CHECK LIST 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 & Monitoring Programmed).

SECTION 1- LAND ENVIRONMENT:

(Attach panoramic view of the project site and the vicinity)

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

- No

The project site lies across river Yamuna with very scarce vegetation on its banks. It is anticipated that the construction activities of the project will not have an adverse effect on the land use activities in the project area. The tree plantation and landscape development will enhance the visual aesthetics of the area.

Location Map and Map showing surrounding features of the site within 500 m are enclosed in the report as annexure.

CONNECTIVITY

S. No.	Detail	Distance	Direction
1.	Nearest Highway (NH-1)	Adjacent to project stretch	West
2.	Hazrat Nizamuddin Railway station	0.72 Km	North West
3.	Indira Gandhi Interational Airport (IGIA)	16.10 Km	South South West

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.

- **LAND REQUIREMENT**

Table 1: Area Statement

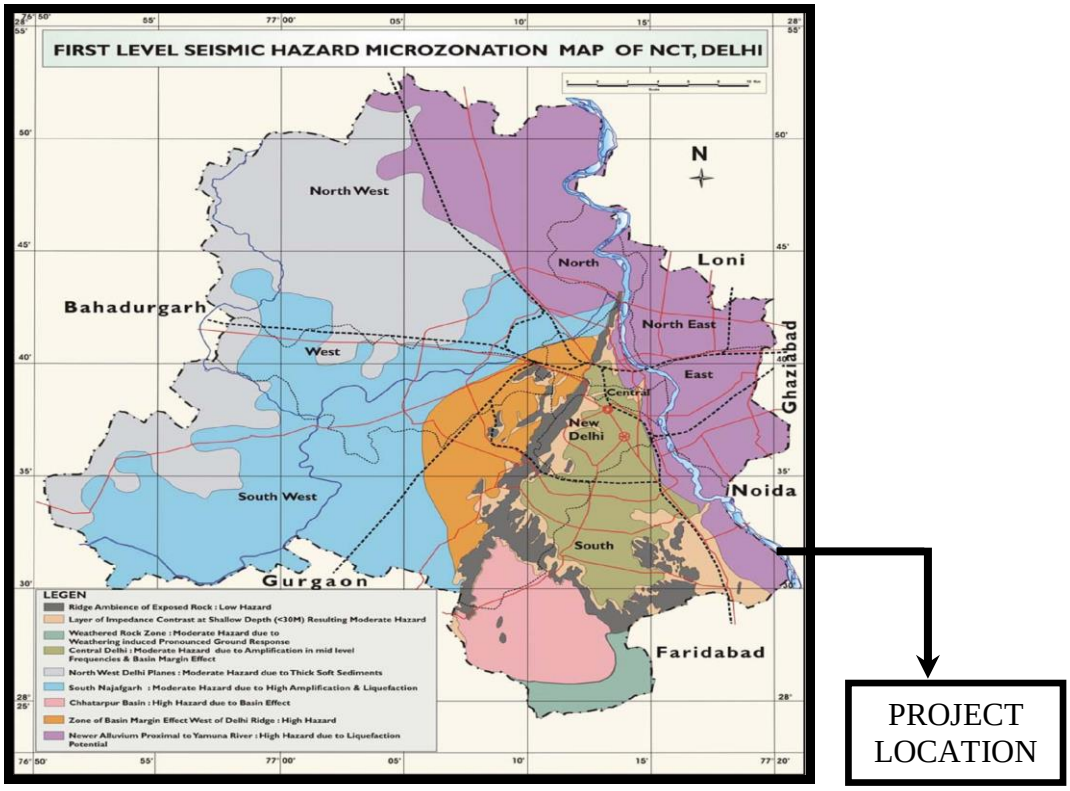
S. No.	Particulars	Area (m2)
1.	Project Name	Barapullah Elevated Road (Phase-III) From Sarai Kalan Khan to Mayur Vihar (Phase-I), New Delhi
2.	Activity at the site	Elevated Road & bridge over river Yamuna
3.	Length of the Stretch	3.5 Kms
4.	Built-up Area	150238 m^2 including modernization of existing UP Link Road
5.	Power Requirement & Sources	1500 KVA, from BSES (backup through DG Sets)(Permission attached as annexure)
6.	No. of DG Sets	3 DG sets of total capacity of 1500 KVA (3 x 500 KVA)
7.	Water requirement & Sources	Total water Requirement: 75 KLD Source: Ground Water(Permission attached as annexure)
8.	Sewage Treatment & Disposal	The total number of workers i.e. 800 people shall generate around 16 KLD of sewage which shall be treated in septic tanks connected to water recycling chambers. The recycled water hence generated shall be used for greenbelt development and dust suppression.
9.	Solid Waste Generated	120 Kg/day
10.	Estimated number of Labors	800
11.	Proposed Greenbelt Area	Compensatory plantation to be carried out by PWD is 2650 plants/trees which shall cover an area of 17,650 m^2
12.	Cost of the project	Rs. 1260.63 Crores

