- Secure the safe rehabilitation of affected area;
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the Emergency.

7.3 EARTHQUAKE

7.3.1 SEISMICITY

Based on the tectonic features and records of earthquake, a Seismic Zoning map has been developed for the country by Bureau of Indian Standard (BIS). The area under study falls under seismic Zone-IV (refer **Figure-7.1)** and thereby almost stable in nature. However suitable seismic coefficients in horizontal and vertical directions will be adopted while designing the structures.

Seismicity of the proposed site has been taken into consideration during designing of the structural components of the development 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. Necessary seismic factors, suggested by Indian Meteorology Department (IMD IS1893-Part I, 2002) shall be incorporated suitably, while designing the structures to safeguard against earthquake risks

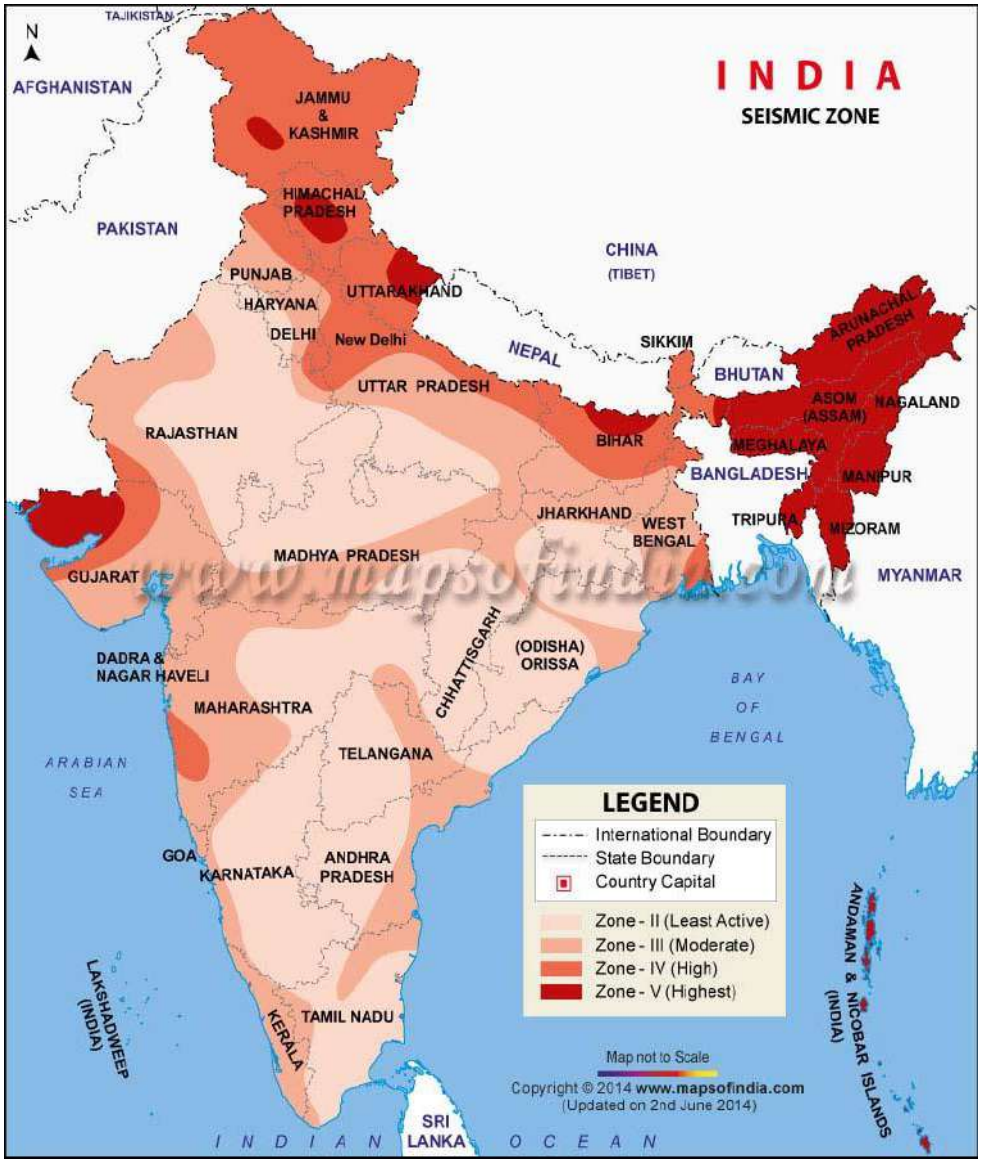


Figure 7. 1: Seismic Zone map

Table 7. 2: History of Earth Quake in NCR Region from April `1980 to March 2013

Dates	Location		Magnitude
	Latitude (°N)	Longitude (°E)	
12-May-15	27.794	85.974	7.3
26-Apr-15	27.794	85.974	6.7
25-Apr-15	28.193	84.865	6.6
25-April-15	28.147	84.708	7.8
21-May-14	-	-	5.6
12-Nov-13	-	-	3.1
16-Apr-13	28.87	95.12	5.3
5-Mar-12	28.808	76.772	4.9

Dates	Location		Magnitude
	Latitude (°N)	Longitude (°E)	
7-Sep-12	28.38	77.12	4.2
16-Nov-94	28.5	76.95	2.9
15-Oct-94	28.59	79.92	2.8
28-Jul-94	28.51	77.25	2.8
3-Dec-93	28.6	77.4	3.5
6-Aug-93	28.64	77.14	2.5
27-Mar-93	28.63	77.2	3.6
16-Feb-93	28.63	76.35	2.6
6-Jun-92	28.65	76.69	2.8
27-Aug-90	76.35	28.58	4.0
15-May-90	76.43	29.12	4.1
27-April-80	77.38	28.37	4.7

7.3.2 Response Procedures for Occupants

If indoors:

1) 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.

1) Provide first aid where appropriate and not to move seriously injured persons unless they are in immediate danger of further injury. Call for help.

2) Remember to help those first who may require special assistance--infants, the elderly, and people with disabilities.

3) Stay out of damaged buildings.

4) Use the telephone only for emergency calls.

7.3.3 Response Procedure for Emergency Team

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

7.4 FLOOD

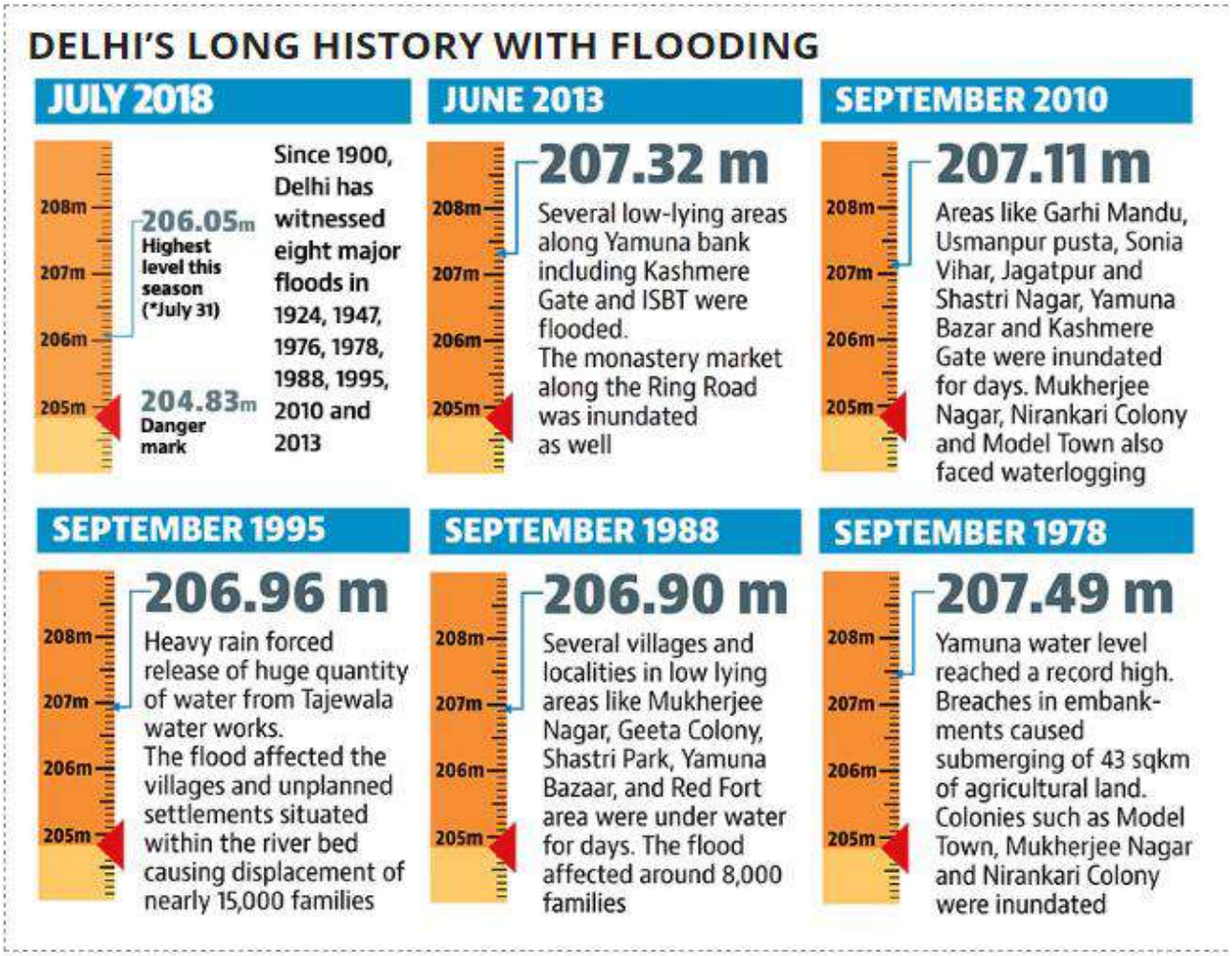
Flooding occurs when an extreme volume of water is carried by rivers, creeks and many other geographical features into areas where the water cannot be drained adequately. Often during times of heavy rainfall, drainage systems in the region are not adequate, or unchecked civil development severely impedes the functionality of an otherwise acceptable drainage system. Floods cause extremely large numbers of fatalities in every country, but due to India's extremely high population density and often under development standards, a large amount of damages and many deaths occurred. India witnesses flood due to excessive rain which then results in overflow of rivers, lakes and dams, which adds to cause large amounts of damage to people's lives and property.

7.4.1 Flood in Delhi-NCR

As per Flood Map of India (**Fig: 7.2**), Delhi does not falls under flood prone area. Hence flood possibilities are very minimal. Figure showing Flood Prone map of India.

Figure 7. 2: Flood Zone Map of India

7.4.2 History of Flood in Yamuna River, Delhi



7.5 FIRE

- Required response during in the event of a fire should be described in signs located in the lobby.
- On sighting a fire, it should be immediately informed to the facility manager giving the exact location and type of fire in detail.
- Initiate the Emergency Response Team for fires.
- If the fire is small, engage in extinguishing the fire using the nearest fire extinguisher.
- Guide the Emergency Response Team staff to the emergency assembly point.
- The Emergency Response Team should immediately inform the nearest dispensary and security force. If required a fire tender should be summoned.
- The response team should immediately move to the point of fire and take all necessary steps to stop the fire. If the fire is not controllable and spreads then the manager in charge should inform the district authorities and call for external help.

- The Emergency Response Team will provide immediate relief to the injured occupants at the scene of incident. Any injured persons should be evacuated on priority to the dispensary or one of the nearest hospitals based on their condition.

7.5.1 Fire Protection Measures

Adequate firefighting system is proposed for the project as per norms to prevent and control fire outbreaks. The firefighting system will consist of portable fire extinguishers, hose reel, wet riser, yard hydrant, automatic sprinkler system for the project, and manual fire alarm system.

Table 7. 3: Fire Protection Measures

S. NO.	Description	Minimum Fire Fighting requirement	Provision
1	Fire Extinguishers	Required	Provided
2	Wet Riser	Required	Provided
3	Yard Hydrant	Required	Provided
4	Automatic Sprinkler System	Required (to be installed in the entire building)	Provided
5	Manually operated electric fire alarm system	Required	Provided
6	Automatic detection and alarm system	Required	Provided
7	Underground static water storage tank capacity	U.G fire tank capacity for Hydrant	Provided

7.6 EMERGENCY RESPONSE PLAN (ERP)

Despite all efforts, it is within the realm of possibility that emergencies and accidents could take place. It is the objective of emergency management to prevent the accidents and to minimize losses that occur due to such accidents by technical and organizational measures. It is also a responsibility of effective management to be able to restore normalcy as quickly as possible. In preparation of the ERP, the following elements have been considered to make it effective.

- Leadership and administration for emergency management.
- Prompt activation of Emergency Management Plan to minimize loss
- Communication arrangements for warning/notification and requesting external help
- Lighting and stand-by power for various combat operations
- Setting up of an Emergency Control Center to act as a command and control point during an emergency
- Defining escape routes and deciding upon methods that will be employed for evacuation of people
- Provision for Medical care to the injured and response personnel
- Protection of vital records
- Formulation of public relations/functions including interaction with media, press, officials and neighboring population
- Preparation and use of checklists for various emergency management functions for pre-, post and in emergency activities.
- Conducting regular training programs for all level of employees, and

Conducting Mock Drills for assessment of the level of preparedness of men and material at the site

8.0 PROJECT BENEFITS

8.1 GENERAL

The proposed project is Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 Acres (DLF Downtown Formally Known as Mall of India) at Sector 25A, Gurugram, Haryana.

8.2 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

Proposed expansion of the project will help in meeting the growing commercial needs of people; it also provides modern terms of comfort and safety of its commercial buildings along with commercial space. Care has been taken to provide necessary facilities as power, water supply, parking spaces and wide roads. Commercial project will provide encouragement to other commercial projects.

8.3 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

As Building construction project requires a large number of manpower in the form of labors. Though the surrounding area is urbanized, there are still plenty of unemployed persons who are engaged as local labours.

In addition, local people have been engaged during construction and operation as security personal and maintenance staffs for this project which have economic and social impact on the unemployed youths.

The community can look forward to benefit due to more jobs and also better access to utilities. The benefit relates to the direct employment associated with the construction.

8.4 EMPLOYMENT POTENTIAL

Considering the increasing emphasis of employment and education in the village, the locals would have the opportunities for jobs, closer to their place of stay. Expenditure incurred by those employed at the project will boost local economy in the village. Jobs has been created for unskilled, semi-skilled as well as skilled labour category, for which locals would be given preference and there by the overall development of the region is envisaged.

8.5 BENEFITS TO WOMEN

During the construction phase and operation phase, the proposed expansion project has provided opportunity of employment related to construction activities.

