BIHAR RAJYA PUL NIRMAN NIGAM LTD.

Form 1A

for Environmental Clearance of the
Proposed Lohia Path Chakra at Jawaharlal Nehru Path (Bailey Road) in Between BPSC office (near Lalit Bhawan) and Vidhyut Bhawan in Patna, Bihar

Submitted By

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A QCI ACCREDIATED ENVIRONMENTAL ORGANIZATION

APPENDIX II
(See paragraph 6)
FORM-1 A (only for construction projects listed under item 8 of the Schedule)

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 program)

1. LAND ENVIRONMENT

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

Figure-1: View of the Project Site

Site Photographs are attached as **Annexure-II**.

1.1 Will the existing land use get significantly altered from the project that is not consistent with the surroundings? (Proposed 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 to be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

Landuse Pattern: Area around the road corridor under consideration is a plain. Mixed land use pattern i.e. commercial and residential is observed near project site. There will be no change in the land use due to the project as construction will be done on existing road. Hence no land change is envisaged. The land use is not expected to get altered due to construction of proposed project.

The project is being developed in line with development plan of state Bihar.

Site Location: Flyover will be constructed on the existing Bailey road (in between Lalit Bhawan & Vidyut Bhawan) with multiple underpasses, flyover, elevated section using U girders and extra dosed cable stayed in Patna Town.

Geographically, the proposed project site coordinates are given in **Table-1** below:

Table-1: Coordinates of the Project

Location	Latitude	Longitude
Coordinate-I	25°36'37.46"N	85° 7'30.84"E
Coordinate-II	25°36'26.18"N	85° 7'3.52"E
Coordinate-III	25°36'41.22"N	85° 7'5.68"E
Coordinate-IV	25°36'19.75"N	85° 7'18.32"E
Coordinate-V	25°36'13.07"N	85° 6'29.48"E
Coordinate-VI	25°36'7.73"N	85° 6'42.67"E

Layout Plan of the project is attached **Annexure-V**

Surrounding Features: The stretch starting near income tax circle, Patna High court till the tree arm intersection near Lalit bhawan on Bailey road has been experiencing traffic congestion and delays. On the stretch of bailey road other connectors such as Serpentine road, Boring road, High court road, Boring canal road and Kautilya marg join to form intersections at very close inetrvals. Bailey road is an important road as it connects traffic coming from outside Patna on the eastern side of the city and it takes it to Danapur road outside the city on the western side which is NH-30, also traffic from NH-30 is taken to NH-19 to Mahatma Gandhi setu.

.Location of project site on Google map of 500 m. radius shown in **Figure-2** below**.**

