Rapid Environmental Impact Assessment
for
Corporate Office Complex
of
Maruti Udyog Ltd.
Gurgaon, Haryana

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EXECUTIVE SUMMARY
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1. HIGHLIGHTS OF CORPORATE OFFICE COMPLEX OF MUL

- MUL is proposing to construct Corporate Office Complex (MUL-COC) at Plot No. 1 A, Shopping Mall Complex, Vasant Kunj, Phase II, New Delhi.

- MUL-COC will be constructed in an area of 7410 sq. m. Construction cost will be nearly Rs. 20 crores and façade, interior furnishing and utilities will also cost nearly Rs. 20 crores.

- MUL-COC will have 2-level underground basement for parking of 582 cars and ground + 4 floors having 18145 sq. m floor area with a maximum height of 21 m above ground level.

- MUL-COC will have 827 employees and will require nearly 49,030 lpd of water from Delhi Jal Board and about 2000 kW of electric power from BSES Rajdhani Ltd. 2 x 750 + 1 x 1010 kVA DG sets will be installed in lower basement as standby source of power. It will generate nearly 38 klpd of domestic waste water.

- There is no source of pollution except gaseous emissions from standby DG sets to be discharged from 2.85 m high stacks from roof top and domestic waste water which will be discharged into the MCD sewer.

- Safety measures will be provided in MUL-COC as per NBC guidelines.

- Design of MUL – COC will be disabled friendly and energy efficient

- Eco-friendly construction materials, such as, autoclaved aerated concrete blocks made up of fly ash (in place of bricks) and medium density fiber board (in place of timber) will be used.

- Building will have facility for rain water harvesting and will also have green belt inside and outside of MUL-COC.

2. BASELINE ENVIRONMENTAL CONDITIONS

- 10 km radius study area around MUL-COC site has a population of nearly 28,23,059 and a population density of about 8986 persons/km².

- Ground and tap water quality in the study area is good and mostly meets the desirable limits for drinking water.

- During October 2005 predominant winds were observed from SE towards NW, temperature varied from 18.0 to 37.5°C and average wind speed is observed to be 2.5 kmph.
In ambient air SO\(_2\) and NO\(_x\) concentrations at all locations and average RPM and SPM concentrations at Mahipalpur are observed to be below the limits for residential, rural and other area. Average RPM and SPM concentrations at other locations meet only the industrial area limit.

Noise levels at all locations are observed to meet mostly commercial area limits for day- and night-time.

Both Nelson Mandela Marg and Mehrauli – Mahipalpur Main Road have fairly high traffic density generally during 8 to 9 am and 6 to 7 pm. Cars/jeeps account for more than 60% of total vehicles.

3. ENVIRONMENTAL IMPACT ASSESSMENT

No discernible adverse impact on any of the environmental parameter is expected.

4. ENVIRONMENTAL MANAGEMENT PLAN

It is recommended that DDA should make a special effort with the help of Forest Department, NCT Delhi, for proper development of Aravali Biodiversity park and curtain plantation between Shopping Mall Complex at Vasant Kunj ad Nelson Mandela Marg for improving the green lung capacity of the area.

5. RISK ASSESSMENT AND SAFETY MEASURES

There is no major risk during construction and operation of MUL-COC and adequate safety measures as per NBC guidelines must be implemented for fire safety.
CHAPTER 1

INTRODUCTION
CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Sustainable development requires environmentally sound yet equitable economic growth. In order to ensure development without destruction, Ministry of Environment & Forests (MOEF), Government of India, issued a notification on 27th January 1994 entitled Environmental Impact Assessment of Development Projects for making environmental clearance (EC) a statutory requirement for certain identified activities listed in Schedule I of EIA notification. On 7th July 2004, MOEF issued a notification incorporating New Construction Projects in Schedule I and made requirement of EC statutory for Office Complexes for more than 1000 persons or discharging more than 50,000 lpd of sewage or with an investment of more than Rupees fifty crores.

1.2 MARUTI UDYOG LIMITED

Maruti Udyog Ltd. (MUL) was established as a Government Company in February 1981 with the objective of modernization of Indian automobile industry and production of fuel-efficient vehicles in large numbers necessary for economic growth. In October 1982 a license and a joint venture agreement was signed with Suzuki Motor Corporation (SMC) of Japan with SMC acquiring 26% share of the equity. SMC increased its share in equity to 40% in 1989 and to 50% in the year 1992 and nearly 52% at present. SMC is the biggest among the small car manufacturers in Japan. MUL is now a Non-Government Company with a total equity of nearly Rs. 144.5 crores.

MUL, a socially conscious and a responsible corporate citizen, is the market leader in the domestic car market and does India proud by exporting cars to over 100 countries around the world. MUL has revolutionized the Indian automobile and component industry, and has set standards in quality of products and services. MUL continues to be the market leader. During 2004-05, MUL sold 5.36 lac passenger cars in the domestic and export markets having a market share of 50.90% of total passenger car sales volume. Currently MUL manufactures mini, compact and mid size categories of passenger cars only.

1.3 CORPORATE OFFICE COMPLEX OF MUL

MUL is planning to construct its Corporate Office Complex (MUL-COC) at Vasant Kunj, New Delhi. MUL has already purchased 7410 sq. m land (Plot No. 1A) at DDA Shopping Mall on Nelson Mandela Road in Vasant Kunj at a total cost of nearly Rs. 49.06 crores. Cost of construction will be nearly Rs. 20 crores and façade, interior furnishing and utilities will cost early Rs 20 crores. Towards east of MUL-COC site lies Nelson Mandela Road at a distance of
nearly 200 m, Hotel Grand is located towards south, Office Complex of Bharti Cellular Ltd. will be located towards west and Ambi Mall (under construction) will be located towards north. Ambi Mall is being constructed by Ambience Developers Pvt. Ltd., New Delhi.

Fig. 1.1 shows the location map of DDA Shopping Mall at Vasant Kunj. Fig. 1.2 shows the location of major buildings proposed to be constructed in DDA Shopping Mall at Vasant Kunj. The location of the proposed MUL-COC site is approximately at 28°32’14.5” North latitude and 77°09’13.8” East longitude at an elevation of nearly 260 m above mean sea level (MSL) and falls in Survey of India toposheet 52 H/2/SE of 1:25,000 scale.

1.4 SCOPE OF EIA STUDY

The objective and scope of work for carrying out Environmental Impact Assessment for MUL-COC are as stated in the following sub-sections:

1.4.1 Objective

The EIA study shall be aimed to cover the following aspects:

- Evaluation of present environmental status through analysis of generated and collected baseline data for post-monsoon season.
- Assess the probable impact on the environmental factors due to implementation of the project with respect to the existing scenario.
- Analyze the predicted impact with respect to the regulatory environmental standards.
- Develop an Environmental Management Plan and Disaster Management Plan for the proposed project to mitigate the negative significant impacts that would arise from the proposed project.
- Obtain necessary clearance from the regulatory authorities.

1.4.2 Scope of Rapid EIA Study

A. Study Area and Period

10 km radius circle with corporate office complex site as its centre shall form the study area. One month field data in post-monsoon season shall be collected for Rapid EIA.

B. Baseline Environmental Data

The baseline data shall collected by necessary monitoring at project site, collection of established data through secondary agencies. The baseline data collection shall include the following components:

- Physical Environment:  
  - Air Quality
  - Meteorology
- Noise Environment
- Water Use and Quality (Ground Water and Surface Water)
- Soil Quality
- Land Use Pattern

- **Biological Environment** - Density and diversity of flora and fauna in the study area.

- **Socio-Economic Profile** - Demographical and socio-economic details

C. **Environmental Impact Assessment**

- A systematic assessment of environmental impacts on air, noise, water, land, ecological and socio-economic environments in the study area shall be done by predicting the nature, scale, severity and event of changes that would be associated with the proposed project and their subsequent effects on the environment in comparison to the existing baseline conditions during construction phase and operational phase.
- Mathematical modeling shall be carried out to predict incremental ground level concentrations of pollutants due to gaseous emissions from the proposed project (SPM, RPM, SOx, NOx, CO). The predictions shall include point source and fugitive source of emissions, vehicular emission and assessed for worst-case meteorological scenarios, if considered necessary.
- The effect of discharge of treated liquid effluent and solid waste, if any, on surface/ground water shall be assessed, as relevant.
- The impact of noise level during construction, and operation phase shall be carried out.
- The impact assessment shall be done for predicting the ecological impact, impact on land environment, socio-economic and health impact.

D. **Environmental Management Plan**

The EIA study shall suggest specific, structured and targeted management plans to mitigate the significant adverse impacts during construction and operation phases.

E. **Risk Assessment and Disaster Management Plan**

Detailed risk assessment shall be carried out and appropriate disaster management plan shall be prepared for the proposed project. Disaster Management Plan shall provide the organizational set up and emergency action plan in case of accident.

F. **Executive Summary**
Rapid EIA study report shall contain executive summary to highlight the findings of the study.

1.5 REPORT PRESENTATION

This report is based on an extensive reconnaissance survey of the area on 1st October 2005 and one month of field studies (October 1 to 31, 2005) for primary baseline data collection for ambient air, water and soil samples and noise levels in the study area, secondary data collected from various sources in public domain and the information provided by MUL about the Corporate Office Complex.

The report has been presented in the following pattern. The environmental parameters are grouped under Physical, Biological, Demographic and Socio-economic Environments. The baseline, impact and mitigatory measures are described in accordance with the broad categories as above in the following chapters.

