

## **FORM-IA**

(Only for Construction projects listed under item 8 of the Schedule)

### **CHECKLIST OF ENVIRONMENTAL IMPACTS**

(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the form and submit along with proposed environmental management plan and monitoring plan).

#### **1. LAND ENVIRONMENT**

**(ATTACH PANORAMIC VIEW OF THE PROJECT SITE AND ITS VICINITY)**

1.1 Will the existing Landuse get significantly altered from the project that is not consistent with the surroundings? (Proposed Landuse must conform to the approved master plan/development plan of the area. Change of Landuse if any and the statutory approval from the competent authority are submitted). Attach maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

Project road lies in urban area & passes through green field area along the Hindon Canal up to 6.7 km, after that project road crosses GT Road, proposed metro line then after crossing Hindon River traverses through open fields & finally meets at master plan road of Rajnagar extension. Total 1.0298 ha (0.3850+0.6448 ha.) area of forest land involved in this project and total number of 1174 trees required to be remove

The alignment of Hindon Elevated Road follows the alignment of Master Plan Road from U.P. Gate via Hindon Canal (Hindon Cut Canal) and up to G.T. Road of length 8.30 km. as part of 45m Master Plan Road which is shown in Ghaziabad Master Plan 2021. It constitutes 8.30 km out of 10.30km in Elevated road.

**Site Location:** Project road starts at NH 24 near Hindon Canal (Hindon Cut Canal) with one interchange proposed at NH 24 for the traffic entering from Delhi to Raj Nagar Extension Area. The project site coordinates are presented in **Table 1** and the project layout is shown in **Figure 2**.

**Table 1: Latitude and Longitude of the Project Site**

<b>Point</b>	<b>Latitude</b>	<b>Longitude</b>
A	28°37'57.5" N	77°20'15.2" E
B	28°38'42.2" N	77°20'54.7" E
C	28°39'59.6" N	77°23'56.3" E
D	28°41'14.3" N	77°23'53.9" E

Source: Site visit by GCPL Team

The site is approachable and connected to NH-24 & NH-58. Connectivity to project site is shown in **figure 1**. The surrounding features of the project site are presented in **Table 2**.

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**ENVIRONMENT CONSULTANT** : **GREENCINDIA CONSULTING (P) LIMITED, GHAZIABAD, U.P.**



**Figure 1: Proposed Project Road on Google Map**

The Hindon Elevated Road will start from near border of U.P. and Delhi, NH-24 (bye-pass) and terminate at a Master Plan road connecting NH-58 with Loni at Zone-1 of Ghaziabad Master Plan- 2021 along Hindon River. The part of the road in Rajnagar extension area will be as surface road with controlled access. The project is a green field project. Project road starts at NH-24 near Hindon Canal (Hindon Cut Canal) with one interchange proposed at NH-24 for the traffic entering from Delhi to Raj Nagar Extension Area. Project road divided into two parts:

- **Elevated**- 10.30 km (NH 24 near Hindon Canal from Delhi to Raj Nagar Extension Area)
- **At Grade**- 7.00 km (NH 24 near Hindon Canal from Delhi to Railway Under Bridge at Hindon Barrage).

### **ELEVATED ROAD**

Proposed Hindon Elevated Road would be 6 lane elevated road of 10.30 km. up ramp & down ramp has been proposed at crossing with Mohannagar link road (Kanawani). Project road crosses railway line, GT road, proposed metro line & Hindon River. Elevated Road shown in **Figure 1**.

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**Table 0: Salient Features of Proposed Hindon Elevated Road**

Sl. No.	Description	Details/Remarks
1	Start Point of Project Road	NH -24 at Hindon Canal (Hindon Cut Canal)
2	End Point of Project Road	Northern Peripheral Road
3	Length	10.30Km Elevated road
4	Configuration	Single pier 6 Lane Elevated / Access Controlled
5	Land Use	Agriculture / Built-up/Green land
6	Interchange	Two (i) at NH 24 at Km 0+000 (ii) at Kanavani at Km 5+000

**Table 3: Salient Features of Proposed Hindon Elevated Road (Elevated Section)**

Sl. No.	Description	Details/Remarks
1	Start Point of Project Road	NH -24 at Hindon Canal (Hindon Cut Canal)
2	End Point of Project Road	at km 10.30
3	Length	10.30 Kms
4	Configuration	6 Lane Elevated
5	Land Use	Agriculture / Built-up/Green land
6	Interchange	Two (iii) at NH 24 at Km 0+000 (iv) at Kanavani at Km 5+000
7	Roundabouts	At km 10+300
8	Underpass	Nil
9	Major Crossings	(v) Railway Line crossing (At Km 7+600)

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Sl. No.	Description	Details/Remarks
		(vi) GT Road crossing (At Km 8+300) Where Hindon Elevated Road would ply above the METRO

Source: Detailed project Report, Hindon Elevated road, GDA

However, for present connectivity of Elevated road to NH-58 Meerut Road, present Rajnagar Ext. road connecting NH-58 near Hindon bridge right up to ALT Center Choraha on Merrut road, is under strengthening and widening to 6-Lane from present 4-Lane configuration. The tender were invited, afterwards the existing road characteristics were got checked from Central Road Research Institute, (CRRI) New Delhi, and now work has begun for widening to 6 lane and is nearing completion.

The alignment of Hindon Elevated Road follows the alignment of Master Plan Road from U.P. Gate via Hindon Canal (Hindon Cut Canal) and up to G.T. Road of length 8.30 km. as part of 45m Master Plan Road which is shown in Ghaziabad Master Plan 2021. It constitutes 8.30 km out of 10.30km in Elevated road.

## PROPOSED DESIGN & CROSS SECTIONS OF ELEVATED ROAD

### Horizontal Alignment

The horizontal alignment for construction of 6 lane roads has been established on base plans using the Highway Design Software, "Mx-Roads". This also included field checks to verify the feasibility of the proposed alignment and thereafter modify the alignment wherever considered essential to safeguard sensitive elements. The following **Table 4** summarizes the existing road features vis-à-vis the standards proposed for adoption. Layout of proposed road as **Figure 2**.

**Table 4: Proposed Design Standards**

Sl. No.	Details	Proposed Standards
1	Proposed ROW	25 m for Elevated Road and 60 m for grade road. (Additional land has been considered for loop, ramp, toll plaza etc.)
2	Design Speed (Km per hour)	100 Kmph (80 Kmph at km 7.6)
3	Road way Width (m)	2 x 12m for elevated road and 28.5m for at –grade road. Now under construction is 1 x 24.5m Single Pier 6-lane road.
4	Paved carriageway	2 x 11 m. for the 6-lane proposal for elevated road and 1 x 7.5 m for at grade part.
5	Earthen Shoulder (m)	1.0m each side for at-grad road
6	Utility Corridor width (m)	2.00m on both side (at- grade road)
7	<b>Camber (%)</b> • Bituminous Surface • Earthen Surface	2.5 3.0

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8	Super elevation (%)	7.0 (max.) 2.5 (min)
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Source: Detailed project Report, Hindon Elevated road, GDA

**Elevated Road**

i	Width of paved carriageway on both side of median	
	a 6- lane carriageway with each lane of 3.5 m width	21 m
	b Kerb Signage's on each side	0.5 m
ii	Width of Crash Barrier on each side	0.5 m
iii	Width of median	1.5 m
iv	Total formation Width	24.5 m

**Loops/ Ramps (at NH 24)**

i	Width of paved carriageway on loop/ramp	
	c 3- lane carriageway with each lane of 3.5 m width	10.5 m
	d Kerb Signages	0.5 m
ii	Width of Crash Barrier on each side	0.5 m
iii	Total formation Width	12.0 m

**Ramps (at Mohan Nagar Link Road Crossing at Kanavani)**

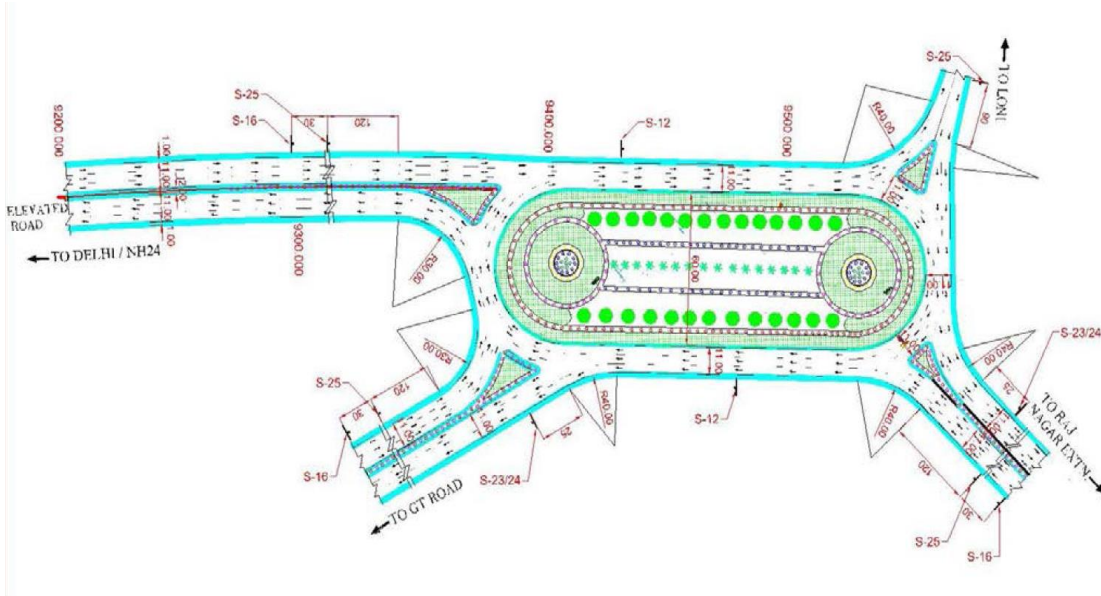
i	Width of paved carriageway on loop/ramp	
	e 2- lane carriageway with each lane of 3.5 m width	7.0 m
	f Kerb Signages	0.5 m
ii	Width of Crash Barrier on each side	0.5 m
iii	Total formation Width	8.5 m

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**Figure 2b: Interchange at Kanawani**



**Figure 2c: End Point of Project Road**

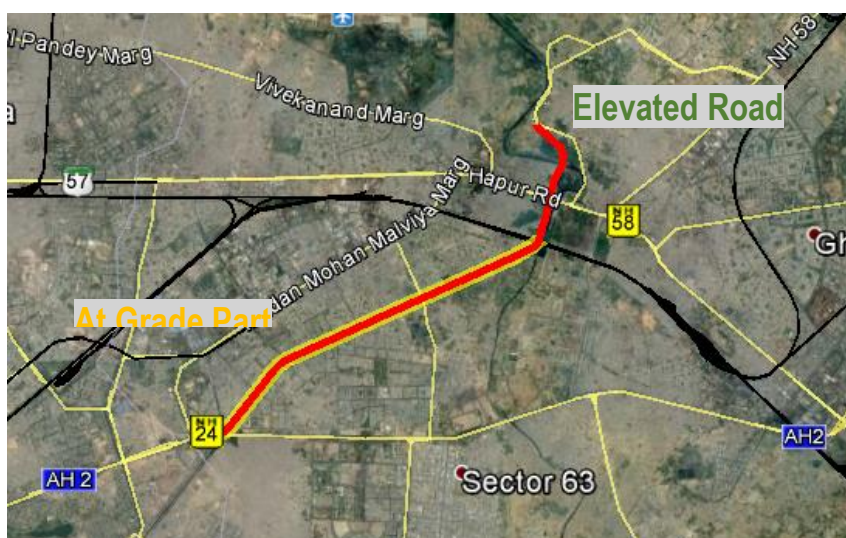


**Figure 2d: Typical Section of 6 Lane of Proposed Elevated Road**

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### AT GRADE ROAD

Proposed At Grade Road would be 2 lane road of 7.50 km developed by Irrigation Department of U.P. At Grade Road on Google map shown in **Figure 3**. At grade road will start from NH-24 U.P Gate and end at railway under bridge at Hindon Barrage. This road will be constructed under the elevated road alignment, A 2 lane road with length of 7.50 km & width of 7.5 m. One under pass at railway crossing and 5 bridge (2 new and 3 existing) will be proposed for the at grade road. Layout of At Grade Road shown in **Figure 2**.