Increase In Land Value

The prices of the land are likely to increase with the coming up of the project. Hence the proposed project will have beneficial impact.

Wider Economic Growth

The proposed expansion of the project will increase the economic activities around the area, creating avenues for direct/indirect employment in the post project period. There would be a wider positive economic impact in terms of generating opportunities for other business too.

8.6 ENVIRONMENTAL BENEFITS

The proposed expansion project will help to enhance the development of green area in the locality which will help to improve air and noise environment. Waste Management will be better and reduce load of waste generation and disposal to the government landfill sites. This will be ZLD project hence help to prevent water pollution. Project will install rain water harvesting to recharge the ground water to increase ground water level.

9.0 ENVIRONMENT MANAGEMENT PLAN

9.1 PREAMBLE

The Environmental Management Plan (EMP) is a site-specific plan developed to ensure that the proposed expansion project is implemented in an environment sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental risks arising from the proposed expansion of the project and take appropriate actions to properly manage that risk. The plan outlines existing and potential problems that may adversely impact the environment and recommends corrective measures where required. Also, the plan outlines roles and responsibility of the key personnel and contractors who are charged with the responsibility to manage the project site. The EMP is:

- To detail out the present environmental scenario.
- To prepare a detailed action plan for implementation of mitigation measures and to comply with environmental rules and regulation.
- To suggest a monitoring programmed to evaluate the effectiveness of mitigation measures.
- To suggest the formation of an Environmental Management core group (Environment Management Cell) responsible for implementation of environmental control & protective measures as well as monitoring of such implementation.
- To prepare an estimate of capital cost and annual recurring cost for Environmental Management Plan.
- A system that addresses public complaints during construction and operation of the facility;

The key benefits of the EMP are that it provides the organization with means of managing its environmental performance thereby allowing it to contribute to improved environmental quality. The other benefits include cost control and improved relations with the stake holders.

- **Commitment & Policy:** The proposed expansion of the project management will strive to provide and implement the Environmental Management Plan that incorporates all issues related to air, noise, land, and water.
- **Planning:** This includes identification of environmental impacts, legal requirements and setting environmental objectives.
- **Implementation:** This comprises of resources available to the developers, accountability of contractors, training of operational staff associated with environmental control facilities and documentation of measures to be taken.
- **Measurement & Evaluation:** This includes monitoring, corrective actions, and record keeping.

9.2 ENVIRONMENTAL MANAGEMENT CELL

The Environmental Management Cell constitutes provision of an Environmental Division, which should be supervised by the Project In-charge of the site and assisted by environmental professionals and external consultancy organization. The task assigned should include compliances to all statutory guidelines, conditions put forth under Environmental Clearance, Compliance to Consent to Establish and Consent to Operate from SPCB, co-ordination of studies, monitoring and implementation of environmental mitigation measures and any other conditions as requires to be maintained under Environmental Norms & Guidelines. The Environment Management Plan shall be implemented in phases, so that optimum benefit could be achieved and it should be synchronized with the construction schedules.

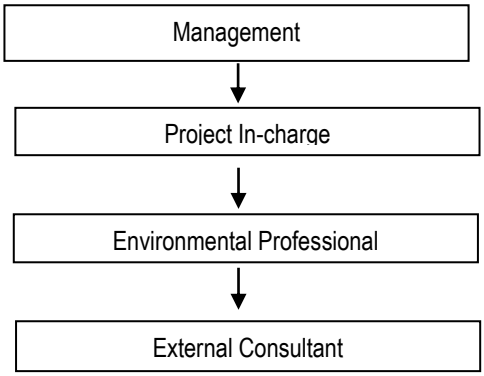


Table 9. 1: EMP Budget during operational phase

ENVIRONMENT BUDGET (Operation Stage)		
COMPONENT	**CAPITAL COST (Rs in Lacs)**	**RECURRING COST (Rs in Lacs)/Annum**
SEWAGE TREATMENT PLANT (3500 Kld) (2000+1500)	700	189.00
RAIN WATER HARVESTING SYSTEM (16 Nos) Rain Water Storage Tanks with Filtration System	56	8.40
SOLID WASTE STORAGE BINS & COMPOSTER (Organic Waste Converter 5.69 tpd)	245.79	162.22
HORTICULTURE DEVELOPMENT (TREE PLANTATION & LANDSCAPING)	18.74	4.69
ROOF TOP SPV PLANT (1218 KWP)	974.4	0.00
"POND MAINTENANCE (At village: Nathupur, Unit ID: 02HRGGMGUR0035NATH002)	27	0.00
ENVIRONMENT MONITORING & 6 MONTHLY COMPLIANCES OF ENVIRONMENT CLEARANCE CONDITIONS		2.00
TOTAL	**2021.93**	**366.30**

Table 9. 2: EMP Budget during construction phase

Environment Budget (Construction Phase)		
COMPONENT	**CAPITAL COST (Rs in Lacs)**	**RECURRING COST (Rs in Lacs)/Annum**
Barricading Of Construction Site	26.1531	5.753682
Anti - Smog Gun with Complete Assembly	20	2.4
Dust Mitigation Measures	4	0.35
Site Sanitation	2	1
Mobile STP	3	1
Disinfection/ Pest Control	3	0.5
Labour Health Check Up & First Aid Facility	5	0.5
Labor Welfare (Canteen, Creche, Safe Access Road - Water Power, Cooking Kerosene/Gas)	5	1.5
Wheel Washing	1	0.5
Waste Storage Bins - Labour Camp/Site Offices	1.5	0.75
Traffic Management Signages	1.5	0.15
Safety Training to Workers		1
Environment Monitoring & 6 Monthly Compliance Report of EC Conditions		2
TOTAL	**72.15**	**17.40**

Table 9. 3: Environmental Management Plan

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
1.	Groundwater Quality	Ground water contamination	Construction Phase Waste water generated from Labor Accumulation of water during excavations.	Waste water is disposed through authorized vendor.	Minor negative impact inside project premises. No negative impact outside project site. Short term.	Wherever possible care is being taken to prevent water from entering excavations

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
			Operation Phase Sewage treatment sludge disposal on land	Sewage sludge will be used as manure	No negative impact on ground water quality envisaged. Not significant	In an unlikely event of soil and ground water contamination, remediation measures shall be implemented.
2.	Groundwater Quantity	Ground Water Depletion	Construction Phase Use of treated wastewater from nearby STP through tankers	No groundwater is being used	No impact on ground water quantity	-
			Operation Phase MCG Fresh water Supply and partly from onsite treated wastewater with dual pipeline system.	Rain Water Harvesting Scheme. Black /Grey water treatment and reuse. Awareness Campaign among occupantsfor water conservation.	No direct impact on ground water as shown in the water balance study.	-
3.	Surface Water Quality	Surface water contamination	Construction Phase Surface runoff from site during construction activity.	Silt traps and other measures such as, additional on-site diversion	No off site impact envisaged as no surface water	

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
				ditches have been made to control surface run-off during site development.	receiving body in impact zone.	
			Operation Phase Discharge of wastewater to surface water body.	STP will be installed to treat the wastewater for reuse in flushing, gardening etc.	No off site impact envisaged	In case of any unlikely event of discharge from the site, the discharge quality will be maintained as per CPCB standard.
3.	Air Quality	Dust Emissions	Construction Phase Dust and air emission particularly due to the excavation activities, movement of vehicles resulting in air pollution.	10 m Height for barricading	Minor negative impact inside project premises. No negative impact outside project site. Short term.	Provision of spraying water to reduce dust emission on roads. Excavated topsoil has been preserved and reused for landscaping. The amount of exposed ground and stockpiles

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
						has been minimized so that re-suspension due to wind and subsequent dust fall is prevented. Ensuring all vehicles, and generators are well maintained and regularly serviced.
		Emissions of PM_{10}, $PM_{2.5}$ SO_2, NO_2 and CO	<u>Construction Phase</u> Dust and other exhaust atmospheric emissions generated by vehicle movement, concrete mixing machinery, concrete conveyers, bucket conveyers, air blowers, pneumatic vibrators, mechanical vibrators and water	Rapid on site construction and improved maintenance of equipment	Minor Negative impact inside the premises. No impact outside the premises. Short term	Regular Monitoring of emissions and control measures to check the emission levels. Construction workers have been provided with appropriate protective equipments wherever high particulate emission is expected.

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
			tankers			It is also recommended that the workers are not allowed to work over a long exposure period.
			<u>Operation Phase</u> Vehicular movement within the project site and DG Emission	Fuel efficient vehicles will be used and proper record of vehicles will be maintained and RECD (Retro Fitted Emission Control Device) will be provided for DG sets.	No significant negative impact.	Maintain record of vehicles.
4.	Noise Environment	Noise emissions	<u>Construction Phase</u> Construction noise mainly due to excavation, plying of vehicles, operations of cranes etc	Use of well-maintained equipment fitted with silencers. Construction activity are limited to daytime hours only.	Minor negative impact near noise generation sources inside premises.	Use of Personal Protective Equipment (PPE) like ear muffs and ear plug during construction activities. Wherever noise level cannot be achieved,

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
						the area is earmarked as high noise level area requiring use of ear protection gadget and rotation of workers.
			<u>Operation Phase</u> Noise from vehicles movement and DG Operation	Green Belt Development and development of silence zones for traffic movement and DG sets will be acoustically enclosed	No significant negative impact.	-
5.	Land Environment	Soil contamination	<u>Construction Phase</u> Disposal of construction debris Contamination of soil due to leakage of oil from vehicles	Construction debris are collected and suitably used on site to the extent possible as per waste management plan.	Minor negative impact inside project premises. No negative impact outside project site. Short term.	The contamination of soil is avoided by suitable management of oil and fuel. Care is taken to compact the soil after refilling so that, soil erosion and consequent soil import is

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
						avoided.
			Operation Phase Dumping of municipal solid waste on land.	Proposed solid waste management system for waste collection, segregation and disposal.	Since solid waste is handled on the site, waste dumping would not be allowed. Not Significant	Solid waste generated daily during the operation phase will be segregated into biodegradable waste and recyclable waste. Organic wastes will be decomposed at site. Inert wastes will be disposed off through agency.
6.	Ecological Environment (Flora and Fauna)	No negative impact envisaged	Construction Phase Site Development during construction.	No tree felling involved in the project	The proposed site was devoid of any vegetation. Surrounding areas have sparse vegetation.	
			Operation Phase Increase of Green Cover	A peripheral dense green belt of native species will	Beneficial impact	

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
				be developed as per landscaping plan, besides parks, gardens and avenue plantation. It will enhance the ecology.		
7.	Socio-Economic Environment	No displacement	Construction Phase No R&R involved in the project.	There is no displacement of village/abadi area.	No negative Impact	_
			Operation Phase Job creation, infrastructure development	Local mass will get direct employment opportunities.	Beneficial Impact	--
8.	Traffic Pattern	Increase of Vehicular traffic	Construction Phase Vehicular movement during construction	Vehicular movement is restricted to day time only and adequate parking facility has been provided.	No significant negative impact.	Maintain record of vehicles
			Operation Phase Traffic due to staffs/ visiting the proposed project	Vehicular movement will be regulated inside the site with internal	Moderate negative Impact	Restricting entry of polluting vehicles.

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
				roads of adequate width and sufficient parking space.		

10.0 SUMMARY AND CONCLUSION

M/s DLF Limited intends for Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 Acres (DLF Downtown Formally Known as Mall of India) at Sector 25A, Gurugram, Haryana. Earlier, EC was obtained from SEIAA vide letter no. SEIAA/HR/2019/81 dated 06.05.2019 and again amendment for ground coverage and maximum number of floors was obtained vide letter no. SEIAA(125)/HR/2020/539 dated 06.11.2020. After obtaining the EC, construction has been started at the project site. As on date only part construction has been completed (Building 2 & 3). Since there is addition in floors in building no. 4 and development of phase-2, this application is submitted to the SEIAA for expansion of the earlier Environmental Clearance according to the revised plan and layout.

The plot area will be 130956.066 sq m. The proposed expansion project will have a total built up area of 875074 sq m. The REIA report has been prepared as per the TOR issued from SEIAA, Haryana vide File No. SEIAA/HR/2022/305 dated 06.02.2023 for the proposed expansion of commercial project.

For this study, the impact zone shall confine within the radius of 10 km from the project boundary. For the purpose of certain environmental components, the radius has extended up to 10 km as well. The EIA is conducted using the baseline monitoring data collected from March-2022 to May-2022, assessing the potential impacts on different environmental components, designing the mitigation measures so as to keep impacts within acceptable limits and strengthening the positive impacts. The project will create an environment for commercial. The project would ensure sustainable development.

It can be concluded from the assessment of impacts that the proposed expansion of the project would have an overall positive impact. The proposed expansion project will not have any significant negative environmental impacts. The associated potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the measures as stated in the Environmental Management Plan. After incorporation of environmental management plans, the environmental sustainability will be improved.

Hence, the proposed expansion of the project is a welcome development and may be accorded environmental clearance.

11.0 DISCLOSURE OF CONSULTANT

IND TECH HOUSE CONSULT

EIA consultancy organization: Ind Tech House Consult, G-8/6, Sector-11, Ground Floor, Rohini, Delhi – 110085, has been appointed as EIA consultant to carry out environmental impact assessment study and obtaining environmental clearance for Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 Acres (DLF Downtown Formally Known as Mall of India) at Sector 25A, Gurugram, Haryana.

Accreditation to NABET Status: M/s Ind Tech House Consult has accredited the Consultancy organization in Ind Tech House Consult was assessed by the NABET and has accredited the Consultancy organization in 1) Building and Construction Projects 2) Common Municipal Solid Waste Management Facilities 3) Mining of minerals including Open cast/ Underground mining 4) Offshore and onshore oil and gas exploration, development & production 5) River Valley projects 6) Industrial estates/ parks/ complexes/Areas, export processing zones(EPZs),Special economic zones (SEZs),Biotech parks, Leather complexes 7) Townships and Area development projects 8) Petro-Chemical complexes (Industries based on processing of petroleum fractions & natural gas and/ or reforming to aromatics 9) Oil & gas transportation pipeline (crude and refinery/ petrochemical products), passing through national parks/ sanctuaries/ coral reefs/ ecologically sensitive areas including LNG terminal 10) Isolated storage & handling of Hazardous chemicals (As per threshold planning quantity indicated in column 3 of schedule 2 & 3 of MSIHC Rules 1989 amended 2000 11) Ports, harbours, break waters and dredging and our organization is present at Sr. No. 87 in NABET accredited consultants list.