- Executive Summary
- **Introduction:** Provides brief description of MUL, scope of this EIA study and report presentation.
- **Policy Framework:** Gives administrative and legal framework for EIA studies.
- **Project Description:** Discusses briefly the main components of the MUL Corporate Office Complex (MUL-COC) project, schedules, details of construction, public utilities requirement, landscaping, pollution sources and strategy for pollution control and safety measures proposed to be used.
- **Baseline Environmental Conditions:** Describes the study area, selection of sampling locations, baseline environmental conditions in the study area covering physical, biological, demographic and socio-economic components.
- **Environmental Impact Assessment:** Discusses the environmental impact assessment of proposed construction and operation of MUL-COC project on each of the environmental components.
- **Environmental Management Plan:** Presents the environmental management measures for reduction of adverse impact on identified environmental parameters.
- **Risk Assessment and Safety Measures:** Discusses briefly the hazards involved and safety measures proposed to be used in construction and operation of MUL-COC.
CHAPTER 2

POLICY FRAMEWORK

2.1 INTRODUCTION

Ministry of Environment & Forests (MOEF), Government of India, issued a notification on 7th July 2004 incorporating New Construction Projects in the Schedule I of the EIA notification dated 27th January 1994 and made the requirement of environmental clearance mandatory for new townships, industrial townships, settlement colonies, commercial complexes, hotel complexes, hospitals and office complexes for more than 1000 persons or discharging sewage of more than 50,000 litres per day or with an investment of more than Rs. 50 crores.

2.2 ENVIRONMENTAL CLEARANCE REQUIREMENT FOR CORPORATE OFFICE COMPLEX OF MUL

MUL has purchased 7410 m² of land (Plot No. 1A) from Delhi Development Authorities (DDA) on 15th December 2003 for the construction of its Corporate Office Complex (COC) at proposed DDA Shopping Mall at Vasant Kunj, New Delhi, at a total cost of Rs.49.057 crores. MUL awarded the contract to M/s Ahluwalia Contracts India Ltd. for construction of its COC on 11th April 2005. Total construction cost of MUL-COC is expected to be nearly Rs. 40 crores.

As per MOEF notification of 7th July 2004, new construction projects (like office complexes) which has not come up to the plinth level and with 1000 persons or more, or discharging sewage more than 50,000 litres per day, or with investment of more than 50,00,00,000 shall require environmental clearance.

2.3 REQUIREMENT OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR ENVIRONMENTAL CLEARANCE

EIA notification of 27th January 1994 mandates submission of EIA report including an environmental management plan prepared in accordance with the guidelines issued by MOEF along with the application by the project proponent in the prescribed proforma for environmental clearance.

Handbook of Environmental Procedures and Guidelines issued by MOEF in 1994 states that as a Comprehensive EIA report will normally take at least one year for its preparation, project proponents may furnish Rapid EIA report to Impact Assessment Agency (IAA) based on one season data (other than monsoon), for examination of the project. Comprehensive EIA report may be submitted later, if so asked for by the IAA.
EIA notification or guidelines issued by the MOEF does not specify any time duration for baseline primary data collection for one season (other than monsoon) for Rapid EIA study. However, Central Pollution Control Board (CPCB) in its document entitled *Assessment of Impact to Air Environment: Guidelines for Conducting Air Quality Modelling* (Probes/70/1997-98) states that three seasons (winter, summer and post-monsoon) are suggested for modeling study. In these seasons the representative months include December to February for winter, May for summer and October for post-monsoon season. All relevant data collection should refer to the above specified months.

### 2.4 RAPID EIA STUDY FOR MUL-COC

In order to meet the statutory requirement for environmental clearance for MUL-COC project, a Rapid EIA study has been carried out for which baseline primary data has been collected for one month (October 1 to 31, 2005) in post-monsoon season in accordance with the requirements of MOEF and CPCB.
CHAPTER 3

PROJECT DESCRIPTION
CHAPTER 3

PROJECT DESCRIPTION

3.1 INTRODUCTION

Maruti Udyog Ltd. (MUL) is proposing to construct its Corporate Office Complex (MUL-COC) at Plot No. 1 A, Shopping Mall Complex at Nelson Mandela Marg, Vasant Kunj, Phase II, New Delhi. In addition to MUL-COC other Commercial cum Office Complexes at Nelson Mandela Marg in Shopping Mall Complex at Vasant Kunj are proposed to be constructed by Jasmine Projects Pvt. Ltd. (Plot No. 1 B), Ambience Developers Pvt. Ltd. (Plot No. 2), Baverly Park Maintenance Pvt. Ltd. (Plot No. 3) and Regency Park Management Services Pvt. Ltd. (Plot No. 4) Fig. 1.1 in Chapter 1 shows the location map of Shopping Mall Complex at Vasant Kunj. Fig. 1.2 in Chapter 1 shows the layout of Shopping Mall Complex. Plot No. 1 will have two equal parts. MUL-COC will be constructed in Part A facing the Nelson Mandela Marg while office complex for Bharti Cellular Ltd. will be constructed by Jasmine Projects Pvt. Ltd. in part B facing Aravali Bio-diversity Park.

3.2 BUILDING PLAN FOR PLOT NO. 1

Total plot area of Plot No. 1 is 14820 sq. m and MUL plot area is one-half of the same or 7410 sq. m. Lay out of building proposed to be constructed at Plot No. 1 will be semi-circular. MUL-COC will have one quadrant facing Nelson Mandela Marg while the other quadrant facing Aravali Bio-diversity Park will have the office complex of Bharti Cellular Ltd. (BCL-CO) Plate 3.1 shows the layout plan for Plot No. 1. Plate 3.2 shows the front elevation and Plate 3.3 shows the side isometric view of the building (from Aravali Bio-diversity Park side) proposed to be constructed at Plot No. 1. Building will have seven floors consisting of 2 level basement for car parking, ground and four more floors. Total floor area for Plot No. 1 will be 18144.6 sq. m. for ground + 4 floors against a maximum permissible FSI of 18395 sq. m. Plot No. 1 will have nearly 4204 sq. m area under roads/pathways and nearly 5943 sq. m under green belt.

Service roads will be constructed in accordance with the DDA master plan for Shopping Mall Complex at Vasant Kunj.

MUL-COC and Office Complex of Bharti Cellular Ltd. are single building block divided equally on Plot No. 1. A 9.0 m buffer is provided between Plot Nos. 1 and 2.

3.3 MUL-COC
Land cost for MUL-COC is Rs. 49.057 crores while the construction cost will be nearly Rs. 40 crores. Thus, the total cost of MUL-COC will become nearly Rs. 89.057 crores. Total floor area of MUL-COC for ground + 4 floors will be 9072.3 sq. m. 4th floor will have 20 to 25 guest rooms for the temporary stay of visiting Japanese officials/experts. 2 level basement will have a total depth of 7.95 m below ground level while the total height of ground + 4 floors will be 21 m above ground level.

Parking accommodation will be for 35 cars at ground level, 291 cars at upper basement and 291 cars at lower basement. Nearly 827 persons are expected to work at MUL-COC and most of them will use personal vehicles for transportation for which adequate parking facility will be created at two level basement.

MUL-COC will have no kitchen facility and only a small pantry will be constructed to serve tea/coffee/cold drink/snack. Automatic vending machine are proposed to be installed at appropriate places on each floor for serving tea and coffee for office staff. Snacks will be out sourced.

### 3.3.1 Requirements of Major Construction Materials

Major construction materials required for MUL-COC are as follows:

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<tr>
<th>Sl No.</th>
<th>Material</th>
<th>Approximate Quantity</th>
<th>Proposed source of supply</th>
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<tbody>
<tr>
<td>1.</td>
<td>Steel</td>
<td>3500 MT</td>
<td>Sail/Tisco/Rathi/Rastriya</td>
</tr>
<tr>
<td>2.</td>
<td>Cement</td>
<td>60,000 bags</td>
<td>L&amp;T/Vikram/JK/Gujarat Ambuja</td>
</tr>
<tr>
<td>3.</td>
<td>Concrete (RMC)</td>
<td>25,000 CUM</td>
<td>ACC/L&amp;T/Birla/Ahcon</td>
</tr>
<tr>
<td>4.</td>
<td>Bricks</td>
<td>3.5 Lacs</td>
<td>Standard Local</td>
</tr>
<tr>
<td>5.</td>
<td>Glass</td>
<td>6000 SQM</td>
<td>St. Gobin/Glaverbell/Modi/Pilkington</td>
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### 3.3.2 Special Feature of Construction

#### 3.3.2.1 Disabled Friendly Design

MUL-COC will have disabled friendly design as a result of implementation of following measures:

- 2 numbers of 1.8 m wide ramps with 1:12 slope and non-skid flooring at the MUL-COC entries;
- 2 numbers of toilets on each floor earmarked for differently abled persons with all necessary provisions
- One number of wheelchair lift in each lift bank designated for differently abled persons with all necessary facilities and
- 4 numbers of reserved parking space for differently abled persons

#### 3.3.2.2 Energy Efficient Design
MUL COC will be energy efficient for lighting and ventilation due to implementation of following measures:

- Air Cooled condenser for AC system for reduction of water consumption;
- VFP for pumps and motors;
- Backward curved vanes in fans/blower in AHU;
- Energy efficient motors for pumps;
- CFL for lighting;
- Automated Building Management system for controlling energy consumption (AC/Lighting);
- Variable Air Flow in AC AHU;
- Precision AC for Server Room; and
- E-glass for reducing heat radiation into building.

3.3.2.3 Fly ash utilization

Fly ash will be utilized for construction y implementation of following measures:
- 3000 cubic meter of autoclaved aerated concrete (AAC) blocks made up of fly ash, an environment friendly material will be used as a substitute for 15 lacs bricks; and
- Fly ash will constitute from 25% to 35% of cementsations material for construction.

3.3.2.4 Timbre Free Construction

Construction shall be done mostly by timbre free materials by using medium density fiber (MDF) board made up of rapidly renewable materials.

3.3.2.5 Rain Water Harvesting Facility

Rainwater from roof top and roads will be collected in two recharge pits, each of approximately 5 m diameter, after passing through inlet slit chambers. Each pit will have 200 mm diameter and 5m deep from bottom of the basement, that is 13m deep from local ground level (as per actual strata encountered at MUL-COC site) pipe partially slotted for recharging ground aquifers to improve ground water availability in the area. Recharge pits will be covered with RCC slabs. Rain water harvesting facility will be constructed as per the standard design of Central Ground Water Board.