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

The project being a well planned activity will result in saving of commuters fuel and time to a huge extent(around 60%). About 17,650 m^2 of the area is earmarked for landscaping. The project will have an overall positive impact on the existing land use and will not cause any disturbance to the local ecology. Hence, proposed activity shall have no impact on surroundings.

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

There shall be no land disturbance resulting in erosion, subsidence and instability as it is a flat land. The project site falls under the zone IV i.e., High Damage Risk Zone (MSK-VIII) as per Earthquake Hazard Map of Delhi NCT (given below). The proposed project will be earthquake resistant taking into account the latest provisions of Indian Standards Codes. Adequate landscape plan is earmarked for the project surroundings which will act as a remedial measure against soil erosion.



Source: Maps of India

Figure-2: Earthquake Hazard Map of Delhi NCT showing Project Site

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

The project does not intersect any natural drainage route directly. The elevated road is to be built across Yamuna without any interference. No perennial or non-perennial drainage system is found to intersect the project area or being obstructed by the project. The surroundings comprise of a non-urbanized stretch. Well planned storm water drainage has been designed to take care of areal storm water drainage. Thus, no impact on the natural drainage system is anticipated.

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?)

The only excavation work is involved in the proposed project for establishing the foundation of the pillars. The filling works will be done by the excavated material and no extra material will be used. All the topsoil excavated from construction activities shall be stored separately and used in landscape development within the project site and the nearby areas. Hence, the need for movement of soil to and from the site is not anticipated.

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

- Water requirement during construction phase will be met from Ground-water.
- Waste handling during the construction phase shall be done by the site supervisor whose responsibility lies with collection and storage of construction and demolition waste generated on the site. All construction wastes generated during construction will be used within the site itself for filling the voids, roads, aggregate for mortar etc. to the extent feasible. Remaining will be sent to the concerned local agency for proper disposal.

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

The site area is a flat land and the surroundings are characterized by a non-urbanized plain stretch across river Yamuna. The proposed project will not pose any threat to the low lying area of river banks because the project is an elevated flyway and no change/modification/alteration in anticipated in the characteristics of the area.

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

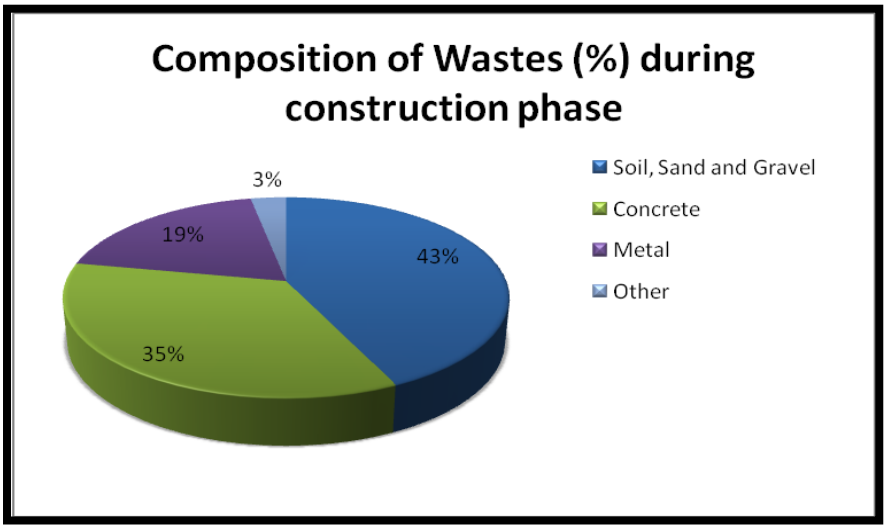
- ❖ No significant health hazard is associated with the proposed construction. The debris and wastes generated from construction shall either be disposed simultaneously or shall be stored in sheds properly covered by tarpaulins.
- ❖ During construction period, fugitive dust generation shall be caused by material handling and vehicular movement. Impacts due to fugitive dust emissions are negligible as water sprinklers will be used to suppress fugitive dust emissions. However, the impacts will be confined to laborers/workers particularly with regard