INTELLECTUAL STRENGTH OF IND TECH HOUSE CONSULT

I	Name	:	Mr. Arvind Narayan Devikar
1	Status in the Organization	:	Vice President & EIA Coordinator
2	Educational Qualification	:	Bachelor of Architecture (Visvesvaraya Regional College of Engineering – Nagpur (1973)
3	Work Experience	:	44 Years
4	Work Experience related to EIA	:	12 years More than 100 successful EIA projects in Building Construction Sector
5	Previous Organizations	:	Senior Architect, CPWD, Directorate General, CPWD Nirman Bhawan (1976 – 2007)

	Served		
6	Specialization	:	Planning and Designing, Energy Efficient Buildings, Climate Responsive Architectural Design, Passive Energy in Buildings, Energy Conservation, Landscape and Environmental Impact Assessment
7	Additional Qualification	:	Evaluator and Trainer for GRIHA - Green Rating for Integrated Habitat Assessment; Panel member for National Building Code 2005 in Landscaping, CED 46:p18; Architecture, Energy and Environment – Lund University Sweden Planning and Design of Energy Efficient Building – CPWD Ghaziabad; Post Graduate Diploma in Public Administration (IIPA)
II	Name	:	Mr. Suman Banerjee
1	Status in the Organization	:	Managing Partner & EIA Coordinator
2	Educational Qualification	:	B.E. Environmental Engineering
3	Work Experience	:	15 Years
4	Work Experience related to EIA	:	12 Years More than 50 successful EIA projects
5	Previous Organizations Served	:	Common - Hazardous Waste Management Facility at Taloja, Mumbai; Common - Biomedical Waste Management Facility at Taloja, Mumbai; Consultant for JBIC for Environment and Social Guideline Frame Work for Steel and Thermal Power Projects in India; Consultant for JICA for Dedicated Freight Corridor for DFCCL - Ministry of Railways, projects; EIA Consultant and Environmental Trainer for JBIC funded Kerala water supply project for Thiruvananthapuram, Meenad, Cherthala, Kozhikode&Pattuvam.
6	Specialization	:	Air Pollution, Water Pollution, Noise and Vibration, Green Building, Municipal Solid Waste, Hazardous Waste and Biomedical Waste; Environmental Impact Assessment for Building

			and Construction Projects, Highway Projects, Area Development Projects, Industrial Estate/ Park/ Leather Park Projects, SEZ, Oil and Natural Gas Exploration Projects, Mineral Beneficiation Projects, Highway and Solid and Hazardous Waste Management Projects; Noise and Vibration assessment and analysis expert
7	Additional Qualification	:	GRIHA – Green Rating for Integrated Habitat Assessment ECBC – Energy Conservation Building Code EIA Trainer for CPWD Officials at CPWD Training Institute, Ghaziabad
III	Name	:	Mr. Anand Kumar Dubey
1	Status in the Organization	:	Partner
2	Educational Qualification	:	M. Sc. Environment and Ecology
3	Work Experience	:	11 years
4	Work Experience related to EIA	:	11 years More than 50 successful EIA projects
5	Previous Organizations Served	:	-
6	Specialization	:	Environmental Impact Assessment for Building Construction, Industrial Estates/ Parks, Solid Waste Management, Area Development Projects, Oil and Natural Gas Exploration, Highway Projects, Air Quality, Water Quality, Solid Waste and Ecology and Biodiversity Expert
IV	Name	:	Dr. Debasish Bhattacharya
1	Status in the Organization	:	Social Expert
2	Educational Qualification	:	Ph.D. – IIT Kharagpur (Tribal Development/ Social Science) MRP Regional Planning – IIT Kharagpur
3	Work Experience	:	28 years
4	Work Experience related to EIA	:	23 years More than 70 successful EIA projects
5	Previous Organizations	:	IIT Kharagpur – Senior Project Manager; LEA Associates;

	Served		SMEC India Pvt. Ltd.; Feedback Ventures Pvt. Ltd.; Nippon Koei; External Funding Agency Projects for World Bank, ADB, JICA.
6	Specialization	:	Tribal Development, Socio economic Development, Social Study in Forest Management, Preparation of RAP, SIA, SE Framework Development, Rehabilitation and Resettlement (R&R)
V	Name	:	Mr. Suman Chattaraj
1	Status in the Organization	:	EIA Coordinator
2	Educational Qualification	:	M-Tech (Env Sc & Engg.), Indian Institute of Technology (ISM), Dhanbad. Environmental Engineering
3	Work Experience	:	20 years
4	Work Experience related to EIA	:	18 years More than 30 successful industrial EIA projects in India & abroad
5	Previous Organizations Served	:	Sonar Bharat Ecology & Environment, Kolkata, 2019-2022 Development Consultants Private Limited (DCPL), Kolkata, 2004-2019 Indian Institute of Bio-Social Research & Development (IBRAD), Kolkata, 2004 Equip Enviro Engineers Private Limited, Mumbai, 2003-2004 MM Aqua Technologies Limited, Gurgaon, Mumbai, 2002-2003
6	Specialization	:	Air Quality Modelling, Water and Waste Water Treatment, Remote sensing and land use land cover study, Water Pollution impact and mitigation studies, Noise and Vibration impact and mitigation study. Environmental Impact Assessment for Thermal Power Plants , Open Cast coal mines , SEZ , Building and Construction Project, Industrial and Domestic wastewater conveyance and treatment and recycling , Ash Handling and Management Study
7	Specialized Study	:	GRIHA Trainer & Evaluator 2012

VI	Name	:	Mr. Sameer Vilasrao Deshpande
1	Status in the Organization	:	Ecology and Biodiversity Expert
2	Educational Qualification	:	M.Sc. Botany
3	Work Experience	:	11 years
4	Work Experience related to EIA	:	11 years
5	Previous Organizations Served	:	National Environmental Engineering Research Institute - NEERI Nagpur
6	Specialization	:	Biological Monitoring, preparation of Biodiversity report, conservation plan for scheduled plant and animals, green belt development plan
VII	Name	:	Mr. Umesh Pratap Singh Chauhan
1	Status in the Organization	:	General Manager –Projects
2	Educational Qualification	:	M.Sc. Geology
3	Work Experience	:	32 years
4	Work Experience related to EIA	:	10 years
5	Previous Organizations Served	:	Uttar Pradesh State Mineral Development Corporation Ltd.; Directorate of Geology and Mining
6	Specialization	:	Senior Geologist; Mining Plan; R&D project for Mining and Quality Control; Exploration, Surveying and Mapping.
VIII	Name	:	Dr. Manoj Kumar Mishra
1	Status in the Organization	:	Air Pollution, Meterology, Modeling and Noise and Vibration Expert
2	Educational Qualification	:	M.Tech. Atmospheric Sciences – University of Pune Ph.D. Atmospheric Sciences (Air Quality Modelling and Micrometeorology – IIT Delhi)
3	Work Experience	:	19 years
4	Work Experience related to EIA	:	19 years

5	Previous Organizations Served	:	IIT Delhi – Research Associate SENES Consultants India Pvt. Ltd.
6	Specialization	:	Air and Noise Impact Assessment Studies; Air Quality and Noise Modeling by ISCST3, AERMOD, CALPUFF, OCD, CALINE, INM, DHAWANI, TNM, etc.; Air and Noise Modeling for Coal and Gas fired industries, landfill, helipads, airports, wind farms, highways & SEZ Projects;
7.	Specialized Study	:	Coastal Atmospheric Boundary Layer (CABL) field experiment at Kalpakkam in collaboration with Indira Gandhi Centre for Atomic Research (IGCAR) Kalpakkam, Bhabha Atomic Research Centre (BARC) Mumbai and Institute of Meteorology and Physics, University of Agriculture, Forestry and Renewable Resources – Vienna, Austria
IX	Name	:	Dr. Bideh Shukla
1	Status in the Organization	:	Project Incharge
2	Educational Qualification	:	Ph.D. Botany
3	Work Experience	:	15 years
4	Work Experience related to EIA	:	5 years
5	Previous Organizations Served	:	B.H.U., I-Service India (Pvt. Ltd.), Dimension India Network (Pvt.) Ltd.
6	Specialization	:	GIS, Water Pollution, Ecology
X	Name	:	Mr. Soumya Dwivedi
1	Status in the Organization	:	Risk and Hazard Expert
2	Educational Qualification	:	B.E. Chemical
3	Work Experience	:	07 years
4	Work Experience related to EIA	:	07 years
5	Previous Organizations Served	:	Mantec Consultants Pvt. Ltd.

6	Specialization	:	Risk and Hazard Study for Oil & Gas Pipeline and Depots, Ports, Harbors& Jetties and Thermal Power Plant
XI	Name	:	Mr. Manish Kumar Shukla
1	Status in the Organization	:	FAE (Geology, Hydro-Geology, Landuse)
2	Educational Qualification	:	M.Sc (Applied Geology), Diploma(GIS & Remote Sensing), Geological Survey of India
3	Work Experience	:	05 Years
4	Work Experience related to EIA	:	03 Years
5	Previous Organizations Served	:	None
6	Specialization	:	EIA
XII	Name	:	Indra Kumar Sharma
1	Status in the Organization	:	Team Member (AP & WP)
2	Educational Qualification	:	B.Tech. – Electronics and Commutations M.Sc:- Environmental Science
3	Work Experience	:	06 year
4	Work Experience related to EIA	:	06 Year
5	Previous Organizations Served	:	None
6	Specialization	:	EIA
XIII	Name		Ankur Srivastav
1	Status in the Organization		Project Executive
2	Educational Qualification		M.Sc. Biotechnology
3	Work Experience		6 Years
4	Work Experience related to EIA		1 Years
5	Previous Organizations Served		Ind Research and Development House Pvt. Ltd.
6	Specialization		EIA & Consent Management

ANNEXURE – 1

TOR Letter

File No.SEIAA/HR/2023/305

Goverment of India

State Level Environment Impact Assessment Authority

Haryana

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To,

M/s M/S DLF LIMITED & OTHERS
DLF Gateway Tower, R Block, DLF City Phase-II, Gurugram-122002, Haryana, India,
Gurgaon-122002
Haryana

Tel.No.-; Email:dlflimited165@gmail.com

Sub. Terms of Reference to the Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana, DLF Centre, Sansad Marg, New Delhi-110001

Dear Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1) along with a Pre-feasibility Report. The details of the proposal are given below:

1. Proposal No.:	SIA/HR/INFRA2/414575/2023
2. Name of the Proposal:	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) at Sector 25A, Gurugram, Haryana
3. Category of the Proposal:	INFRA-2
4. Project/Activity applied for:	8(a) Building and Construction projects
5. Date of submission for TOR:	03 Feb 2023

Date : 06-02-2023

Sh. Pardeep Kumar, IAS
(Member Secretary)

Office : **Bays No. 55-58, Ist Floor, Prayatan Bhawan, Sector-2, Panchkula, Haryana**
Phone No : Mobile : **8448181956**
Email id : **seiaa-21.env@hry.gov.in**

Note : This is auto tor granted letter.

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

ANNEXURE – 2

Previous EC Letter

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY HARYANA

Bay No. 55-58, Prayatan Bhawan, Sector-2, PANCHKULA.

No. SEIAA/HR/2019/ 81 Dated: 06.05.2019

To

M/s DLF City Centre Ltd
Gateway Tower (2nd Floor), DLF City, Phase-III,
Gurgaon-122002

Subject: Environment Clearance for shopping/commercial Building on 32.36 acres site (Mall of India) in Block-V, DLF City Phase-III, Sector-25 A, Gurgaon, Haryana

This letter is in reference to your application no. nil dated 24.04.2018 addressed to M.S. SEIAA, Haryana received on 26.04.2018 seeking prior Environmental Clearance for the above project under the EIA Notification, 2006. The proposal has been appraised as per prescribed procedure in the light of provisions under the EIA Notification, 2006 on the basis of the mandatory documents enclosed with the application viz., Form-1, Form1-A, Conceptual Plan and additional clarifications furnished in response to the observations of the State Expert Appraisal Committee (SEAC) constituted by MOEF & CC, GOI in its meeting held on 11.05.2018 and 13.08.2018 awarded "Gold" grading to the project.

[2] It is inter-alia, noted that the project proponent has proposed for shopping/commercial Building on 32.36 acres site (Mall of India) in Block-V, DLF City Phase-III, Sector-25 A, Gurgaon, Haryana being developed by M/S DLF City Centre Limited. The estimated cost of the project is Rs. 4551 Crores. Total Plot area is 32.36 Acres (1,30,956.07 Sq. Meters). Total built up area will be approximately 10, 57,114.09 Sq. Meters. The maximum height of the building is approx. 43.1 meters. The project will comprise of 5 Basement + LG +UG+ 8 Floor. It was also informed that the green area development has been kept as 25.01% (i.e. 32,754.438 SQ. Meter approximately) of the plot area. The total water requirement for the project will be 2354.4 KLD (i.e. 1204.7 KLD of fresh water & 1149.7 KLD of recycled treated water). The waste water generation will be 1171.7 KLD which will be treated upto tertiary level in STP having total capacity of 1600 KLD. The STP treated water will be used for flushing, horticulture and other misc. The power requirement for the project will be 28,310 KW supplied by DHBVNL and the DG set power will be 20X2000 KVA. Parking requirement for the project as per Haryana Bye Laws is 8,248 ECS and the parking proposed to be provided in the project is 10,522 ECS. There will be total solid waste generation of 9,322 Kg/day. Out of this the bio -degradable waste 3729 Kg/day will be composted in 3 Nos. of Organic Waste Converter provided within the project premises and the manure produced will be used for horticulture and green development. The calculations of the same are in accordance with the prescribed

norms. It was pointed out that the required water for the project will be provided through HUDA. There will be 28 numbers of rain water harvesting structures as approved by the Central Ground Water Authority (CGWA).

[3] The State Expert Appraisal Committee, Haryana after due consideration of the relevant documents submitted by the project proponent and additional clarification furnished in response to its observations, have recommended the grant of environmental clearance for the project mentioned above, subject to compliance with the stipulated conditions. Accordingly, the State Environment Impact Assessment Authority in its meeting held on 18.04.2019 decided to agree with the recommendations of SEAC to accord necessary environmental clearance for the project under Category 8(a) of EIA Notification 2006 subject to the strict compliance with the specific and general conditions mentioned below:-

PART A-

SPECIFIC CONDITIONS:-

Construction Phase:-

[1] "Consent for Establish" shall be obtained from Haryana State Pollution Control Board under Air and Water Act and a copy shall be submitted to the SEIAA, Haryana before the start of any construction work at site.

[2] A first aid room as proposed in the project report shall be provided both during construction and operational phase of the project.

[3] Adequate drinking water and sanitary facilities shall be provided for construction workers at the site. Provision should be made for mobile toilets. Open defecation by the laboures is strictly prohibited. The safe disposal of solid wastes/ waste water generated during the construction phase should be ensured. Efforts shall be made to provide mobile STP for treatment of waste water during the construction phase.