3.4 PUBLIC UTILITIES REQUIRED

3.4.1 During Construction Phase
All the utilities required during construction phase will be arranged by the construction contractor from appropriate sources. Construction contractor proposes to use mobile DG set of requisite capacity to meet the electric power requirement during construction. There is no plan to construct temporary huts for construction labourers and only a small office is constructed at the site for supervisory staff of the construction contractor for the supervision of construction work for MUL-COC and office complex of Bharti Cellular Ltd. Nearly 200 labourers are expected to work every day to carry out construction work and the same is expected to be completed by October 2006.

3.4.2 Operation Phase

Public utilities are proposed to be used during operation of MUL-COC for which applications have been submitted to public utility providers for requisite permissions. Utilities requirements during operation of MUL-COC are discussed in the following sub-sections.

3.4.2.1 Water

Nearly 49,030 lpd of water will be required for 827 persons expected to work at MUL-COC corresponding to nearly 59.3 lpd/person. Slightly higher per capita water requirement is planned for MUL-COC personnel than normal requirement of 30 to 40 lpd/person basically to take care of the additional water requirement of Japanese officials/experts who may stay in 20 to 25 guest rooms proposed to be constructed at the 4th floor of MUL-COC. Water will be supplied by Delhi Jal Board through MCD mains. No ground water will be extracted for meeting water requirement.

An underground water tank of 50 kl capacity and an overhead water tank of 30 kl capacity are proposed to be constructed for water storage at MUL-COC.

Filteration and UV sterilization systems are proposed to be provided for potable water for MUL personnel.

3.4.2.2 Electricity

Nearly 2000 kW of power will be required during operation of MUL-COC and the same will be provided by BSES Rajdhani Ltd., New Delhi. For this purpose substation will be constructed to step down voltage from 11 kV to 440 volt 3 phase 4 wire distribution.

3 DG sets of total 2510 kVA (or 2008 kW) capacity (2 x 750 kVA + 1 x 1010 kVA) are proposed to be installed at the lower basement with acoustic enclosures for controlling noise and vibrations. 3 numbers of day tanks, each of 900 litre capacity, are also proposed to be constructed at the lower basement for storage of HSD for DG sets. DG sets are standby power supply system for meeting total
power requirement of MUL-COC and will be operated only during grid power failure. Acoustic enclosure for DG set will be provided as per CPCB norms.

3.4.2.3 Air Conditioning

Central air conditioning will be provided for MUL-COC. Total air conditioning load is expected to be 450 tonne refrigeration (TR). 3 numbers of 175 TR capacity air cooled condensers (to reduce water consumption) are proposed to be installed at roof top for meeting the air condensing requirement of MUL-COC. 3 members of air conditioning compressors of matching capacity will also be installed at roof top with requisite vibration control measures.

3.5 POLLUTANTS GENERATION, TREATMENT AND DISPOSAL

3.5.1 Pollution Sources

3.5.1.1 Gaseous Pollution

Only source of gaseous pollution will be standby DG sets which will be operated for short time only during grid power failure. Based on the recent measurements at Suzuki Powertrain India Ltd., it is observed that consumption of HSD is nearly 0.23 lph/kVA. If all DG sets (2510 kVA) are operated during grid power failure, then HSD consumption at full load will be 577.3 lph and on combustion in DG sets will produce 14289 Nm³/h of exhaust gases containing a maximum of 198 mg/Nm³ of SPM and 427 mg/Nm³ of SO₂. Therefore, maximum emission load during grid power failure due to 2 x 750 + 1 x 1010 kVA DG sets at full load will be 2.83 kg/h of SPM and 6.10 kg/h of SO₂. It may, however, be noted that DG sets are not a continuous source of gaseous emissions and these will be operated for short period only during grid power failure.

3.5.1.2 Liquid Effluents

Nearly 38 m³/d of domestic waste water is likely to be generated by the persons working in MUL-COC and Japanese officials/experts who may be staying in guest rooms of MUL-COC.

3.5.1.3 Solid Wastes

Only office paper waste and discarded cups used for tea, coffee and drinking water are likely to be produced at MUL-COC.

3.5.2 Treatment of Pollutants

No treatment strategy is required for the above mentioned gaseous emissions, liquid effluents and solid wastes and none will be used at MUL-COC.
3.5.3 Disposal of Pollutants

3.5.3.1 Gaseous Emissions

DG set gaseous emissions will be discharged through 3 separate stacks of 6.5 m height above roof top for control of gaseous pollution by natural dispersion process.

3.5.3.2 Liquid Effluents

Liquid effluents will be discharged without any treatment in municipal sewer of MCD.

3.5.3.3 Solid Wastes

Solid wastes generated at MUL-COC will be collected daily and disposed off by a contractor as per approved procedure.

3.6 SAFETY MEASURES

Fire is the only hazard which can occur in an office complex such as MUL-COC. High quality electric wire and fittings meeting international standards are proposed to be used for MUL-COC construction which will reduce chances of short circuiting and electric sparking. Fire retardant material will be used for paneling in MUL-COC for reducing propagation of fire as far as possible.

Fire hydrant system, fire extinguishers and fire escape stairs will be provided as per National Building Code (NBC).

A 200 kl capacity under ground static water tank and a 25 kl capacity overhead make up water tank will be provided for fire fighting purpose.

3.7 LANDSCAPING/TREE PLANTATION

Following plantation is proposed inside and outside Plot No. 1:

- **Inside the Plot:**
  
  
  Palms: Washingtonia Filifera – 43 Nos.
  
  Shrubs: 350 Nos.
Landscaping will be done as per the site plan. Water requirement for maintaining green belt will be nearly 2000 lpd and the same will be met by water supply from Delhi Jal Board.

3.8 RAIN WATER HARVESTING

Roof top and roads/pathways rain water harvesting is proposed to be implemented at MUL-COC. Collected rain water will be discharged into subsoil recharging pit.

3.9 STATUTORY APPROVALS

MUL-COC fulfills land use/zoning as per DDA plan. MUL has also applied for requisite approval/agreement from following authorities:

- Building plan approval from local authorities.
- Water supply agreement with DJB.
- Power supply agreement with BSES Rajdhani Ltd., New Delhi.
CHAPTER 4

BASELINE ENVIRONMENTAL CONDITIONS
CHAPTER 4

BASELINE ENVIRONMENTAL CONDITIONS

4.1 INTRODUCTION

The field studies were carried out in the study area around Corporate Office Complex of MUL (MUL-COC) for one month (October 1 to 31, 2005) for the Rapid Environmental Impact Assessment (REIA) studies to get baseline primary data for the present environmental scenario in the study area.

4.2 STUDY AREA

10 km radius area around proposed MUL-COC site (28°32'14.5” N latitude and 77°09'13.8” E longitude) at Vasant Kunj in New Delhi is chosen as the study area. It may, however, be realized that in a densely populated and essentially completely urbanized area of New Delhi, the impact, if any, of construction and operation of MUL-COC is unlikely to be felt beyond 2 km radius. Therefore, primary data collection for ambient air, water and soil quality and ambient noise level has been restricted, in general, to within 5 km radius from MUL-COC site. Fig. 4.1 shows 10 km radius study area around MUL-COC site and it can be observed that even Rashtrapati Bhavan, Central Secretariat (North and South Blocks), Chanakayapuri, Indira Gandhi International Airport and Maruti Udyog Ltd. located at Gurgaon, Haryana, fall within 10 km radius study area. Extent of urbanization with dense population is also clearly discernible in Fig. 4.1. It can be observed from Fig. 4.1 that interstate border between Haryana and NCT of Delhi lies at a distance of nearly 5.6 km in south-west direction at its nearest point. A small portion of C.D. block Gurgaon of tehsil Gurgaon in district Gurgaon of Haryana state lies within 10 km radius study area. Major ecological and otherwise sensitive areas including religious and historical places, archaeological monuments, scenic areas, health resorts, biosphere reserves, natural parks and sanctuaries, natural lakes, swamps, defense installations and airports falling in NCT of Delhi are shown in Fig. 4.2. Topographical details for 2 km radius Core Zone of the study area on 1:25,000 scale are shown in Fig. 4.3. Administrative divisions of NCT of Delhi and Gurgaon C.D. block, tehsil and district in Haryana state are shown in Fig. 4.4. Extent of urbanization (Statutory and Census towns) is shown in Fig. 4.5.

Table 4.1 gives the demographic details of statutory town (ST), census town (CT) and villages of different tehsils of NCT of Delhi and Gurgaon tehsil of Haryana falling either fully or partially in the study area. Tables 4.2, 4.3 and 4.4 list approximate percentage of total urban and rural land areas of every tehsil which fall respectively within Core Zone (0 to 2 km), Middle Zone (2 to 5 km) and Outer Zone (5 to 10 km) of the study area as estimated from Fig. 4.4. From demographic details given in Table 4.1 for ST, CT and village areas falling in each tehsil, a realistic estimate of approximate population lying in different zones of the study area is made by multiplying total urban (ST and CT) and/or rural (village) population for different tehsils lying within the study area by percentage of total
urban and/or rural land areas of every tehsil which fall within Core, Middle and Outer Zones of the study area. This procedure had to be adopted because Primary Census Abstract, Census of India 2001, gives only ward wise population for towns [statutory towns NDMC, Delhi Cantt. and DMC(U) in NCT of Delhi and Dundahera and Sukhrali census towns in Gurgaon, Haryana] and total population of census towns and villages lying in a tehsil and actual distribution of population within the study area is not available. Realistic estimates of total population lying in Core, Middle and Outer Zones of the study area as estimated by above mentioned procedure are given in Tables 4.2, 4.3 and 4.4, respectively. Table 4.5 gives the summary of demographic details for the study area. It may be noted that the study area of 10 km radius area around MUL-COC site consists of land area of following tehsils either fully or partially:

<table>
<thead>
<tr>
<th>State</th>
<th>District</th>
<th>Tehsil</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCT of Delhi</td>
<td>New Delhi</td>
<td>Parliament Street, Connaught Place and Chanakyapuri</td>
</tr>
<tr>
<td></td>
<td>South-West</td>
<td>Najafgarh, Delhi Cantonment and Vasant Vihar</td>
</tr>
<tr>
<td></td>
<td>South</td>
<td>Defence Colony, Hauz Khas and Kalkaji</td>
</tr>
<tr>
<td></td>
<td>Central</td>
<td>Karol Bagh</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>Patel Nagar and Rajouri Garden</td>
</tr>
<tr>
<td>Haryana</td>
<td>Gurgaon</td>
<td>Gurgaon</td>
</tr>
</tbody>
</table>

The study area has a total population of nearly 28,23,059 consisting of 98.04% from NCT of Delhi and 1.96% from Haryana. Urban population in the study area is nearly 93.42 % of total population while rural population is only 6.58% of total population with following distribution in different zones.