to occupational exposure. Proper Personal Protective Equipments will be provided to the workers working in the potential areas (e.g. masks, ear plugs etc.).

- Careful design, planning and good site management would minimize waste of materials such as concrete, mortars and cement grouts. Construction wastes will be segregated as much as possible at site itself to increase the feasibility of recycling concrete and masonry as filling material and steel pieces as saleable scrap. Litter disposal and collection points will be established around the work sites. Empty packaging materials, drums, glass, tin, paper, plastic, pet bottles, wood, thermocol and other packaging materials, etc will be disposed through recyclers. The construction spoils will be temporarily stored at designated dumpsite located inside the site premises (properly covered by tarpaulin). Later on, these wastes will be used for land filling/leveling work within the site premises. An estimate of the average composition of waste generated from the onsite construction activities given in **Table-2**.

Table-2: Waste Composition - During Construction Phase

S. No.	Constituents	Percentage Composition (%)
1	Soil, Sand and Gravel	43.00
2	Brick and Masonry	00
3	Concrete	35.00
4	Metal	19.00
5	Bitumen	00
6	Wood	00
7	Other	3.00
	Total	**100.00**



SECTION-2 WATER REQUIREMENT

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

The water requirement shall be met by bore-wells (ground water). Total water requirement for the project will be approximately 75 KLD, out of which 20 KLD shall be used for domestic purpose. The requirement for the greenbelt development and dust suppression shall be fulfilled by recycled water generated from the water recycling tanks. The Water balance diagram is showing given below in Figure-4.