[4] All the topsoil excavated during construction activities shall be stored for use in horticulture/landscape development within the project site.

[5] The project proponent shall ensure that the building material required during construction phase is properly stored within the project area and disposal of construction waste should not create any adverse effect on the neighboring communities and should be disposed of after taking necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.

[6] Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water and any hazardous waste generated during construction phase, should be disposed off as

per applicable rules and norms with necessary approval of the Haryana State Pollution Control Board.

[7] The diesel generator sets to be used during construction phase shall be of ultra low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.

[8] The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.

[9] Ambient noise levels shall conform to the Commercial/Industrial standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be taken to reduce ambient air pollution and noise level during construction phase, so as to conform to the stipulated Commercial/Industrial standards of CPCB/MoEF.

[10] Fly ash shall be used as building material in the construction as per the provisions of Fly Ash Notification of September 1999 and as amended on 27th August 2003.

[11] Storm water control and its re-use as per CGWB and BIS standards for various applications should be ensured.

[12] Water demand during construction shall be reduced by use of pre-mixed concrete, curing agents and other best practices.

[13] In view of the severe constrains in water supply augmentation in the region and sustainability of water resources, the developer will submit the NOC from CGWA specifying water extraction quantities and assurance from HUDA/ utility provider indicating source of water supply and quantity of water with details of intended use of water – potable and non-potable. Assurance is required for both construction and operation stages separately. It shall be submitted to the SEIAA and RO, MOEF, Chandigarh before the start of construction.

[14] Roof must meet prescriptive requirement as per Energy Conservation Building Code by using appropriate thermal insulation material.

[15] Opaque wall must meet prescriptive requirement as per Energy Conservation Building Code which is proposed to be mandatory for all air conditioned spaces while it is desirable for non-air-conditioned spaces by use of appropriate thermal insulation material to fulfill requirement.

[16] The approval of the competent authority shall be obtained for structural safety of the building on account of earthquake, adequacy of fire fighting equipments, etc. as per National Building Code including protection measures from lightening etc.

[17] Overexploited groundwater and impending severe shortage of water supply in the region requires the developer to redraw the water and energy conservation plan. Developer shall reduce the overall footprint of the proposed development. Project

proponent shall incorporate water efficiency /savings measures as well as water reuse/recycling within 3 months and before start of construction to the SEIAA, Haryana and RO, MOEF, GOI, Chandigarh.

[18] The Project Proponent as stated in proposal shall construct 28 nos. rain water harvesting structure for recharging the ground water within the project premises. Rain water harvesting pits shall be designed to make provisions for silting chamber and removal of floating matter before entering harvesting pit. Maintenance budget and persons responsible for maintenance must be provided. Care shall also be taken that contaminated water do not enter any RWH pit.

[19] The project proponent shall provide for adequate fire safety measures and equipments as required by Haryana Fire Service Act, 2009 and instructions issued by the local Authority/Directorate of fire from time to time. Further the project proponent shall take necessary permission regarding fire safety scheme/NOC from competent Authority as required.

[20] The Project Proponent shall obtain assurance from the DHBVN for total supply of 28,310 KW of power supply before the start of construction. In no case project will be operational solely on generators without any power supply from any external power utility.

[21] Detail calculation of power load and ultimate power load of the project shall be submitted to DHBVN under intimation to SEIAA Haryana before the start of construction. Provisions shall be made for electrical infrastructure in the project area.

[22] The Project Proponent shall not raise any construction in the natural land depression / Nallah/water course and shall ensure that the natural flow from the Nallah/water course is not obstructed.

[23] The Project Proponent shall keep the plinth level of the building blocks sufficiently above the level of the approach road to the Project. Levels of the other areas in the Projects shall also be kept suitably so as to avoid flooding.

[24] Construction shall be carried out so that density of population does not exceed norms approved by Director General Town and Country Department Haryana.

[25] The Project Proponent shall submit an affidavit with the declaration that ground water will not be used for construction and only treated water should be used for construction.

[26] The project proponent shall not cut any existing tree and project landscaping plan should be modified to include those trees in green area.

[27] The project proponent shall ensure that ECBC norms for composite climate zone are met. In particular building envelope, HVAC service, water heating, pumping, lighting and electrical infrastructure must meet ECBC norms.

[28] The Project Proponent shall provide 3 meter high barricade around the project area, dust screen for every floor above the ground, proper sprinkling and covering of stored material to restrict dust and air pollution during construction.

[29] The project proponent shall construct a sedimentation basin in the lower level of the project site to trap pollutant and other wastes during rains.

[30] The project proponent shall provide proper rasta of proper width and proper strength for the project before the start of construction.

[31] The project proponent shall ensure that the U-value of the glass is less than 3.177 and maximum solar heat gain co-efficient is 0.25 for vertical fenestration.

[32] The project proponent shall adequately control construction dusts like silica dust, non-silica dust and wood dust. Such dusts shall not spread outside project premises. Project Proponent shall provide respiratory protective equipment to all construction workers.

[33] The project proponent shall provide fire control room and fire officer for building above 30 meter as per National Building Code.

[34] The project proponent shall obtain permission of Mines and Geology Department for excavation of soil before the start of construction.

[35] The project proponent shall provide one refuge area till 24 meter and one till 39 meter each, as per National Building Code. The project proponent shall not convert any refuse area in the habitable space and it should not be sold out/commercialized.

[36] The project proponent shall seek specific prior approval from concerned local Authority/HUDA regarding provision of storm drainage and sewerage system including their integration with external services of HUDA/ Local authorities beside other required services before taking up any construction activity.

[37] The project proponent shall discharge excess of treated waste water/storm water in the public drainage system and shall seek permission of HUDA before the start of construction.

[38] The project proponent shall maintain the distance between STP and water supply line.

[39] The project proponent shall ensure that the stack height is 6 meter.more than the highest tower.

[40] The project proponent shall ensure that structural stability to withstand earthquake of magnitude 8.5 on Richter scale.

[41] Vertical fenestration shall not exceed 60% of total wall area.

Operational Phase:

[a] "Consent to Operate" shall be obtained from Haryana State Pollution Control Board under Air and Water Act and a copy shall be submitted to the SEIAA, Haryana.

[b] The Sewage Treatment Plant (STP) shall be installed for the treatment of the sewage to the prescribed standards including odour and treated effluent will be recycled to achieve zero exit discharge. The installation of STP shall be certified by an independent expert and a report in this regard shall be submitted to the SEIAA, Haryana before the project is commissioned for operation. Tertiary treatment of waste water is mandatory. The project proponent shall remove not only Ortho-Phosphorus but total Phosphorus to the extent of less than 2mg/liter. Similarly total Nitrogen level shall be less than 2mg/liter in tertiary treated waste water. Discharge of treated sewage shall conform to the norms and standards of CPCB/ HSPCB, whichever is environmentally better. Project Proponent shall implement such STP technology which does not require filter backwash. The project proponent shall essentially provide STP preferably equivalent to 50% of total capacity or as per the initial occupancy as the case may be.

[c] Separation of the grey and black water should be done by the use of dual plumbing line. Treatment of 100% grey water by decentralized treatment should be done ensuring that the re-circulated water should have BOD level less than 5 mg/litre and the recycled water will be used for flushing, gardening and DG set cooling etc.

[d] For disinfection of the treated wastewater ultra-violet radiation or ozonization process should be used.

[e] Diesel power generating sets proposed as source of back-up power for lifts, common area illumination and for domestic use should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The location of the DG sets shall be in the basement as promised by the project proponent with appropriate stack height above the highest roof level of the project as per the CPCB norms. The diesel used for DG sets shall be ultra low sulphur diesel (35 ppm sulphur), instead of low sulphur diesel.

[f] Ambient Noise level should be controlled to ensure that it does not exceed the prescribed standards both within and at the boundary of the Proposed Research and Development Centre.

[g] The project proponent as stated in the proposal shall maintain at least 25.718% as green cover area for tree plantation especially all around the periphery of the project and on the road sides preferably with local species which can provide protection against noise and suspended particulate matter. The open spaces inside the project shall be preferably landscaped and covered with vegetation/grass, herbs & shrubs. Only locally available plant species shall be used.

[h] The project proponent shall strive to minimize water in irrigation of landscape by minimizing grass area, using native variety, xeriscaping and mulching, utilizing efficient irrigation system, scheduling irrigation only after checking evapo-transpiration data.

[i] Rain water harvesting for roof run-off and surface run-off, as per plan submitted should be implemented. Before recharging the surface run off, pre-treatment through sedimentation tanks must be done to remove suspended matter, oil and grease. The bore well for rainwater recharging shall be kept at least 5 mts. above the highest ground water table. Care shall be taken that contaminated water do not enter any RWH pit. The project proponent shall avoid Rain Water Harvesting of first 10 minutes of rain fall. Roof top of the building shall be without any toxic material or paint which can contaminate rain water. Wire mess and filters should be used wherever required.

[j] The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.

[k] A report on the energy conservation measures conforming to energy conservation norms finalized by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & U Factors etc and submitted to the SEIAA, Haryana in three months time.

[l] Energy conservation measures like installation of LED only for lighting the areas outside the building and inside the building should be integral part of the project design and should be in place before project commissioning. Use of solar panels must be adapted to the maximum energy conservation.

[m] The Project Proponent shall use zero ozone depleting potential material in insulation, refrigeration, air-conditioning and adhesive. Project Proponent shall also provide halon free fire suppression system.

[n] The solid waste generated should be properly collected and segregated as per the requirement of the MSW Rules, 2000 and as amended from time to time. The bio-degradable waste should be treated by appropriate technology (proposed OWC) at the site ear-marked within the project area and dry/inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.

[o] The provision of the solar water heating system shall be as per norms specified by HAREDA and shall be made operational in each building block.

[p] The traffic plan and the parking plan proposed by the Project Proponent should be meticulously adhered to with further scope of additional parking for future requirement. There should be no traffic congestion near the entry and exit points

from the roads adjoining the proposed project site. Parking should be fully internalized and no public space should be used.

[q] The Project shall be operationalized only when HUDA/local authority will provide domestic water supply system in the area.

[r] Operation and maintenance of STP, solid waste management and electrical Infrastructure, pollution control measures shall be ensured even after the completion of project.

[s] Different type of wastes should be disposed off as per provisions of municipal solid waste, biomedical waste, hazardous waste, e-waste, batteries & plastic rules made under Environment Protection Act, 1986. Particularly E-waste and Battery waste shall be disposed of as per existing E-waste Management Rules 2011 and Batteries Management Rules 2001. The project proponent shall maintain a collection center for E-waste and it shall be disposed of to only registered and authorized dismantler as per existing E-waste Management Rules 2011.

[t] Standards for discharge of environmental pollutants as enshrined in various schedules of rule 3 of Environment Protection Rule 1986 shall be strictly complied with.

[u] The project proponent shall make provision for guard pond and other provisions for safety against failure in the operation of wastewater treatment facilities. The project proponent shall also identify acceptable outfall for treated effluent.

[v] The project proponent shall ensure that the stack height of DG sets is as per the CPCB guide lines and also ensure that the emission standards of noise and air are within the CPCB latest prescribed limits. Noise and Emission level of DG sets greater than 800 KVA shall be as per CPCB latest standards for high capacity DG sets.

[w] All electric supply exceeding 100 amp, 3 phase shall maintain the power factor between 0.98 lag to 1 at the point of connection.

[x] The project proponent shall minimize heat island effect through shading and reflective or pervious surface instead of hard surface.

[y] The project proponent shall not use fresh water for HVAC and DG cooling. Air based HVAC system should be adopted and only treated water shall be used by project proponent for cooling, if it is at all needed. The Project Proponent shall also use evaporative cooling technology and double stage cooling system for HVAC in order to reduce water consumption. Further temperature, relative humidity during summer and winter seasons should be kept at optimal level. Variable speed drive, best Co-efficient of Performance (CoP), as well as optimal Integrated Point Load Value and minimum outside fresh air supply may be

resorted for conservation of power and water. Coil type cooling DG Sets shall be used for saving cooling water consumption for water cooled DG Sets.

[z] The project proponent shall ensure that the transformer is constructed with high quality grain oriented, low loss silicon steel and virgin electrolyte grade copper. The project proponent shall obtain manufacturer's certificate also for that.

[aa] Water supply shall be metered among different users and different utilities.

[ab] The project proponent shall ensure that exit velocity from the stack should be sufficiently high. Stack shall be designed in such a way that there is no stack down-wash under any meteorological conditions.

[ac] The project proponent shall provide water sprinkling system in the project area to suppress the dust in addition to the already suggested mitigation measures in the Air Environment Chapter of EMP.

[ad] The project proponent shall provide additional green area on terrace and roof top.

[ae] The project proponent shall ensure proper Air Ventilation and light system in the basements area for comfortable living of human being and shall ensure that number of Air Changes per hour/(ACH) in basement never falls below 15. In case of emergency capacity for increasing ACH to the extent of 30 must be provided by the project proponent.

[af] The project proponent shall install solar panel for energy conservation.

PART-B. GENERAL CONDITIONS:

[i] The Project Proponent shall ensure the commitments made in Form-1, Form-1A, EIA/EMP and other documents submitted to the SEIAA for the protection of environment and proposed environmental safeguards are complied with in letter and spirit. In case of contradiction between two or more documents on any point, the most environmentally friendly commitment on the point shall be taken as commitment by project proponent.

[ii] The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the northern Regional Office of MoEF, HSPCB and SEIAA Haryana.

[iii] STP outlet after stabilization and stack emission shall be monitored monthly. Other environmental parameters and green belt shall be monitored on quarterly basis. After every 3 (three) months, the project proponent shall conduct environmental audit and shall take corrective measure, if required, without delay.

[iv] The SEIAA, Haryana reserves the right to add additional safeguard measures subsequently, if found necessary. Environmental Clearance granted will be revoked if it is found that false information has been given for getting approval of

this project. SEIAA reserves the right to revoke the clearance if conditions stipulated are not implemented to the satisfaction of SEIAA/MoEF.

[v] The Project proponent shall not violate any judicial orders/pronouncements issued by any Court/Tribunal.

[vi] All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972, Forest Act, 1927, PLPA 1900, etc. shall be obtained, as applicable by project proponents from the respective authorities prior to construction of the project.

[vii] The Project proponent should inform the public that the project has been accorded Environment Clearance by the SEIAA and copies of the clearance letter are available with the Haryana State Pollution Control Board & SEIAA. This should be advertised within 7 days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region and the copy of the same should be forwarded to SEIAA Haryana. A copy of Environment Clearance conditions shall also be put on project proponent's web site for public awareness.

[viii] Under the provisions of Environment (Protection) Act, 1986, legal action shall be initiated against the Project Proponent if it was found that construction of the expansion project has been started before obtaining prior Environmental Clearance.