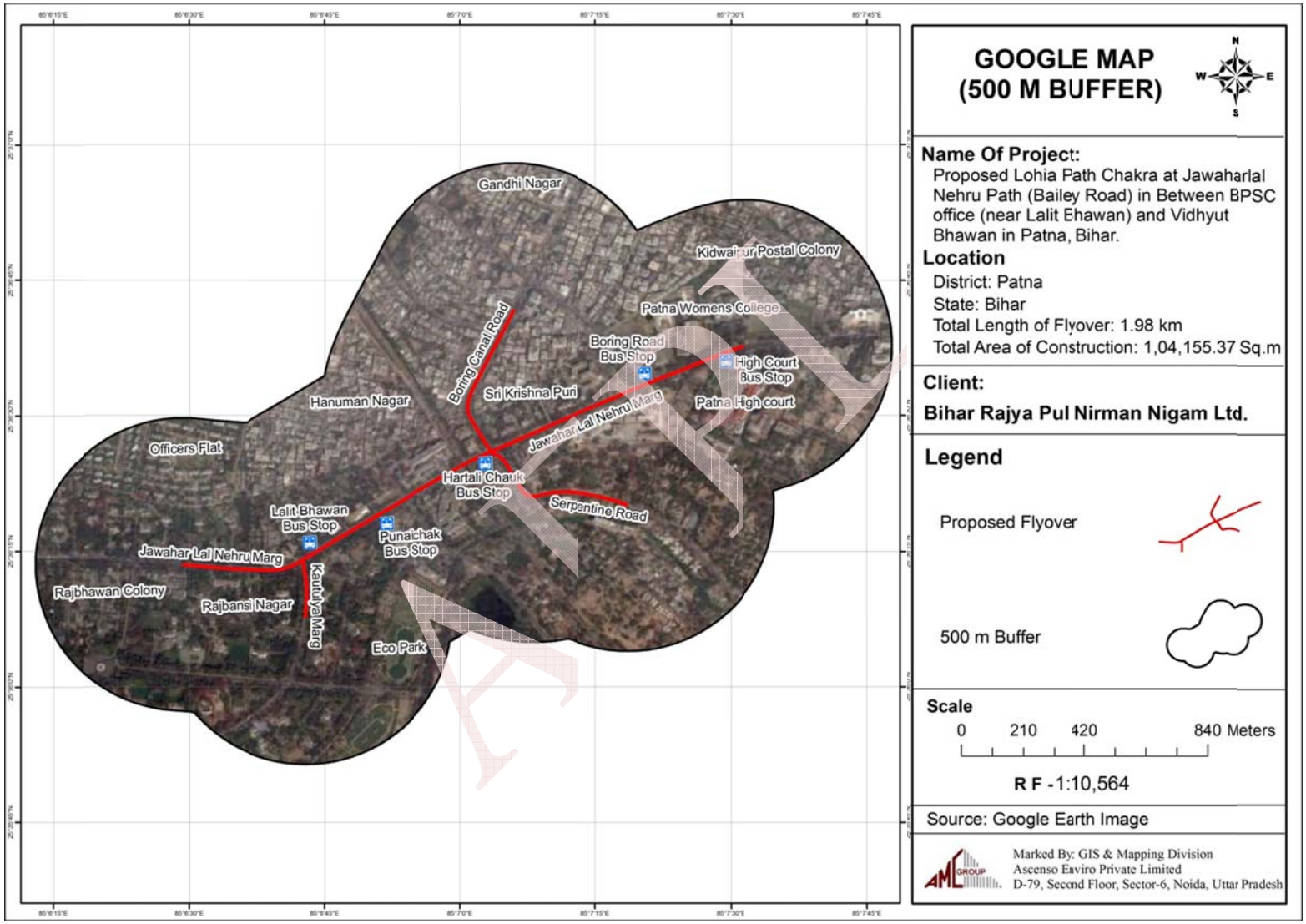

Figure-2: Google map of 500 m. radius showing surroundings of the area

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.

Government of Bihar has formed Bihar Rajya Pul Nirman Nigam Limited (BRPNNL) for the development of bridges in the state. BRPNNL objective is to plan, design and construct flyover in the state of Bihar as per the development plan for the state. Bihar Rajya Pul Nirman Nigam Limited (BRPNNL) is planning, designing and constructing proposed Lohia Path Chakra at Jawaharlal Nehru Path (Bailey Road) in Between BPSC office (near Lalit Bhawan) and Vidhyut Bhawan in Patna, Bihar with multiple underpasses, flyover, elevated section using U girders and extra dosed cable stayed, in Patna Bihar.

Land Area: The area of this flyover is 1,04,155.37 sq.m and the total length of the flyover will be 1.98 km.

Water Consumption: During the construction phase, water requirement will be met through the private water tanker. It is estimated that water demand during the construction phase will be 50 KLD. No water requirement will be there during the operational phase of the project.

Power Requirement: Temporary connection has been taken from the South Bihar Power Distribution Company Limited. Copies of Electricity Bills are attached as **Annexure-IV**. DG sets will be used during the construction phase of the project. 06 number of DG sets of total capacity 490 KVA (2 x 125 KVA + 4 x 60 KVA) will be used.

Connectivity:

Table-2: Site Surroundings and Connectivity Details

	Connectivity & Site Surroundings		
S. No.	**Particulars**	**Description**	**Distance & Direction**
1.	Nearest Railway Station	Patna Junction Railway Station	approx.1 km in South-East
2.	Nearest Airport	Jai Prakash International Airport	approx. 2.0 km in South-West
3.	Nearest Highway	NH-30	approx.2 km in East
4.	Water Body	Ganga River Kachchi Talab Pond in Eco Park	approx.2 km in North approx.1 km in South within 500 mtrs. in South
5.	Nearest Habitation	Sri Krishna Puri Hanuman Nagar	approx.150 mtrs in East approx.750 mtrs in West
6.	Nearest School	Dayanand High School KPS Memorial High School	approx.750 mtrs in South-East approx.9.5 mtrs in South-West
7.	Nearest Hospital	Jan Chikitsha Hospital Sanjeevani Eye Hospital	approx.850 mtrs in South approx.1 km in North
8.	Places of worship	Iskon Temple	approx.950 mtrs in South-East

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).

- There will be temporary impact on open spaces during construction phase. These may be utilizing for material storage, construction, vehicle parking etc.

- No impact on community facilities is anticipated.

- The main areas of concern which will pose a significant impact are Emissions from D.G. Sets, Noise from D.G. Sets and Sewerage discharge from labour hutments. Mitigation options that are proposed are mentioned below:

  - Emission from the numbers of DG sets: Proper stack height will be provided as per CPCB / MoEF & CC guidelines.
  - Noise from DG sets: Acoustic enclosure will be provided for D.G. sets.
  - The wastewater generation will be disposed in septic tank with soak pits.

Further, there shall not be any change in the land use pattern due to the proposed project as flyover will be constructed on the existing road. The project will be constructed as per the development plan of Bihar.

Only, clearance of the existing land would be done (start and end point of flyover) along with the locations of pillar for the foundation work. Tree cutting is involved and we had received the NOC from DFO Vide Letter No.2804 dated: 24/10/2016 for the cutting of trees is attached as **Annexure-I**.

BRPNNL submitted the fees of Rs. 5,69,09,245 and Rs. 29, 85,870/- as compensatory afforestation to be done by forest department.

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 activity will not affect any land disturbance resulting in erosion, subsidence and instability. The area is not susceptible to erosion.

Soil Type:

Soils are predominantly sandy loam with clay loam at places with low to medium nutrient status. It is generally alkaline with pH value ranging from 6.3 to 8.2. Traditionally soils in an area are classified on the basis of mode of deposition. Soils are divided into three groups viz. (i) Recent alluvium (ii) Tal and (iii) Older alluvium. The soils of the district have developed on alluvial

deposits transported from relatively younger geological formations where physical weathering is predominant and the soils developed in them are generally coarser in texture.

(Source: CGWB September-2013)

Slope Analysis:

The project area possesses fairly plain terrain with negligible drainage slope of the project site.

Subsidence/Erosion:

Paving of area will not cause any soil erosion problem and subsidence.

Seismicity:

- The whole country has been divided into 5 Seismic zones as per maximum intensity of 'Modified Mercalli Scale' (MMS). The project site lies in Seismic Zone IV, called as 'High Damage Risk Zone'.