**Figure 3: Proposed At grade Road on Google Map**

**Table 5: Surrounding Features of the Project Site (within 2 km)**

Sl. No.	Surrounding Features	Distance & Direction from the Project Site
1	NH 24	Linked with Southern Side of Proposed road
2	Hindon Air force Station	2.2 km West
3	Hindon River & Canal	Adjacent
4	Ghaziabad Town	3.0 km East
5	Yamuna River	7.2 km SSW
6	Anand Vihar Bus Terminal	2.8 km West
7	Okhla Bird Sanctuary	7.3 km SSW
8	Ghaziabad City Forest	Approx. 1.1 km NNW

Source: Satellite Imagery of Project Area, Google earth Inc, USA

**The Site (Indicative Level and Contour Map):** The project site is almost plain. Topography and average elevation of the site is 544 m to 549 m above Mean Sea Level.

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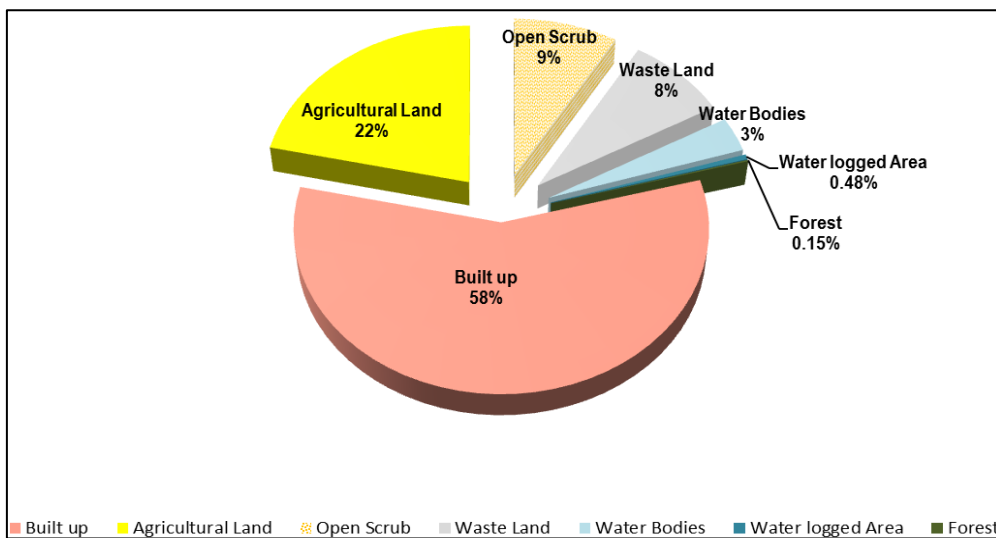
1.2 List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

- (i) **Existing & Proposed Land use:** The break-up of existing and proposed land use for the proposed project are given below in the **Table 6**.

**Table 6: Existing and Proposed land use of the Project**

Feature	Area (In Ha.)	Area (in %)
Built up	28926.06	57.63
Agricultural Land	10797.07	21.51
Open Scrub	4274.42	8.52
Waste Land	4199.42	8.37
Water Bodies	1680.83	3.35
Water logged Area	239.75	0.48
Forest	73.17	0.15
<b>Total</b>	<b>50190.73</b>	<b>100.00</b>

Source: (i) Satellite Imagery Interpretation (ii) Madhya Pradesh Police Housing Corporation Ltd



**Figure 3a: Land use Map of the Project Area**

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**(ii) Water Consumption**

**a) Construction Phase:** The water requirement has been assumed based on past project experiences and on the strict quality control basis. Domestic requirement of 86 liters per worker has been assumed (as per MoEF&CC). About 300 workers (maximum) have been considered for this project. Details of the water requirement assessed for the project is described below:

**Table 7: Requirement of Water for Proposed Construction Works**

Sl. No.	Purpose	m <sup>3</sup> /day
1	Dust Suppression at work zone	50
2	Curing	18
3	Laboratory	10
4	Haul roads	35
5	Crusher	20
6	Domestic purpose	27
<b>Total Requirement</b>		<b>160 m<sup>3</sup>/day</b>

This requirement of water will be spread over the project road length. It will be assured that no public water sources will be used for construction purpose.

For this Elevated road an amount of 50,000 liter treated water per day from the Indirapuram Sewage Treatment Plant has been allotted by Ghaziabad Development Authority to GDA. This water is not drinkable and it will be used only for construction purpose. Domestic water of 27 KLD will be met by Authorized private Tanker or private supply.

**(iii) Power Requirement:**

For the proposed project requirement of power will be supplied by Uttar Pradesh State Electricity Board to project during operation phase. Total power required for the proposed project during construction is estimated to be around 3 DG sets of 250 KVA capacities during construction and operation.

**Table 8: Power Requirement during Construction and Operation Phase**

Parameters	Construction & Operation Phase
Power requirement	<b>3x250 kVA</b>
Source	UP State Electricity Board
Back-up power supply	Back-up of 250 kVA will be provided by 3 DG sets

*Source: U.P Housing & Infrastructure Development Board*

In case of power failure, backup will be provided by DG sets. Power back-up will be provided by the (3 x 250 KVA). Stack height of 3.5 m will be provided as per CPCB guidelines. DG sets will be installed with acoustic enclosures. During operation phase, the provision of solar light on the road is proposed to decrease the power requirement.

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(iv) **Connectivity:** The site is approachable and connected to NH-24 & NH-58. The surrounding features of the project site are presented in **Table 9**.

**Table 9: Surrounding Features of the Project Site**

Sl. No.	Surrounding Features	Distance & Direction from the Project Site
1	NH 24	Linked with Southern Side of Proposed road
2	Hindon Air force Station	2.2 km West
3	Hindon River & Canal	Adjacent
4	Ghaziabad Town	3.0 km East
5	Yamuna River	7.2 km SSW
6	Anand Vihar Bus Terminal	2.8 km West
7	Okhla Bird Sanctuary	7.3 km SSW
8	Ghaziabad City Forest	Approx. 1.1 km NNW

Source: Satellite Imagery of Project Area, Topo-sheet of Survey of India (Gol).

**1.3. What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing land use, disturbance to the local ecology).**

No negative impact is anticipated of the proposed activity on the existing facilities adjacent to the proposed site. The project site is surrounded by agricultural and forest land. Hence, no significant impact on land use is expected due to construction of proposed elevated road project. The area is free from any eco-sensitive zone. The proposed project will enhance the ecological condition of the adjoining areas due to proposed development of extensive green belt within its premises.

**1.4 Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc. may be given).**

The proposed project will not involve significant change in land profile and disturbance in natural setting of the area. The project will not disturb the natural vegetation and will also facilitate in developing green area in the project site. The details of soil type and soil quality are given below:-

(i) **Soil Type:** The soil sample was collected from the project site. The soil is Sandy Clay Loam in nature. The soil samples contain sufficient organic carbon content (refer **Table 10**).

**Table 10: Physical Properties of Soil in the Proposed Project**

Sl. No.	Parameters	Unit	Near GDA Complex	Near Nangla
1	Soil colour	-	Yellow Brown	Light Brown
2	pH	-	6.98	7.22

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3	Electrical Conductivity	µmhos /cm	469.10	511.40
4	Moisture	%	12.40	8.10
5	Soil texture	-	Loam	Clay Loam
	Clay	%	21.00	35.00
	Silt	%	28.00	24.00
	Sand	%	51.00	41.00
6	Infiltration Rate	mm/hr	44.00	53.00
7	Bulk density	gm/cm <sup>3</sup>	1.56	1.47
8	Porosity	%	36.00	41.00
9	Nitrogen as N	mg/kg as N	105.00	134.00
10	Phosphorus	mg/kg as P	16.00	19.00
11	Potassium as K	mg/kg as K	214.0	249.00
12	Organic Carbon	%	0.51	0.59
13	Organic matter	%	0.88	1.02

Source: Data Collection and Testing, Greenc Laboratory Services, Ghaziabad

**Table 11: Standard Classification of Soil**

Sl. No.	Soil Test	Classification
1	pH	<4.5 Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.0 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Salinity electrical conductivity (µmhos/cm) (1 mmhos/cm = 640 ppm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
3	Organic carbon (%)	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient

Source: (i) Greenc Laboratory Services, Ghaziabad; (ii) Handbook of Agriculture, Indian Council of Agriculture Research, New Delhi

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From **Table 10**, the following conclusions can be made about physical and chemical characteristics of the samples.

- The pH of the soil samples was found to be neutral to slightly alkaline in nature.
- Moisture content of the soil samples were found in the range of 8.1% to 12.4% by mass
- The predominant texture of the soil was found to be loam.
- Organic carbon content of the soil samples was found to be in the range of 0.51% to 0.59% by mass, which indicates medium fertility status of the soil.
- The phosphorus content in the soil samples were found to be in less range.
- Potassium content in the soil samples were found medium to average and the nitrogen content was found in good condition in all the samples.

In general the soil of the study area is moderately fertile in presence of average irrigation facility

**(i) Slope Analysis:** The project site lies at an average elevation of 544 m to 549 above Mean Sea Level and has a flat topography.

**(ii) Seismicity:** The area falls under Seismic Zone IV which is Earthquake High Damage Risk Zones. All civil structures will be seismically resistant and designed as per proper IS codes. No threat of other natural disasters is anticipated.

**(iii) Flood Plain:** The proposed project site is flat and no natural drains are passing through the project site and therefore no incidence of flooding and water logging is envisaged by the proposed project.

**1.5. Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)**

The area represents almost a monotonous flat plain dissected by drainage of different order. Ghaziabad town is situated almost in the old flood plain of river Hindon. Morphologically, the area can be divided into 3 morpho units viz a viz (i) older Alluvial Plain (ii) Older Flood Plain and (iii) Active Flood Plain. The banks of rivers are steep and ravinous. The older alluvium occupies the entire upland and interfluvial area occurring between major drainage ways i.e. Yamuna and Hindon and Hindon and Ganga. No alteration of natural drainage system is envisaged.

**1.6. What are the quantities of earthwork involved in the construction activity cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc?)**

During Construction Phase excavation is envisaged for foundation in the proposed project. This excavated soil will be properly stacked within the site under tarpaulin cover which will be reused for filling in building and road construction. Hence no immediate adverse impacts on the land environment are envisaged.

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**1.7. Give details regarding water supply, waste handling etc. during the construction period.**

**Water Supply:** The water requirement has been assumed based on past project experiences and on the strict quality control basis. Domestic requirement of 86 liters per worker has been assumed (as per MoEF&CC). About 300 workers (maximum) have been considered for this project. Details of the water requirement assessed for the project is described below:

**Table 11: Requirement of Water for Proposed Construction Works**

Sl. No.	Purpose	m <sup>3</sup> /day
1	Dust Suppression at work zone	50
2	Curing	18
3	Laboratory	10
4	Haul roads	35
5	Crusher	20
6	Domestic purpose	27
<b>Total Requirement</b>		<b>160 m<sup>3</sup>/day</b>

This requirement of water will be spread over the project road length. It will be assured that no public water sources will be used for construction purpose.