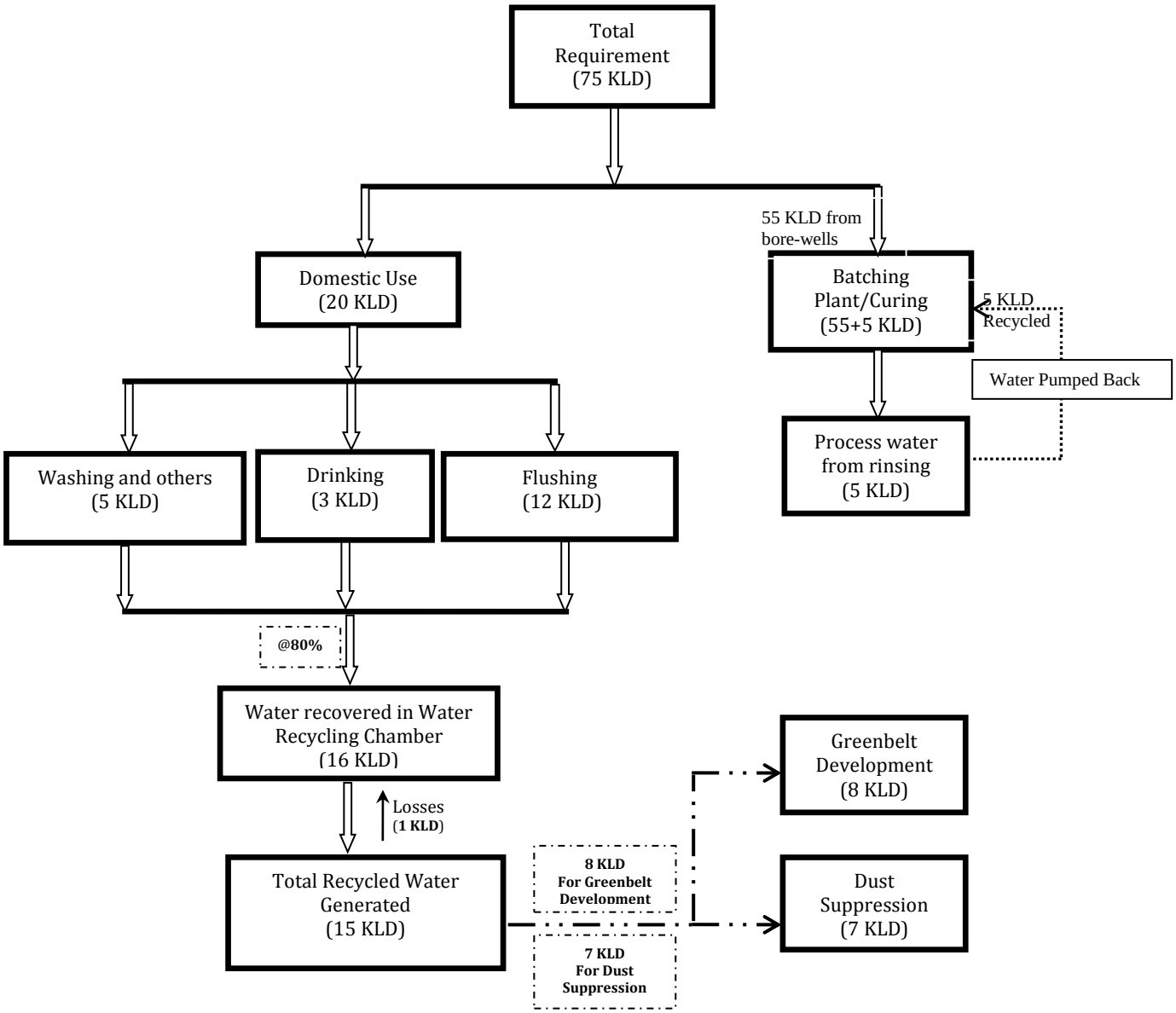


Figure-4: Water Balance Diagram

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

Water requirement will be fulfilled by groundwater i.e. boreholes (permission by Delhi Jal Board attached).

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).

Not Applicable as the water requirement will be fulfilled from Boreholes for which the permission from the regulatory authority i.e. Delhi Jal Board is taken.

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

The water requirement for flushing and landscaping will be met through treated water from water recycling tanks. Approximately 15 KLD of recycled water will be obtained from the recycling tanks which will be used for greenbelt development and dust suppression.

Table-4: Details of Treated/Recycled Water from STP

Details	Water (KLD)
Water requirement for domestic purpose	20
Wastewater generated from domestic use	**16**
Recycled water from water recycling tank	**15**
Use of Recycled Water	1.Greenbelt Development: 8 KLD 2.Dust Suppression: 7 KLD

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 will be no diversion of water from other users.

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

Approximately 16 KLD of sewage will be generated during the construction phase of the proposed project. Septic tanks shall treat the sewage. Prior channelization and sump will be provided to collect the treated water which shall be used for landscaping. Hence, no incremental pollution load is been expected from wastewater generated from the activity.

Table-5: Details of Sewage Generated during construction Phase

Details	Water (KLD)
Water requirement for domestic purpose	20
Wastewater generated from domestic use	**16**
Recycled water from water recycling tanks available for use	**15**
Use of Recycled Water	1.Greenbelt Development: 8 KLD 2.Dust Suppression: 7 KLD

Approximately 15 KLD of sewage will be generated during the construction phase of the proposed project. This wastewater generated will be treated in well designed water recycling tanks. Prior channelization and sump will be provided to collect the treated water which shall be used for landscaping and dust suppression.

2.7 Give details of the water requirements met from water harvesting? Furnish details of the facilities created.

The trunk drains shall be located near the carriage way along either side of the roads. Taking the advantage of road camber (slope), the rainfall run off from roads shall flow towards the **trunk drains** provided at the side of the roads. **Sprouts** for seepage of water from the trunk drains shall be provided at the bottom of the drains at regular intervals. The location of the **sprouts** is being determined according to the slope of the cross-section. Thus, the storm water generated during the monsoons shall automatically get directed to the proposed **trunk drains**. The sprouts will allow the rainwater to fall freely in the Yamuna basin and its banks, thus resulting in **ground water recharge**. Since the existing topography is congenial to surface disposal, a network of drains is planned adjacent to roads. The drains shall act as the drainage lines and will transfer the water to the catchment basins.