<table>
<thead>
<tr>
<th></th>
<th>Core Zone</th>
<th>Middle Zone</th>
<th>Outer Zone</th>
<th>Study Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>53,571</td>
<td>5,15,857</td>
<td>20,67,784</td>
<td>26,37,212</td>
</tr>
<tr>
<td>Rural</td>
<td>25,354</td>
<td>34,758</td>
<td>1,25,735</td>
<td>1,85,847</td>
</tr>
<tr>
<td>Total</td>
<td>78,925</td>
<td>5,50,615</td>
<td>21,93,519</td>
<td>28,23,059</td>
</tr>
</tbody>
</table>

It can, therefore, be observed that the study area is highly urbanized and has a population density of nearly 8986 persons/km$^2$. Even the census villages in the study area have very little or no agricultural activity and may become part of urban agglomeration in a decade or two.

### 4.3 SAMPLING LOCATIONS

It has been pointed out earlier that the impact of the construction and operation of MUL-COC is unlikely to extend beyond 2 km radius from MUL-COC site. Therefore, ambient air, water and soil sampling and nose level monitoring
locations were kept within 5 km radius from MUL-COC site in different directions and distances as far as possible. The locations chosen for sampling/monitoring of different parameters are as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Air</td>
<td>MUL-COC Site, Masudpur, Mehrauli, Andheria Morh and Mahipalpur.</td>
</tr>
<tr>
<td>Water</td>
<td>MUL-COC Site (Tubewell), Vasant Kunj (Tap), Masudpur (Tubewell), Mehrauli (Tap), Mahipalpur (Tap), Munirka (Tap) and Mahipalpur Pahari (Handpump).</td>
</tr>
<tr>
<td>Soil</td>
<td>MUL-COC Site, Aravali Bio-diversity Park, Masudpur, Mehrauli and Mahipalpur</td>
</tr>
<tr>
<td>Noise</td>
<td>MUL-COC Site, Hotel Grand (Main Gate), Masudpur, Mehrauli, Andheria Morh and Mahipalpur.</td>
</tr>
</tbody>
</table>

Sampling/monitoring locations are shown in Fig. 4.2 for various environmental parameters.

4.4 PHYSICAL ENVIRONMENT

Baseline conditions regarding various components of physical environment are presented in following sub-sections.

4.4.1 Topography and Physiography

The study area is part of northern plain having hot semi-arid ecosystem with alluvium derived soils and 90 to 150 days of growing period for crops. The study area is essentially plain with little vegetation due to extensive urbanization. Land elevation varies from 280 m above mean sea level (msl) towards south-east periphery near Asola Wildlife Sanctuary to about 210 m above msl at north-west and north-east peripheries and about 230 m above msl at south-west periphery. The elevation at the MUL-COC site is nearly 260 m above msl. River Yamuna flows outside the study area in eastern direction while Najafgarh Drain flows outside the study area towards western and northern directions and meets river Yamuna in north-east direction outside the study area.

Large number of stone quarries can be observed generally in northern and eastern directions within 2.5 km distance from MUL-COC site (refer Fig. 4.3).

4.4.2 Soils

Soils are usually differentiated into horizons of minerals and organic constituents of varying depth, which differ from the parent material below in morphology,
Soil serves as a source of nutrients for plants and crops and also provides mechanical anchorage and favourable tilth.

As per the National Bureau of Soil Survey & Land Use Planning, Indian Council of Agricultural Research, Government of India, the soils of the study area are mostly characterized as follows:

Very deep, well to somewhat excessively drained, coarse loamy to sandy soils with loamy to sandy surface, slightly to moderately eroded corresponding to *Typic Ustipsamments* and *Typic Ustochrepts* taxonomy.

In view of nearly complete urbanization of the study area, there is practically no agricultural activity in the area. The land area of even the limited number of villages existing in the study area has practically very little or no agricultural activity and is also under pressure of urbanization and may become part of urban agglomerate in a decade or two.

To understand the soil quality of the study area, soil sampling was carried out at five locations (refer Section 4.3) as shown in Fig. 4.2. Composite soil sampling (10 to 15 cm depth) was carried out at each location.

The values of important physically and chemical parameters of these soils samples are given in Table 4.6. From the tabulated data it can be concluded that soils are generally sandy to sandy loam in texture, slightly alkaline in nature with moderate water holding capacity and low organic carbon content. It may also be observed that MUL-COC site soil has extremely low organic carbon content.

### 4.4.3 Water Resources and Water Quality

#### 4.4.3.1 Water Resources

There is no surface water resource in the study area. Ground water constitutes rain water accumulated either in shallow aquifers or deeper aquifers. Shallow aquifers are generally exploited by wells or handpumps while deeper aquifers are exploited by tubewells. The study area portion lying in NCT of Delhi uses mostly tap water supplied by Delhi Jal Board to meet domestic requirement. The study area portion lying in Haryana state is also using mostly tap water for meeting domestic requirement.

#### 4.4.3.2 Water Quality
To understand the water quality of the study area, water sampling was carried out at seven locations as indicated in Section 4.3. Out of given samples, 4 samples are tap water samples (Vasant Kunj, Mehrauli, Mahipalpur and Munirka) and 3 are ground water samples. Out of 3 ground water samples 2 are from deep aquifers (tubewells) (MUL-COC Site and Masudpur) and one is from shallow aquifer (handpump) (Mahipalpur Pahari). Water sampling locations are shown in Fig. 4.2.

The values of essential and desirable parameters for drinking water (IS 10500) for water samples of the study area are given in Table 4.7. Drinking water quality standards (desirable limit as well as permissible limit in the absence of alternate source) as per IS 10500 are also shown in Table 4.7. Values of monitored parameters for water samples found to be above desirable standard but below permissible standard in the absence of alternate source are marked by superscript a in Table 4.7. From tabulated data it can be observed that the parameter values for all water samples are mostly below the desirable limit except for total alkalinity for all water samples; iron for Vasant Kunj tap water; total hardness, total dissolved solids and calcium for Mahipalpur tap water; iron for Mehrauli tap water; total hardness, iron and total dissolved solid for MUL-COC Site tubewell water; and TDS in Mahipalpur Pahari handpump water. But the monitored values for all these parameters/samples are well within the permissible limits in the absence of alternate source of drinking water.

### 4.4.4 Climatology and Meteorology

#### 4.4.4.1 Introduction

The meteorological parameters play a vital role in transport and dispersion of pollutants in the atmosphere. The collection and analysis of meteorological data, therefore, is an essential component of environmental impact assessment studies. The long term and short term impact assessment could be made through utilization and interpretation of meteorological data collected over long and short periods.

Since the meteorological parameters exhibit significant variation in time and space, meaningful interpretation can only be drawn through a careful analysis of reliable data collected very close to the site.

Climatological (long-term) data is obtained from the closest India Meteorology Department (IMD) station or from any other nearby station, which has been collecting meteorological data for more than ten years.

Safadarjung IMD Observatory at New Delhi is the closest IMD station and is located within the study area at a distance of nearly 7.6 km in NE direction from the MUL-COC site. Climatological data for Safadarjung IMD station is discussed in Subsection 4.4.4.2.

Meteorological (short-term) data was recorded for one month in post-monsoon...
season (October 1 to 31, 2005) at Mahipalpur close to the site (2.2 km in nearly WNW direction) to obtain reliable meteorological data suitable for dispersion modeling as well as to verify the applicability of climatological data for long-term dispersion modeling. Meteorological station was set up on the roof of a two storey building at an elevation of nearly 10 m from local ground level to measure wind speed and direction, as well as ambient air temperature at each hour. Dry and wet bulbs temperatures and relative humidity and barometric pressure were recorded at 8:30 and 17:30 hours, and maximum and minimum temperatures were measured daily. The meteorological data collected by Envirotech field team is discussed in Subsection 4.4.4.3.

It may, however, be noted that operation of MUL-COC will not result in any regular gaseous emissions. Only source of gaseous emissions will be 3 standby DG sets (2 x 750 kVA and 1 x 1010 kVA) to be operated only for meeting power requirement during grid power failure. Therefore, no dispersion modeling of any regular stack emission source is involved for the operation of MUL-COC.

4.4.4.2 Climatological Data At Safdarjang IMD Station

Safdarjang observatory is the closest IMD station and is collecting meteorological data since August 1927. It is located nearly 7.6 km in NE direction from MUL-COC site. Latest available climatological data for Safdarjang is collected from India Meteorological Department, New Delhi (1951 to 1980 period) and the same is discussed below:

A. Seasons

From Safdarjang climatological data given in Table 4.8, it can be said that the region has four seasons as follows:

- Summer - March to May
- Monsoon - June to September
- Post-Monsoon - October and November
- Winter - December to February

B. Barometric Pressure

Data in Table 4.8 indicates that at 8:30 hour barometric pressure varies from 974.7 mb in July to 992.7 mb in December with an annual average of 984.1 mb. At 17:30 hour the same varies from 971.3 mb in June to 990.2 mb in December with an annual average of 981.1 mb.