For this Elevated road an amount of 50,000 liter treated water per day from the Indirapuram Sewage Treatment Plant has been allotted by Ghaziabad Development Authority to GDA. This water is not drinkable and it will be used only for construction purpose. Domestic water of 27 KLD will be met by Authorized private Tanker or private supply.

**Solid & Hazardous Waste:** Small Paved areas with spill collection pits will be constructed for the interception of oils and grease. Separate areas will be designated for fresh and used oils. The used oils will be sold to Authorized recyclers of CPCB/MoEF&CC.

**1.8. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)**

The proposed site is not the part of any low lying area or wetland. The project site is surrounded by the residential areas, educational institutes and barren land and no natural water bodies are impacted by the project directly or indirectly.

**1.9. Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labors and the means of disposal)**

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The construction debris & waste during construction will not cause any health hazard. Construction debris will be segregated and stored in storage bins provided at the site for each type of waste like steel scrap, shuttering wood, gypsum & sand and paint cans etc. These will be sent to approved recycling agents. The waste generated from the brick masonry, concrete etc. will be used for plinth filling and for sub-base of roads.

The mobile toilets will be provided for the laborers thereby avoiding any health hazard.

## **2. WATER ENVIRONMENT**

**2.1 Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.**

Please refer to **Clause no. 1.2 (ii)** of Form 1A for proposed project regarding details of water quantity & sources, wastewater generation and water balance statement.

**Water Storage:** There will be the facility for raw water storage tanks, Fire water tank & Treated water tanks. Water from supply will be initially collected in water storage tanks of required capacities and later will be transferred to overhead water tanks by using pumps.

**2.2 What is the capacity (dependable flow or yield) of the proposed source of water?**

The water requirement has been assumed based on past project experiences and on the strict quality control basis. Domestic requirement of 86 liters per worker has been assumed (as per MoEF&CC). About 300 workers (maximum) have been considered for this project. Details of the water requirement assessed for the project is described below:

**Table 11: Requirement of Water for Proposed Construction Works**

<b>Sl. No.</b>	<b>Purpose</b>	<b>m<sup>3</sup>/day</b>
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<b>Total Requirement</b>		<b>160 m<sup>3</sup>/day</b>

This requirement of water will be spread over the project road length. It will be assured that no public water sources will be used for construction purpose.

For this Elevated road an amount of 50,000 liter treated water per day from the Indrapuram Sewage Treatment Plant has been allotted by Ghaziabad Development Authority to GDA. This water is not drinkable and it will be

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used only for construction purpose. Domestic water of 27 KLD will be met by Authorized private Tanker or private supply.

**2.3 What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)**

The ground water and surface water were sampled from different locations (refer **Table 12**) and physical and chemical characteristics of water are presented in **Table 12** and **Table 13** respectively.

**Table 12: Water Sampling Locations**

Sl. No.	Code	Location	Distance (km)	Direction
1	GW1	Vaishali Sector-2	0.31	W
2	GW2	Adarsh Nagar	0.46	NE
3	SW1	Hindon River (Near NH 24)	0.48	S

Source: Sampling Location Selection by GCPL, NCR, Ghaziabad and Collection & Testing by Greenc Laboratory Services.

**Table 13: Ground Water Quality**

Sl. No.	Parameters	Unit	GW1 Vaishali Sec- 2	GW 2 Adarsh Nagar	IS 10500 :2012	
					Acceptable limits	Permissible limits
1	Color	Hazan	<5	<5	5	15
2	Turbidity	NTU	<1	<1	1	5
3	pH	--	7.23	7.59	6.5-8.5	No Relaxation
4	Conductivity	µS/cm	2214	1342	\$	\$
5	Total Dissolve Solids	mg/l	1345	814	500	2000
6	Alkalinity as CaCO <sub>3</sub>	mg/l	389.2	243.1	200	600
7	Total Hardness as CaCO <sub>3</sub>	mg/l	450.4	338.1	300	600
8	Calcium as Ca	mg/l	124.1	97.4	75	200
9	Magnesium as Mg	mg/l	34.2	23.1	30	100
10	Sodium	mg/l	162	67	\$	\$
11	Potassium	mg/l	43	12	\$	\$
12	Bicarbonate	mg/l	389.2	243.1	\$	\$
13	Chloride as Cl	mg/l	224.1	164.2	250	1000
14	Sulphate as SO <sub>4</sub>	mg/l	186.4	64.2	200	400
15	Nitrate as NO <sub>3</sub>	mg/l	12.1	6.2	45	No Relaxation
16	Fluoride as F	mg/l	0.59	0.71	1.00	1.5
17	Phenolic compound as C <sub>6</sub> H <sub>5</sub> OH	mg/l	BDL	BDL	0.001	0.002
18	Cyanide	mg/l	BDL	BDL	0.05	No Relaxation
19	Aluminum	mg/l	BDL	BDL	0.03	0.2

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Sl. No.	Parameters	Unit	GW1 Vaishali Sec- 2	GW 2 Adarsh Nagar	IS 10500 :2012	
					Acceptable limits	Permissible limits
20	Arsenic	mg/l	BDL	BDL	0.01	0.05
21	Cadmium	mg/l	BDL	BDL	0.003	No Relaxation
22	Chromium as Cr <sup>+6</sup>	mg/l	BDL	BDL	0.05	No Relaxation
23	Iron	mg/l	0.19	0.11	0.3	No Relaxation
24	Copper	mg/l	BDL	BDL	0.05	1.5
25	Lead	mg/l	BDL	BDL	0.01	No Relaxation
26	Manganese	mg/l	BDL	BDL	0.1	0.3
27	Mercury	mg/l	BDL	BDL	0.001	No Relaxation
28	Zinc	mg/l	1.59	1.04	5	15

\$- Not Specified

Source: Sampling Location Selection by GCPL, NCR, Ghaziabad and Collection & Testing by Greenc Laboratory Services.

**Interpretation:**

- **pH:** All the samples of ground water analyzed meet the desirable pH limit of 6.5 -8.5 as per IS 10500:2012. The pH values were found to be ranging from 7.23 (Vaishali Sec- 2) to 7.59 (Adarsh Nagar).
- **Turbidity:** All the samples of ground water meet the acceptable and permissible limit.
- **Alkalinity:** Alkalinity in the ground water samples ranges from 243.2 mg/l (Adarsh Nagar) to 389.2 mg/L (Vaishali Sec- 2) which is within the permissible limit if alternate source is not available.
- **Total Dissolved Solids:** Minimum TDS value of 814 mg/L (Rajat Nagar) and maximum value of 1345 mg/l (Project Site) was encountered. Values are found within the permissible limit if alternate source is not available as per IS 10500:2012.
- **Chlorides:** The chloride value of all the samples confirmed the desirable limit of 250 mg/l.
- **Sulphate:** Sulphate content in the ground water the desirable limit of 200 mg/l.
- **Fluoride:** Fluoride content ranges from 0.59 mg/l (Vaishali Sec- 2) to 0.71 mg/l (Adarsh Nagar).
- **Zinc:** Zinc content in the ground water samples were found to be within the desirable limit (i.e. 5 mg/l).
- **Iron:** Iron content in all three sampling locations was found to be within the desired permissible limit of 0.3 mg/l.
- **Other Parameters:** Other parameters like heavy metals were found below detection level.

**Table 14: Surface Water Quality**

Sl. No.	Parameters	Unit	SW1 Hindon River (Near NH 24)	Water Quality Criteria as per CPCB
1	Odour	-	Pungent	\$
2	Colour	Hazen	15	\$
3	Turbidity	NTU	128	\$
4	pH	--	7.38	Class A

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PRADESH.**

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Chapter 9

Sl. No.	Parameters	Unit	SW1 Hindon River (Near NH 24)	Water Quality Criteria as per CPCB
5	Conductivity	µS/cm	1680	\$
6	Total Dissolve Solids	mg/l	1094	\$
7	Alkalinity as CaCO <sub>3</sub>	mg/l	271.5	\$
8	Total Hardness as CaCO <sub>3</sub>	mg/l	468.3	\$
9	Calcium as Ca	mg/l	124.2	\$
10	Magnesium as Mg	mg/l	38.5	\$
11	Sodium	mg/l	84	\$
12	Potassium	mg/l	19	\$
13	Bicarbonate	mg/l	271.5	\$
14	Chloride as Cl	mg/l	205.3	\$
15	Sulphate as SO <sub>4</sub>	mg/l	168.4	\$
16	Nitrate as NO <sub>3</sub>	mg/l	10.3	\$
17	Flouride as F	mg/l	1.29	\$
18	Phenolic compound as C <sub>6</sub> H <sub>5</sub> OH	mg/l	BDL	\$
19	Cyanide	mg/l	BDL	\$
20	Aluminium	mg/l	BDL	\$
21	Arsenic	mg/l	BDL	\$
22	Cadmium	mg/l	BDL	\$
23	Chromium as Cr <sup>+6</sup>	mg/l	BDL	\$
24	Iron	mg/l	1.97	\$
25	Copper	mg/l	BDL	\$
26	Lead	mg/l	BDL	\$
27	Manganese	mg/l	BDL	\$
28	Mercury	mg/l	BDL	\$
29	Zinc	mg/l	0.87	\$
30	Dissolve Oxygen	mg/l	1.9	Not Meeting Any Class
31	COD	mg/l	106.3	\$
32	BOD, 27°C 3 days	mg/l	32.9	Not Meeting Any Class
33	Total Coliforms	MPN/100ml	175815	Not Meeting Any Class

Source: Sampling Location Selection by GCPL, NCR, Ghaziabad and Collection & Testing by Greenc Laboratory Services.

**Interpretation:**

The surface water quality was very poor because of domestic sewage discharge into the river.

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**2.4 How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)**

For this Elevated road an amount of 50,000 liter treated water per day from the Indirapuram Sewage Treatment Plant has been allotted by Ghaziabad Development Authority to GDA. This is a new project. The proposed project will increase of surface run-off due to more paved road surface. It will have adverse impact on ground water recharging if measures are not taken during the design. Therefore, compensation is required to recharge ground water.

**2.5 Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)**

No, there is no diversion of water from other users.

**2.6 What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of quantities and composition of wastewater generated from the proposed activity)**

**2.8 What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?**

At present the site is agricultural and forest land. Due to the construction of building and road paved area will increase thereby the run off will increase quantitatively but no qualitative change is expected. No flooding & water logging is expected due to the proposed project.

**2.9 What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any.**

During construction and operation phase, ground water will be abstracted for various usages. Depth of ground water at site varies from 1.70 to 24.60 mbgl during pre-monsoon and 2.20 to 23.37 mbgl during post monsoon.

Hydro geological data indicates that the area is underlain by deposits of high porosity and permeability, with excellent recharge capacity. The approval from competent authority will be taken if need be.

**2.10 What precautions / measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)**

During the construction phase, surface & ground water quality may get affected due to soil erosion from excavated area during rains leading to generation of wastewater. Construction site run-off (wastewater) would be routed through catch pit/ sedimentation basin prior to final / ultimate disposal.

The impact on land and ground water quality will be minimized by adopting following measures:

- Excavation during dry season only and proper management of excavated soils
- Regular inspection and cleaning of storm drains

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- Covering of waste storage areas
- Avoid application of pesticides and herbicides before wet season
- Secondary containment and dykes in fuel/oil storage facilities
- Conducting routine inspections to ensure cleanliness
- Preparation of spill response plans, particularly for fuel and oil storage
- Provision of silt traps in storm water drains

**2.11 How is the storm water from within the site managed? (State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)**

The project site level is plain. Adequate storm water channel will be provided at the site to provide proper drainage facilities and to avoid flooding at the site and in area. A storm drainage system will be laid. The storm drains will collect, convey and dispose to natural drainage system.