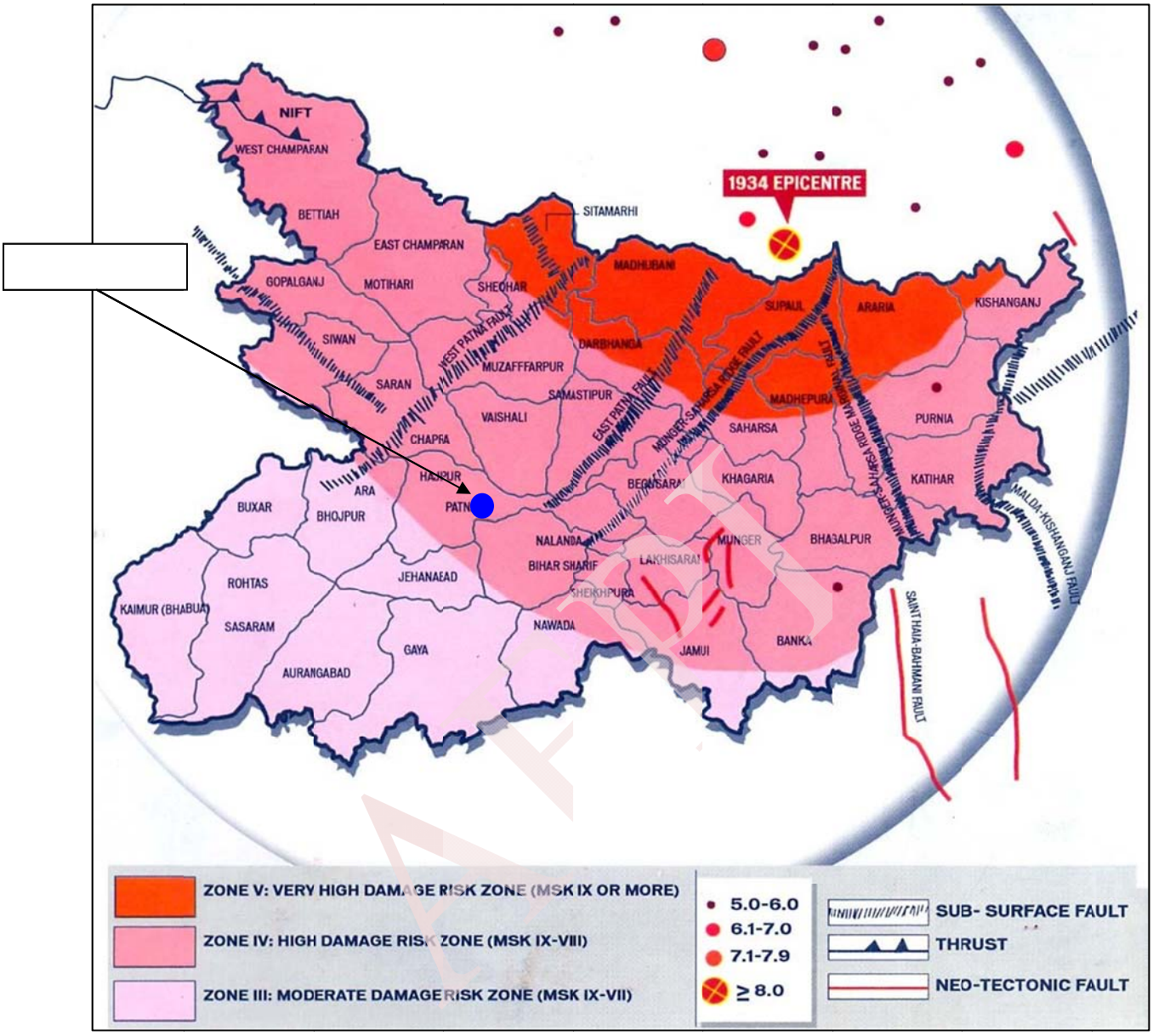

Figure-3: Map showing the Seismic Zone classification of Bihar

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 district falls in the Ganga Basin and is drained by the mighty Ganga in the north, by the Sone in the West, and by the Punpun, Phalgu and their tributaries in the central part of the terrain.
No natural drainage lies in the vicinity of the proposed project. Therefore topography of the site is not expected to change due to the project activities and hence, no impacts are expected on the natural drainage profile or run-off characteristics.

(Source: CGWB September-2013)

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 will be carried out to provide foundations and for establishing the pillar.20,000 cu.m of soil will be excavated for the proposed project. This excavated soil will be properly stacked within the site under tarpaulin cover. The filling works will be done by the excavated material and no extra material will be used. All the topsoil excavated during construction activities shall be stored for backfilling. The lower strata earth is either used for filling the plinths, road substructure and leveling low lying areas.

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

Water Supply:

During the construction phase, water requirement will be met through private water tanker. Approx.50 KLD water will be required in construction phase. Liquid membrane forming compound would be used for curing concrete. These membrane reduce the loss of water from concrete during early hardening period and also help in reducing the temperature-rise of concrete exposed to the radiation from the sun. These curing compounds would be conforming to ASTM-C-309-81, Type-2 & white pigmented compound. These compound shall meet with the requirement of water retention test as per ASTM designation C-156-80.The loss of water in this test shall be restricted to not more than 0.55 kg/m^2 of exposed surface in 72 hours.

Water will be used in the construction activity for cement mixing, sprinkling, dust suppression and domestic purposes of the construction workers.

Waste Generation/Handling:

Sewage: Sewage generated from the labor camps will be disposed off through Soak pit or septic tank..

Municipal Waste: Approx. 45 kg/day municipal waste will be generated from labour colony and it will be handed to vendors of municipal corporation.

Construction & Demolition waste: Approx. 4,000 sq.m areas (existing roads) and one existing bus stand (approx.101.36 sq.m) will be demolished for the foundation. The solid waste generated during the construction phase like metal cutting, debris, plastic material etc. will be collected and stored in a separate covered area so as to prevent damage to property and personnel working at the project site. Further, most of the construction debris will be used for filling activities and the rest will be disposed as per the Construction & Demolition Rules' 2016.