C. Temperature
Data given in Table 4.8 indicates that the hottest month is May with monthly mean of daily maximum temperature as 39.6°C and monthly mean daily minimum as 25.9°C. However, the monthly mean daily minimum temperature in June (28.3°C) is significantly higher than that in May (25.9°C). January is the coldest month with monthly mean daily maximum temperature at 21.1°C and the monthly mean daily minimum temperature at 7.3°C. Highest maximum temperature ever recorded at Safdarjang is 47.2°C on May 29, 1944. The lowest minimum temperature ever recorded is –0.6°C on January 16, 1935.

D. Humidity

Table 4.8 gives the relative humidity (RH) data at IMD station Safdarjang. RH is high during July to September months (72 to 80% at 8:30 hour and 56 to 68% at 17:30 hour) and low during April and May months (37 to 39% at 8:30 hour and 20 to 21% at 17:30 hour). RH is higher by 12% (August) to 32% (January) at 8:30 hour as compared to that at 17:30 hour.

E. Rainfall

Safdarjang IMD station receives, on an average, 797.3 mm (Table 4.8) of rainfall annually mostly from south-west monsoon. Nearly 84.4% of annual rainfall is received during June to September and only 5.4% of the annual rainfall is received during the winter season. On an average there are 39.1 rainy days in a year with precipitation for 2.5 mm or more, most of them (21.3 d) being in July and August (Table 4.8). November and December months have practically no rainfall.

F. Cloud Cover

The skies are generally moderately to heavily clouded and occasionally overcast during the monsoon season. July and August are the cloudiest months of the year with complete cloud cover for 8 days at 8:30 hr and 5 days at 17:30 hr in each month. There are, on an average, 29 days at 8.30 hour and 23 days at 17.30 hour of cloudy skies with cloud cover of 8 octas. 156 days at 8.30 hour and 119 days at 17.30 hour have completely clear skies in a year. (Table 4.8).

G. Special Weather Phenomena

Thunder occurs, on an average, 42.3 days in a year, primarily between May and September. Dust storm and fog occur, on an average, 8.3 and 16.8 days in a year,
respectively, at IMD station Safdarjang (Table 4.8). Dust storm generally occurs during summer season (April to June) and fog occurs during winter season (December and January). Squall occurs, on an average, 18.5 days in a year, maximum squall occurs during summer season (April to June). Hail is much less prevalent and, on an average, occurs for 1.6 days in a year.

H. Winds

Table 4.8 shows that the annual mean wind speed at the Safdarjang IMD station is 9.5 kmph with highest (13.7 kmph) in June and lowest (6.1 kmph) in October and November. At 8:30 hour, wind blows mostly from W-NW sector towards E-SE sector throughout the year except July when wind blows mostly from E-SE sector to W-NW sector. At 17:30 hour, the wind blows mostly from NW-N sector towards SE-S sector during September to April and mostly from W-NW sector to E-SE sector in May and June. Morning hours have slightly higher calm periods (12%) as compared to evening hours (11%) November month has the highest calm period (21%) and May and June have the lowest calm period (7%) at 8:30 hour. October month has the highest calm period (26%) and March has the lowest calm period (2%) at 17:30 hour.

Fig. 4.6 and 4.7 shows monthly 16-direction wind rose diagrams for Safdarjang IMD station for the period 1976-1985 at 8:30 and 17:30 hours, respectively, and support the conclusions given above.

I. Visibility

Table 4.8 indicates that the area generally has good visibility throughout the year, mostly 4 km and more except for few days, mostly in winter, when visibility is up to 1000 m only.

4.4.4.3 Meteorological Observation at Site

Micrometeorological data changes after a few kilometers due to changes in local topography. Furthermore, an IMD station records data only at 8:30 and 17:30 hours with wind speed over widely spaced ranges and the same, therefore, is not of much use in dispersion modelling. Because of these limitations, micrometeorological station was set up at Mahipalpur closes to MUL-COC site and hourly meteorological parameters were recorded during post-monsoon season (October 1 to 31, 2005). Table 4.9 gives the summary of meteorological conditions during the study period. In the following subsections, the meteorological data collected during the study period is discussed briefly.
A. Atmospheric Pressure

The atmospheric pressure data at the site at 8:30 and 17:30 hours during study period is presented in Table 4.9. The maximum and minimum atmospheric pressures at 8:30 hour are observed to be 987 and 986 mb, respectively. The maximum and minimum atmospheric pressure at 17:30 hour are observed to be 984 and 983 mb, respectively. The average monthly atmospheric pressures at 8:30 and 17:30 hours are 986.6 and 983.3 mb, respectively, at the site.

B. Temperature

Table 4.9 presents the daily maximum and minimum temperatures recorded at the site during study period. From tabulated data it is observed that maximum temperature varies from 31.0 to 37.5°C, whereas minimum temperature varies from 18.0 to 23.5°C. The average daily maximum and minimum temperatures are observed to be respectively 34.3°C and 21.3°C during the study period.

C. Relative Humidity

The relative humidity (RH) recorded at the site during the study period presented in Table 4.9 indicates that at 8:30 hour RH varies from 63 to 86% and at 17:30 hour RH varies from 51 to 81%. The average RH at 8:30 and 17:30 hours is 72.9% and 60.2%, respectively.

D. Average Wind Speed

Table 4.9 also gives the average wind speed at Mahipalpur for day, night and 24 hourly period. The daily average highest wind speeds at site during day, night and 24-hourly are observed to be 6.7, 3.1 and 5.1 kmph, respectively, and daily average lowest wind speeds for these periods are observed to be 1.8, 0.1 and 1.0 kmph during October 2005. The monthly average wind speed is 4.3 kmph during day time, 1.2 kmph during night time and 2.5 kmph during day + night time during the study period.

E. Wind Pattern during October 1 to 31, 2005

- Day Time

Table 4.10 and Fig. 4.8 present the wind pattern data during the study period at the site during day time.

Predominant winds from SE towards NW direction are observed for 48.71% of the total time, with wind speeds and frequencies in the range of >1.8-3.6 kmph (7.83%), >3.6-7.2 kmph (22.17%) and >7.2-14.4 (18.71%).
The other directions and percentage frequencies are (in decreasing order of frequency) from ESE (13.04%), E (3.48%) and NNE (3.04%), and frequencies of winds from other remaining directions are less than 3% each of the total time. Calm period prevails for 20.43% of the total time.

- **Night Time**

Table 4.11 and Fig. 4.8 present the wind pattern data during the study period at the site during night time.

Predominant winds from SE towards NW direction are observed for 8.78% of the total time, with wind speeds and frequencies in the range of >1.8-3.6 kmph (21.62%) and >3.6-7.2 kmph (3.38%).

The other directions and percentage frequencies are (in decreasing order of frequency) from ESE (6.76%) and N (4.06%) and frequencies of winds from other remaining directions are less than 3% each of the total time. Calm period prevails for 75.00% of the total time.

- **Day + Night Time**

Table 4.12 and Fig. 4.8 present the wind pattern data during the study period at the site during day + night time.

Predominant winds from SE towards NW direction are observed for 26.94% of the total time, with wind speeds and frequencies in the range of >1.8-3.6 kmph (7.03%), >3.6-7.2 kmph (11.03%) and >7.2-14.4 kmph (8.18%).

The other directions and percentage frequencies are (in decreasing order of frequency) from ESE (9.51%) and N (3.43%) and frequencies of winds from other remaining direction are less than 3% each of the total time. Calm period prevails for 51.17% of the total time.

### 4.4.5 Ambient Air Quality

#### 4.4.5.1 Introduction

To study the baseline air quality scenario in the study area, five ambient air quality monitoring (AAQM) stations were selected in the study area in different directions and at different distances from the MUL-COC Site keeping in view of the guidelines of the Ministry of Environment and Forests (MOEF), Government of India.
Fig. 4.2 indicates the locations of these stations. The locational details of the monitoring stations with respect to the MUL-COC Site are given in Table 4.13.

### 4.4.5.2 Selection of Ambient Air Quality Monitoring Locations

To locate the ambient air quality monitoring (AAQM) stations, climatological data for Safdarjang IMD station was studied to understand wind direction and velocity frequencies. But since the operation of MUL-COC will not have any regular stack emission source and the only source of pollution will be ground level emissions from vehicles to be used for personal transport to and fro from office by the staff of the MUL-COC. Therefore, three AAQM locations close to major roads leading to MUL-COC were selected in addition to one location at the MUL-COC site and one location at Mehrauli.

### 4.4.5.3 Methodology of Monitoring and Analysis

The monitoring was carried out for a period of one month in post-monsoon season at all locations at a frequency of two days in a week at each location. Five Envirotech Respirable Dust Samplers (APM 460) were deployed for ambient air quality monitoring (AAQM). The RDS have been located on concrete slab rooftops of single storied houses. At each station 24-hourly air sampling was carried out and samples were collected for analysis SO$_2$, NO$_x$, SPM and RPM. Grab samples for CO were also collected once at each location.

Bureau of Indian Standards codes IS 5182, parts 2 and 4 were followed for collection and analysis of samples. Analysis of CO was carried out using gas chromatograph.

### 4.4.5.4 Ambient air Quality In the Study Area

The results of 24-hourly monitoring SO$_2$, NO$_x$, SPM and RPM concentrations and grab samples for CO in study area during study period in post-monsoon season are given in Tables 3.14 for MUL-COC Site, Masudpur (Main Road), Mehrauli (Near Jaj Mahal), Andheria Morh (Near Kisan Haat) and Mahipalpur (Residential Area). On the basis of tabulated data following observations can be made:

**A. Suspended Particulate Matter (SPM)**

During the study period, MUL-COC Site shows the highest mean 24-hourly SPM concentration (602 µg/m$^3$) and is followed by Mehrauli (426 µg/m$^3$), Masudpur (375 µg/m$^3$), Andheria Morh (308 µg/m$^3$) and Mahipalpur (94 µg/m$^3$). The maximum and minimum SPM concentrations measured at various AAQM stations are 918 µg/m$^3$ at MUL-COC Site and 78 µg/m$^3$ at Mahipalpur, respectively.
B. Respirable Particulate Matter (RPM)

During the study period, MUL-COC Site shows the highest mean 24-hourly RPM concentration (254 µg/m³) and is followed by Masudpur (159 µg/m³), Mehrauli (138 µg/m³), Andheria Morh (133 µg/m³) and Mahipalpur (65 µg/m³). The maximum and minimum RPM concentrations measured at various AAQM stations are 389 µg/m³ at MUL-COC Site and 46 µg/m³ at Mahipalpur, respectively.