1) Since the existing topography is considered congenial for surface disposal, a catchment basin is not required. The rain-water will automatically direct to Yamuna bank thus, leading to automatic ground water recharge.
2) Proposed storm water system consists of sprouts at regular intervals for transfer of water to the below area.

2.8 What would be the impact of the land use changes occurring due to the 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?

The project will include road areas only and thus the runoff from the flyway is expected to increase due to reduced infiltration. However, the increased runoff will not cause

water logging as a well designed storm water drainage system will be provided. The runoff will finally be transported to trunk drains for groundwater recharging.

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)

Water demand during the construction phase will be fulfilled from ground water. No adverse impact is expected on this account as extensive rainwater harvesting will be implemented across the project site to reduce the freshwater demand and hence the groundwater stress, recycled wastewater generated from septic tanks will be used for landscaping and water sprinkling purpose.

2.10 What precautions/ measures have been to check the surface run-off, as well as uncontrolled flow of water into any water body?

The following management measures are suggested to protect the water quality are:

- Excavation of any kind shall be avoided during monsoon season.
- Care would be taken to avoid soil erosion by well planned greenbelt development.
- Any area with loose debris/soil within the site shall be fully planted by local plant species.

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).

Most of the storm water produced on site will be harvested for ground water recharge. Thus proper management of this resource will be done to ensure that it is free from contamination. A detailed Storm Water Management Plan will be developed which will consider the sources of storm water. The plan will incorporate best management practices which will include the following:

- Regular inspection and cleaning of trunk drains.
- Application of pesticides and herbicides in the nearby areas before monsoon season.
- Conducting routine inspections to ensure cleanliness.
- Provision of silt traps in trunk drains.
- Good housekeeping in the above areas.

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, mostly local laborers will be employed during the construction phase and thus negligible quantities of wastes will be generated. Septic tanks will be provided in the labor colonies and the treated water will be collected in water recycling tanks.

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).

- It is expected that the project will generate approx. 16 KLD of sewage during construction phase. The sewage will be treated in septic tanks provided within the premises generating 15 KLD of recoverable/recycled water which will be used in greenbelt development and dust suppression.

- Separate garbage bins with different colours will be provided for the management of bio-degradable and non-bio-degradable waste during the construction phase.

2.14 Give details of dual plumbing system if treated waste used for flushing of toilets or any other use.

Total water requirement for the project will be approximately 75 KLD, out of which 20 KLD shall be used for domestic purpose. The requirement for the greenbelt development and dust suppression shall be fulfilled by recycled water generated from the water recycling tanks.

SECTION-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).

No ecologically sensitive area falls within the project site. Hence, no ecological/ biological threat has been anticipated.

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

Some trees needs to be cut for which prior permission from forest and wildlife department is already taken. It also comprises only wild grasses and bushes, which are however not going to be hampered as the proposed road is elevated. The project will develop landscape by planting (both on site and compensatory) native plant species to enhance the aesthetic value of the region and also provide an excellent habitat for various faunal groups.

3.3 What are the measures 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?)

Tree plantation will be done in the nearby areas of the project Site. The landscape area of the project is 17,650 m^2. Plantation would be of large leaf trees that provide adequate shade and will range from evergreen to semi-evergreen.

SECTION 4: FAUNA

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.

No. The existing land use around the site is a semi-urban stretch and does not provide a habitat for wild species. The tree plantation however will provide an excellent habitat for the native fauna.

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

The project will not have any direct or indirect impacts on the avifauna of the area. However, planting of trees bearing fruits will be an attraction to the local bird species population.

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

No direct or indirect adverse impact on fauna is envisaged.

SECTION 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 construction).