Scrap metal painted with heavy metals will be sent to a salvage yard for recycling.

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).

There are no low lying areas and wetlands in near vicinity of the project site. So, there will be no impact.

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).

- The construction waste generated from the project is common in nature and cause no health hazard to associate and nearby population. The construction debris is being used for embankment filling and construction activities.

- No significant health hazard is associated with the proposed construction.

- During construction period, source of fugitive dust generation will be material handling and vehicular movement. Impact due to fugitive dust emission is negligible as water sprinklers will be used to suppress fugitive dust emission as and when generate. However, the impacts will be confined to laborers/workers particularly with regard to occupational exposure. Proper Personal Protective Equipment 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, 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. Later on these wastes will be used for land filling / leveling work within the site premises.

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.

Water Requirement:

During Construction Phase:

During the construction phase, water requirement will be met through private water tanker. Approx.50 KLD water will be required in construction phase. Liquid membrane forming compound would be used for curing concrete. These membrane reduce the loss of water from concrete during early hardening period and also help in reducing the temperature-rise of concrete exposed to the radiation from the sun. These curing compounds would be conforming to ASTM-C-309-81, Type-2 & white pigmented compound. These compound shall meet with the requirement of water retention test as per ASTM designation C-156-80.The loss of water in this test shall be restricted to not more than 0.55 kg/m^2 of exposed surface in 72 hours.

Water will be used in the construction activity for cement mixing, sprinkling, dust suppression and domestic purposes of the construction workers.

During Operation Phase:

No water will be required during the operational phase of the project.

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

During the construction phase, water requirement will be met through private water tanker. Approx.50 KLD water will be required in construction phase. Liquid membrane forming compound would be used for curing concrete. These membrane reduce the loss of water from concrete during early hardening period and also help in reducing the temperature-rise of concrete exposed to the radiation from the sun. These curing compounds would be conforming to ASTM-C-309-81, Type-2 & white pigmented compound. These compound shall meet with the requirement of water retention test as per ASTM designation C-156-80.The loss of water in this test shall be restricted to not more than 0.55 kg/m^2 of exposed surface in 72 hours.

Water will be used in the construction activity for cement mixing, sprinkling, dust suppression and domestic purposes of the construction workers.

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

During Construction Phase:

During the construction phase, water requirement will be met through private water tanker. Approx.50 KLD water will be required in construction phase. Liquid membrane forming compound would be used for curing concrete. These membrane reduce the loss of water from concrete during early hardening period and also help in reducing the temperature-rise of concrete

exposed to the radiation from the sun. These curing compounds would be conforming to ASTM-C-309-81, Type-2 & white pigmented compound. These compound shall meet with the requirement of water retention test as per ASTM designation C-156-80.The loss of water in this test shall be restricted to not more than 0.55 kg/m^2 of exposed surface in 72 hours.

Water will be used in the construction activity for cement mixing, sprinkling, dust suppression and domestic purposes of the construction workers.

During Operation Phase:

No water will be required during the operational phase of the project.

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).

<u>During Construction Phase</u>:

During the construction phase, water requirement will be met through private water tanker. Approx.50 KLD water will be required in construction phase. Liquid membrane forming compound would be used for curing concrete. These membrane reduce the loss of water from concrete during early hardening period and also help in reducing the temperature-rise of concrete exposed to the radiation from the sun. These curing compounds would be conforming to ASTM-C-309-81, Type-2 & white pigmented compound. These compound shall meet with the requirement of water retention test as per ASTM designation C-156-80.The loss of water in this test shall be restricted to not more than 0.55 kg/m^2 of exposed surface in 72 hours.

Water will be used in the construction activity for cement mixing, sprinkling, dust suppression and domestic purposes of the construction workers.

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).

During the construction phase, water requirement will be met through private water tanker. Approx.50 KLD water will be required in construction phase. Liquid membrane forming compound would be used for curing concrete. These membrane reduce the loss of water from concrete during early hardening period and also help in reducing the temperature-rise of concrete exposed to the radiation from the sun. These curing compounds would be conforming to ASTM-C-309-81, Type-2 & white pigmented compound. These compound shall meet with the requirement of water retention test as per ASTM designation C-156-80.The loss of water in this test shall be restricted to not more than 0.55 kg/m2 of exposed surface in 72 hours.

Water will be used in the construction activity for cement mixing, sprinkling, dust suppression and domestic purposes of the construction workers.

No there will be 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 the quantities and composition of wastewater generated from the proposed activity).

Provision of mobile toilets will be provided along with the septic tanks and soak pits during the construction phase.

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

Rain water will be channelized to storm water drain. No rain water harvesting is proposed.

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?

Rain water will be channelized to storm water drain. No rain water harvesting is proposed. Existing drains will be reconstructed. The length will be 5.1 km and width will be 1.2 mtrs. Runoff will be drained into storm water drain lines.

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 phase, water requirement is being met through private water tanker and there will be no requirement of water during operational phase of the project.

No ground water abstraction will be there in construction as well as in operational phase of the project

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

During Construction phase suitable garland drain as per the existing contours of the plot will be developed to avoid any chance of contamination due to runoff.

Liquid membrane forming compound would be used for curing concrete. These membrane reduce the loss of water from concrete during early hardening period and also help in reducing the temperature-rise of concrete exposed to the radiation from the sun. These curing compounds would be conforming to ASTM-C-309-81, Type-2 & white pigmented compound. These compound shall meet with the requirement of water retention test as per ASTM designation C-156-80.The loss of water in this test shall be restricted to not more than 0.55 kg/m2 of exposed surface in 72 hours.