[ix] Any appeal against the this Environmental Clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

[x] Corporate Environment and Social Responsibility (CSER) shall be laid down by the project proponent (2% shall be earmarked) as per guidelines of MoEF, GoI Office Memorandum No. J-11013/41/2006-IA.II(I) dated 18.05.2012 and Ministry of Corporate Affairs, GoI Notification Dated 27.02.2014. A separate audit statement shall be submitted in the compliance. Environment related work proposed to be executed under this responsibility shall be undertaken simultaneously. The project proponent shall select and prepare the list of the work for implementation of CSER of its own choice and shall submit the same before the start of construction.

[xi] The fund ear-marked for environment protection measures should be kept in separate account and should not be diverted for other purposes and year wise expenditure shall be reported to the SEIAA/RO MoEF, GoI under rules prescribed for Environment Audit.

[xii] The project proponent shall ensure the compliance of Forest Department, Haryana Notification no. S.O.121/PA2/1900/S.4/97 dated 28.11.1997.

[xiii] The Project Proponent shall ensure that no vehicle during construction/operation phase enter the project premises without valid 'Pollution Under Control' certificate from competent Authority.

[xiv] Besides the developer/applicant, the responsibility to ensure the compliance of Environmental Safeguards/ conditions imposed in the Environmental Clearance letter shall also lie on the licensee/licensees in whose name/names the license/CLU has been granted by the Town & Country Planning Department, Haryana.

[xv] The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; $PM_{2.5}$, PM_{10}, SO_X NO_X, Ozone, Lead, CO, Benzene, Ammonia, Benzopyrine, arsenic and Nickel. (Ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

[xvi] The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the HSPCB Panchkula as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of the EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.

[xvii] The project proponent shall conduct environment audit at every three months interval and thereafter corrected measures shall be taken without any delay. Details of environmental audit and corrective measures shall be submitted in the monitoring report.

[xviii] The project proponent shall seek fresh environmental clearance in case any modification /revision is required at a later stage due to exchange of revenue rasta existing in the project area or change in any plan due to combined zoning plan.

[xix] The validity of this environment clearance letter is valid up to 7 years from the date of issuance of EC letter. The environment clearance conditions applicable till life space project in case of Residential project will continue to apply. The resident welfare association/Housing co-operative societies shall responsible to comply conditions laid down in EC. In case of violation the action would be taken as per the laid dow.00n law of land. Compliance report should be sent to this office till life of the project.

[xx] If project is not completed within the validity period then the project proponent shall submit the application for extension of validity within one month before the lapse of validity period of Environment Clearance i.e. 7 years.

[xxi] The project proponent should intimate to the Authority well before shifting their address of communication.

Chairman,

State Level Environment Impact

Assessment Authority, Haryana, Panchkula.

Endst. No. SEIAA/HR/2019/ Dated:.....

A copy of the above is forwarded to the following:

1. The Additional Director (IA Division), MoEF&CC, GoI, Indra Paryavaran Bhavan, Zor bagh Road-New Delhi.
2. The Regional office, Ministry of Environment, Forests & Climate Change, Govt. of India, Bay's no. 24-25, Sector 31-A, Dakshin Marg, Chandigarh.
3. The Chairman, Haryana State Pollution Control Board, C-11, Sector-6, Pkl.

Chairman,

State Level Environment Impact

Assessment Authority, Haryana, Panchkula.

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY HARYANA
Bay No. 55-58, Prayatan Bhawan, Sector-2, PANCHKULA.
Tel: 0172-2565232
E-mail Id: seiaa.hry@gmail.com

No. SEIAA(125)/HR/2020/ 539 Dated: 06 /11/2020

To

M/s DLF City Centre Ltd,
Gateway Tower, (2nd Floor), DLF City, Phase-III,
Gurgaon-122002, Haryana

Subject: Amendment/Revision of Environment Clearance for Shopping/ Commercial Building on 32.36 acres (Mall of India) in Block V, DLF City, Phase-III, Sector 25-A, Gurugram, Haryana.

[1] This letter is in reference to your application dated 24.06.2020 addressed to **Member Secretary, SEIAA,** Haryana received on 21.08.2020 and subsequent letter dated 31.08.2020 seeking prior Amendment/Revision in Environmental Clearance for the above project under the EIA Notification, 2006. The proposal has been appraised as per prescribed procedure in the light of provisions under the EIA Notification, 2006 on the basis of the mandatory documents enclosed with the application viz., Form-1, Form1-A, Conceptual Plan and additional clarifications furnished in response to the observations of the State Expert Appraisal Committee (SEAC) constituted by MoEF & CC, GoI vide their Notification dated 30.01.2019, in its meeting held on 30.08.2020 and recommended to SEIAA for Amendment/Revision in EC to the project.

[2] It is inter-alia, noted that the project involves the Amendment/Revision of Environment Clearance for Shopping/ Commercial Building on 32.36 acres (DLF Downtown – Gurugram, earlier Mall of India) in Block V, DLF City, Phase-III, Sector 25-A, Gurugram, Haryana. The details of amendment of the project as given below:

Sr. No.	Particulars	Existing as per EC Dated 06.05.2019	Proposed	Total
1.	Ground Coverage	62262.7 m^2	16304.39 m^2	78567.69 m^2
2.	Max. no of floors	LG+UG+8 Floors	LG+UG+9 Floors	LG+UG+9 Floors

[3] The State Expert Appraisal Committee, Haryana after due consideration of the relevant documents submitted by the project proponent and additional clarification furnished in response to its observations, have recommended the grant of **amendment/revision in earlier environmental clearance dated 06.05.2019** for the project mentioned above. The State Environment Impact Assessment Authority in its **125th meeting held on 07.10.2020** after due deliberations the Authority decided to agree with the recommendations of SEAC to accord amendment/revision in environmental clearance for the project under **Category 8(a)** of EIA Notification 2006 subject to strict compliance with the additional stipulations and other conditions will remain the same as per earlier Environment Clearance granted dated 06.05.2019.

Additional Conditions:-

[1] The Project Proponent should not be any increase in population/foot fall/ water consumption/ waste water generation/ waste generation;

[2] Extensive studies have been undertaken regarding Traffic flow & Level of Services around the site to ascertain that there would be no adverse effect or impediment in movement of traffic during Construction or Operational phase of upcoming project.

[3] While carrying out the "Air Dispersion modeling" inbound and outbound vehicles (440 PCU/hr.) along with the emission and running hours (04 hours) of DG sets has been considered.

[4] Running of DG sets/ Captive Power during construction or operational phase and fuel to be used would be as per related Guidelines of GRAP & amp; strictures/injunctions passed by Hon'ble EPCA/NGT and further National Clean Air program vide Office Order No. HSPCB/SSC/2020/4320-44 dtd. 25/06/2020 would be implemented;

[5] The Project Proponent would achieve "Zero Liquid discharge" by installing MEE along with associated equipment;

d/c

Chairman,
State Level Environment Impact
Assessment Authority, Haryana, Panchkula.

Endst. No. SEIAA(125)/HR/2020/ 540 – 543 Dated: 06 /11/2020

A copy of the above is forwarded to the following:

1. Director (IA Division), MoEF & CC, GoI, Indra Paryavaran Bhavan, Zor bagh Road-New Delhi-110003.
2. Regional office, Ministry of Environment, Forests & Climate Change, Govt. of India, Bay's no. 24-25, Sector 31-A, Dakshin Marg, Chandigarh-160018.
3. Chairman, Haryana State Pollution Control Board, C-11, Sector-6, Panchkula.
4. Director General, Town & Country Planning Haryana, Plot No. 3, Sector - 18A, Madhya Marg, Chandigarh- 160018.
5. Director General, Mines & Geology Department Haryana, Chandigarh
6. Concerned File/ Office Copy

d/c

Chairman,
State Level Environment Impact
Assessment Authority, Haryana, Panchkula.

ANNEXURE – 3

Transfer of EC Letter

State Environment Impact Assessment Authority, Haryana,
Bays No.55-58, Prayatan Bhawan, Sector-2 Panchkula.

Tel: 0172-2565232, 4043956
E-mail Id: seiaa-21.env@hry.gov.in

Memo No. SEIAA/HR/2023/ 59 Date: 02/02/2023

To

M/s DLF Limited & Others
Address: DLF Centre, Sansad Marg,
New Delhi-110001
Email : dlflimited165@gmail.com

Subject: **Transfer of Environment Clearance of Proposed Shopping / Commercial Building on 32.36 Acres in Block –V, DLF City, Phase – III, Sector – 25 A, Gurugram, Haryana by M/s DLF Limited from M/s DLF City Centre Limited.**

Kindly refer to the subject cited above; it is intimated that the Project Proponent has applied for **Transfer of Environment Clearance** under EIA Notification dated 14.09.2006 issued by MoEF& CC, GoI to the SEIAA, Haryana through PARIVESH Web Portal vide online **Proposal No. SIA/HR/MIS/295315/2022 dated 17.12.2022** to SEIAA.

In this connection, it is submitted that the subject cited project was granted Environment Clearance by SEIAA, Haryana vide letter No. SEIAA/HR/2019/81 dated 06.05.2019 for total Plot Area of 1,30,956.07 Sqmtr (32.36 Acres) and Built up Area of 10,57,114.09 Sqmtr. Theafter, Amendment/Revision in EC was issued by SEIAA, Haryana vide letter No. SEIAA(125)/HR/2020/539 dated 06.11.2020 **in favour of M/s DLF City Centre Ltd.**

Now, the PP has intimated that DLF LIMITED is a developer of the colony and all the approvals for the said project are in the name of DLF LIMITED and requested for transfer of Environment Clearance in the name of M/s DLF Limited.

The matter for Transfer of EC was taken up during **152nd meeting of SEIAA held on 25.01.2023 and** the application submitted by PP has been examined in the light of **Para (11) of EIA Notification dated 14.09.2006** and observed that:

1. The validity of Environment Clearance (EC) granted **in favour of Transferor i.e. M/s DLF City Centre Ltd** by SEIAA, Haryana vide letter No. SEIAA/HR/2019/81 dated 06.05.2019 **is valid upto 05.05.2019 in accordance with the MoEF & CC, GoI Notification No. S.O.1807 (E), dated the 12th April, 2022.**

2. The **Transferee i.e. M/s DLF Limited & Others** has submitted an undertaking that they will comply with all the terms and conditions of Environment Clearance (EC) vide letter No. SEIAA(125)/HR/2020/539 dated 06.11.2020 which was granted to **M/s DLF City Centre Ltd for the said Shopping / Commercial Building on 32.36 Acres in Block –V, DLF City, Phase – III, Sector – 25 A, Gurugram, Haryana.**

3. Occupation Certificate granted in favour of **M/s DLF Limited & others** by DTCP, Haryan vide its Memo No. ZP-1156/AD (RA) / 2022/ 17429 dated 27.06.2022.

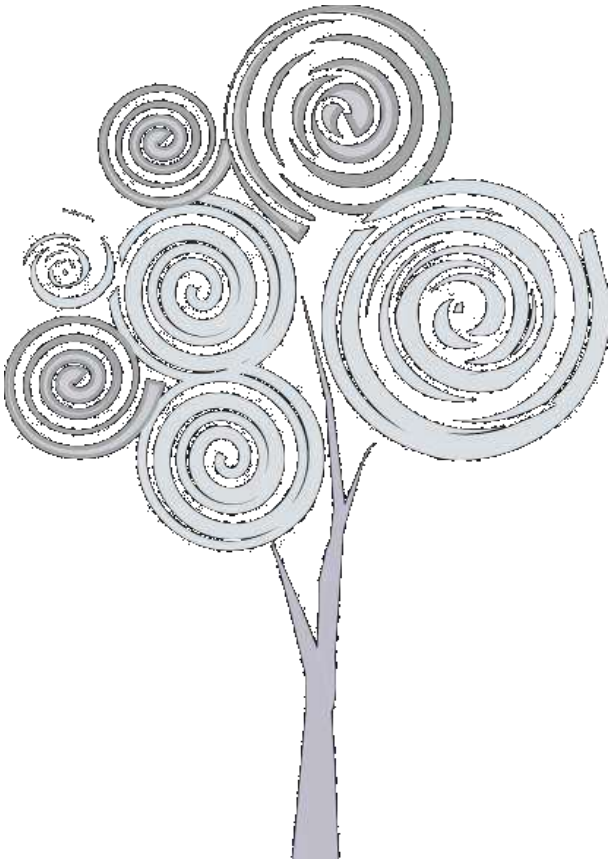
4. PP **(M/s DLF Limited & Others)** has submitted a copy of Bank Demand Draft of **Rs. 2,00,000/- vide DD No. 521519 dated 22.12.2022 on account of requisite Scrutiny Fee as per Notification No. DE&CCH/3060 dated 14th October, 2021 issued by the Haryana Government.**

Keeping in view of above, **the Authority decided to agree with proposal and considered to transfer Environment Clearance letter dated 05.06.2018** from **M/s DLF City Centre Limited** to **M/s DLF Limited & Others** without any change in,the developing plan, location and the same nature of the Project; subject to strict compliance of the stipulated conditions imposed vide Environment Clearance letter dated 06.05.2019 for all the intents & purposes.

Member Secretary,
SEIAA, Haryana

ANNEXURE – 4

ECBC Report



Energy Analysis Report R0

DLF DOWNTOWN,
Gurugram (Haryana)

Submitted by: Environmental Design Solutions Pvt. Ltd., D1/25, Basement, Vasant Vihar, New Delhi, 110057, India.

Contents

Table of Figure:

Quality Control

Job No	1939	**Document Type**	Energy Analysis Report
Project	DLF Downtown		
Location	Gurugram, India		
File name	Energy Analysis Report_R0		
Date	26/08/2022		
Prepared by	Robin Jain	Signature (for file)	RJ
Reviewed by	Mayank Bhatnagar	Signature (for file)	MB
Authorised by	Hisham Ahmed	Signature (for file)	

Executive Summary

Project Description : DLF Downtown, Gurugram

Scope : Energy Simulation for Energy Conservation Building Code (ECBC) 2017 Compliance

Summary of Analysis Results

Alternative	Annual Electrical Energy Use[1] (kWh/Yr)
ECBC 2017 Baseline Building	6,91,96,085
Present Building	6,76,18,338

Anticipated Annual Energy Savings & ECBC Compliance Status

Annual Electrical Energy Savings (kWh/Yr)	15,77,747
Annual Energy Savings (%)	2.3
ECBC 2017 Compliance	Yes. The building complies with ECBC 2017 energy performance requirements

A Baseline building as per the requirements of the Energy Conservation Building Code of India, ECBC 2017 was modelled. The building is simulated with its actual orientation and again after rotating the entire building 90,180,270 degrees, then averaging the results to get the ECBC Baseline Building Energy consumption in Kilowatt Hours. A Present building with energy efficiency measures for HVAC, Lighting and Envelope features is modeled and compared with the Baseline Building.