**2.12 Will the deployment of construction laborers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)**

No, the deployment of construction laborers will not lead to any unsanitary conditions as all the necessary precautions will be taken including provision of mobile toilet. The facilities to be provided at the labour camp include the following:

- During construction phase, mobile toilet will be provided. Hence there is no possibility of unsanitary conditions around the project site
- Regular segregation and disposal of solid waste generated by these workers as per local practices
- Proper housekeeping will be maintained throughout the premises
- First aid and medical facilities will be provided to all the concerned people working on the site.

**2.13 What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)**

**2.14 Give details of dual plumbing system if treated wastewater is used for flushing of toilets or any other use**

Dual Plumbing will be provided for flushing of toilets, landscaping and miscellaneous activities.

### **3. VEGETATION**

**3.1 Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with its unique features, if any)**

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No, threat on bio-diversity is envisaged due to proposed project. No major forest land exists in its vicinity and no ecologically important habitats were observed in the study area (Nearest RF are City Forest at Ghaziabad about 1.1 km in Northern direction from the project site) of the project.

**3.2 Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)**

Total 1.0298 ha (0.3850+0.6448 ha.) area of forest land involved in this project and total number of 1174 trees required to be removed.

**3.3 What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale?)**

Other impacts on flora can be placed under Minor Impact category as these can be effectively reduced with mitigation measures. The felling of 22 trees and as a compensation transplantation 44 trees was permitted by the Social Forestry Department Ghaziabad vide letter dated on 06.02.2016. An amount of Rupees 2, 96,192/- was deposited for the same. Permission from Social Forestry Department Ghaziabad has also been granted to the Ghaziabad Development authority for the cutting of another 18 trees and transplantation of 148. The amount of Rupees 14, 50,176/- has already been deposited into the concerned authority to fulfill the purpose of transplantation of 148 trees and maintenance for next 3 years. The permissions from the Ministry of Environment, Forest & climate change as well as from the Chief Forest Conservator, Government of Uttar Pradesh have been granted. According to this permission total number of 335 trees in the vicinity of the road will be cut down on the proposed land (0.6448 ha). For the compensation trees will be planted on another forested land of the area approximately twice ( $0.6448 \times 2 = 1.2896$ ha.) that of affected lan.

No significant faunal species were recorded in the area apart from monkeys, squirrels, chameleon, snakes, rats and domestic animals like buffaloes, cows, dogs, goats, pigs and donkeys etc.

### **CROPPING PATTERN**

In the study area Wheat is the dominant crop followed by Toria, Sugarcane, Pulses and Mustard in Rabi season. In Kharif season Rice, Pulses and Soybeans are the major crops in irrigated land area while bajra, Jowar is the only crop in un-irrigated land.

**4.1 Is there likely to be any displacement of fauna both terrestrial and aquatic or creation of barriers for their movement? Provide the details.**

The proposed site is earmarked for infrastructural development. The site is free from any major vegetation. The site is surrounded by residential areas, educational institutes and barren land. Due to high interaction of the people

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in the area, site is free from any major fauna. Therefore, no displacement of fauna and their movement is envisaged by the proposed project.

**4.2 Any direct or indirect impacts on the avifauna of the area? Provide details.**

Since the activities involved in a construction project are mainly confined to the project site, therefore the project is not expected to cause any direct impact on avifauna of the area. Moreover, the solid waste generated from the project during construction and operation phase will be properly segregated and disposed/treated as per prescribed norms. Hence the project will not cause any indirect impact on avifauna of nearby area.

**4.3 Prescribe measures such as corridors, fish ladders etc. to mitigate adverse impacts on fauna.**

No interface with the fisheries activity and/or fauna is envisaged. Hence, no mitigation is required.

## 5. AIR ENVIRONMENT

**5.1 Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)**

Three monitoring locations have been selected on the basis of predominant wind direction. All probable directions, which may be affected due to the proposed project, have been considered. Also the effort was made to collect the baseline conditions of all the project affecting villages.

The monitoring stations have been setup in order to locate the locations as close as feasible to the anticipated maximum pollutant concentration areas. Logistic considerations such as accessibility, security, and availability of reliable power supply etc. were also examined while finalizing the stations. The monitoring locations are depicted

Table 15 and shown in Figure 16

**Table 15: Ambient Air Quality Monitoring Locations**

Sl. No.	Code	Location	Dist. from the project site (km)	Direction	Approx. height of instrument from ground level (m)
1	AAQ1	Vaishali Sector-2	0.31	W	3.3
2	AAQ2	Adarsh Nagar	0.48	E	3.0
3	AAQ3	Nangla Village	0.48	W	3.5

Source: Sample collection and testing done by M/s Eko Pro Engineers Pvt. Ltd. Ghaziabad. March-May, 2016

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### 3.1.1 AMBIENT AIR QUALITY

Table 14 shows the consolidated values of AAQ (98th percentile) recorded in the monitoring stations and it is observed from table that:

- PM<sub>10</sub> (98th percentile) was in the range of 168.0 µg/m<sup>3</sup> (Nangla Village) to 200.7 µg/m<sup>3</sup> (Vaishali Sector-2). Whereas the concentration of PM<sub>2.5</sub> was found to be in the range of 66.1 µg/m<sup>3</sup> (Nangla Village) to 91.0 µg/m<sup>3</sup> (Vaishali Sector-2). The PM<sub>10</sub>& PM<sub>2.5</sub> value found above the prescribed limits of NAAQS are due to the high vehicular movement and agricultural activity.
- The level of SO<sub>2</sub> varied between 14.2 µg/m<sup>3</sup> at Nangla Village and 15.8 µg/m<sup>3</sup> at Vaishali Sector-2. The level was found to be well within the prescribed limits of NAAQS at all receptors.
- Levels of NO<sub>2</sub> (98th percentile) varied between 26.4µg/m<sup>3</sup> at Nangla Village and 35.8 µg/m<sup>3</sup> at Vaishali Sector-2 which is also within the prescribed limit of NAAQ standard.
- The other parameters like carbon monoxide is found below 1.51 mg/m<sup>3</sup> which is also within the prescribed limit of NAAQ standard.

**Table 17: Consolidated Values of AAQ (98th percentile)**

Sl. No.	Code	Location	(µg/m <sup>3</sup> )				(mg/m <sup>3</sup> )
			PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO
1	AAQ1	Vaishali Sector-2	200.7	91.0	15.8	35.8	1.51
2	AAQ2	Adarsh Nagar	181.1	73.9	15.1	31.8	1.51
3	AAQ3	Nangla Village	168.0	66.1	14.2	26.4	1.41
<b>Standard concentration (in µg/mg<sup>3</sup>) 24 hrs**</b>							
Industrial, Residential, Rural & other Areas			100	60	80	80	02**
Sensitive areas			100	60	80	80	02**

Source: Sample collection and testing done by Greencindia Pvt. Ltd. Ghaziabad. March-May, 2016

\* Annual Arithmetic Means of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals, \*\* 24 hourly or 8 hourly or 1 hourly monitored values, as applicable shall be complied with 98% of the time in a year. 2% of the time they may exceed the limits but not on two consecutive days of monitoring, \*\*\* For CO 8 hourly standard is being considered **Pollution Load from DG Set**

During the construction phase, dust emissions in unpopulated areas will be emitted and deposited on the leaves of trees and other vegetation which may affect the growth of the trees and other vegetation. Certain amount of dust and gaseous emissions will generate during the construction phase from excavation machine and road construction machines. Pollutants of primary concern include particulate matters i.e. PM<sub>10</sub> and PM<sub>2.5</sub>. However, suspended dust particles mater may be coarse and will be settled within a short distance of construction area. Therefore, impact will be temporary and restricted within the closed vicinity of the construction activities only.

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Gaseous emissions include carbon monoxide (CO), unburned hydrocarbons, sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>2</sub>), volatile organic compounds (VOCs) etc. from the DG set/ vehicles involved in transportation of materials during road construction.

#### Generation of dust and particulates

- Site clearance and use of heavy vehicles and machinery etc.
- Transport of raw materials, borrow and quarry material to construction sites;
- Earthworks;
- Handling and storage of aggregates at the asphalt plants;
- Concrete batching plants and;
- Asphalt mixing plants due to mixing of aggregates with bitumen.

Generation of dust is a critical issue and is likely to have adverse impact on health of workers in project area, borrow areas and stone crushing units. This is a direct adverse impact, which will last almost throughout the construction stage along the project road.

#### Generation of Exhaust Gases

Generation of exhaust gases is likely due to movement of heavy machinery for clearance of the PROW for construction. Toxic gases are released through the heating process during bitumen production. Although the impact will be much localized, it can spread downwind direction depending upon the wind speeds.

The health effects of inhaling particulate matter have been widely studied in humans and animals and include asthma; lung cancer, cardiovascular issues, and premature death are given in **Table 18**.

**Table 18: Emission and their Impacts (Prediction of Impact on Ambient Air Quality)**

Emission	Impact	
	Human	Vegetation
Hydrocarbons	Prolonged exposure to hydrocarbons contributes to asthma, liver disease, lung disease, and cancer. Inhaling formaldehyde can cause irritation. It is a major contributor to eye and respiratory irritation which is caused by photochemical smog.	Ethylene causes injury to the leaves of sensitive plants. Effects are epinasty, chlorosis, curling, and abscission and growth retardation.
CO	Reduces the ability of hemoglobin to carry oxygen to the body tissues.	Nil
NO <sub>2</sub>	Nitrogen dioxide damages the cell membranes in the lung tissues and	Nitrogen dioxide causes growth retardation.

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Emission	Impact	
	Human	Vegetation
	constriction of the lung passages. Edema or a filling of the intercellular spaces with fluid. Eye and nasal irritation and pulmonary discomfort are also common.	
CO <sub>2</sub>	Asphyxiation, caused by the release of carbon dioxide in a confined or unventilated area. Kidney damage or coma.	Elevated atmospheric carbon dioxide and reduces plant growth.
Ozone	Ozone causes an irritant action in the respiratory tract, cough chest pain, eye irritation, headaches and asthma attacks. Chronic effects include losses in immune system functions, accelerated aging and increased susceptibility to other infections.	Ozone concentrations cause flecks on the upper surfaces, premature aging and suppressed growth, leaf bleaching, necrosis.
SO <sub>2</sub>	The health problems related to the mucous membrane and respiratory tract are due to sulfate aerosols. Chronic effects of SO <sub>2</sub> include increased probabilities of bronchitis, "colds" of long duration and suppression of immune system.	SO <sub>x</sub> produce injury on leaves and plants which is characterized by the killing of marginal or intervention areas of the leaf.
Fugitive Dust	Irritation to the eyes, nose and throat. Respiratory distress, including coughing, difficulty in breathing and chest tightness. Increased severity of bronchitis, asthma and emphysema.	Reduced photosynthesis due to reduced light penetration through the leaves. This can cause reduced growth rates and plant vigor. Increased incidence of plant pests and diseases.

**5.2 What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.**

**Impacts during Construction Phase**

**Emissions**

During the construction phase, dust emissions in unpopulated areas will be emitted and deposited on the leaves of trees and other vegetation which may affect the growth of the trees and other vegetation. Certain amount of dust and gaseous emissions will generate during the construction phase from excavation machine and road construction machines. Pollutants of primary concern include particulate matters i.e. PM<sub>10</sub> and PM<sub>2.5</sub>. However, suspended dust particles mater may be coarse and will be settled within a short distance of construction area. Therefore, impact will be temporary and restricted within the closed vicinity of the construction activities only.

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- Site clearance and use of heavy vehicles and machinery etc.
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- Earthworks;
- Handling and storage of aggregates at the asphalt plants;
- Concrete batching plants and;
- Asphalt mixing plants due to mixing of aggregates with bitumen.