Existing drains will be reconstructed. The length will be 5.1 km and width will be 1.2 mtrs. Runoff will be drained into storm water drain lines.

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 storm drains.
- ✓ Cover waste storage areas.
- ✓ Conducting routine inspections to ensure cleanliness.

- ✓ Preparation of spill response plans, particularly for fuel and oil storage areas.
- ✓ Provision of silt traps in storm water drains.
- ✓ Good housekeeping in the above areas.

Precautions /Measures Taken to Prevent the Run-Off from Construction Activities

- **Domestic Wastewater from Toilets:** Domestic wastewater generated from the toilets will be treated through soak pit or septic tank.

- **Site Development and Construction:** The wastewater generation during site development and construction mainly includes the storm water run-off from the construction areas, stockpiles of construction materials and wastes, etc. mainly containing high suspended solids (SS), in case these activities are undertaken during rainy season.

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).

During Construction phase suitable garland drain as per the existing contours of the plot will be developed to avoid any chance of contamination due to runoff.

Hessain cloth will also be used for concrete curing purpose. Storage facility of cured water will be provided for the reuse of water for curing purposes.

During the operational phase, runoff will be drained into existing storm water drain lines

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 storm drains.
- ✓ Cover waste storage areas.
- ✓ Conducting routine inspections to ensure cleanliness.
- ✓ Preparation of spill response plans, particularly for fuel and oil storage areas.
- ✓ Provision of silt traps in storm water drains.
- ✓ Good housekeeping in the above areas.

Precautions /Measures Taken to Prevent the Run-Off from Construction Activities

- **Domestic Wastewater from Toilets:** Domestic wastewater generated from the toilets will be treated through soak pit or septic tank.

- **Site Development and Construction:** The wastewater generation during site development and construction mainly includes the storm water run-off from the construction areas, stockpiles of construction materials and wastes, etc. mainly containing high suspended solids (SS), in case these activities are undertaken during rainy season.

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).

During construction phase sewage generated will be treated through the soak pit or septic tank. Hence it will not lead to unsanitary conditions around the project 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).

During construction phase sewage generated will be treated through the soak pit or septic tank. Hence it will not lead to unsanitary conditions around the project site.

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

This condition is not applicable.

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).

There is no are no eco-sensitive areas in the project vicinity.

Tree cutting is involved and we had received the NOC from DFO Vide Letter No.2804 dated: 24/10/2016 for the cutting of trees is attached as **Annexure-I**.

BRPNNL submitted the fees of Rs. 5,69,09,245 and Rs. 29, 85,870/- as compensatory afforestation to be done by forest department.

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

Tree cutting is involved and we had received the NOC from DFO Vide Letter No.2804 dated: 24/10/2016 for the cutting of trees is attached as **Annexure-I**.

BRPNNL submitted the fees of Rs. 5,69,09,245 and Rs. 29, 85,870/- as compensatory afforestation to be done by forest department.

3.2. 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?).

Tree cutting is involved and we had received the NOC from DFO Vide Letter No.2804 dated: 24/10/2016 for the cutting of trees is attached as **Annexure-I**.

BRPNNL submitted the fees of Rs. 5,69,09,245 and Rs. 29, 85,870/- as compensatory afforestation to be done by forest department.

. **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.

The proposed site is within the Patna urban area, an open land and devoid of forestation so in the existing conditions, this place is not the habitat for any wild fauna. There will not be any type of displacement or any other effect on the local fauna due to proposed project activities.

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

The vibration and noise raised during construction and operational phase might be affect the movement of birds.

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

These measures are not applicable for this project.

4. AIR ENVIRONMENT

4.1. 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).

Increased traffic generation due to proposed project will lead increase in atmospheric concentration of gases but will not result island formation.

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.

Construction Phase:

During construction phase there will be increased generation of dust and smoke from the background levels. There is no activity associated with generation of odorous fumes and any hazardous gases during construction phase. The main sources of dust generation can be associated to land clearing, drilling, ground excavation, and construction of a particular facility. A large portion of the dust emissions results from traffic over roads at the construction site.

The main source of smoke generation will be use of Diesel Generators during power failure. The meteorological conditions such as higher turbulence in lower layers of atmosphere will increase the impact of dust emissions on workers at the site.

Measures taken during Transport and Handling of Materials during Construction

The transport and handling of materials during construction has potential impacts on air quality in the vicinity. Thus the following mitigation measures are adopted to minimize the impacts.

Air Emissions

- **Dust Suppression:** The most cost-effective dust suppressant applied to mitigate airborne dust is water, because of its efficiency as well as ready availability on the construction site. Water can be applied using handheld sprays Water spray at the site also effectively suppresses dust generated. Results have proven that for about 80% of such active area(s), the water spray suppresses airborne dust by about >90%.

Table-3: EMP for Dust Suppression

Sources/Process	Emission Potential	Scope of Control	Effectiveness
Hydraulic excavators and loaders (e.g Front loader, backhoe face shovel bulldozers) for the excavation, lifting and movement of material such as Soil, overburden.	High when dry or fine silty material are being handled, particularly during strong windy weather	Use of water sprays to moisten material being handled. Soils may be subject to a soil moisture content planning condition	Moderate
	Low when coarse or wet material are being handled during conditions of low wind speed	Minimize drop heights when unloading material. Protect from exposure to wind where possible.	
Tractor scrapers (Soil strippers) for cutting ,lifting transporting and placing, spreading or shaping of soils	Moderate/High-when dry silty materials handled during windy weather	Use of water sprays to moisten material being handled.	Low
Vehicles for transport of material within the site.	High particularly when travelling over unsurfaced and dry site	Minimize onsite transportation distances.	High
		Use of water sprays to moisten road surfaces during dry weather.	