No. The project will not cause any increase in atmospheric concentration of gases. During the post construction phase, cars, scooter/motorcycle will ply on the road. Vehicular emissions will be the major source of air pollution during operational phase which will be suppressed by water sprinkling. Quantum and dispersion of pollutants from vehicular emission will depend upon the following:

- Volume of traffic on the roads
- Meteorological conditions
- Emission sources

From vehicular emissions, PM, NO_2 and CO is pollutants of primary concern. The dispersion of vehicular emission would be confined within 100 m from the road and concentration will decrease with increase in distance from road. It is anticipated that the contribution of vehicular emission in ambient air quality will be marginal but well within the stipulated National Ambient air quality standards. Dispersion will be faster at higher wind speed.

Mitigation Measures: The proposed project will develop suitable landscape along with prominent tree plantation nearby the project site, which will work as a barrier for the movement of pollutants and help in pollution control.

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.

During construction phase of the project, there will be increase in atmospheric concentration of gases and particulate matter due to running of DG sets. Total 3 Nos. of DG sets of total capacity 1500 KVA (3 x 500 KVA) will be provided as power back up during power failure. This will cause emissions of PM, SO_2, NO_2 and CO. However, ultra low sulfur diesel will be used. Adequate stack height for D.G. sets will be provided as per the stipulated guidelines of Central Pollution Control Board (CPCB) to facilitate natural dispersion of exhaust gases.

5.3 Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures for improvement including the traffic management at the entry and exit to the project site.

No. The project will not cause any shortage of parking space or any blockage of transport. It will in fact mobilize the current traffic by reducing the intensities both at

Sarai Kale Khan and Mayur Vihar. Proper traffic circulation management plan has been prepared and proper adherence will be maintained with the same.

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

Bicycle tracks/pedestrian pathways/footpaths on either side of the road have been proposed which are equipped with solar panels which will generate power to make the flyover self-sustained. The surplus power shall be utilized for the betterment of area. It will be supplied to the farmers of the Yamuna banks for betterment of farming techniques.

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

The noise and vibration shall be caused by plying of vehicles in the road. The impacts however will not be significant. The noise and vibration of the vehicles shall be compensated by landscape development which will act as an absorbing media for the same. The vibration caused do the plying of traffic shall be neutralized by providing interlocking expansion joints at intervals.

5.6 What will be the impact of D.G. sets and other equipment on noise levels and vibration in ambient air quality around the project site? Provide details.

During construction phase of the project, vehicular movement and operation of DG sets will be the major sources of noise pollution. But both these activities- DG set and vehicular movement will not have any significant impact on the environment. Since DG sets will not be operational continuously and moreover it will be placed away from workable area and will be enclosed within suitable enclosures. Hence, no or minimal impact will be anticipated due to DG set and vehicular emission. It is envisaged that the movement of the motor vehicles will be restricted to designated carriageways only.

SECTION-6: AESTHETICS

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

The construction of proposed project is well planned. Thus, no obstruction of view or scenic beauty or landscape is anticipated. Furthermore, the construction will be planned

in such a way that the well organized landscaped areas will render the plot aesthetically appealing.

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

No impacts anticipated.

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

The project will strictly follow the concerned norms. All norms on Height, Setbacks, Fire Safety Requirements, Structural Design and other parameters will be strictly adhered to.

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

No anthropological or archaeological sites or artifacts are found near the site area.

SECTION-7: SOCIO-ECONOMIC ASPECTS

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

The project is situated in a non-urbanized zone and hence, there will be no change in demographic structure.

Construction phase: Since local laborers will be engaged during construction phase, alteration to the existing demographic profile of the area is not anticipated.

Operation phase: The project does not consist of any residential or semi-residential area. Thus no change in demographic structure is envisaged.

7.2 Give details of the existing social infrastructure around the project.

The project lies in a non-urbanized stretch. However all sorts of social infrastructure like transportation facilities, water supply & sanitation facilities, communication facilities, educational institutes, hospital, markets, banks, cultural amenities etc. exist at the starting and ending point of the elevated road i.e. Sarai Kale Khan and Mayur Vihar (Phase-I).

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

Construction phase: There are no religious sites or archeological monuments of historical significance falling in the project stretch. Hence, no adverse impact in this regard is anticipated. Rather, this project will provide jobs that relate to unskilled, semi skilled as well as skilled labour category. Few supervisory positions will also open up, for which local candidates will be considered based on merit.