With the current design and specifications, the proposed building is expected to consume 2.3 % less energy per year or **15,77,747** less kWh per year compared with the ECBC baseline building. This meets the ECBC 2017 energy performance requirements.

[1] The energy performance of a building depends on a number of factors like weather, occupant behaviour, equipment performance and maintenance etc which are out of the control of the designer/ energy analyst and hence the energy performance predicted here may vary from the actual energy performance of the building once it is operational. This electrical energy does not include the energy consumed by heating and cooling.

Introduction

This report has been prepared by Environmental Design Solutions Pvt. Ltd. It contains the results of the energy analysis of the DLF Downtown, Gurugram, Haryana, India, based on information provided by Architect and consultants.

The proposed building was analysed using hourly energy simulation software to determine compliance with the Energy Conservation Building Code of India, ECBC 2017 and to predict the performance of this building in comparison to a Baseline building based on the prescriptive requirements of ECBC 2017.

Figure 1: 3D View of the Building

Energy Conservation Building Code-2017

The Energy Conservation Building Code (ECBC) is the extensive work by the Bureau of Energy Efficiency (BEE) and its committee of experts. ECBC aims to provide minimum requirements for the energy efficient design and construction of buildings. The code provides us the basic guidelines of the components used in the buildings which make the building more efficient. It is essential that new buildings to be designed and built with efficient considerations right from the initial stage.

This Code is applicable for buildings or building complexes that have a connected load of 100 kW or more, or a contract demand of 120 KVA or greater. For this, the design and technologies are encouraged so that the structure will reduces the use of energy without affecting the building function, comfort, or the productivity of the occupants. Savings resulting from energy code compliance directly benefit the building owners and occupants over the life cycle of the building.

Plans and specifications shall show all pertinent data and features of the building, equipment, and systems in sufficient details to permit the Authority having jurisdiction to verify that the building complies with the requirements of the code. Mandatory sections and recommendations of the code are grouped in following sections: -

- Building Envelope.
- Lighting.
- Heating Ventilation and Air Conditioning.
- Service Water Heating.
- Electric Power and Distribution.

There are two approaches explained in the code to make the construction ECBC compliant. In the ***Prescriptive Approach***, the compliance can be achieved by meeting the specific level described for each individual element of the building system. In the envelope section- ***Trade off method*** allows to trade off the efficiency of one envelop element with another to evaluate optimized energy performance of the building. In the second approach- ***Whole Building Simulation,*** method a computer simulation model is used to meet compliance. The simulation analysis helps to evaluate the energy performance of a building and provides the necessary modifications before the building is constructed.

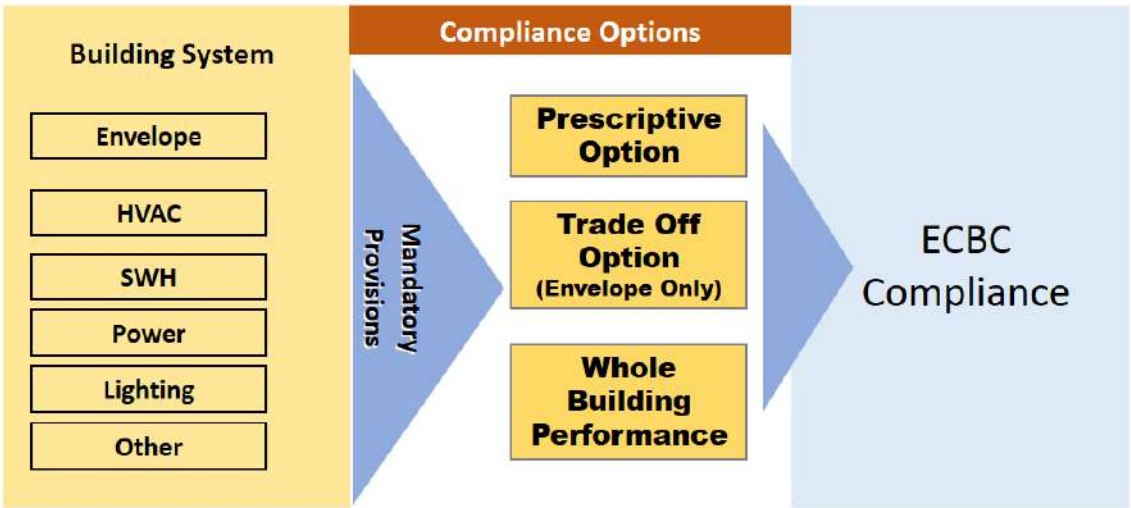


Figure 2 ECBC-2017 Compliance Options

Analysis Methodology

Whole Building Simulation

Building performance for all measures was evaluated using eQUEST software program. This program uses the DOE-2.2 simulation engine for evaluating energy-use and peak demand on an hourly basis. A Baseline building model minimally complying with ECBC 2017 was developed and simulated in eQUEST. A Proposed building with energy efficiency measures for Lighting, Vent Fan and efficient building envelope is modelled and compared with the ECBC Baseline Building.

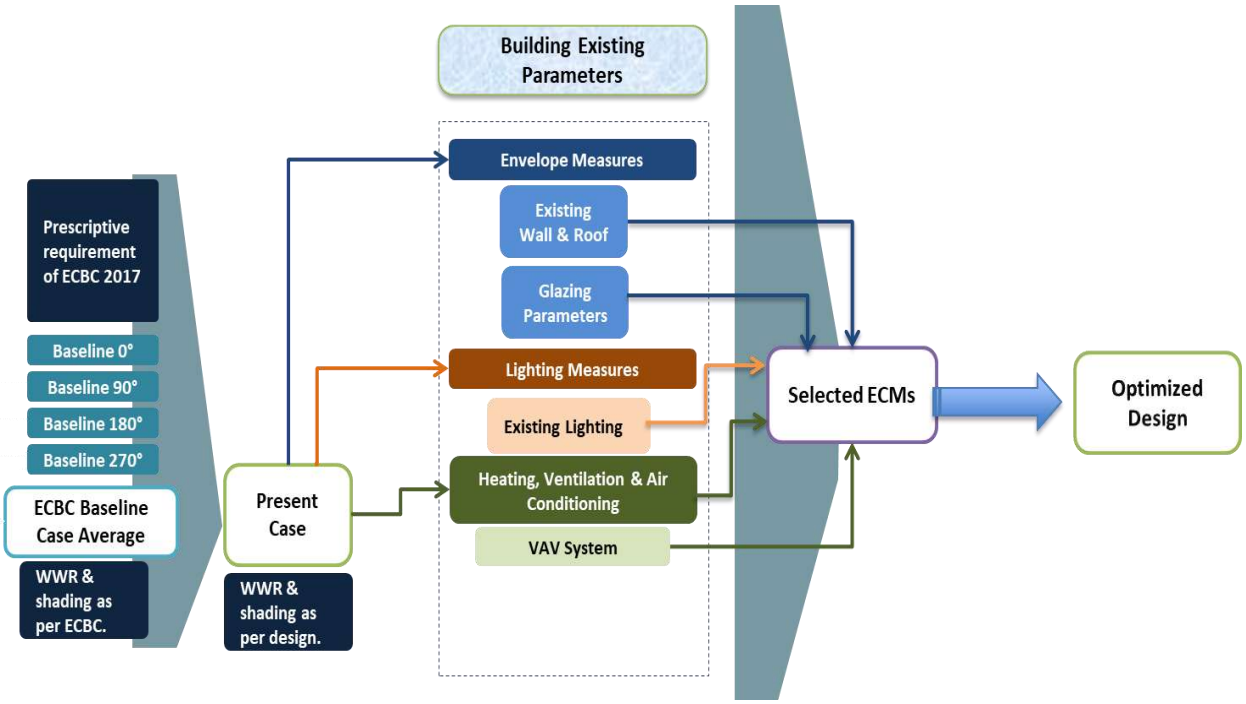


Figure 3 Simulation Methodology

Project description

DLF Downtown is a commercial building complex comprising of I.T. offices and retail/commercial facilities. Located in DLF phase 3, Sector 24, Gurugram, well connected to most basic services. The project is applying for ECBC Compliance which comprises of a total of 1,15,07,730 square feet of built up area, divided into four newly constructed core and shell buildings which will be occupied by tenants. Block 2 and 3, 9 story buildings are identical to each other. Block 4 is a 15-story building whereas DLF Mall of India is comprises of 8 floors.

The building has curtain walls, insulated reflective roof and efficient double glazing. The high side HVAC is a combination of a central chilled water plant with efficient centrifugal chillers. The building is aiming for ECBC Compliance and has a number of energy efficiency features like efficient glass, minimal interior & exterior lighting, efficient HVAC systems etc.

Area Statement

The project space types and areas are categorised in the table below

Table 1 Block 2 Area Description

Floors	Conditioned Area (sqft)
Lower Ground Floor	7,400
Upper Ground Floor	2,479
First Floor	62,430
Second Floor	62,430
Third Floor to Fifth Floor	1,87,290
Sixth Floor	54,676
Seventh Floor to Ninth Floor	1,87,290
Total Area	563,995

Table 2 Block 3 Area Description

Floors	Conditioned Area (sqft)
Lower Ground Floor	7,400
Upper Ground Floor	2,479
First Floor	62,430
Second Floor	62,430
Third Floor to Fifth Floor	1,87,290
Sixth Floor	54,676
Seventh Floor to Ninth Floor	1,87,290
Total Area	563,995

Table 3 Block 4 Area Description

Floors	Conditioned Area (sqft)
Ground Floor	74,691
First Floor	66,655
Second Floor	86,322
Third Floor to Fifth Floor	2,58,966
Sixth Floor	73,954
Seventh Floor to Ninth Floor	2,58,966
Tenth Floor	69,951
Eleventh Floor to Twelfth Floor	1,62,816
Thirteenth Floor	69,951
Fourteenth to Fifteenth Floor	1,62,816
Total Area	12,85,088

Table 4 DLF Mall of India Area Description

Floors	Conditioned Area (sqft)
Lower Ground Floor	5,26,775
Upper Ground Floor	3,89,617
First Floor	3,79,160
Second Floor	3,06,229
Third Floor	2,72,626
Fourth Floor	2,25,906
Fifth Floor	2,25,906
Sixth Floor	2,25,906
Total Area	25,52,125

Simulation Parameters

The Baseline Building was developed based on the prescriptive requirements of Table 9-1 of ECBC-2017. The building is simulated with its actual orientation and again after rotating the entire building 90,180,270 degrees, then averaging the results. The Proposed building has been modelled as per actual design. Following are the parameters considered for simulating the ECBC-2017 and the Proposed buildings:

Building Envelope

Table 3 Comparison of Envelope Parameters

Component		**Present Design**	**Baseline Design**
Wall	Material	-	ECBC Wall
	U-value (BTU/hr.ft^2 ^{o}F)	0.074	0.07
Roof	Material	150 mm RCC Slab + 50 mm PUF Insulation + Plaster	ECBC Roof
	U-value (BTU/hr.ft^2 ^{o}F)	0.063	0.058
	Reflectivity	0.30	0.30
Fenestration	Material	Double Glazed unit	Double Glazed unit
	U-value (BTU/hr.ft^2 ^{o}F)	0.32	0.53
	SHGC	0.29	0.27
Window to Wall Ratio	%	Block 2: 55.4% Block 3: 55.4% Block 4: 60% DLF Mall of India: 50%	40%
Shading Devices		None	None

Lighting, Equipment and Occupant densities

Following are the lighting and equipment power densities modeled for various spaces.

Table 4 Comparison of Lighting and Equipment Parameters

Parameter	Present Design	Baseline Design
Interior Lighting Power Density(W/sqft)	• Office: 0.7 • Retail: 0.92	• Office: 0.88 • Retail: 1.31
Day lighting controls	None	None
Other Lighting Control Credits	NA	NA
Equipment Power Density (W/sqft)	• Office: 2.5 • Retail: 2.0	Same as Present Design
Occupant Densities (sqft/Person)	• Office 57 • Retail 75 • Lobby 100	Same as Present Design

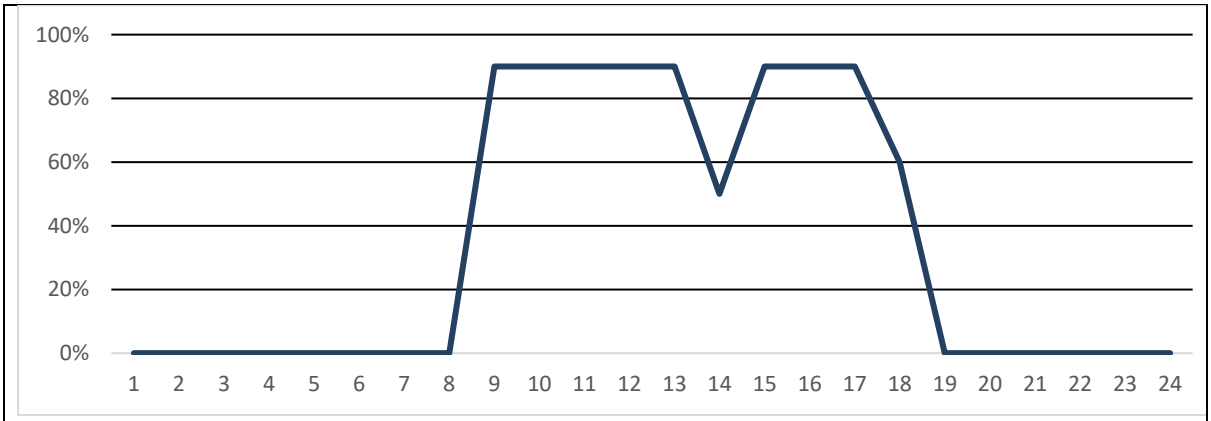


Figure 4: Building Occupancy Profile

The building is expected to be occupied 8 hours. Schedules have been modelled identically for both the Baseline and Present design. Refer Appendix A1 for all schedules.