Generation of dust is a critical issue and is likely to have adverse impact on health of workers in project area, borrow areas and stone crushing units. This is a direct adverse impact, which will last almost throughout the construction stage along the project road.

#### Generation of Exhaust Gases

Generation of exhaust gases is likely due to movement of heavy machinery for clearance of the PROW for construction. Toxic gases are released through the heating process during bitumen production. Although the impact will be much localized, it can spread downwind direction depending upon the wind speeds.

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Emission	Impact	
	Human	Vegetation
Hydrocarbons	Prolonged exposure to hydrocarbons contributes to asthma, liver disease, lung disease, and cancer. Inhaling formaldehyde can cause irritation. It is a major contributor to eye and respiratory irritation which is caused by photochemical smog.	Ethylene causes injury to the leaves of sensitive plants. Effects are epinasty, chlorosis, curling, and abscission and growth retardation.
CO	Reduces the ability of hemoglobin to carry oxygen to the body tissues.	Nil
NO <sub>2</sub>	Nitrogen dioxide damages the cell membranes in the lung tissues and	Nitrogen dioxide causes growth retardation.

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Emission	Impact	
	Human	Vegetation
	constriction of the lung passages. Edema or a filling of the intercellular spaces with fluid. Eye and nasal irritation and pulmonary discomfort are also common.	
CO <sub>2</sub>	Asphyxiation, caused by the release of carbon dioxide in a confined or unventilated area. Kidney damage or coma.	Elevated atmospheric carbon dioxide and reduces plant growth.
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**5.3 Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site.**

As this is an elevated road project, so no parking facilities will be available

**5.4 Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.**

Ghaziabad Development Authority (GDA) had appointed IUT (Institute of Urban Transport) to conduct Traffic Impact Assessment Study.

The OD data analysis showed that around 22% of the traffic plying on the roads in Ghaziabad is Internal or intra-city traffic, of the remaining 78% of the traffic, 53% either starts or ends in the city. A good 25% traffic is by-passable traffic which amounts to a total of 3,33,197 PCUs in a day. This huge number in itself justifies the need for building the proposed corridor.

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If the proposed corridor is built as it is in the base year scenario, most of its sections would exceed their capacity during the peak hour.

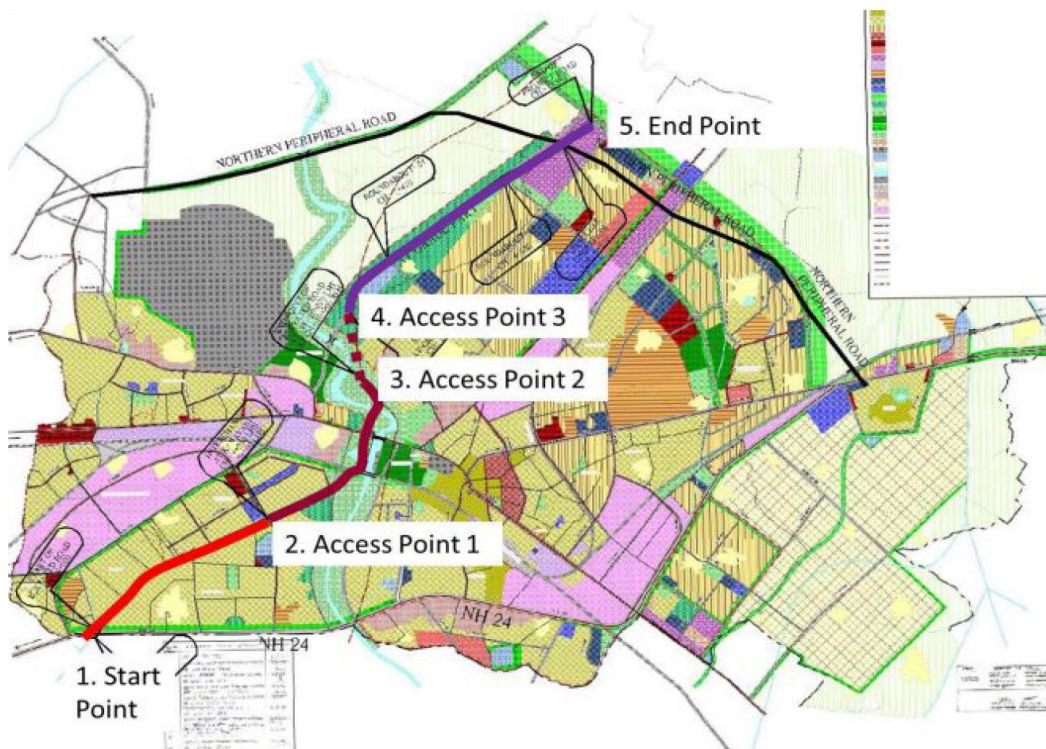
The analysis shows that almost 5800 vehicles will shift to the proposed corridor during the peak hour. Limiting the number of access point would limit the internal traffic to get diverted on to the proposed corridor.

Because of the very high percentage of the by-passable traffic, the corridor under consideration will exceed its capacity even in the base year during the peak hours.

Due to increased capacity of the road, high amount of traffic, 7600 vehicles, is projected to be diverted on to the proposed corridor leading to a very high V/C ratio on the corridor in the base year itself.

In this scenario it was seen that around 5000 vehicles got diverted to the proposed corridor and the V/C ratio came out to be 1. This shows that there is an immediate requirement of the corridor bypassing the Ghaziabad city.

Following points have been considered in IUT report as shown in map.



**Figure 2.11: Proposed Access Points of Elevated Road**

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In the existing network it could be seen that the NH-24 and the Hapur Road around the Meerut Chowk are the ones with maximum amount of congestion with V/C ratio above 1.5.

Consultant has proposed 6 lanes elevated road with 2 interchanges, this proposal is same as analyzed in scenario 2 of Traffic Impact Assessment Study done by Institute of Urban Transport (IUT). In this scenario, it has been assumed that proposed corridor exists with three access point. However, proposed elevated road ends at point no 3 (i.e. Access Point No. 2).

The traffic assignment on the base year network plus the proposed corridor showed that almost 4,000 – 8,000 vehicles will ply on the proposed corridor in the peak hour on different stretches of the corridor. This traffic includes the diverted traffic, as well as the generated traffic because of the corridor.

If the proposed corridor is built as it is in the base year scenario, most of its sections would exceed their capacity during the peak hour.

**Table 20: Traffic on various section of Proposed Corridor**

Location of Proposed Corridor	Total Traffic Diverted (Peak hour)	
	Total Traffic	Total PCU
Point 1 to Point 2	5133	6254
Point 2 to Point 1	3973	5195
Point 2 to Point 3	4462	5729
Point 3 to Point 2	3688	4841

Source: IUT Report

**Table 21: Comparison of Scenario**

Scenario	TVC*(PHPDT)			TVC (PCU)*			V/C Ratio*		
	Proposed Corridor	NH-24	Hapur Road	Proposed Corridor	NH-24	Hapur Road	Proposed Corridor	NH-24	Hapur Road
Scenario 1	-	12,708	11,219	-	10,948	9,313	-	2.6	2.25
Scenario 2	6,254	11,416	9,152	5,133	9,840	8,229	1.68	2.34	1.86
Scenario 3	7,946	10,891	9,268	7,332	9,185	7,708	2.17	2.22	1.89
Scenario 4	5,756	11,444	9,144	4,953	9,836	8,261	1.58	2.34	1.87
Scenario 5	4,590	11,363	9,835	3,745	9,811	8,817	1.24	2.33	2.00

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Chapter 9

Scenario 6	7,626	11,146	8,771	6,681	9,497	7,821	1.38	2.27	1.77
Scenario 7	5,016	11,150	9,773	4,000	9,670	8,689	1.00	2.29	1.99

\*Section having the maximum value has been tabulated

Source: IUT Report

**Table 22: Comparison of Horizon Year Scenario**

Scenario	TVC*(PHPDT)			TVC (PCU)*			V/C Ratio*		
	Proposed Corridor	NH-24	Hapur Road	Proposed Corridor	NH-24	Hapur Road	Proposed Corridor	NH-24	Hapur Road
Scenario 1 2024	7,148	13,572	11,148	8,072	16,307	13,438	2.24	2.8	3.4
Scenario 2 2024	6,824	13,494	11,536	8,136	15,613	13,925	1.69	3.25	3.66
Scenario 1 2034	12,472	22,992	15,500	12,734	27,036	22,421	3.54	5.6	4.16
Scenario 2 2034	11,893	21,554	18,018	14,243	25,653	22,890	2.97	5.34	4.77
Scenario 1 2044	20,204	36,256	26,541	21,256	44,711	37,950	5.9	9.3	7.9
Scenario 1 2044	21,443	33,845	29,062	25,499	41,783	38,412	5.31	8.7	8.0

Source: IUT Report

Traffic Impact Assessment Study done by Institute of Urban Transport (IUT) shows that there is an immediate requirement of Project facility of more than 6 lanes. However, 6 lane elevated road has been proposed along the project corridor considering the technical & financial constraints.

**5.5 Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.**

**Impacts during Construction Phase**

**Operation of Heavy Machineries:** Movement of heavy vehicles, stone crushing and aggregate mixing activities generates high noise and would increase the ambient noise level in the surrounding. The behavior of truck drivers also plays a role in increasing the noise level by the injudicious frequent use of blow horns. Especially in the settlement area this can pose a problem. Workers working near the noise generating equipments and plants are likely to be exposed to high noise level. The acceptable limits (for 8 hour duration) of the equivalent noise level exposure during one shift is 90 dB(A). Hence, noise generated due to various activities in the construction camps may affect health of the workers if they are continuously exposed to high noise level. For reasons of occupational safety, exposure to impulses or impact noise should not exceed 140 dB(A) (peak acoustic pressure).

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**Mitigation Measures**

- All noise generating equipment's installed sufficiently away from settlement areas.
- The main stationary noise producing sources such as generator sets provided with an acoustic shield around them. These done by brick masonry structure or any other physical barrier which is effective in adequate attenuation of noise levels.
- The plants and equipment used for construction -strictly conform to CPCB standards.
- Vehicles and equipment's used fitted with silencer and maintained accordingly.
- Noise are monitored as per monitoring plan and if the noise level at any time is found to be higher, then immediate measure to reduce noise in that area will be ensured.
- Noise standards of industrial area/zone will be strictly enforced to protect construction workers from severe noise impacts. All the workers working very close to the noise generating machinery having earplugs to avoid any ill impacts on their health.

**Impacts during Operation Phase**

The noise level will increase due to increase in traffic intensity.

All the above impacts can be placed under Minor Impact category (Category C) as these are undesirable but can be effectively reduced with mitigation measures. Noise reflectors shall be provided in stretches passing through residential localities.

**5.6 What will be the impact of DG sets & other equipment on noise levels & vibration & ambient air quality around the project site? Provide details.**

It could be concluded from the **Table 23** that the noise levels recorded at various stations are below the prescribed limit. It is observed that the noise levels (Leq) ranges from 60.1 dB (NH-24 near Vaishali) to 55.9dB (Near GDA Complex) in daytime and 40.3 dB (NH-24 near Vaishali) to 36.8 dB(Near GDA Complex) at night time. **Table 23** gives the details of ambient noise levels in the study area.