Operation phase: Since it is an elevated road project , thus it will not cause any disturbance to sacred sites or cultural values.

SECTION-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)

For the purpose of paved path on the either sides of the road, sun dried pavers will be used instead of baked pavers as they are manufactured through energy efficient processes. The roads will also be equipped with solar panels to make the functioning of the project, self sustained.

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

Mitigation Measures for Air Pollution during Construction Stage:

- Construction materials will be suitably covered with tarpaulin cover etc during storage and transportation.
- Water sprinkling shall be done on haul roads/kuchha rasta during, where dust generation is anticipated during construction phase.
- Raw material storage and handling yard will be enclosed from all sides.
- To minimize the occupational health hazard, proper personal protective gears i.e. masks, ear plugs etc. shall be provided to the workers working in the dust prone areas.

Mitigation Measures for Noise Pollution during Operational Stage:

- Administrative as well as engineering control of noise will be implemented.

- Plantation in and around the site shall suppress the noise to a large extent.

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

Yes, construction waste/ debris; generated during construction will be utilized for other projects of PWD. Construction waste/ debris will be used as fillers in base and sub-base of the carriageway, footpaths pavements or pedestrian way, as needed.

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

The solid waste of the project during construction phase will be segregated into biodegradable and non-biodegradable waste. Biodegradable waste and non biodegradable waste will be collected in separate bins. Biodegradable waste shall be disposed off as per MSW Rules 2000 & amendment 2008. The recyclable wastes will be sent off to the government authorized recyclers. Proper guidelines for segregation, collection and storage will be prepared as per Municipal Solid Wastes (Management and Handling) Rules, 2000 and amended Rules, 2008.

SECTION-9: ENERGY CONSERVATION

9.1 Give details of the power requirements, source and 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 details of power requirement, sources, and backup power requirement are given in the Table below:

Power Requirement, Sources and Backup Plan

Power Requirement	1500 KVA
Sources of Power	BSES
Backup power supply arrangement	3 Nos. of DG sets of total capacity 1500 KVA (3 x 500 KVA)

9.2 What type and capacity of power backup do you plan to provide?

Power backup will be provided by 3 Nos. of DG sets of total capacity 1500 KVA (3x500 KVA). The DG sets will be operated during power failure only.

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?

Not applicable as this is an elevated road project.

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

The paved areas on the either side of the road will be equipped with the solar panels of reputed make. The solar panels will hence generate enough energy to make the operation of the road self- sufficient. The heat influx will not be generated because there is no closed area proposed in the entire stretch.

9.5 Does the layout of street & building 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.

Layout of buildings has been done as per the sun path analysis so that the design cuts off direct radiations of critical hours which are specific to the orientation. Solar energy will be harnessed through solar street lights and reflectors to avoid accidents.

9.6 Is the shading effectively used to reduce cooling/heating lands? 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?

Green area and open areas will be so spaced that a reduction in temperature is achieved. The energy saving measures will generate enough energy to facilitate street lighting and usage of reflectors at night to avoid accidents.

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

Energy efficient solar powered street lights and reflectors shall be used. Measures prescribed in Energy Conservation Building Code 2007 will be adopted to reduce the heat influx by road surface.

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

Heat emissions from the construction may be from the following sources:

- Heat absorbed from the paved and concrete structures
- Heat generated from equipment/appliances
- Heat increase due to traffic increase
- However, the heat generated will not be significant and will be dissipated in the greens and open areas provided in and around the project area.

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 value or the R values of the individual components.

This is an elevated road project. Hence, the above is not applicable.

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

Firefighting measures shall be adopted as per the guidelines of NBC. In addition, 10 kg fire extinguishers will be provided for class A, B, and C fires. CO_2 extinguishers will also be provided during construction phase.

9.11 If you are using glass as wall materials, provide details and specifications including emissivity and thermal characteristics.

Not applicable.

9.12 What is the rate of air infiltration in to 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.

Solar energy will be harnessed through solar street lights, reflectors etc.
Landscape development will be done which will result in lowering the temperature of the surrounding areas.