	roads.	Use mechanical road sweepers during dry weather, to, limit visible dust emissions. Restrict vehicle speeds through signage/staff training.	
		Use of covered conveyors to transport material around the site.	
Hydraulic breakers for size reduction of large rocks	Low	Water spraying of rock prior to fragmentation when high degree of control required.	Moderate
Stockpiles for storage of quarried materials and soil/overburden during extraction and site development phases.	High when dry or fine silty materials are being stored /handled particularly during strong which weather.	Seed surfaces of completed mounds of overburden and top soil (restoration materials).	High
		Limit mechanical disturbance.	
		Shield from wind e.g. through the use of tree planting or screening	
		Use of water sprays to moisten surfaces during dry weather.	Moderate

- **Emission Control for Construction Equipment/Vehicles:** Construction equipment and heavy transport vehicles shall meet emission standards like Bharat Stage -III requirements for vehicles. The operation and maintenance of all vehicles, equipments deployed on site by different contractors would be regulated and effectively monitored. The Pollution under Control (PUC) certification will be ensured for proper O&M of vehicles.

- **Improved Maintenance:** Recognizing that significant emission reductions can be achieved through regular equipment and vehicle maintenance, all site contractors will be asked to take necessary steps for proper maintenance of vehicle and equipments. A monetary incentive/ disincentive provision encourages contractors to comply with regular maintenance requirements. The fuel used in the equipments, DG sets and vehicles will be of good quality with low "Sulphur" percentage by following the norms prevailing in project area.

- **Reduction of On-site Construction Time:** The heavy construction activities will be confined to the daytime to avoid higher impacts during the night time. During daytime, there is higher atmospheric dilution. Rapid on-site construction would reduce the duration of traffic interference and therefore, reduce emissions from traffic delay. Off-site fabrication of various moulded structural components, obtaining proper cut size of stone, pre-fabricated concrete slabs, etc. shall also enhance the quality of work environment at the construction site because other factors such as traffic congestion and emissions are then not relevant.

- **Barrier around the Site:** Besides the project site is enclosed by about 2.5 m high temporary barrier during the whole construction period so that the spread of dust to the neighborhood shall be restricted.

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.

No, the proposed project will not create shortage of parking space for the vehicle. Traffic movement will be more smooth as existing road get choked during peak hours. In order to overcome the traffic problems, it is proposed to construct flyover to minimize signals and allow the main traffic on the major corridors to move freely

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

The details of length and width are given in **Table-4** below:

Table-4: Area Details

S.No.	Description	Length (mtrs.)	Width (mtrs.)	Area (sq.mt.)
1.	Cable Stayed Bridge BPSC	298	19.85	15597.95
2.	Integral Spine Beam Bridge Lalit Bhawan	209	31.70	9121.92
3.	Circular Road	189	16.50	9470.57
4.	Integral Spine Beam Bridge Punia Chak	224	31.10	16789.23
5.	Sardar Patel Marg	104	13.39	2569.15
6.	Punaichak Marg	122	10.00	2199.51
7.	Integral Spine Beam Bridge Hartali More	262	31.10	21407.02
8.	Cable Stayed Bridge Daroga Rai Path	261	14.00	12319.65
9.	Cable Stayed Bridge Boring Canal Road	320	14.00	14680.37
Total Area of Construction				**1,04,155.37**

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.

Sources of traffic noise & vibrations in construction phase:

Construction vehicles (Majorly Trucks & JCBs, Road rollers etc.)

The trucks carrying materials such as concrete bags, construction debris etc. will be serviced regularly and there will be speed limit for all the vehicles moving within the project site. Proper maintenance of the vehicles will be carried out, encourage vehicle owners to not to blow horns. The movement of vehicles will be restricted to day time so as to reduce the disturbances in nearby areas of project site during night.

Vibration and noise is likely to increase due to increase in traffic movement.

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

During operational phase of the project, there would be DG sets with acoustic enclosure.

Impact of D.G. sets on noise & vibration and mitigation measures to be adopted in construction and operational phase:

D.G. sets if not enclosed in acoustic enclosures will contribute to significant increase in noise levels at the project site. However the D.G. sets used during construction will be enclosed in an acoustic enclosure to reduce the noise. The DG sets foundation will be comprises of heavy weight inertia concrete block. The generator will be mounted on Cushy Foot mounting and the concrete block will be isolated from the adjoining floor. Thus no vibration impacts are expected from the DG sets.

The noise level of DG sets will be maximum 75dB (A) (at 1.0 m distance) & the insertion loss will be maintained at minimum 25 db as per the prescribed compliance standards of the MoEF & CC {Noise pollution (regulation & control) (Amendment) rule 2010}.

Impact of D.G. sets on Ambient Air Quality and mitigation measures to be adopted:

The D.G. Set emission consist of following pollutants

1. Hydrocarbon+ NO_x
2. Carbon Monoxide (CO)
3. Particulate Matter (PM)
4. Smoke

If unchecked the emissions from D.G sets will increase the concentration of above mentioned pollutants in the atmosphere. To mitigate the polluting effects of D.G. sets following mitigation measures will be taken,

A. Use of High Speed Diesel as a fuel to run D.G. sets
B. Provision of stack with height as prescribed by Central Pollution Control Board.
C. Emission test of D.G. stacks every 6 months to check the concentration of pollutants.

5. 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?

The site lies in an urbanized settlement and 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 it will improve scenic amenity of the area.

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

There will not be any adverse impacts from new constructions on the existing structures as the proposed development shall be carried out as per the development plan of Bihar. All precautions would be taken to mitigate the impact due to water, air, and noise pollution during construction and operation phase.

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

There is no local consideration of urban form and urban design criteria. The proposed project will be constructed within the designated site as per the development plan of Bihar.