Heating Ventilation and Air Conditioning

Table 5 Comparison of HVAC System Parameters

	Present Design	**Baseline Design**
Primary HVAC system type	Variable Air Volume System Fan Coil Unit	Variable Air Volume System
Air Flow Rate (cfm/TR)	600	300
Fan Power (kW/CFM)	AHU 0.00055 FCU 0.0003	0.0008
Economizer Control	No	Yes
Energy Recovery	Yes	No
Effectiveness	0.76 Sensible, 0.74 Latent	NA
Demand Control Ventilation	No	NA
Ventilation Rates (CFM/Person)	As per ASHRAE 62.1-2010	Same as Present design
Airflow Sizing	20F difference between supply air and room set point temperature.	20F difference between supply air and room set point temperature.
System Efficiency (COP)	Chiller 6.3	Chiller 6.3
Chilled water pump control	Primary + Secondary (Secondary Variable)	Primary + Secondary (Secondary Variable)
Chilled water Primary + Secondary Pump Power (W/kWr)	35.14	18.2
Condenser water pump control	Constant speed	Constant speed
Condenser water Pump Power (W/kWr)	26.21	17.7
Cooling Tower Fan Control	Variable Speed	Two Speed
Cooling Tower Fan Power (kW/kWr)	0.0089	0.017

Results:

Table 6 Annual Energy Consumption Baseline and Present Case

Alternative	Lights (kWh)	Equipment (kWh)	Heating (kWh)	Cooling (kWh)	Heat Rejection (kWh)	Pumps (kWh)	Fans (kWh)	Heat Recovery (kWh)	Ventilation (kWh)	Ext Light (kWh)	Elevator (kWh)	Total Annual Energy (kWh)
Baseline Case 0 Degree	1,45,87,863	1,90,57,364	1,69,644	1,59,17,821	10,52,044	60,30,815	79,79,434	-	21,47,830	1,80,936	19,07,272	6,50,31,022
Baseline Case 90 Degree	1,45,87,863	1,90,57,364	1,78,358	1,60,52,341	10,61,358	60,80,924	79,99,246	-	21,47,830	1,80,936	19,07,272	6,52,53,491
Baseline Case 180 Degree	1,45,87,863	1,90,57,364	1,72,301	1,60,52,813	10,60,519	60,64,098	80,37,335	-	21,47,830	1,80,936	19,07,272	6,52,68,331
Baseline Case 270 Degree	1,45,87,863	1,90,57,364	1,72,727	1,60,41,655	10,60,553	60,71,901	80,03,395	-	21,47,830	1,80,936	19,07,272	6,52,31,496
Baseline Case Average	1,45,87,863	1,90,57,364	1,73,258	1,60,16,157	10,58,618	60,61,934	80,04,852	-	21,47,830	1,80,936	19,07,272	6,51,96,085
Present Design	1,05,69,039	1,90,57,364	58,460	1,50,47,178	8,09,617	84,53,048	92,59,574	1,28,020	21,47,830	1,80,936	19,07,272	6,33,68,338
% Savings	**27.5%**	**0.0%**	**66.3%**	**6.1%**	**23.5%**	**-39.4%**	**-15.7%**	**-**	**0.0%**	**0.0%**	**0.0%**	**2.3%**

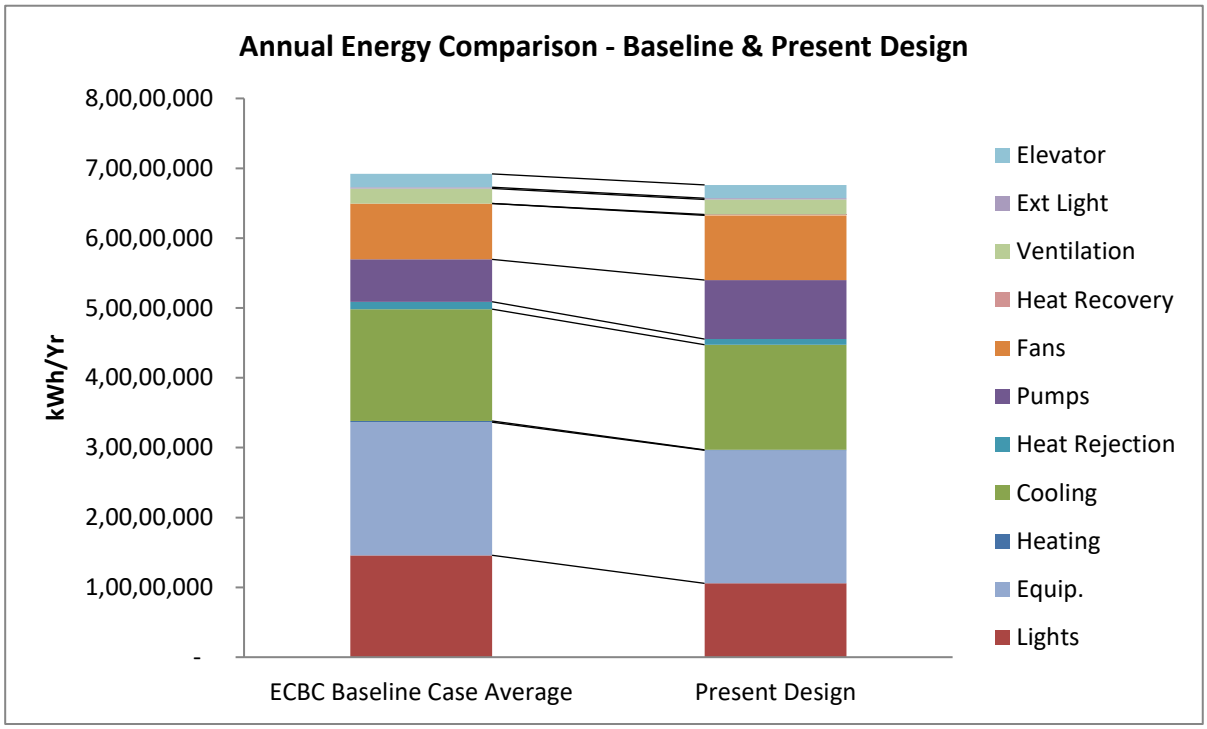


Figure 5 Annual Energy Use Comparison

The Present building is expected to consume 2.3% less energy per year or 15,77,747 kWh less per year compared with ECBC baseline building. This meets the ECBC 2017 energy performance requirements.

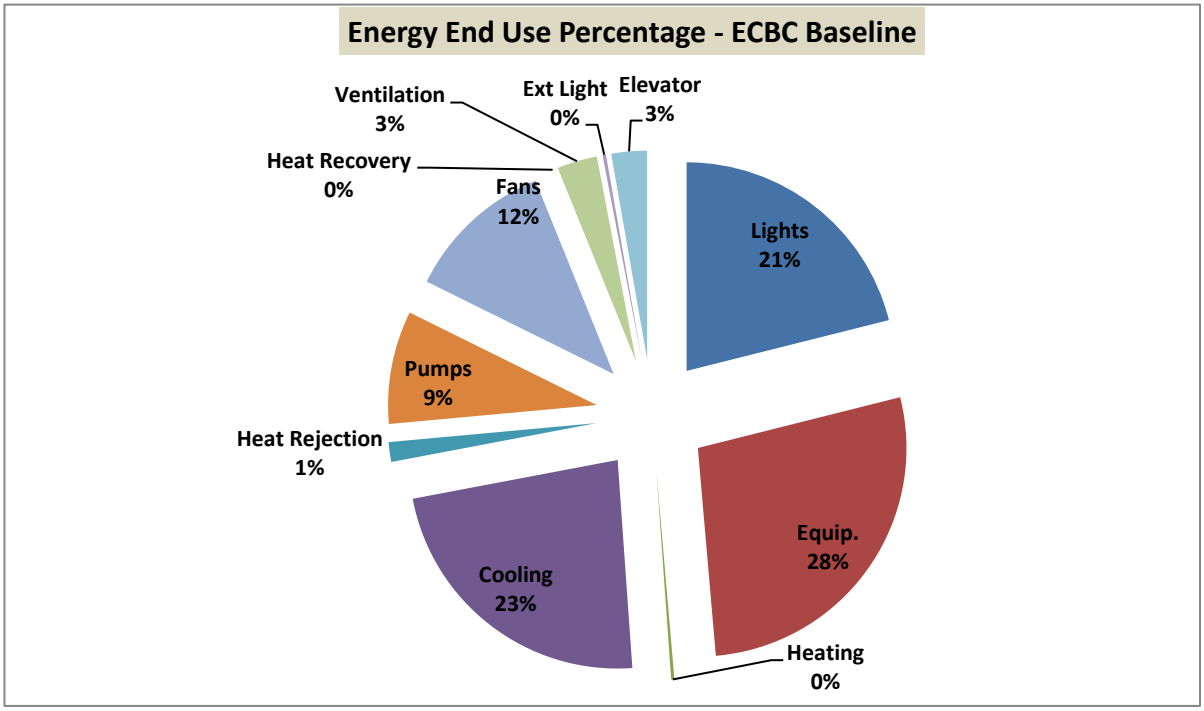


Figure 6 Energy Use Break up – ECBC Baseline

The Baseline energy use is dominated by Equipment energy. The equipment energy is 28% of the overall energy use.

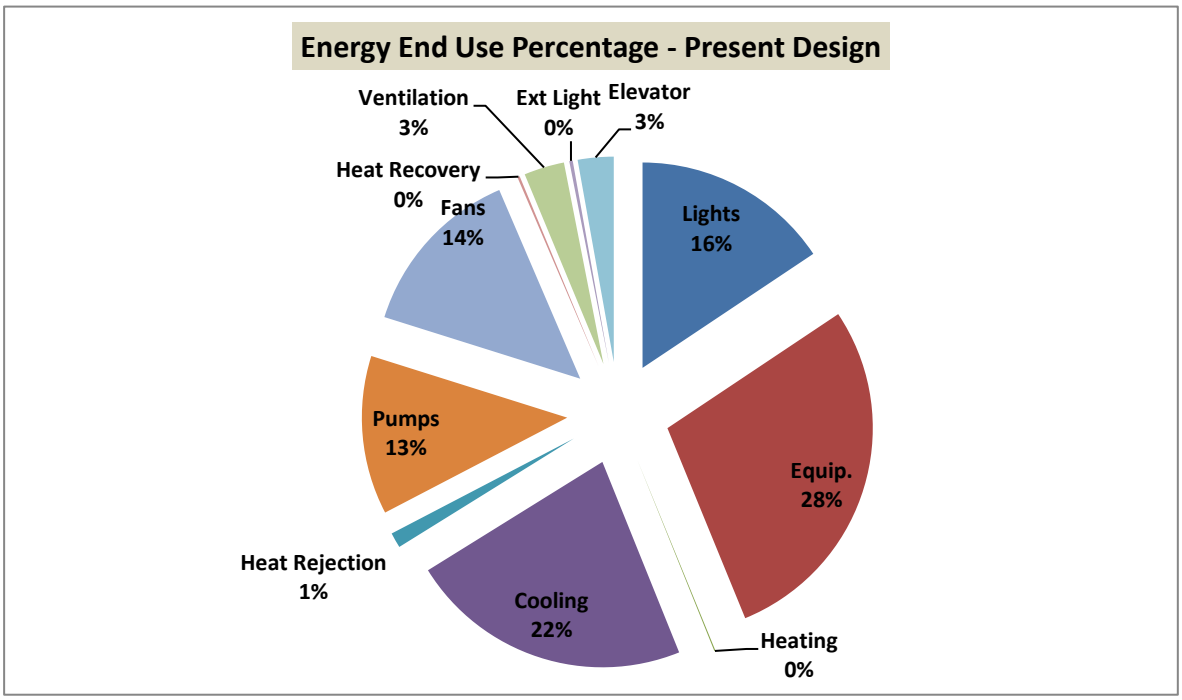
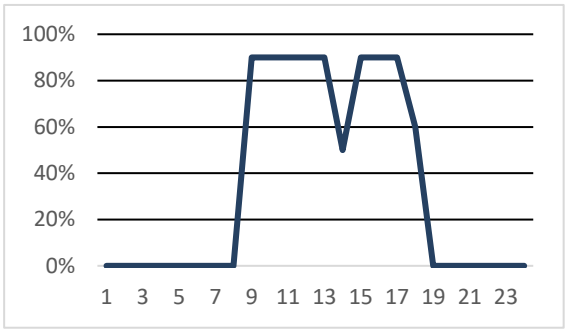
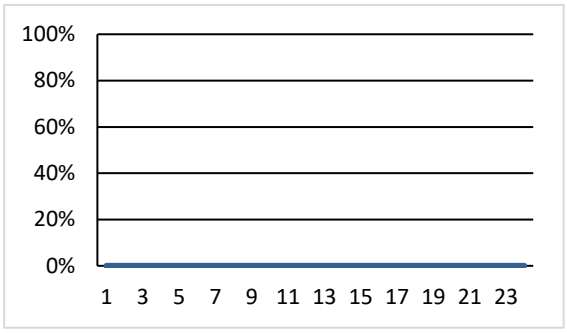
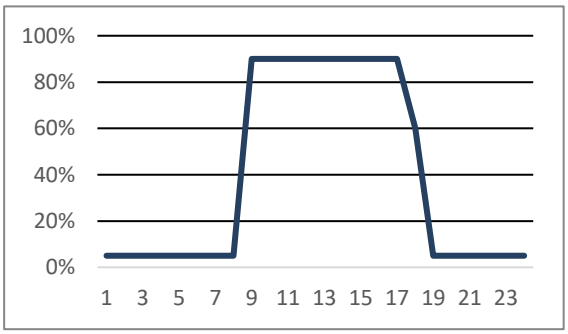
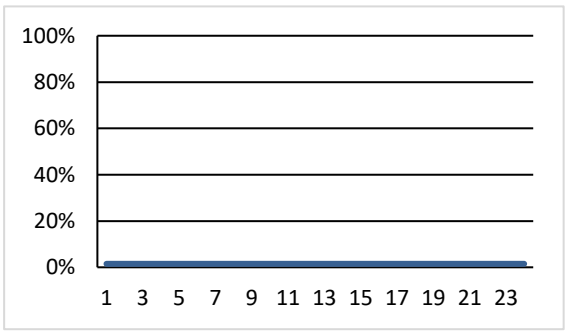
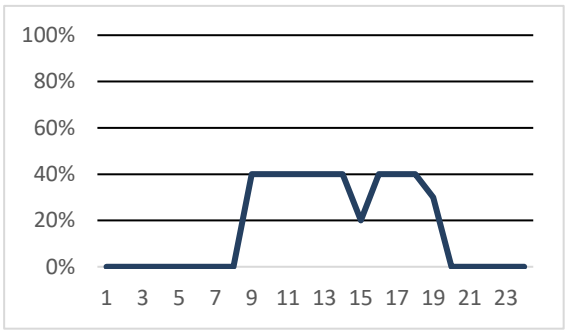
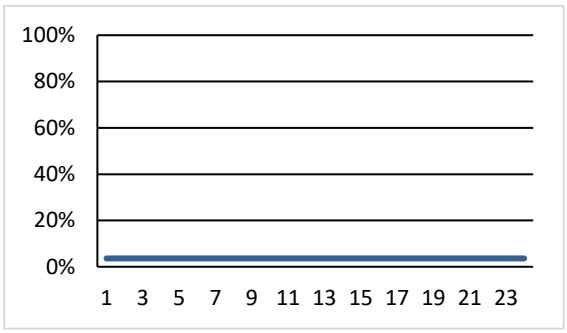


Figure 7 Energy Use Break up - Present Design

The Present design energy use is still dominated by Equipment energy. The equipment energy is 28% of the overall energy use.