C. Sulphur Dioxide (SO₂)

During the study period, MUL-COC Site shows the highest mean 24-hourly SO₂ concentration (21.4 µg/m³) and is followed by Masudpur (15.7 µg/m³), Andheria Morh (15.0 µg/m³), Mahipalpur (14.0 µg/m³) and Mehrauli (13.2 µg/m³). The maximum and minimum SO₂ concentrations measured at various AAQM stations are 35.2 µg/m³ at MUL-COC Site and 8.0 µg/m³ at Mehrauli, respectively.

D. Oxides of Nitrogen (NOx)

During the study period, Mahipalpur shows the highest mean 24-hourly NOx concentration (64.3 µg/m³) and is followed by MUL-COC Site (51.0 µg/m³), Masudpur (48.9 µg/m³), Andheria Morh (39.5 µg/m³) and Mehrauli (38.5 µg/m³). The maximum and minimum NOx concentrations measured at various AAQM stations are 80.1 µg/m³ at Mahipalpur and 23.0 µg/m³ at Mehrauli.

E. Carbon Monoxide (CO)

During the study period, concentration of CO for grab samples is found to be highest at Masudpur (380 µg/m³) and is followed by Mahipalpur (292 µg/m³), Andheria Morh (270 µg/m³), Mehrauli (208 µg/m³) and MUL-COC Site (182 µg/m³).

4.4.5.5 Ambient Air Quality Status

National ambient air quality standards for SPM, RPM, SO₂, NOx and CO are given in Table 4.15.

All five locations, namely, MUL-COC Site, Masudpur, Mehrauli, Andheria Morh and Mahipalpur always meet the 24-hourly National Ambient Air Quality Standards for residential, rural and other area for average SO₂ and NOx concentrations during the study period. Mahipalpur also meets these standards for average SPM and RPM concentrations. Industrial area 24-hourly concentration limit for SPM is met for Masudpur, Mehrauli and Andheria Morh and that for RPM is met for Mehrauli and Andheria Morh. High SPM and RPM concentrations at MUL-COC Site reflects the impact of construction activities at that location. Concentration of CO for all grab samples is well below the 8-hourly standard for CO in residential, rural and other area.
4.4.6 Noise

4.4.6.1 Introduction

Noise can be defined as an unwanted sound. It interferes with speech and hearing. If intense enough, it can damage hearing, or is otherwise annoying. The definition of noise as unwanted sound implies that it has an adverse effect on human beings and their environment. Noise can also disturb natural wildlife and ecological system.

4.4.6.2 Methodology

To understand the noise environment around the proposed plant, a noise survey was conducted using Sound Level Meter 2031 manufactured by Cygnet Systems. Noise measurements were carried out at the same locations where ambient air quality was monitored. The 24-hourly sound levels were measured at each location during the study period. Fig. 4.2 shows the noise monitoring locations in the study area during the study period.

4.4.6.3 Equivalent Sound Energy Level or Leq

In most of the acoustic environments, the sound pressure level fluctuates with time due to changes in noise generation sources. The fluctuating noise levels are reported as equivalent sound energy level or Leq. It is defined as the steady sound pressure level which would have given the same total energy as the actual time varying sound pressure level over the given time period. By noise levels recorded during measurements, Leq was computed using following the statistical relationship:

\[ L_{eq} = L_{50} + \frac{(L_{10} - L_{90})^2}{60} \]

where \( L_{90} \) = the noise levels exceed 90 percent of the time
\( L_{50} \) = the noise levels exceed 50 percent of the time
\( L_{10} \) = the noise levels exceed 10 percent of the time

It may be noted here that \( L_{10}, L_{50} \) and \( L_{90} \) values can be considered as peak, average and background sound pressure levels at each location, respectively.

4.4.6.4 Ambient Standards in Respect of Noise

Ministry of Environment and Forest has notified the ambient standards in respect of noise. Table 4.16 gives these standards in respect of noise.

4.4.6.5 Hourly Noise Levels

Envirotech Consultants field team carried out noise measurement survey at different locations at the study area over 24-hour period at each location. The hourly \( L_{10}, L_{50} \) and \( L_{90} \) values of recorded noise levels at all six locations, namely, MUL-COC Site, Hotel Grand (Main Gate), Masudpur (Main Road), Andheria Morh (Near Kisan Haat), Mehrauli (Near Jaj Mahal) and Mahipalpur (Residential Area) are given in Tables 4.17, 4.18, 4.19, 4.20, 4.21 and 4.22, respectively. Table
4.23 gives the day-time ($L_{\text{day}}$) and night-time ($L_{\text{night}}$) noise levels for all locations computed from hourly $L_{\text{eq}}$ values during day-time and night-time, respectively, and also specifies area category and applicable noise standards for each location.

4.4.6.6 Day and Night-Time Noise Levels

The $L_{\text{eq}}$ value of noise levels in the study area during day-time ($L_{\text{day}}$) varies between 56.1 to 63.3 dB(A) during the study period. Highest $L_{\text{day}}$ value is recorded at Masudpur {63.3 dB(A)} followed by Mahipalpur {61.2 dB(A)}, Mehrauli {57.0 dB(A)}, Hotel Grand {56.8 dB(A)}, MUL-COC Site {56.4 dB(A)} and Andheria Morh {56.1 dB(A)}.

$L_{\text{night}}$ values in the study area range between 49.4 to 56.9 dB(A) during the study period. Highest $L_{\text{night}}$ value is recorded at Masudpur {56.9 dB(A)} followed by MUL-COC Site {53.7 dB(A)}, Hotel Grand {51.9 dB(A)}, Andheria Morh {51.2 dB(A)}, Mehrauli {51.0 dB(A)} and Mahipalpur {49.4 dB(A)}.

From the tabulated data (Table 2.23) it may be noted that none of the six ambient noise monitoring location meets either the $L_{\text{day}}$ or $L_{\text{night}}$ noise limits for residential area but monitored values for $L_{\text{day}}$ and $L_{\text{night}}$ are well within their respective standards for commercial area. Highest noise levels monitored at Masudpur during day- and night-time reflect the impact of the noise generated due to high vehicular traffic density since noise monitoring location at Masudpur was located merely at a distance of nearly 20 m from Mehrauli-Mahipalpur Main Road.

4.4.7 Traffic Analysis

It has been pointed out in Sub-section 4.6.2 that the operation of MUL-COC will not have any regular stack emission source and the only major source of pollution will be ground level emissions from personal vehicles to be used for transport to and from the office. It was, therefore, considered desirable to carry out traffic survey on two major roads near MUL-COC Site, namely, Nelson Mandela Marg and Mehrauli-Mahipalpur Main Road. Results of traffic survey are discussed in following subsections:

4.4.7.1 Nelson Mandela Marg

Nelson Mandela Marg is nearly 200 m east of MUL-COC Site and connects Munirka to Vasant Kunj at Mehrauli-Mahipalpur Main Road. Persons working at MUL-COC will have to invariably use this road whether they will be traveling to/from Munirka or Vasant Vihar or Mehrauli or Mahipalpur or Vasant Kunj.

Tables 4.24 and 4.25 give traffic distribution over 24-hour period on Nelson Mandela Marg respectively towards and from Munirka over 24-hour period. 12646 and 11389 vehicles are observed to ply daily towards and from Munirka, respectively. Passenger cars (car/jeep) constitute largest number (64.15% towards and 60.36% from Munirka), followed by 2-wheelers.
(14.87% towards and 16.10% from Munirka) and 3-wheelers (11.79% towards and 13.16% from Munirka). Traffic density of heavy vehicles (bus/truck) is observed to be quite low (5.27% towards and 5.58% from Munirka). Traffic density both ways is observed to be highest during 14:00-15:00 hours followed by 18:00-19:00 hours and 15:00-16:00 hours. In the morning heaviest traffic density is observed during 08:00-09:00 hours (4th/5th highest) followed by 09:00-10:00 hours. Traffic density is observed to be very low during night between 24:00 to 05:00 hours.

4.4.7.2 Mehrauli – Mahipalpur (NH-8) Main Road

Mehrauli - Mahipalpur Main Road passes through Vasant Kunj and is the main link road connecting Mehrauli to national highway NH-8 at Mahipalpur. This road will have to be used by persons traveling to/from NH-8 or Mahipalpur or Mehrauli or Vasant Kunj from/to MUL-COC via Nelson Mandela Marg.

Tables 4.26 and 4.27 give traffic distribution over 24 hour period on Mehrauli-Mahipalpur (NH-8) Main Road respectively towards and from Mahipalpur (NH-8). From tabulated data it can be observed that 10469 and 10692 vehicles ply daily towards and from Mahipalpur, respectively. Passenger cars (car/jeep) again constitute largest number (48.87% towards and 48.48% from Mahipalpur) followed by 2-wheelers (22.51% towards and 23.75% from Mahipalpur). Heavy vehicles constitute third largest density category (11.38% towards and 10.28% from Mahipalpur) followed by 3 wheelers (9.58% towards and 9.70% from Mahipalpur). Traffic density is observed to be highest during 08:00 to 09:00 hours in the morning. Traffic density in the evening is highest during 18:00 to 19:00 hours (overall 2nd highest). Traffic density is extremely low during the night between 24:00 to 04:00 hours.