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

Within the project influence area, there are no significant archeological sites or artifacts nearby. Since all the activities whether during the construction or operation stage, will be carried out in the project premises hence no impact on any type of archeological monuments are envisaged.

6. SOCIO-ECONOMIC ASPECTS

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

Project will not have any change in demographic structure of the area.

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

Table-5: Existing Social Infrastructure around the project site.

	Connectivity & Site Surroundings		
S. No.	**Particulars**	**Description**	**Distance & Direction**
1.	Nearest Railway Station	Patna Junction Railway Station	approx.1 km in South-East
2.	Nearest Airport	Jai Prakash International Airport	approx. 2.0 km in South-West
3.	Nearest Highway	NH-30	approx.2 km in East
4.	Water Body	Ganga River Kachchi Talab Pond in Eco Park	approx.2 km in North approx.1 km in South within 500 mtrs. in South
5.	Nearest Habitation	Sri Krishna Puri Hanuman Nagar	approx.150 mtrs in East approx.750 mtrs in West
6.	Nearest School	Dayanand High School KPS Memorial High School	approx.750 mtrs in South-East approx.9.5 mtrs in South-West
7.	Nearest Hospital	Jan Chikitsha Hospital	approx.850 mtrs in South

		Sanjeevani Eye Hospital	approx.1 km in North
8.	Places of worship	Iskon Temple	approx.950 mtrs in South-East

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, the proposed development will not have adverse effects on local communities. On the contrary, it is expected that there will be major positive impacts due to development of the proposed project. Positive impacts would include improvement in occupational Stability directly and economic condition of society indirectly. Respect to the local sacred sites and other cultural phenomena will be the integral part of the proposed project.

7. 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).

The main construction materials being utilized in the construction of the proposed project include Stone Aggregate, Coarse sand/fine sand, Steel, Sand Stone, Granite/Marble, Bricks, and Blocks, etc.
The embodied energy content of the material is given in **Table-6.**

Table-6: Embodied Energy Content of the Material

Primary Energy Requirement	Materials	Primary Energy Requirement(Gj/tonne)
Very High Energy	Aluminum	200-250
	Stainless steel	50-100
	Copper	100+
	Steel	30-60
	Lead	25+
High Energy	Glass	12-25
	Cement	5-8
	Plasterboard	8-10
	Lime	3-5
Medium Energy	Clay bricks and tiles	2-7
	Gypsum Plaster Concrete	1-4
	Sand, aggregate	<0.5

Source: Manual on norms and standards for environment clearance of large construction projects, MoEF&CC

- These construction materials will be procured from the reputed suppliers/manufacturers and thus it is expected that they are produced with energy efficient processes. Most of the quality grade building material production facilities and industries now use energy efficient processes.

- 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?

The transport and handling of materials during construction phase has potential impacts on air and noise emissions in the vicinity. Thus, to control this, various mitigation measures will be adopted to minimize the impacts.

Air Emissions

Dust Suppression: The most cost-effective dust suppressant applied to mitigate airborne dust is water, because of its efficiency as well as ready availability on the construction site. Water can be applied using water trucks, handheld sprays and automatic sprinkler systems depending on the location. Water spraying at the site also effectively suppresses dust generated. Results have proven that for about 80% of such active area(s), the water spray suppresses airborne dust by about >90%.

Emission Control for Construction Equipment/Vehicles: Construction equipment and heavy transport vehicles shall meet emission standards like Bharat Stage -III requirements for vehicles. The operation and maintenance of all vehicles, equipment deployed on site by different contractors will be regulated and effectively monitored. The Pollution under Control (PUC) certification will be ensured for proper O&M of vehicles.

Improved Maintenance: Recognizing that significant emission reductions can be achieved through regular equipment and vehicle maintenance, all site contractors are asked to take necessary steps for proper maintenance of vehicle and equipments. A monetary incentive/ disincentive provision encourages contractors to comply with regular maintenance requirements. The fuel used in the equipments, DG sets and vehicles will be of good quality with low "Sulphur" percentage by following the norms prevailing in project area.

Reduction of On-site Construction Time: The heavy construction activities will be confined to the daytime to avoid higher impacts during the nighttime. During daytime, there is higher atmospheric dilution. Rapid on-site construction would reduce the duration of traffic interference and therefore, reduce emissions from traffic delay. Off-site fabrication of various moulded structural components, obtaining proper cut size of stone, pre-fabricated concrete slabs, etc. shall also enhance the quality of work environment at the construction site because other factors such as traffic congestion and emissions are then not relevant.

Noise Emissions

The mitigation measures concerning technological control at source (of vehicles) shall meet the minimum compliance requirements for manufacturing stage. Besides these, other measures shall be of preventive nature as follows:

Restriction of Time of Construction: The heavy construction and transport activities shall be restricted to daytime operation when the background noise levels are high so that impacts like sleep disturbance during the night time are avoided.

Proper Maintenance of Construction Equipment/Vehicles: Proper operation and maintenance of heavy equipment as well as transport vehicles shall also ensure lower noise emissions.

Occupational & Passive Protection: Ear plugs, ear muffs, etc. will be provided to workers handling high noise equipment or stone cutting operations shall protect them from high noise exposure.

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

No, recycled materials was and will be used 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.

No generation of waste is anticipated during operation phase. However, garbage and dust on roads will be collected and disposed of in garbage bins.

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?

Temporary connection has been taken from the South Bihar Power Distribution Company Limited. Copies of Electricity Bills are attached as **Annexure-IV**.

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

Type of power back-up = Diesel Generator Sets

DG sets will be used during the construction phase of the project. 06 number of DG sets of total capacity 490 KVA (2 x 125 KVA + 4 x 60 KVA) will be used.