**Table 23: Ambient Noise Quality**

Code	Location	Noise level in dB (A)	
		Leq (6 AM to 10 PM)	Leq (10 PM to 6 AM)
N1	T Point near Shamsher	58.4	40.2
N2	Near GDA Complex	55.9	36.8
N3	NH-24 near Vaishali	60.1	40.3

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Code	Location	Noise level in dB (A)			
		Leq (6 AM to 10 PM)		Leq (10 PM to 6 AM)	
Ambient Noise Standard in dB(A) Leq		A. Industrial Area	B. Commercial Area	C. Residential Area	D. Silence Zone
Day time(6 AM to 10 PM)		75	65	55	50
Night time(10 PM to 6 AM)		70	55	45	40

Source: Sample collection and testing done by M/s Eko Pro Engineers Pvt. Ltd. Ghaziabad. March-May, 2016

**Table 242: Vehicle Emission Statement**

Area Code	Category of Area	Noise Levels (dB (A) Leq (Limits)	
		Day time	Night time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Source: (i) Testing by Greenc Laboratory Services, Ghaziabad; (ii) Ambient Noise Standards of Central Pollution Control Board, New Delhi

The expected noise levels due to construction equipment during construction phase are given in **Table 22**.

**Table 25: Noise levels generated from major construction equipment**

Name of the Source	Noise level at 1m from source [dB(A)]
Concrete Mixer	75
Concrete Vibrators	75
Generator	85-90
Hammering	110

Source: Noise standards for construction equipment's have been notified in Part 'E', Schedule-VI of Environment (Protection) Rules, 1986

The construction site will be encapsulated from all sides. The noise produced during construction phase will have temporary impacts on the existing ambient noise levels at project site only during daytime. Therefore, the impact of noise levels on surrounding area will be insignificant during the construction phase.

During construction & operation phase, emissions from the DG sets may cause localized impact ambient air quality for short duration. It may be noted that the DG sets will be operated only in case of grid power failure. However, acoustic enclosures will be fitted with the DG sets to control the noise levels. Adequate height of stacks (51 m) will be provided to the DG sets as per guidelines of CPCB to facilitate the dispersion of flue gases in the atmosphere. As such, these activities will have insignificant impact on noise level and vibration in the neighborhood.

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## **6. AESTHETICS**

**6.1 Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?**

This is an elevated road construction project, so no high-rise buildings will be constructed. That's is why there is no case of obstruction of a view, scenic amenity or landscapes.

**6.2 Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?**

This is an elevated road construction project so there is no adverse effect on new constructions on the existing structure.

**6.3 Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.**

All the items to be used in the proposed project will be as per the national building code specification. If the building materials with high-embodied energy are locally available, it will be used in construction.

**6.4 Are there any anthropological or archaeological sites or artifacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.**

Some archeological monument of Delhi found in 15 km radius from the elevated road, like Humayun Tumb, Siri Fort, Old Fort, National Zoological Park etc

## **7. SOCIO-ECONOMIC ASPECTS**

**7.1 Will the proposal result in any changes to the demographic structure of local population? Provide the details.**

(i) **Construction phase:** There will be temporary influx of workers during construction phase. The workers will be hired from the surrounding areas.

(ii) **Operation Phase:** The proposed project will have about 300 workers and development of amenities for the project will also provide direct and indirect employment to the local people from the surrounding areas.

**7.2 Give details of the existing social infrastructure around the Proposed Project**

Socio-economic studies are one of the important aspects of Environmental studies. The socio-economic parameters viz. population growth, density, sex ratio, health, work force participation, occupational structure, literacy etc, play an important role in determining the impact of the proposed activity on the human population of the study area, directly or indirectly.

With 32,90,586 population and 1148 sq. km. area, the district constituted 1.98 per cent population but only 0.48 per cent area of Uttar Pradesh (U.P.) of the total population 1,769,042 are males while remaining i.e. 1,521,544 are females. Hence the sex-ratio (females per 1000 males) of the district is 860. A gap of 10.40 percentage points

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exists between rural-urban populations in the district. There are 1,474,171 (44.80%) persons living in rural areas and 1,816,415 (55.20%) are urban dwellers. There is heavy pressure of population on the district as evident from the above table. The district in comparison of the state has more demographic density as well as annual growth rate. Urbanization in the district is quite high as it has nearly three times more urban population than state average. This is certainly due to rapid industrialization in the district in the last two decades. It is a matter of high concern that the district, which has experienced rapid industrialization and urbanization, lags behind state average by 38 points in sex-ratio. Hindus and Muslims, constitute about 99 per cent population of both the district. Sex-ratio of six religious communities is not uniform. It is varied both in the district and the state (Source: Census of India 2001, Report on Religion Data, Uttar Pradesh).

**7.3 Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?**

No adverse impact is anticipated on local communities. There are no sacred or cultural sites near the proposed development site. So no question arises of disturbing them. Many local people may get jobs as per their skill. Security requirement will also be met from the local private agencies.

## **8. BUILDING MATERIALS**

**8.1 May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)**

Only IS approved materials will be used for the construction. Construction material will be selected based on their thermal characteristic U and R

- The major materials required for construction of the proposed project will be steel, cement, bricks, aggregate-10mm, aggregate-20mm, fine Sand, reinforcement steel etc.
- All the items to be used in the proposed project will be as per the national building code specification. If the building materials with high-embodied energy are locally available, it will be used in construction.

**8.2 Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?**

- Construction vehicles, machineries, and equipments will move, or be stationed in the designated places.
- The emission levels of all vehicles, equipment and machinery used for construction will conform to the standards prescribed in India Central Motor Vehicles Rules, 1989.
- Air pollutant parameters will be monitored regularly during construction, as envisaged in the EMP.
- Water will be sprayed in the lime, cement, and earth mixing sites; Batching Plants and temporary service and access roads.

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- After compacting works, water will be sprayed on the earthwork regularly to prevent dust.
- Delivery vehicles will be covered.
- Mixing equipment will be well sealed and equipped as per existing standards.
- Vehicles and equipment used will be fitted with silencer and maintained to keep noise at minimum levels
- Noise standards shall be strictly enforced to protect construction workers from severe noise impacts.
- Workers exposed to High Noise areas shall provided with appropriate ear muffs/plugs and shall be rotated.
- The noise level shall be monitored during the construction, as per the EMP.

**8.3 Are recycled materials used in roads and structures? State the extent of savings achieved?**

Recycled materials will be used in roads as well as for paving if locally available. Also materials with low embodied energy will be used in construction which will significantly result in energy savings. The efforts will also be made for the larger use of fly ash bricks and cement in the project.

**8.4 Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project**

## **SOLID WASTE GENERATION**

The road construction activities will generate a number of waste materials such as:

- a) Vegetation and demolition waste from site clearance;
- b) Excavated materials from earthworks (e.g. cuttings, pile foundations);
- c) General construction waste (e.g. wood, scrap metal, concrete);
- d) Chemical wastes generated by general site practices (e.g. vehicle and plant maintenance/servicing); and
- e) Municipal wastes generated by site workers

### **Impacts**

The above-mentioned waste materials have the potential to cause adverse environmental impacts during generation, storage, transport and disposal. The principal adverse effects relate to dust, water quality, general health and safety and visual impacts. Potential hazards associated with the inappropriate handling of chemical wastes include effects on human health (i.e. dermal and toxic effects with respect to site workers), phyto-toxic effects to vegetation, contamination of the soil, ground waters and surface water following spillage, risk of fire or explosions and discharge of chemical wastes to sewer and potential disruption of the sewage treatment works. If not appropriately managed, municipal wastes generated by site workers have a potential to cause impacts in terms of nuisance, insects and vermin. This may give rise to adverse environmental impacts for both site workers and site neighbors, solid waste material is not collected on a frequent basis, wind-blown material causing litter problems, if it is not well maintained and cleaned regularly.

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**Table 26: Waste Management**

Waste Type	Control Measures	Proposed Disposal Method
General Requirements	<ul style="list-style-type: none"> <li>• Minimization of waste generation for disposal (via reduction/recycling/re-use)</li> <li>• Segregating waste materials according to type to facilitate re-use and recycling</li> <li>• Separation of inert construction and demolition materials for either re-use on-site or use as material fill</li> <li>• During demolition works, segregating materials at source as far as practical</li> <li>• Co-ordinate material deliveries to site in order to minimize storage times on site and the likelihood of causing damage</li> <li>• Training site staff in waste minimization practices</li> <li>• Transport of wastes off site as soon as possible</li> <li>• Maintenance of accurate waste records</li> <li>• Use of re-useable metal hoardings/ signboards</li> <li>• No on-site burning will be permitted</li> </ul>	-
Vegetation from preparatory works	<ul style="list-style-type: none"> <li>• Segregation of materials to facilitate disposal</li> <li>• In site mulching by contractor to reduce bulk and review of opportunities for possible use within landscaping areas</li> </ul>	Re-use/ landfill
Demolition waste	<ul style="list-style-type: none"> <li>• Segregation of materials to facilitate disposal</li> <li>• Appropriate stockpile management</li> </ul>	Pre designated disposal site
Excavated materials	<ul style="list-style-type: none"> <li>• Segregation of materials to facilitate disposal/reuse</li> <li>• Appropriate stockpile management</li> <li>• Re-use of excavated material on or off site (where possible)</li> <li>• Special handling and disposal procedures in the event that contaminated materials are excavated</li> </ul>	Re-use of Suitable material on site. Disposal of Unsuitable materials to pre-designated disposal site
Construction waste	<ul style="list-style-type: none"> <li>• Segregation of materials to facilitate recycling/reuse (within designated area and in appropriate containers/stockpiles)</li> <li>• Appropriate stockpile management</li> <li>• Planning and design considerations to reduce over ordering and waste generation</li> <li>• Recycling and re-use of materials where possible (e.g. metal, wood from hoardings, formwork)</li> <li>• For material which cannot be re-used/recycled, collection should be carried out by an approved waste contractor for landfill disposal</li> </ul>	Public fill for inert wastes.  Disposal to landfill for Material unsuitable for public filling
Chemical waste	<ul style="list-style-type: none"> <li>• Storage within locked, covered and bounded area</li> </ul>	Chemical

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Waste Type	Control Measures	Proposed Disposal Method
	<ul style="list-style-type: none"> <li>Storage area should not be located adjacent to sensitive receivers e.g. drains</li> <li>Minimize waste production and recycle oils/solvents where possible</li> <li>A spill response procedure should be in place and absorption material available for minor spillages</li> <li>Use appropriate and labeled containers</li> <li>Educate site workers on site cleanliness/waste management procedures</li> <li>Collection by a licensed chemical waste collector</li> </ul>	Waste collection by a licensed agency
Municipal waste	<ul style="list-style-type: none"> <li>Waste should be stored within a temporary refuse collection facility, in appropriate containers prior to collection and disposal</li> <li>Regular, daily collections are required by an approved waste collector and recycler</li> </ul>	Landfill

## 9. ENERGY CONSERVATION

**9.1 Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?**

The power requirement during construction and operation phase is presented in **Table 27**.

For the proposed project requirement of power will be supplied by Uttar Pradesh State Electricity Board to project during operation phase. Total power required for the proposed project during construction is estimated to be around 3 DG sets of 250 KVA capacities during construction and operation.

**Table 27: Power Requirement during Construction and Operation Phase**

Parameters	Construction & Operation Phase
Power requirement	3x250 kVA
Source	UP State Electricity Board
Back-up power supply	Back-up of 250 kVA will be provided by 3 DG sets

*Source: U.P Housing & Infrastructure Development Board*

In case of power failure, backup will be provided by DG sets. Power back-up will be provided by the (3 x 250 KVA). Stack height of 3.5 m will be provided as per CPCB guidelines. DG sets will be installed with acoustic enclosures. During operation phase, the provision of solar light on the road is proposed to decrease the power requirement.

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**9.2 What type of, and capacity of, power back-up you plan to provide?**

In case of power failure, backup will be provided by DG sets. Power back-up will be provided by the (3 x 250 KVA. Stack height of 3.5 m will be provided as per CPCB guidelines. DG sets will be installed with acoustic enclosures.