SECTION-10: ENVIRONMENT MANAGEMENT PLAN

10.1 The Environment Management Plan (EMP) would consist of all mitigation measures for each component of the environment due to the activities increased during the construction, operation and the entire life cycle to minimize adverse environmental impacts resulting from the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the sites including fire.

A detailed environmental management plan is presented in Table-6 & 7 to mitigate all the identified environmental impacts that are found to be significant.

Table-6: Environmental Management Plan – Construction Phase

S. No	Environmental Impacts	Mitigation Measures	Implementing Agency	Monitoring Agency
(i)	Air pollution due to emissions from construction machinery and movement of vehicles.	a) Vehicles transporting construction materials prone to fugitive dust emissions will be covered. b) Trucks carrying sand will be provided with tarpaulin sheets to cover the bed and sides of the trucks. c) Idling of delivery trucks or other equipment will not be permitted during loading and unloading. d) All construction vehicles will comply with air emission standards and will be maintained properly. e) Development of alternative access routes to the site by passing the residential areas to avoid air pollution will be done.	Project Execution Agency, i.e. M/S L&T	Project proponent
(ii)	Air pollution, noise and safety hazard due to movement of construction vehicles through internal roads of project premises.	a) Improvement of unpaved surface (kuchha rasta) to the standards adequate to withstand movement of heavy construction vehicles will be done. b) Regular water sprinkling for dust suppression during non working hours will be done.	Project Execution Agency, i.e. M/S L&T	Project proponent
(iii)	Noise pollution due to operation of construction machinery at the site.	a) Construction contracts will specify that the construction equipment should meet the noise and air emission levels as per EPA Rules, 1986. b) DG sets will be provided with noise shields around them.	Project Execution Agency, i.e. M/S L&T	Project proponent

		c) Vehicles used for transportation of construction material will be well maintained and PUC certified. d) The workers operating high noise machinery or operating near it will be provided with ear plugs e) The high noise generating stationary machinery will be located at the southern or central portion of the site		
(iv)	Impact on community water resources (quality).	a) All sewage discharges from construction site will be received in septic tanks, of adequate capacity and sumps. b) Oil handling and storage area will be surfaced and provided with catch pit to intercept any accidental spillages.	Project Execution Agency, i.e. M/S L&T	Project proponent
(v)	Sanitation and healthcare at workers camp	a) The contractor shall install adequate lavatories; septic tanks at the construction camp/labor colonies to cater to the requirements of the workers. b) The proponent shall build water recycling tanks attached with septic tanks with adequate capacity at the construction camp. c) All organic waste shall be disposed off according to Municipal Solid Waste (Management & Handling) Rules 2000 & Amendment 2008. d) Quarterly health check-ups of construction workers will be organized at workers colony. e) Adequate provision of water supply will be made at	Project Execution Agency, i.e. M/S L&T	Project proponent

		workers camp.		
(vii)	Improvement of Access Roads to the site	a) Improvement and widening of the existing access roads. b) Establishing road connection.	Project Execution Agency, i.e. M/S L&T	Project proponent
(viii)	Impact on Micro Climate	a) Extensive planting of shading trees shall be done. b) Planting of numbers of trees, of species suitable to the local climatic condition and soil of the project site along the kuchha rasta and on the designated open spaces to ensure the improvement of micro-climatic condition of the project site.	Project Execution Agency, i.e. M/S L&T	Project proponent

Table-7: Environmental Management Plan - Operational Phase

S. No.	Environmental Impacts	Mitigation Measures	Organizational / Monitoring Arrangements	Training Requirements	Implementing Arrangements
(i)	Stagnancy and clogging of either end of road during rainy season.	• Provision of rain-water harvesting pits and catchment basins. • Proper drainage system by providing drains on	Regular maintenance of the pits, application of disinfectants during monsoon periods in the pits.	Training and awareness programs with the community members.	Day to day functioning of rain-water collection and management of fund would be the responsibility of the housing society.

		either side which will accumulate in the catchment basins.			
(ii)	Power required for street lighting and reflectors.	The power required for street lighting and reflector shall be achieved from the solar panels which will be equipped along the pathways on either side.	Regular maintenance of the solar panels and protective measures during monsoon seasons.	Training programs with community members.	Proper day to day maintenance of the installed solar panels.