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 it is construction of Flyover project.

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

Not Applicable as it is construction of Flyover project.

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.

No solar lights will be installed. Apporx. 500 nos. Light Emitting Diodes (LED) will be installed on both the sides of the flyover of 250 watt each.

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?

Not Applicable as it is construction of Flyover project

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? Provide specifications.

Not Applicable as it is construction of Flyover project

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 as it is construction of Flyover project

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 as it is construction of Flyover project

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

During construction necessary storage of dry chemicals powder, fire extinguisher is being kept at site for any unforeseen incident. During operation phase- fire hazard are not envisaged.

10. ENVIRONMENT MANAGEMENT PLAN

10.1. The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of 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 site including fire.

The mitigation measures suggested for the impacts identified on the various environmental components due to the project activities are given in this section. A detailed environmental management plan is presented in **Table-7** to mitigate all the identified environmental impacts that are found to be significant.

Table-7: Environmental Management Plan – Construction Phase and Operational phase

S.No.	Environmental components	Potential Impacts	Potential Source of Impact	Controls Through EMP & Design	Impact Evaluation	Preventive Measures
1	Ground Water Quality	Ground Water Contamination	Construction Phase • Sewage generated from temporary labor tents.	• Soak pit or septic tank will be provided	No significant impact as majority of labors would be locally deployed	
			Operation Phase • No impact identified	Not Applicable	Not Applicable	
2.	Ground Water Quantity	Ground Water Depletion	Construction Phase • Ground water will be not be used during construction.	• Not Applicable	No significant impact on ground water quantity envisaged.	
			Operation Phase • Groundwater will not during operation phase.	• runoff will be drained into existing storm water drain lines	No significant impact on surface/ground water quantity envisaged.	
3.	Surface Water Quality	Surface water contamination	Construction Phase • Surface runoff from site during construction activity.	• Silt traps and other measures such as additional on site diversion ditches will be constructed to control surface run-off during site development	No off site impact envisaged as no surface water receiving body is present in the core zone.	
			Operation Phase • No impact identified	Not Applicable	Not Applicable	
4.	Air Quality	Dust Emissions	Construction Phase	• Suitable control	Not significant	During construction

			• All heavy construction activities	measures will be adopted for subsiding the PM level in the air as per air pollution control plan.	because dust generation will be temporary and will settle fast due to dust suppression techniques used.	phase the contractors are advised to facilitate masks for the labors. Water sprinklers will be used for suppression of dust during construction phase.
		Emissions of PM, SO_2, NO_2 and CO	<u>Construction Phase</u> • Operation of construction equipment and vehicles during site development. • Running D.G. sets (back up)	• Rapid on-site construction and improved maintenance of equipment	Not significant.	Regular monitoring of emissions and control measures will be taken to reduce the emission levels.
			<u>Operation Phase</u> • Emission from vehicular traffic in use	Impact is very localized; it can spread downwind depending on wind speeds	Not significant	
5.	Noise Environment		<u>Construction and Operation Phase</u> • Noise from vehicular movement • Noise from DG sets operation	•Development of silence zones to check the traffic movement • DG set rooms will be equipped with acoustic enclosures.	No significant impact	
6.	Land Environment	Soil contamination	<u>Construction Phase</u> • Disposal of construction debris	• Construction debris will be collected and suitably used on site as per the solid waste management plan for construction phase	No significant impact. Impact will be local, as waste generated will be reused for filling of low lying areas etc.	

			Operational Phase: Garbage and dust on roads will be	collected and disposed of in garbage bins	No significant impact.	
7.	Biological Environment (Flora and Fauna)	Displacement of Flora and Fauna on site	Construction Phase Not Applicable	Not Applicable	Not Applicable	
			Operation Phase • Not Applicable	Not Applicable	Not Applicable	
8.	Socio-Economic Environment	Population displacement and loss of income	Construction Phase Not Applicable	Not Applicable.	Not Applicable.	
			Operation Phase Not Applicable	Not Applicable	Not Applicable	
9.	Traffic Pattern	Increase of vehicular traffic	Construction Phase • Heavy Vehicular movement during construction	•Heavy Vehicular movement will be restricted to daytime only and adequate parking facility will be provided	No negative impact	
			Operation Phase • Traffic	• Minimize signals and allow the main traffic on the major corridors to move freely the site.	Positive impact	

Environmental Monitoring:

Various environmental protection and mitigation measures have been suggested in the previous Chapter/section for ensuring compliance with the stipulated environmental regulations and applicable standards. Also, there are specified environmental monitoring and record keeping requirements for operating facilities that the proposed Project will have to comply with. Though record keeping would be largely an in-house activity, environmental monitoring within and outside of the proposed Project would be carried out through recognized environmental laboratories as per the requirements of MoEF&CC.

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of EMP by periodically monitoring the important environmental parameters within the impact area, so that any potential adverse impacts are detected and timely action can be taken. In order to ensure compliance with the applicable regulatory requirements, the Project plans to conduct the following environmental monitoring activities.

Environmental Monitoring Program during Construction & Operational Phase

Based on the above, the following environmental monitoring program during construction activities is proposed for the Project. The monitoring program would be discussed and approved by BSPCB's are given in **Table-8**.

Table-8: Monitoring Program for Construction & Operational Phase of the Project

S.No.	Type	Locations	Parameters	Period and Frequency
1.	Ambient Air Quality Monitoring	As per requirement	SO_2, NO_2, PM_{10}, $PM_{2.5}$ and CO	As per BSPCB's requirements
2.	Ambient Noise Monitoring	As per requirement	Noise level L_{eq} both during day time and night time	As per BSPCB's requirements