**9.3 What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?**

This is an elevated road construction project, so any kind of glasses are not required for this project.

**9.4 What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project?**

Usages of solar power for auxiliary power requirement have been proposed. 20% of total external lights shall be on solar power. The architecture design for project carefully weaves in its vocabulary elements.

**9.5 Does the layout of streets & buildings maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.**

Yes, 20% of total external lights shall be on solar power.

**9.6 Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?**

This is an elevated road construction project. So this is not applicable.

**9.7 Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers?**

This is an elevated road construction project. So air conditioning is not applicable.

**9.8 What are the likely effects of the building activity in altering the micro-climates? Provide a self-assessment on the likely impacts of the proposed construction on creation of heat island & inversion effects?**

Not applicable.

**9.9 What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.**

Not applicable

**9.10 What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans**

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A state of the art firefighting system is proposed for the project to prevent and control fire outbreaks. The firefighting system will consist of portable fire extinguishers, hose reel, wet riser, yard hydrant, and manual fire alarm system. Important component are mentioned below.

- Provision of hose reels, external hydrants and wet risers
- Provision of firefighting tank for the emergency,
- There is a provision of firefighting pumps in emergency.
- Adequate Fire Extinguishers shall be available in emergency situations
- HT and LT panels will be protected with manually operated CO<sub>2</sub> protection system.
- Portable fire extinguishers shall be provided at strategic locations

**9.11 If you are using glass as wall material provides details and specifications including emissive and thermal characteristics**

Not Applicable

**9.12 What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration**

Not applicable

**9.13 To what extent the non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies used**

The proposed construction activities will consider every aspect of the recommendations of the Energy Conservation Building Code, 2006 and best energy management practices towards efficient use of all conventional and non-conventional energy. Some of the measures being considered to minimize pressure on energy sources are:

- Minimizing idling of construction equipment and vehicles
- Recycling of construction material to the extent possible
- Efficient scheduling of construction machinery / equipment
- 20% of total External lights shall be on solar power
- Use of energy-efficient lighting;
- Judicious use of freshwater
- Use of treated wastewater for irrigation, cooling tower.

## **10. ENVIRONMENT MANAGEMENT PLAN**

The Environmental Management Plan (EMP) is the synthesis of all proposed mitigation and monitoring actions, set to a time frame with specific responsibility assigned and follow-up actions defined. EMP is a plan of actions for avoidance, mitigation and management of the negative impacts of the project. Environmental enhancement is also an important component of EMP. Sound Environment Management Plan (EMP) will be implemented, which will make environment protection an essential requirement.

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## COMPONENT OF EMP

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 stakeholders. EMP includes four major elements;

- **Commitment & Policy:** The project management will strive to provide and implement the Environmental Management Plan that incorporates all issues related to environment and social parameters.
- **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 staff associated with environmental control facilities and documentation of measures to be taken.
- **Measurement & Evaluation:** This includes monitoring, corrective actions, and record keeping

## ENVIRONMENT MANAGEMENT PLAN

The Environment Management Plan (EMP) outlines the environmental management system that will be implemented during the detailed design and construction stage of the project for minimization of deleterious effects and implementation of enhancement measures. The EMP embraces environmental management issues comprising of beneficial impacts as well as long-term adverse impacts and their remedial measures.

The Elevated Road management should implement sound Environment Management Plan (EMP), which will make environment protection an essential requirement. Prediction of the potential environmental and social impact arising due to development activities are considered as the heart of EIA process. An equally essential element of this process is to develop measure to eliminate, offset or reduce adverse impacts to acceptable levels and enhance the beneficial ones during implementation and operation of the projects. The integration of the project planning is done by clearly defining the environment requirements within an Environment Management Plan (EMP). The Management Action Plan aims at controlling pollution at the source level to the maximum possible extent with the available and affordable technology followed by treatment measures before they are discharged. Specifically, the EMP lays stress on key environmental aspects and issues of the project during operation phase by:

- Identifying potential environmental impacts;
- Recommending mitigation measures for the negative impacts;
- Identifying opportunities for enhancement measures;

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- Providing an organizational framework for operating Environment Management System and other functions of the project by assigning roles and responsibilities for environmental monitoring and management;
- Formulating Environmental Action Plans (EAPs) which specify mitigation, periodic and annual monitoring activities during project implementation and operation.

## **ENVIRONMENT MANAGEMENT CELL: STRUCTURE AND RESPONSIBILITIES**

A separate environment management cell comprising of a team of experienced and qualified personnel reporting to a very senior level executive preferably an environmental engineer is proposed. He will be assisted by well-trained staffs comprising of environmental and safety specialists. Staff will be trained for environment control measures like air, water quality monitoring, solid waste management, noise abatement etc. Staff would also be trained to operate ESP and other pollution control equipment at optimum efficiency.

The Environment Management Cell will be responsible for managing the following activities related to environment function of proposed project:

- Coordinate and manage the EMP implementation during pre-construction, construction and operation phase
- Appoint dedicated environment staff to manage environmental monitoring responsibilities
- Manage and coordinate environmental monitoring and control
- Coordination with other sections of the plant and government agencies in relation to environmental management activities
- Implement and monitor greenbelt protection and plantation activities
- Safety specialist will ensure safe working practices in all the sections of the plant

## **EMP IMPLEMENTATION FRAMEWORK**

The environmental experts/ officers of various agencies are identified to implement the mitigation measures for the minimal impact on environment.

**Environmental Experts/ Officers:** The role of Environmental Experts/officers of various agencies is to ensure that all works should be carried out in accordance with the environmental management plan prepared for a specific project as per the environmental legislation (Laws, Acts, and Rules etc.) and also the guidelines of funding agency. It should make a part of the Tender Document for appointment of Environmental Expert for imposition of penalty to the violators, particularly contracts.

**Civil Work Contractor:** The environmental problems and issues usually arise out from the construction sites and workers camps are to be controlled by the civil work contractor. Such type of role of civil work contractor should be clearly defined in the Tender Document.

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**ENVIRONMENT CONSULTANT : GREENCINDIA CONSULTING (P) LIMITED, GHAZIABAD, U.P.**

**Revenue Department:** The District Collector is the head of the Revenue Department. His responsibility is to support the project through providing civil and soya land for compensatory afforestation on one hand and disbursement of compensation to PAPs without delay and dispute on other.

**Forest Department:** The Divisional Forest Officer (DFO) at Division and Conservator of Forest (CF) at Circle level are head of the Forest Department. Whatever, issues arise in relation to diversion of forest land and resources (tree felling etc.) to be supported for the developmental activities as per all the regulatory authorities.

**Project Promoter:** The responsibilities of the project promoter are to verify the well managed practices, which can be smoothly followed and implemented under project. It also keeps in mind the accident prone zones and environmental hazards. The interface of project promoter is extremely valuable for taking additional actions to the implementing and supervising agency for eco-friendly implementation of EMP.

## **ENVIRONMENTAL MANAGEMENT ACTION PLAN**

This section describes the Environmental Management Action Plan for the proposed project during different stages of project. The Environmental mitigation measures have been incorporated at all the stages of the project right from Designing phase to Construction and Operational Phase. All care has been taken to have minimum impact on trees and ground cover, to keep impacts on people at a minimum, to keep land acquisition at a minimum, to provide maximum safety to the users and to provide mitigation measures to all expected environmental degradation during design stage itself. Further to this the Management Plan has been formulated for implementation of environmental mitigation measures to be carried out by the Contractor and to ensure that the provisions of the EMP are strictly followed and implemented by implementation arrangements to prevent and minimize the adverse environmental impacts during Construction phase of the project. EMP has also addressed certain environmental measures to be taken to prevent further deterioration of environment components and to improve the safety of the users and roadside communities during Operational Stage of the Project.

Appropriate measures have also been identified for action during various stages of the project, viz, design and pre construction, construction and operational phases. The measures identified for all three phases, are tabulated in **Table 24** which describes the nature of the potential environmental impact, the measures, which have or will be taken, the timeframe in which they are taken, the implementing agency and responsible organization.

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**ENVIRONMENT CONSULTANT : GREENCINDIA CONSULTING (P) LIMITED, GHAZIABAD, U.P.**



**ENVIRONMENT CLEARANCE OF DEVELOPMENT OF HINDON ELEVATED ROAD AT  
GHAZIABAD, UTTAR PRADESH.**

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**Table 27: Environmental Management Action Plan**

Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
<b>A CONSTRUCTION PHASE</b>				
A-1	Clearing & Grubbing	<ul style="list-style-type: none"> <li>Vegetation removed from the construction zone before commencement of construction. All works carried out such that the damage or disruption to flora other than those identified for cutting is minimum.</li> <li>Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works removed with prior approval from the Environmental Expert. The Contractor, under any circumstances not cut or damage trees. Trees identified under the project and cut only after receiving permission from the Forest Department of Uttar Pradesh.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-2	Generation of debris from dismantling structures and road surface	<ul style="list-style-type: none"> <li>This is Greenfield Alignment project.</li> </ul>	-	-
A-3	Disposal of other construction waste	<ul style="list-style-type: none"> <li>The Environmental Expert approved these disposal sites after conducting a joint inspection on the site with the Contractor.</li> <li>Non-bituminous wastes dumped in borrow pits (preferably located in barren lands) covered with a layer of the soil. No new disposal site created as part of the project, except with prior approval of the Environment Expert. All waste materials completely disposed of and the site fully cleaned and certified by Environmental Expert before handing over.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
A-4	Stripping, stocking and presentation of top soil	<ul style="list-style-type: none"> <li>➤ Stockpiles not be surcharged or otherwise loaded and multiple handing kept to a minimum to ensure that no compaction occur. The stockpiles covered with gunny bags or vegetation.</li> <li>➤ It ensured by the Contractor that the topsoil not be unnecessarily trafficked either before stripping or when in stockpiles.</li> <li>• Such stockpiled topsoil will be utilized for                             <ul style="list-style-type: none"> <li>➤ Covering all disturbed areas including borrow areas</li> <li>➤ Top dressing of the road embankment and fill slopes</li> <li>➤ In the agricultural fields of farmers, acquired temporarily. Residual topsoil, if there is any will be utilized for the plantation.</li> </ul> </li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-5	Accessibility	<ul style="list-style-type: none"> <li>• The Contractor provides safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property access as connecting the project road. The Contractor also ensured that the existing accesses are not blocked without providing adequate provisions and to the prior satisfaction of Environmental Expert.</li> <li>• The Contractor take care that the cross roads are constructed in such a sequence so that traffic movement on any given area does not get affected.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-6	Planning for Traffic diversion	<ul style="list-style-type: none"> <li>• The Contractor provided specific measures for safety of pedestrians and workers at night as a part of traffic control plans.</li> <li>• The Contractor ensured that the diversion/ detour are always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow.</li> <li>• The Contractor also informed local community of changes to traffic routes, conditions and pedestrian access arrangements with assistance from IC.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-7	Earth form Borrow Areas For Construction	<ul style="list-style-type: none"> <li>• No borrow area will be opened without permission of the Environment Expert. The location, shape and size of the designated borrow areas will be as approved by the Environmental Expert of IC and in accordance to</li> </ul>	/Contractor	SUPERVISION CONSULTANT, GDA