Appendix A-1: Occupancy and Operational Schedules

	Weekday	Weekend
Occupancy		
Lights		
Equipment		

ECBC Mandatory Compliance Recommendations

ECBC 2017 has mandatory requirements for each of the building systems under its scope: envelope, lighting, HVAC, service hot water heating, and electrical. These **must** be integrated in buildings irrespective of the path followed for demonstrating code compliance.

Table 7 Recommendations for mandatory compliance - building envelope

ENVELOPE		
Clause No	*Compliance Requirement*	*Recommendations*
4.2.1	**Fenestration**	
4.2.1.1	U factors	U factor of fenestration products (includes sash, frame and the glazing) must be determined as per area weighted method of ISO 15099, described in Appendix C11, ECBC 2017. U factor must be determined by an accredited laboratory and the product must carry labels or certificates of the manufacturer confirming this.
4.2.1.2	Solar heat gain coefficient (SHGC)	Solar Heat Gain Coefficient (or Shading Coefficient (SC) X 0.86) of the glazing in fenestrations must be determined in accordance with ISO-15099. SHGC must be determined by an accredited laboratory and the product must carry labels or certificates of the manufacturer confirming this.
4.2.1.3	Air Leakage	Air leakage shall not exceed 5.0 l/s-m² for glazed swinging entrance doors and revolving doors in the building. For all other fenestration and doors, it must not exceed 2.0 l/s-m².
4.2.2	**Opaque Construction**	U factors of opaque wall and roof assembly must be determined as per data or procedures contained in the ASHRAE Fundamentals, 2005 or as per Appendix C11 in ECBC 2017.
4.2.3	**Daylighting**	
4.2.4	**Building Envelope Sealing**	The following must be sealed, caulked, gasketed, or weather stripped: Joints around fenestration and door frames Openings between wall and foundations, and between walls and roof Penetration openings of utility services through roof, wall and floors Site built fenestration and doors Building assemblies used as ducts or plenums Any other opening in the building envelope Exhaust fans shall be fitted with a sealing device such as a self-closing damper Operable fenestration should be constructed to eliminate air leakages from fenestration frame and shutter frame

Table 8 Recommendations for mandatory compliance - HVAC systems

	HEATING, VENTILATION AND AIR CONDITIONING	
Clause No	*Compliance Requirement*	*Recommendations*
5.2.1	**Ventilation**	
5.2.1.1	Natural Ventilation	Not Applicable
5.2.1.2	Mechanical Ventilation	Install mechanical systems that provide outdoor air change rate as per NBC
5.2.1.3	Demand Control Ventilation	
5.2.2	**Minimum HVAC Equipment Efficiencies**	Cooling equipment shall meet or exceed the minimum efficiency requirements presented in Tables 5-1 through Table 5-5.The chiller COP must be greater than or equal to 6.3.
5.2.3	**Controls**	
5.2.3.1	Time clock control	For all cooling systems of capacity > 5 TR (17.5kW), install timeclocks that can control the system as per three different day types per week. These should also have a manual override which allow temporary operations for 2 hours and be capable of retaining their programming for at least 10 hours in case of power loss and, operate the system.
5.2.3.2	Temperature Control	Provide thermostats in all conditioned zones. Simultaneous heating and cooling must be avoided in areas that have both heating and cooling. Maintain temperature dead band of 3°C in zones where the same system provides both. Zones with different systems for heating and cooling must have interlocked thermostats.
5.2.3.3	Occupancy sensor	Occupancy controls shall be installed to de-energize or to throttle to the minimum ventilation and/or air conditioning systems where there are no occupants in each conference/ meeting room in an office building.
5.2.3.4	Fan controls	All cooling towers and closed-circuit fluid coolers shall have either two speed motors, pony motors, or variable speed drives controlling the fans. The project will install variable speed drives controlling fans.
5.2.3.5	Dampers	All air supply and exhaust equipment, having a Variable Frequency Drive (VFD), shall have dampers that automatically close upon fan shutdown or when space served are not in use
5.2.4	**Piping & Ductwork**	
5.2.4.1	Pipe Insulation	Piping for heating, space conditioning, and service hot water systems shall meet the insulation requirements listed in Table 5-7 through Table 5-9. Insulation exposed to weather shall be protected by aluminum sheet metal, painted canvas, or plastic cover. Cellular foam insulation shall be protected as above, or be painted with water retardant paint.

5.2.4.2	Ductwork	Supply ducts in unconditioned spaces shall have a minimum insulation of R-0.6 (m^2-°C/W). Those in indirectly conditioned spaces need not be insulated.
5.2.5	**System Balancing**	
5.2.5.1	General	System balancing report shall be provided by technicians for conditioned area greater than 500 m^2.
5.2.5.2	Air Systems Balancing	System should be balanced to minimize throttle losses. Fans > .75 Kw or 1 HP should meet design flow conditions provided by MEP consultant.
5.2.5.3	Hydraulic Systems Balancing	Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses; then the pump impeller shall be trimmed, or pump speed shall be adjusted to meet design flow conditions.
5.2.6	**Condensers**	
5.2.6.1	Condenser Locations	Locate condensers such that zone is free from heat discharge by other devices. Demarcate location of condensers in MEP drawings.

Table 9 Recommendations for mandatory compliance – service hot water heating

Service Hot Water Heating		
Clause No	*Compliance Requirement*	*Recommendations*
5.2.7	**Solar Water Heating**	20% of the design capacity of centralized service water heating systems must be provided by solar water heater systems.
5.2.7.1	Equipment Efficiency	Solar water heaters installed in the must meet minimum efficiency requirements listed in IS 13129 (Part 1 & 2). Electric water heaters installed in the building must meet minimum efficiency requirements listed in IS 2082. Gas instantaneous water heaters must meet minimum efficiency requirements listed in IS 15558.
5.2.7.3	Supplementary Water Heating System	Supplementary systems must maximize energy efficiency of primary service water heating systems. These systems must recover maximum heat possible from hot discharge systems like condensers of air conditioners. Supplementary service water heating systems must be gas fired wherever possible. Electric heaters must should only be installed as supplementary systems if gas is unavailable.
5.2.7.4	Piping Insulation	Piping for heating systems with design operating temperature >= 60 °C must have at least R-0.70 (R-4) insulation. Id operating design temperature is < 60 °C but >40 °C, minimum insulation on piping should be R- 0.4 (R2). All other components like storage tanks of the service water heating systems must be insulated as per relevant Indian standards on materials and applications.
5.2.7.5	Heat Traps	Vertical pipe risers serving storage water heaters and storage tanks without integral heat traps and serving a non-recirculating system, must have heat traps on both the inlet and outlet piping. These traps must be as close to the storage tank as is possible.
5.2.7.6	Swimming Pools	Any heated pools, which are not deriving more than 60% of their energy from a solar heat source or from an energy recovery system on the project site, must be provided with a vapor retardant pool cover on or at the water surface. Pool cover must have a minimum insulation of R-4.1 (R-24) for any such pool heated to more than 32 °C.

Table 10 Recommendations for mandatory compliance – lighting systems

LIGHTING		
Clause No	*Compliance Requirement*	*Recommendations*
6.2.1	**Lighting Control**	
6.2.1.1	Automatic Lighting Shutoff	All lighting systems inside the building must have automatic controls to switch off lights. Install occupancy sensors for all offices < 30 m² (300 ft²) with walls or ceiling height partitions, conference/ meeting rooms, and storage spaces. In all other spaces, either provide occupancy sensors (with manual overrides) that turn off lights after 15minutes or automatic controls that function as per programmed schedules. Each area > 2,500 m²(25,000 ft²) and not more than one floor and building floor should have an independent schedule of operating lights.
6.2.1.2	Space Control	Install separate manual controls or occupancy sensors only for general lighting in all spaces with ceiling height partitions. These manual controls should be readily accessible by occupants and should be able to override any occupancy sensors installed for 2 hours. Each control device must not control more than 250 m² (2,500 ft²) in spaces =< 1,000 m² (10,000 ft²). In spaces with area > 1,000 m² (10,000 ft²), each control device can control a maximum area of 1,000 m² (10,000 ft²).
6.2.1.3	Control in Daylit Areas	Luminaries in daylight areas (all area > 24 m² or 250 ft² and within a distance of 1.35 mt perpendicular to the fenestrations) should be controlled by manual or daylight control device that are capable of reducing light output of the said luminaires by at-least 50%
6.2.1.4	Exterior Lighting Control	Install either astronomical time switch that turn off lights during daytime and when not required or, photo sensors for all exterior lighting not used for advertising signage or not required for health or life safety (Table: 8.4, ECBC).
6.2.1.5	Additional Control	All task lighting should have a control integrated with the luminaire or a wall mounted control device. Non-visual lighting and display or accent lighting should have control devices.
6.2.2	**Exit Signs**	Install exit signs with wattage per face < 5W

Table 11 Recommendations for mandatory compliance – electrical equipment

ELECTRICAL POWER		
Clause No	*Compliance Requirement*	*Recommendations*
7.2.1	**Transformers**	
7.2.1.1	Maximum Allowable Power Transformer Losses	Power transformers of the proper ratings and design must be selected to satisfy the minimum acceptable efficiency at 50% and full load rating. The transformer must be selected such that it minimizes the total of its initial cost in addition to the present value of the cost of its total lost energy while serving its estimated loads during its respective life span.
7.2.1.2	Measurement and Reporting of Transformer Losses	All measurement of losses must be carried out by using calibrated digital meters of class 0.5 or better accuracy and certified by the manufacturer All transformers of capacity of 500 kVA and above must be equipped with additional metering class current transformers (CTs) and potential transformers (PTs) additional to requirements of Utilities.
7.2.2	**Energy Efficient Motors**	All permanently wired polyphase motors of 0.375 kW or more serving the building and expected to operate more than 1,500 hours per year and all permanently wired polyphase motors of 50kW or more serving the building and expected to operate more than 500 hours per year must have a minimum acceptable nominal full load motor efficiency not less than IS 12615 for energy efficient motors. Motors of horsepower differing from those listed in the table shall have efficiency greater than that of the next listed kW motor. Motor horsepower ratings must not exceed 20% of the calculated maximum load being served. Motor nameplates shall list the nominal full-load motor efficiencies and the full-load power factor. Proper rewinding practices must be followed for any rewound motors. Damaged motor should be replaced with a new, efficient one if the proper rewinding practices cannot be assured. Certificates shall be obtained and kept on record indicating the motor efficiency Core characteristics of the motor must not be lost during rewinding due to thermal and mechanical stress caused by removal of damaged parts.
7.2.3	**Diesel Generator (DG) Sets**	BEE star rated DG sets shall be used in all compliant buildings. DG sets in buildings greater than 20,000 m2 BUA shall have minimum 3 stars rating
7.2.4	**Check-Metering and Monitoring**	Services exceeding 1000 kVA must have permanently installed electrical metering to record demand (kVA), energy (kWh), and total power factor the metering must also display current (in each phase and the neutral), voltage (between phases and between each phase and neutral),

		and total harmonic distortion (THD) as a percentage of total current. Services not exceeding 1000 kVA but over 65 kVA must have permanently installed electric metering to record demand (kW), energy (kWh), and total power factor (or kVARh). Services not exceeding 65 kVA must have permanently installed electrical metering to record energy (kWh).
7.2.5	**Power Factor Correction**	Power factor between 0.97 lag and unity at the point of connection must be maintained for all electricity supplies exceeding 100 A, 3 phase.
7.2.6	**Power Distribution Systems**	The power cabling must be adequately sized as to maintain the distribution losses not to exceed 3% of the total power usage. Record of design calculation for the losses must be maintained.
7.2.7	**Uninterruptible Power Supply (UPS)**	In all buildings, UPS shall meet or exceed the energy efficiency requirement of 93.8% at 100% load.
7.2.8	**Renewable Energy Systems**	
7.2.8.1	**Renewable Energy Generating Zone (REGZ)**	A dedicated REGZ equivalent to at least 25 % of roof area or area required for generation of energy equivalent to 1% of total peak demand or connected load of the building, whichever is less, shall be provided in all buildings.
7.2.8.2	**Main Electrical Service Panel**	Minimum rating shall be displayed on the main electrical service panel. Space shall be reserved for the installation of a double pole circuit breaker for a future renewable electric installation.

Glossary

Visual light transmission is the amount of light that passes through the film and glass

U-value is the measurement of heat transfer through a given material. A measure of heat transmission (loss or gain) due to the thermal conductance and the difference in indoor and outdoor temperatures. As the U-value decreases, so does the amount of heat that is transferred through the material. Unit- W/sqm ^{0}C or Btu/hr.ft2.ºF

R-value is the resistance a material has to heat transfer. Sqm ^{0}C/W or hr.ft2.ºF/Btu

Solar Factor or SHGC is the ratio of total solar energy flux entering through the glass to the incident solar energy.

Shading Coefficient (SC) is the shading coefficient is calculated by dividing the solar factor by 0.87, which is the solar factor of a 3 mm clear float glass.

Ton - One ton of cooling is the amount of heat absorbed by one ton of ice melting in one day: 12,000 Btu/h or 3.516 thermal kilowatts (kW).

kW/ton rating: Commonly referred to as efficiency, but actually power input to compressor motor divided by tons of cooling produced. Lower kW/ton indicates higher efficiency.

Coefficient of performance (COP): Chillers efficiency measured in Btu output (cooling) divided by Btu input (electric power). Multiplying the COP by 3.412 yields energy efficiency ratio.

Energy-efficiency ratio (EER): Performance of smaller chillers and rooftop units is frequently measured in EER rather than kW/ton. EER is calculated by dividing a chiller's cooling capacity (in Btu/hour) by its power input (in watts) at full-load conditions. Higher the EER, the more efficient the unit. Dividing 12 by the EER value yields kW/ton.

ARI conditions: Standard reference conditions at which chillers performance is measured, as defined by the Air-Conditioning and Refrigeration Institute (ARI): 44° Fahrenheit(F) water leaving the chillers and, for water entering the condenser, 85°F at 100 percent load and 60°F at 0 percent loads.

LEED: Leadership in Energy and Environmental Design.

ANNEXURE – 5

Traffic Study Report

Traffic Study for DLF Down-Town, Sector 25A, Gurgaon

TRAFFIC IMPACT ASSESSMENT REPORT

AECOM INDIA PRIVATE LIMITED

AUGUST, 2022

Contents