4.4.8 Land Use

In view of near complete urbanization of NCT of Delhi no land use information is available for the study area falling within NCT of Delhi even for few villages falling mainly in Core and Outer Zones of the study area. In very small area of the study area lying towards south-west of MUL-COC Site falling in Gurgaon C.D. block and tehsil of Haryana also has two major census towns, namely, Dundahera and Sukhrali which are now totally urbanized. In view of rapid urbanization due to development of commercial complexes, institutional areas and residential colonies in rural village area in the study area, there is practically no cultivation even in cultivable area of villages.

There is no dense forest area within the study area, though patches of green/forest area exist, such as, Aravali Biodiversity Park (mainly Babul) towards north-west in Core Zone; Rajokri PF (open Babul) towards south-west and Hauz Khas village (dense Babul) as well as Deer Park (fairly dense Shisham) towards north-east in Middle Zone; and Jahapanah City PF (fairly dense mixed jungle having mainly Babul) towards east, Central Ridge RF (fairly dense mixed jungle having mainly Kikar) and Asola Wildlife Sanctuary (fairly dense Babul) towards south-east in Outer Zone.
4.5 BIOLOGICAL ENVIRONMENT

4.5.1 Flora

It has been pointed out in Section 4.4.8 that no major forest area exists in the study area and only patches of green/forest area exist in Core, Middle and Outer Zones. Acacia is the dominant species observed in the study area. Table 4.28 lists major tree species observed by our field team in (A) Vasant Kunj residential area, (B) Aravali Biodiversity Park and (C) Ridge Area.

4.5.2 Fauna

No wildlife is found in the study area. Deer Park in Hauz Khas village has large number of deers.

4.6 DEMOGRAPHIC AND SOCIO-ECONOMIC ENVIRONMENT

4.6.1 Introduction

Summary of demographic details of the study area is presented in Section 4.2. Most of the study area falls in the New Delhi, South-West, South, Central and West districts of NCT of Delhi and only a small south-western area falls in Gurgaon district of Haryana. The study area is highly urbanized having nearly 26,37,212 urban population (93.42%) and only 1,85,847 rural population (6.58%). Summary of demographic data for the study area and its distribution Core, Middle and Outer Zones is given in Table 4.5.

4.6.2 Population

The study area sustains a total population of 28,23,059 as per 2001 Census and 93.42% of the total population belongs urban area and 6.58% of the total population belongs to rural area. Population distribution in Core Zone, Middle and Outer Zones is 78,925 (67.88% urban), 5,50,615 (93.69% urban) and 21,93,519 (94.27% urban), respectively.

4.6.3 Population Density

From Table 4.5 it can be observed that the population density in the study area is 8986 persons/km² and its distribution in Core, Middle and Outer Zones is respectively 6281, 8346 and 9310 persons/km².

4.6.4 Sex Ratio

Table 4.5 indicates that the sex ratio (number of females per 1000 males) is 793 in the study area. Sex ratio in urban area is 794 while that in rural area is 778. Sex ratio distribution in Core, Middle and Outer Zones is respectively 810, 799, and 791.

4.6.5 Literacy
Table 4.5 indicates that literacy rate in the study area is 72.06% (77.50% amongst males and 65.22% amongst females). Literacy rate distribution in Core, Middle and Outer Zones is respectively 71.14% (76.48% amongst males and 64.54% amongst females), 73.56% (78.77% amongst males and 67.04% amongst females) and 71.72% (77.21% amongst males and 64.78% amongst females).

CHAPTER 5

ENVIRONMENTAL IMPACT ASSESSMENT
5.1 INTRODUCTION

The impacts of construction activities as well as that of generation and disposal of gaseous emissions, liquid effluents and solid wastes during operation of MUL-COC on various environmental parameters in the study area are discussed in this Chapter.

It may be noted that the construction and operation of MUL-COC will not have any impact on Topography and Physiography; Surface and Ground water Hydrology; Climatology and Meteorology; Land Use; Terrestrial Flora and Fauna; and Demographic of the study area.

The construction and operation of MUL-COC can only have impact on Soil, Water and Power Resources, Water and Air Quality, Noise, Traffic Density and Socio-economic Environment in a limited area of about 2 km from MUL-COC site due to generation and disposal of gaseous emissions, liquid effluents and solid wastes at MUL-COC. Impact on these parameters is, therefore, discussed in the following sections of this chapter for construction and operation MUL-COC.

5.2 SOILS

5.2.1 Construction Phase

Construction of MUL-COC may generate small amount of construction waste, such as, oil and grease as well as debris from construction. These may contaminate the soil at the construction site but the extent of contamination will be insignificant and will be restricted close to construction site. Furthermore, construction wastes will be disposed off properly on completion of construction and plot area will be landscaped as per the site plan and planted with trees, shrubs and green bed for improving the aesthetic of the area.

5.2.2 Operation Phase

Operation of MUL-COC will have no impact on the soils of the area.

5.3 WATER RESOURCES

5.3.1 Construction Phase

Water requirement for the construction phase will be small and temporary and construction contractor is expected to meet the same from DJB supply system. This temporary requirement of small quantity of water for construction of MUL-COC is not expected to put any appreciable strain on huge DJB supply system.

5.3.2 Operation Phase
Operation of MUL-COC will require nearly 49,030 lpd on continuous and regular basis for which MUL has already applied to DJB for water supply agreement. Even though, the water requirement of 49,030 lpd for operation phase of MUL-COC is extremely small as compared to the huge water supply network of DJB, but even a small incremental water requirement is likely to put an additional stress on DJB water supply system which is already facing water shortage problem specially during summer season for meeting the water requirement of residents of Delhi. DJB will, therefore, have to make necessary efforts to augment water availability by tapping additional resources as well as by reducing pipeline losses.

5.4 POWER SUPPLY

5.4.1 Construction Phase

Power requirement for the construction phase will be small and temporary and the same will be met by construction contractor by using portable DG set. This will not have any impact on the power supply system of the area.

5.4.2 Operation Phase

Operation of MUL-COC will require nearly 2000 kW of power on regular and continuous basis for which an application has already been submitted to BSES Rajdhani Ltd., New Delhi, for power supply agreement. Even though, the power requirement of 2000 kW for operation of MUL-COC is small as compared to power supply network of BSES Rajdhani Ltd., but even this small incremental power requirement is likely to put an additional stress on power supply system of BSES Rajdhani Ltd. which is already facing power shortage specially during peak summer and winter periods resulting into regular power cuts causing serious inconvenience to residents of Delhi. BSES Rajdhani Ltd. will, therefore, have to make necessary efforts to improve power availability by tapping additional sources as well as by reducing transmission and distribution losses.

5.5 WATER QUALITY

5.5.1 Construction Phase

Waste water likely to be generated by about 200 construction workers will be small and temporary, but contamination of vacant land in between Plot No. 1 and Hotel Grand as well as Aravali Bio-diversity Park by human excreta and urination was already observed by Envirotech field team during reconnaissance survey of the area around MUL-COC site. However, the problem was not alarming due to two reasons: (i) no hutsments have been made for construction workers at construction site and (2) natural decay process in hot semi-arid ecosystem. No contamination of either ground water or water supply system in the area is expected. On completion of construction, this problem due to construction workers will be automatically estimated as construction workers will move to some other construction site.
5.5.2 Operation Phase

Nearly 38000 lpd of domestic waste water created from operation of MUL-COC will be discharged directly into municipal sewer of Municipal Corporation of Delhi (MCD). Application has already been made to MCD for granting permission. Therefore, operation of MUL-COC will have no impact on the quality of ground water or water supplied by DJB in the area.

5.6 AIR QUALITY

5.6.1 Construction Phase

Exhaust gas emissions from construction machineries will be small and temporary. Therefore, no adverse impact except some increase in SPM and RPM levels very close to construction site (upto about 200 m from construction site) is expected. On completion of construction this adverse impact on SPM and RPM concentrations in ambient air close to construction site will be eliminated.

5.6.2 Operation Phase

Operation of MUL-COC will not have any continuous source of gaseous emissions and, therefore, no adverse impact on ambient air quality in the area is likely. DG sets (2 x 750 + 1 x 1010 kVA) are standby source of power for use only during grid power failure. They are, therefore, unlikely to be operated for not more than few hours in a month. Furthermore, exhaust gases from DG sets whenever operated will be discharged at an elevation of 27.5 m (6.5 m + height of the building, 21 m). Therefore, any adverse impact on ambient air quality due to operation of standby DG sets for power supply will be insignificant and may last upto a maximum of one hour at any given occasion.

Exhaust emissions due to use of personal transport vehicles (mostly cars and some two wheelers) by 827 persons working in MUL-COC will be restricted to short inward and outward journey periods. Since these vehicles are expected to be compliant of Bharti III emission standards, adverse impact, if any, due to use of these vehicles on ambient air quality close to MUL-COC site is expected to be minimal and may last for a maximum of about 2 hours every working day, one hour in the morning (08-09 hour) and one hour in the evening (18-19 hour).

No ambient air quality modeling either for exhaust emissions from standby DG set stacks or for surface level automobile emissions due to personal transport vehicles likely to be used by staff likely to work in MUL-COC is required.

5.7 NOISE

5.7.1 Construction Phase

During construction of MUL-COC, there will be temporary increase in noise levels at construction site due to use of construction machinery and vehicles.
However, noise levels will be generally below 100 dB (A) at a distance of 1 m from source and will have small effect only at the nearest place of residence (Hotel Grand at a distance of nearly 150 m) where the noise level due to construction activity will be expected to drop to 56.5 dB (A) without any excess attenuation. Since the monitored noise levels at the Hotel Grand Main Gate are found to be 56.8 dB (A) during day-time and 51.9 dB (A) during night-time (Table 4.18 in Chapter 4), the noise levels at Hotel Grand Main Gate due to construction activity is likely to increase to 59.7 dB (A) during day-time and 57.8 dB (A) during night-time.