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		the IRC recommended borrow pits for road embankments. The borrowings operations will be carried out as specified in the guidelines for setting an operation of borrow areas.		
A-8	Quarry Operation	<ul style="list-style-type: none"> <li>The Contractor will develop a Comprehensive Quarry Redevelopment Plan as per the Mining Rules of Uttar Pradesh and IC prior to opening of the quarry site. The quarry operations will be undertaken within the rules and regulations in force.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-9	Construction water	<ul style="list-style-type: none"> <li>The Contractor arranged adequate supply and storage of water for the whole construction period at his own costs from the water treatment plant.</li> <li>The Contractor will take all precaution to minimize the wastage of water in the construction process/operation.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-10	Drainage & Flood Control	<ul style="list-style-type: none"> <li>The Contractor will ensure that construction materials like earth, stone are disposed off at canal so that it does not block the flow of water of any watercourse and cross drainage channels.</li> <li>The Contractor will take all necessary measures to prevent the blockage of water flow. In addition to the design requirements, the Contractor will take all required measures as directed by the Environmental Expert of IC to prevent temporary or permanent flooding of the site or any adjacent area, if any.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-11	Slope Protection and Control of Soil Erosion	<ul style="list-style-type: none"> <li>The Contractor taking slope protection measures as per design, or as directed by the Environmental Expert of IC to control soil erosion and sedimentation through use of dykes sedimentation chambers, basins, fibber mats, mulches, grasses, slope, drains and other devices.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-12	Water pollution from Construction wastes	<ul style="list-style-type: none"> <li>The Contractor will take all precautionary measures to prevent the waste-water generated during construction from entering into canals, water</li> </ul>	Contractor	SUPERVISION CONSULTANT GDA

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		<p>bodies or the irrigation system and avoid construction works close to canals or water bodies during monsoon.</p> <ul style="list-style-type: none"> <li>All waste arising from the project is to be disposed off in the manner that is acceptable to the Delhi Pollution Control Committee or Uttar Pradesh State Pollution Control Board or as directed by Environmental Expert.</li> <li>Run- off from wasted concrete may be alkaline and thus pH reduction may be needed. The Environmental Expert will certify that all liquid wastes disposed off from the sites meet the discharge standards.</li> </ul>		
A-13	Water pollution from fuel and lubricants	<ul style="list-style-type: none"> <li>The Contractor also ensures that spillage of fuels and lubricants do not contaminate the ground.</li> <li>If fuel storage and refueling areas are located on agricultural land or areas supporting vegetation, the topsoil will be stripped, stockpiled and returned after cessation of such activities.</li> <li>All location and layout plans of such sites submitted by the Contractor prior to their establishment and approved by the Environment Expert. The Contractor arranges for collection and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to IC) and approved by the Environment Expert. All spills and collected petroleum products disposed off in accordance with Uttar Pradesh Pollution Control Board guidelines.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-14	Dust Pollution	<ul style="list-style-type: none"> <li>The Contractor take precautions viz. water sprinkling etc. to reduce the level of dust generating from construction site. All the plants sited at least 1 km in the downwind direction from the nearest human settlement.</li> <li>The Contractor will provide necessary certificates to confirm that all crushers used in construction conform to relevant dust emission control legislation.</li> <li>Crushers licensed by the Uttar Pradesh Pollution Control Board used for the project.</li> <li>Fly ash used as per IRC-SP-58 Guidelines.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		<ul style="list-style-type: none"> <li>On daily basis it will be ensured that all dumpers carrying fly ash are fully covered by tarpaulin</li> <li>Water sprinkling during loading and unloading of fly ash periodically.</li> <li>Storage of fly ash within enclosures done and regular water sprinkling will be ensured over the stack.</li> </ul>		
A-15	Emission from construction vehicles, equipments & machineries	<ul style="list-style-type: none"> <li>The Contractor ensured that all vehicles, equipments and machineries used for construction are regularly maintained and confirm the pollution emission levels comply with the relevant requirements of Delhi Pollution Control Committee or Uttar Pradesh Pollution Control Board.</li> <li>The Contractor submits PUC certificates for all vehicles /equipment/ machinery used for the project and maintains a record of the same during the contract period. Monitoring results will also be submitted to IC as per monitoring plan.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-16	Noise from vehicles, equipments and machineries	<ul style="list-style-type: none"> <li>The Contractor will confirm the following:                             <ul style="list-style-type: none"> <li>➤ Servicing of all construction vehicles and machinery done for exhaust silencers and will be checked and if found defective will be replaced.</li> </ul> </li> <li>All the construction sites within 150m of the nearest habitation, noisy construction work such as crushing; concrete mixing stopped during the night time between 10.00 pm to 6.00 am.</li> <li>No noisy construction activities permitted around educational institutions / health centers (silence zones) up to a distance of 100 m from the sensitive receptors.</li> <li>Monitoring carried out at the construction sites as per the monitoring schedule and results will be submitted to IC.</li> </ul>	Contractor	SUPERVISION CONSULTANT, GDA
A-17	Personal Safety measures for labour	<ul style="list-style-type: none"> <li>The Contractor will provide:</li> </ul>	Contractor	SUPERVISION CONSULTANT,

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		<ul style="list-style-type: none"> <li>➤ Protective footwear and protective goggles to all workers employed on asphalt materials, cement, concrete etc.</li> <li>➤ Protective goggles and clothing to workers engaged in stone breaking activities</li> <li>➤ Earplugs to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation.</li> <li>➤ Adequate safety measures for workers during handling of materials at site.</li> <li>• The Contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labour Organization (ILO).</li> <li>• The Contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. They will provide facemasks for use to the workers when paint is applied in the form of spray or a surface having lead paint is rubbed and scraped. The Contractor will mark 'no smoking' in high risk areas and enforce noncompliance of use of PPE with zero tolerance. These will be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization and will be approved by IC.</li> </ul>		GDA
A-18	Traffic & Road Safety	<ul style="list-style-type: none"> <li>• The Contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the Traffic Control Plan/Drawings and as required by the Environmental Expert of IC for the information and protection of traffic approaching or passing through the section of any existing cross roads.</li> <li>• The Contractor will ensure that all signs, barricades, pavement markings are provided as per the specifications or as directed by the Engineer., a Traffic Management Plan will be devised and implemented to the</li> </ul>	Contractor	SUPERVISOR CONSULTANT GDA

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		satisfaction of the Contractor's vehicle drivers must be strictly controlled particularly when plying on local/village roads.		
A-19	Risk from electrical equipments	<ul style="list-style-type: none"> <li>The Contractor will take all required precautions to prevent danger from electrical equipment and ensure that –                             <ul style="list-style-type: none"> <li>No material will be stacked or placed as to cause danger or inconvenience to any person or the public.</li> <li>All necessary fencing and lights is provided to protect the public in construction zones.</li> </ul> </li> <li>All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, are free from patent defect, are kept in good working order, regularly inspected and properly maintained as per IS provision and to the satisfaction of the Environment Expert.</li> </ul>	Contractor	SUPERVISION CONSULTANT GDA
A-20	First aid	The Contractor will arrange for – <ul style="list-style-type: none"> <li>A readily available first aid unit including adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone</li> <li>Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital.</li> </ul>	Contractor	SUPERVISION CONSULTANT GDA
A-21	Informatory Signs and Hoardings	<ul style="list-style-type: none"> <li>The Contractor provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Environment Expert of IC.</li> </ul>	Contractor	SUPERVISION CONSULTANT GDA
A-22	Accommodation for labour camps	<ul style="list-style-type: none"> <li>The Contractor follow all relevant provisions of the Factories Act, 1948 and the Building and the other</li> <li>Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labor camp.</li> </ul>	Contractor	SUPERVISION CONSULTANT GDA

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
A-23	Water facilities	<ul style="list-style-type: none"> <li>The Contractor provided potable water facilities within the precincts of every work-place in an accessible place.</li> </ul>	Contractor	SUPERVISON CONSULTANT GDA
A-24	Sanitation and Sewage system	The Contractor will ensure that mobile toilet facility for the construction worker and labours.	Contractor	SUPERVISON CONSULTANT GDA
A-25	Waste disposal	<ul style="list-style-type: none"> <li>The Contractor provide segregated garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Expert of IC.</li> </ul>	Contractor	SUPERVISON CONSULTANT GDA
A-26	Pollution Monitoring	<ul style="list-style-type: none"> <li>The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/ contamination in the selected locations done as per environmental monitoring plan.</li> </ul>	Contractor	SUPERVISON CONSULTANT GDA
<b>B</b>	<b>OPERATION STAGE</b>			
B-1	Monitoring Operation Performance	<ul style="list-style-type: none"> <li>The GDA will monitor the operational performance of the various mitigation/ enhancement measures carried out as a part of the project.</li> <li>The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision for relocated utilities, hand pumps and other relocated structures if any; status of rehabilitation of borrow areas; and noise barriers, which are proposed at different locations.</li> </ul>	Contractor	SUPERVISON CONSULTANT GDA
B-2	Maintenance of Drainage	<ul style="list-style-type: none"> <li>GDA will ensure that all drains (side drains, cross drains etc.) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding.</li> <li>GDA will ensure that all the sediment and oil and grease traps set up at the water bodies are cleared once in every three months.</li> </ul>	Contractor	SUPERVISON CONSULTANT GDA

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
B-3	Pollution Monitoring	<ul style="list-style-type: none"> <li>The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/ contamination in the selected locations as suggested in environmental monitoring plan will be the responsibility of Contractor.</li> <li>Air Pollution Control Device (APCD) will be installed to display the current scenario of the pollution.</li> <li>Greenbelt will be planted within the elevated area and both side of the roads to control the dust or emission from the traffic.</li> </ul>	Contractor, Pollution Monitoring Agency	SUPERVISION CONSULTANT GDA
B-4	Monitoring of survival rate of plantation in the PRow	Every year there will be monitoring for the survival rate of plantation in the PRow for the first five years before on set of monsoon. A minimum survival of 85% will be maintained. Any loss will be made up by fresh plantation.	Contractor	SUPERVISION CONSULTANT GDA
B-5	Changes in Land use pattern	<ul style="list-style-type: none"> <li>GDA shall take initiative and act as facilitator to prepare an action plan for balanced regional development in consultation with local development authority and State Government to control the ribbon development along the project road. A land use regulation control need to be adopted.</li> <li>A land use – zoning map may be developed, under which up to a particular distance from the PRow of the alignment no development will be allowed.</li> <li>Necessary hoardings will be erected indicating the availability of PRow and legal charges for encroachment of PRow. Budgetary provisions are to be made to control the ribbon development along project road.</li> <li>Safety of public and road users shall be maintained through traffic control and management throughout the operation period. Trauma centers for treatment of accident victims should be established at regular intervals and operated to the full satisfaction of GDA.</li> </ul>	Revenue Department	GDA
B-5	Corporate Social Responsibility (CSR)	<ul style="list-style-type: none"> <li>Ghaziabad Development Authority is a corporate body of Uttar Pradesh State Govt. and works on 'no profit no loss' basis. GDA is already developing various villages, nearby areas as part of its development</li> </ul>	GDA	GDA

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		plans. This road project is also being created in the larger interest of not only Ghaziabad citizens but also to connect Uttar Pradesh/ Uttarakhand traffic to Delhi. No toll or any other charges are proposed to be levied against this project. This project itself can be termed as a project being executed under CSR.		

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**ENVIRONMENT CONSULTANT** : **GREENCINDIA CONSULTING (P) LIMITED, GHAZIABAD, U.P.**

**ENVIRONMENT CLEARANCE FOR CONSTRUCTION OF “ MULTI-STOREY  
RESIDENTIAL COMPLEX FOR PUBLIC PERSONNEL ” AT 15TH BATTALION, INDORE,  
MADHYA PRADESH**

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**8(A)**

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**PROJECT PROPONENT:**  
MADHYA PRADESH POLICE HOUSING CORPORATION LTD  
**PROJECT ARCHITECT:**  
ARINEM CONSULTANCY SERVICES PVT LTD

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**ENVIRONMENT CONSULTANT:**  
GREENCINDIA CONSULTING PRIVATE LIMITED,  
NCR, GHAZIABAD