5.7.2 Operation Phase

Operation of MUL-COC will not have any noise source. Standby DG sets will be the only major noise source and they will operate only during grid power failure. Furthermore, DG sets will have acoustic enclosures to control noise levels as per CPCB guidelines and will be housed in the lower basement providing additional barriers for noise propagation. Therefore, impact of operation of standby DG sets during grid power failure on ambient noise levels around the MUL-COC will be insignificant.

5.8 TRAFFIC DENSITY

5.8.1 Construction Phase

Construction vehicles will be very few and construction workers will either use bicycle or public transport system to travel to and from MUL-COC site. Therefore, construction of MUL-COC will have insignificant impact on traffic density.

5.8.2 Operation Phase

Assuming that MUL-COC will operate from 09:00 to 17:30 hours, use of 827 personal transport vehicles by MUL-COC staff will result in significant increase in traffic density. Assuming 50%, 30% and 20% of staff will travel from/to Mahipalpur side (includes person staying in Gurgaon), Mehrauli side (includes persons staying in Vasant Kunj) and Munirka side, respectively, expected traffic density at 08:00-09:00 hour and 18:00-19:00 hour period will be as shown below:

<table>
<thead>
<tr>
<th>Road</th>
<th>Time Hours</th>
<th>From Munirka</th>
<th>Towards Munirka</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Existing</td>
<td>After MUL-COC Operation</td>
</tr>
<tr>
<td>Nelson Mandela Marg</td>
<td>08-09</td>
<td>711</td>
<td>876</td>
</tr>
<tr>
<td></td>
<td>18-19</td>
<td>953</td>
<td>1615</td>
</tr>
<tr>
<td>Road</td>
<td>Time Hours</td>
<td>From Mahipalpur</td>
<td>Towards Mahipalpur</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Existing</td>
<td>After MUL-COC Operation</td>
</tr>
<tr>
<td>Mehrauli-Mahipalpur</td>
<td>08-09</td>
<td>784</td>
<td>1198</td>
</tr>
<tr>
<td>Main Road</td>
<td>18-19</td>
<td>762</td>
<td>1010</td>
</tr>
</tbody>
</table>

5.9 SOCIO-ECONOMIC

5.9.1 Construction Phase
There will be very little impact of construction of MUL-COC on the socio-economic activity in the area surrounding MUL-COC site.

5.9.2 Operation Phase

The impact of operation of MUL-COC on socio-economic activity will be only marginal in the area surrounding MUL-COC because of extremely limited interaction of MUL staff in the area unless they plan to reside in the area.
CHAPTER 6

ENVIRONMENTAL MANAGEMENT PLAN
CHAPTER 6

ENVIRONMENTAL MANAGEMENT PLAN

6.1 INTRODUCTION

Construction and operation of Corporate Office Complex of Maruti Udyog Ltd. (MUL-COC) will not have any important pollution sources and will not require any elaborate environmental management plan. However, a brief management plan for the environmental parameters likely to be affected by the construction and operation of the proposed MUL-COC is discussed in the following sections.

6.2 SOILS

There will be no adverse impact of construction of MUL-COC on soils of surrounding area of the proposed MUL-COC if it is ensured that fugitive emissions of cement and fine dust is properly controlled during construction and construction wastes are properly disposed off on completion of construction.

Operation of MUL-COC will have no impact on soils.

6.3 WATER RESOURCES

Construction and operation will have insignificant impact on the water supply system of Delhi Jal Board. However, proper long term agreement for the regular supply of 49030 lpd of water must be ensured and necessary management steps should be taken to minimize the water consumption.

6.4 DOMESTIC WASTE WATER DISPOSAL

Proper agreement must be reached with Municipal Corporation of Delhi for disposal of anticipated 38 klpd of domestic waste water from the operation of MUL-COC in municipal sewer and it should be ensured that sewer lines of MUL-COC are completely leak proof.

6.5 POWER SUPPLY

Construction of MUL-COC will have no impact on electric power supply network of the area. Requirement of 2000 kW of electric power during operation of MUL-COC should be drawn only after entering into proper long term agreement with BSES Rajdhani Ltd. and constructing separate subsection for power supply. All efforts should be made to minimize the electric power consumption by using energy efficient equipments for lighting and air conditioning as well as to have enough natural light in office rooms so as to reduce electric lighting requirement.

It will also be desirable to install solar water heating system at the roof of MUL-COC of adequate capacity for supply of hot water in guest rooms and pantry. This will help in reducing consumption of electric power.
6.6 AIR QUALITY

The adverse impact of construction of MUL-COC will be minimized in the surrounding area if necessary efforts are made to minimize fugitive dust emissions during construction.

No management step is required for ambient air quality during operation of MUL-COC except to have one stack of 6.5 m height from roof level (27.5 m from ground level) for each D.G. set for discharge of emissions from DG sets whenever operated during grid power failure. DG sets should have high design efficiency to reduce HSD consumption and only low sulfur (0.25% max.) HSD should be used for DG sets.

6.7 NOISE

Operation of construction machinery and vehicles will have some adverse impact on nearest residential place (Hotel Grand) especially during night-time. Efforts should be made to minimize the use of machinery and construction activity having high noise levels especially during night-time to ensure that noise levels at the Main Gate of Hotel Grand are less than 60 dB(A) during day-time (6 am to 10 pm) and 55 dB(A) during night-time (10 pm to 6 am).

Operation of MUL-COC will not require any management plan for noise control except for properly designed and fabricated acoustic enclosures and vibration free installation for DG sets in the lower basement.

6.8 TRAFFIC DENSITY

Construction of MUL-COC will have no impact on traffic density.

In order to reduce traffic density due to operation of MUL-COC on Nelson Mandela Marg and Mehrauli-Mahipalpur Main Road, employees should be encouraged to use car pools as far as possible for transport to and from office.

6.9 LANDSCAPING/GREEN BELT

Properly designed landscaping should be implemented to improve the aesthetic around MUL-COC. Green belt proposed inside the MUL-COC must be properly maintained by MUL.

DDA should make a special effort with the help of Forest Department, NCT Delhi, for proper development of (a) Aravalli Bio diversity Park and (b) Curtain Plantation in between Shopping Mall Complex and Nelson Mandela Marg. This will reduce the impact noise and surface level emissions generated due to vehicular movement on Nelson Mandela Marg as well as improve the green lung capacity of area surrounding Shopping Mall Complex at Vasant Kunj.

6.10 RAIN WATER HARVESTING

MUL management must ensure that roof top and roads/pathways rain water harvesting is properly designed and implemented. Collected rain water should be discharged into shallow aquifers for assisting their recharge.
CHAPTER 7

RISK ASSESSMENT AND SAFETY MEASURES
CHAPTER 7

RISK ASSESSMENT AND SAFETY MEASURES

7.1 RISK ASSESSMENT

7.1.1 Construction Phase

Construction of a seven storey building with 2-level basement upto a depth of 7.95 m below ground level and ground + 4 floors upto a height of 21 m above ground level is an activity which is quite routine and does not pose any specific hazard.

7.1.2 Operation Phase

The operation of MUL-COC has no hazardous activity to necessitate risk assessment. Fire appears to be the only hazard during the operation of MUL-COC either due to electric short-circuiting or due to ignition of HSD due to leakage from 3 numbers of 900 litre capacity diesel storage day tanks.

7.2 SAFETY MEASURES

7.2.1 Construction Phase

Implementation of safe construction practices by the construction contractor must be ensured by MUL management for safety of workmen.

7.2.2 Operation Phase

Since HSD consumption for operation of 2 x 750 kVA + 1 x 1010 kVA DG sets at full load is estimated as 577.3 lph (Sub-section 3.5.1.1 in Chapter 3), it is recommended that only 2 hour full load requirement of HSD (2 x 577.3 lph = 1154.6 litre) should be stored in day tanks and 3 storage tanks each of 400 litre capacity should be sufficient since two petrol pumps already exist within 500 m from MUL-COC site. This will reduce the inventory of HSD to a maximum of 1200 litres and HSD storage hazard potential will also be reduced.

It is recommended that very high quality electric wiring and fittings as well as paneling with fire retardant materials to the extent possible must be used to reduce chances of electric sparks and spread of fire.

It is also recommended that HSD tanks, piping and fittings are properly maintained to prevent leakage of HSD. Furthermore, care should be taken to ensure that there is no leakage of HSD while filling of HSD storage day tanks in lower basement. *No Smoking* sign must be prominently displayed near HSD storage and DG set area.

It is further recommended that smoke and fire detectors must be installed at requisite places for early detection of fire.
It is further recommended that fire extinguishers of appropriate capacity and type are installed in ready to use condition at appropriate places and these are properly maintained as per NBC guidelines. It should always be ensured that fire water tanks are full with water and fire hydrant system is provided and maintained as per NBC guidelines. Escape stairs should not have any obstruction appropriate signs for escape routes are prominently displayed for the convenience of persons working at MUL-COC.
CORRIGENDUM

The following correction shall be incorporated in the EIA report for Corporate Office Complex of Maruti Udyog Limited

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Pg No</th>
<th>Existing Text</th>
<th>Corrected Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ES-1</td>
<td>There is no source of pollution except gaseous emissions from standby DG sets to be discharged from 6.5 m high stacks from roof top and domestic waste water which will be discharged into the MCD sewer.</td>
<td>There is no source of pollution except gaseous emissions from standby DG sets to be discharged from 2.85 m high stacks from roof top and domestic waste water which will be discharged into the MCD sewer.</td>
</tr>
<tr>
<td>2</td>
<td>5-3</td>
<td>Operation of MUL-COC will not have any continuous source of gaseous emissions and, therefore, no adverse impact on ambient air quality in the area is likely. DG sets (2 x 750 + 1 x 1010 kVA) are standby source of power for use only during grid power failure. They are, therefore, unlikely to be operated for not more than few hours in a month. Furthermore, exhaust gases from DG sets whenever operated will be discharged at an elevation of 24.5 m (6.5 m + height of the building, 21 m). Therefore, any adverse impact on ambient air quality due to operation of standby DG sets for power supply will be insignificant and may last upto a maximum of one hour at any given occasion.</td>
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